

**CAR PART V**

**CAR 21**

**CERTIFICATION OF AIRCRAFT AND RELATED  
PRODUCTS, PARTS AND APPLIANCES  
AND  
OF DESIGN AND PRODUCTION ORGANISATIONS**

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## FOREWORD

1. The reason for this revision is to add a paragraph to the foreword, as its indicated with a revision bar.
2. This issue of CAR 21 has been published to align GCAA CAR 21 regulations with the latest EASA publication (EU) No 69/2014, including Operational Suitability Data (OSD) requirements.
3. This issue of the Regulation shall enter into force on 1<sup>st</sup> April 2014.
5. The holder of an aircraft type-certificate issued before 17 February 2014 intending to deliver a new aircraft to an UAE operator on or after 17 February 2014 shall obtain approval in accordance with point CAR 21.21(e) of this regulation except for the minimum syllabus of maintenance certifying staff type rating training and except for aircraft validation source data to support the objective qualification of simulator(s). The approval shall be obtained not later than 18 December 2015 or before the aircraft is operated by an UAE operator, whichever is the latest. The operational suitability data may be limited to the model which is delivered.
6. The applicant for an aircraft type-certificate for which the application was filed before 17 February 2014 and for which a type-certificate is not issued before 17 February 2014 shall obtain approval in accordance with point CAR 21.21(e) of this regulation except for the minimum syllabus of maintenance certifying staff type rating training and for aircraft validation source data to support the objective qualification of simulator(s). The approval shall be obtained not later than 18 December 2015 or before the aircraft is operated by an UAE operator, whichever is the latest. Compliance findings made by the authorities in Operational Evaluation Board processes conducted under the responsibility of the JAA or the EASA before the entry into force of this Regulation shall be accepted by the EASA and validated by GCAA without further verification.
7. Operational Evaluation Board reports and master minimum equipment lists issued in accordance with JAA procedures or by the EASA before the entry into force of this Regulation shall be deemed to constitute the operational suitability data approved in accordance with point CAR 21.21(e) of this regulation and shall be included in the relevant type-certificate. Before 18 June 2014 the relevant type-certificate holders shall propose to the Authority a division of the operational suitability data in mandatory data and non-mandatory data.
8. Holders of a type-certificate including operational suitability data shall be required to obtain approval of an extension of the scope of their design organisation approval or procedures alternative to design organisation approval, as applicable, to include operational suitability aspects before 18 December 2015.
9. With regards to OSD amended CAR 21.90A, to CAR 120B of this regulation shall apply to applicants for the approval of a change to a type- certificate as well as applicants for a supplemental type- certificate from 19 December 2016.
10. For EASA Type Certified aircraft the applicable Master Minimum Equipment List shall be based on CS-GEN-MMEL or CS-MMEL requirements.

CAR 21 - CERTIFICATION OF AIRCRAFT AND RELATED PRODUCTS, PARTS AND APPLIANCES, AND OF DESIGN AND PRODUCTION ORGANIZATIONS

11. New amended and corrected or added text will be indicated through a revision bar on the left side of the paragraph.
12. Future amendments of CAR 21 shall be harmonised with amendments to EASA and ICAO Annexes in a timely manner.
13. The General Civil Aviation Authority is hereinafter called, "Authority".
14. "Acceptable Means of Compliance" (**AMC**) illustrate a means, but not the only means, by which the proposed requirement can be met. Organisations are required to comply with the AMC's unless Alternative Means of Compliance have been accepted by the Authority.
15. "Guidance Material" (**GM**) is non-binding material that helps to illustrate the meaning of a requirement or specification and is used to support the interpretation of regulations or AMCs.
16. "Certification Specifications" (**CS**) refers when used in the text to the airworthiness codes and associated acceptable means of compliance.
17. Subpart B – Type Certificates and Restricted Type Certificates, Subpart E – Supplemental Type Certificates and Subpart O – United Arab Emirates (UAE) Technical Standard Order Authorisations are held in abeyance.

## TABLE OF CONTENTS

<b>CERTIFICATION OF AIRCRAFT AND RELATED PRODUCTS, PARTS AND APPLIANCES AND OF DESIGN AND PRODUCTION ORGANISATIONS</b>	<b>1</b>
<b>SUBPART A - GENERAL PROVISIONS</b>	<b>17</b>
<b>CAR 21.1 Scope</b>	<b>17</b>
<b>CAR 21.2 Undertaking by another person than the applicant for, or holder of, a certificate</b>	<b>17</b>
<b>CAR 21.3A Failures, malfunctions and defects</b>	<b>17</b>
<b>CAR 21.3B Airworthiness directives</b>	<b>18</b>
<b>CAR 21.4 Coordination between design and production</b>	<b>19</b>
<b>CAR 21.5 Safety Management System</b>	<b>19</b>
<b>SUBPART B - TYPE-CERTIFICATES AND RESTRICTED TYPE-CERTIFICATES</b>	<b>19</b>
<b>CAR 21.11 Scope</b>	<b>19</b>
<b>CAR 21.13 Eligibility</b>	<b>19</b>
<b>CAR 21.14 Demonstration of capability</b>	<b>19</b>
<b>CAR 21.15 Application</b>	<b>20</b>
<b>CAR 21.16A Certification Specifications</b>	<b>20</b>
<b>CAR 21.16B Special conditions</b>	<b>21</b>
<b>CAR 21.17A Type-certification basis</b>	<b>21</b>
<b>CAR 21.17B Operational suitability data certification basis</b>	<b>22</b>
<b>CAR 21.18 Designation of applicable environmental protection requirements and certification specifications</b>	<b>22</b>
<b>CAR 21.19 Changes requiring a new type-certificate</b>	<b>23</b>
<b>CAR 21.20 Compliance with the type-certification basis, operational suitability data certification basis and environmental protection requirements</b>	<b>23</b>
<b>CAR 21.21 Issue of a type-certificate</b>	<b>23</b>
<b>CAR 21.23 Issue of a restricted type-certificate</b>	<b>24</b>
<b>CAR 21.31 Type design</b>	<b>24</b>
<b>CAR 21.33 Investigation and tests</b>	<b>25</b>
<b>CAR 21.35 Flight Tests</b>	<b>26</b>
<b>CAR 21.41 Type-certificate</b>	<b>26</b>
<b>CAR 21.44 Obligations of the holder</b>	<b>26</b>
<b>CAR 21.47 Transferability</b>	<b>27</b>

<b>CAR 21.51 Duration and continued validity</b>	<b>27</b>
<b>CAR 21.55 Record-keeping</b>	<b>27</b>
<b>CAR 21.57 Manuals</b>	<b>27</b>
<b>CAR 21.61 Instructions for continued airworthiness</b>	<b>27</b>
<b>CAR 21.62 Availability of operational suitability data</b>	<b>28</b>
<b><u>SUBPART B1 - TYPE ACCEPTANCE CERTIFICATE</u></b>	<b><u>28</u></b>
<b>CAR 21.70 Applicability</b>	<b>28</b>
<b>CAR 21.72 Airworthiness requirements</b>	<b>28</b>
<b>CAR 21.74 Data requirements</b>	<b>29</b>
<b>CAR 21.76 Duration and continued validity</b>	<b>30</b>
<b><u>SUBPART C - RESERVED</u></b>	<b><u>31</u></b>
<b><u>SUBPART D - CHANGES TO TYPE-CERTIFICATES AND RESTRICTED TYPE- CERTIFICATES</u></b>	<b><u>31</u></b>
<b>CAR 21.90A Scope</b>	<b>31</b>
<b>CAR 21.90B Standard changes</b>	<b>31</b>
<b>CAR 21.91 Classification of changes to a type-certificate</b>	<b>31</b>
<b>CAR 21.92 Eligibility</b>	<b>32</b>
<b>CAR 21.93 Application</b>	<b>32</b>
<b>CAR 21.95 Minor changes</b>	<b>32</b>
<b>CAR 21.97 Major changes</b>	<b>32</b>
<b>CAR 21.101 Designation of applicable certification specifications and environmental protection requirements</b>	<b>33</b>
<b>CAR 21.103 Issue of approval</b>	<b>34</b>
<b>CAR 21.105 Record-keeping</b>	<b>35</b>
<b>CAR 21.107 Instructions for continued airworthiness</b>	<b>35</b>
<b>CAR 21.108 Availability of operational suitability data</b>	<b>35</b>
<b>CAR 21.109 Obligations and UAE PA marking</b>	<b>36</b>
<b><u>SUBPART E - SUPPLEMENTAL TYPE-CERTIFICATES</u></b>	<b><u>36</u></b>
<b>CAR 21.111 Scope</b>	<b>36</b>
<b>CAR 21.112A Eligibility</b>	<b>36</b>
<b>CAR 21.112B Demonstration of capability</b>	<b>36</b>
<b>CAR 21.113 Application for a supplemental type-certificate</b>	<b>37</b>
<b>CAR 21.114 Showing of compliance</b>	<b>37</b>
<b>CAR 21.115 Issue of a supplemental type-certificate</b>	<b>37</b>

<b>CAR 21.116 Transferability</b>	<b>37</b>
<b>CAR 21.117 Changes to that part of a product covered by a supplemental type-certificate</b>	<b>38</b>
<b>CAR 21.118A Obligations and UAE PA marking</b>	<b>38</b>
<b>CAR 21.118B Duration and continued validity</b>	<b>38</b>
<b>CAR 21.119 Manuals</b>	<b>38</b>
<b>CAR 21.120A Instructions for continued Airworthiness</b>	<b>38</b>
<b>CAR 21.120B Availability of operational suitability data</b>	<b>39</b>
<b><u>SUBPART F - PRODUCTION WITHOUT PRODUCTION ORGANISATION APPROVAL</u></b>	<b>40</b>
<b>CAR 21.121 Scope</b>	<b>40</b>
<b>CAR 21.122 Eligibility</b>	<b>40</b>
<b>CAR 21.124 Application</b>	<b>40</b>
<b>CAR 21.125A Issue of a letter of agreement</b>	<b>40</b>
<b>CAR 21.125B Findings</b>	<b>41</b>
<b>CAR 21.125C Duration and continued validity</b>	<b>42</b>
<b>CAR 21.126 Production inspection system</b>	<b>42</b>
<b>CAR 21.127 Tests: aircraft</b>	<b>43</b>
<b>CAR 21.128 Tests: engines and propellers</b>	<b>43</b>
<b>CAR 21.129 Obligations of the manufacturer</b>	<b>43</b>
<b>CAR 21.130 Statement of Conformity</b>	<b>44</b>
<b><u>SUBPART G - PRODUCTION ORGANISATION APPROVAL</u></b>	<b>45</b>
<b>CAR 21.131 Scope</b>	<b>45</b>
<b>CAR 21.133 Eligibility</b>	<b>45</b>
<b>CAR 21.134 Application</b>	<b>45</b>
<b>CAR 21.135 Issue of production organisation approval</b>	<b>45</b>
<b>CAR 21.139 Quality system</b>	<b>45</b>
<b>CAR 21.143 Exposition</b>	<b>46</b>
<b>CAR 21.145 Approval requirements</b>	<b>47</b>
<b>CAR 21.147 Changes to the approved production organisation</b>	<b>48</b>
<b>CAR 21.148 Changes of location</b>	<b>48</b>
<b>CAR 21.149 Transferability</b>	<b>48</b>
<b>CAR 21.151 Terms of approval</b>	<b>49</b>
<b>CAR 21.153 Changes to the terms of approval</b>	<b>49</b>

<b>CAR 21.157 Investigations</b>	<b>49</b>
<b>CAR 21.158 - Findings</b>	<b>49</b>
<b>CAR 21.159 Duration and continued validity</b>	<b>50</b>
<b>CAR 21.163 Privileges</b>	<b>50</b>
<b>CAR 21.165 Obligations of the holder</b>	<b>50</b>
<b><u>SUBPART H - CERTIFICATES OF AIRWORTHINESS AND RESTRICTED CERTIFICATES OF AIRWORTHINESS</u></b>	<b><u>52</u></b>
<b>CAR 21.171 Scope</b>	<b>52</b>
<b>CAR 21.172 Eligibility</b>	<b>52</b>
<b>CAR 21.173 Classification</b>	<b>52</b>
<b>CAR 21.174 Application</b>	<b>52</b>
<b>CAR 21.175 Language</b>	<b>53</b>
<b>CAR 21.177 Amendment or modification</b>	<b>53</b>
<b>CAR 21.179 Transferability</b>	<b>53</b>
<b>CAR 21.180 Inspections</b>	<b>54</b>
<b>CAR 21.181 Duration and continued validity</b>	<b>54</b>
<b>CAR 21.182 Aircraft identification</b>	<b>54</b>
<b>CAR 21.183 Issue of certificates of airworthiness</b>	<b>54</b>
<b>CAR 21.184 Issue of restricted certificates of airworthiness</b>	<b>54</b>
<b><u>SUBPART I - NOISE CERTIFICATES</u></b>	<b><u>56</u></b>
<b>CAR 21.201 Scope</b>	<b>56</b>
<b>CAR 21.203 Eligibility</b>	<b>56</b>
<b>CAR 21.204 Application</b>	<b>56</b>
<b>CAR 21.205 Issue of noise certificates</b>	<b>56</b>
<b>CAR 21.207 Amendment or modification</b>	<b>56</b>
<b>CAR 21.209 Transferability</b>	<b>56</b>
<b>CAR 21.210 Inspections</b>	<b>57</b>
<b>CAR 21.211 Duration and continued validity</b>	<b>57</b>
<b><u>SUBPART J - DESIGN ORGANISATION APPROVAL</u></b>	<b><u>57</u></b>
<b>CAR 21.231 Scope</b>	<b>57</b>
<b>CAR 21.233 Eligibility</b>	<b>57</b>
<b>CAR 21.234 Application</b>	<b>57</b>
<b>CAR 21.235 Issue of design organisation approval</b>	<b>57</b>

<b>CAR 21.239 Design assurance system</b>	<b>57</b>
<b>CAR 21.243 Data</b>	<b>58</b>
<b>CAR 21.245 Approval requirements</b>	<b>58</b>
<b>CAR 21.247 Changes in design assurance system</b>	<b>59</b>
<b>CAR 21.249 Transferability</b>	<b>59</b>
<b>CAR 21.251 Terms of approval</b>	<b>59</b>
<b>CAR 21.253 Changes to the terms of approval</b>	<b>59</b>
<b>CAR 21.257 Investigations</b>	<b>59</b>
<b>CAR 21.258 - Findings</b>	<b>59</b>
<b>CAR 21.259 Duration and continued validity</b>	<b>60</b>
<b>CAR 21.263 Privileges</b>	<b>61</b>
<b>CAR 21.265 Obligations of the holder</b>	<b>62</b>
<b><u>SUBPART K — PARTS AND APPLIANCES</u></b>	<b><u>62</u></b>
<b>CAR 21.301 Scope</b>	<b>62</b>
<b>CAR 21.303 Compliance with applicable requirements</b>	<b>62</b>
<b>CAR 21.305 Approval of parts and appliances</b>	<b>62</b>
<b>CAR 21.307 Release of parts and appliances for installation</b>	<b>63</b>
<b><u>SUBPART L - RESERVED</u></b>	<b><u>63</u></b>
<b><u>SUBPART M - REPAIRS</u></b>	<b><u>64</u></b>
<b>CAR 21.431 Scope</b>	<b>64</b>
<b>CAR 21.432A Eligibility</b>	<b>64</b>
<b>CAR 21.432B Demonstration of capability</b>	<b>64</b>
<b>CAR 21.433 Repair design</b>	<b>64</b>
<b>CAR 21.435 Classification of repairs</b>	<b>65</b>
<b>CAR 21.437 Issue of a repair design approval</b>	<b>65</b>
<b>CAR 21.439 Production of repair parts</b>	<b>65</b>
<b>CAR 21.441 Repair embodiment</b>	<b>65</b>
<b>CAR 21.443 Limitations</b>	<b>65</b>
<b>CAR 21.445 Unrepaired damage</b>	<b>66</b>
<b>CAR 21.447 Record-keeping</b>	<b>66</b>
<b>CAR 21.449 Instructions for continued airworthiness</b>	<b>66</b>
<b>CAR 21.451 Obligations and UAE PA marking</b>	<b>67</b>

<b>SUBPART N - RESERVED</b>	<b>67</b>
<b>SUBPART O - UNITED ARAB EMIRATES (UAE) TECHNICAL STANDARD ORDER AUTHORISATIONS</b>	<b>68</b>
CAR 21.601 Scope	68
CAR 21.602A Eligibility	68
CAR 21.602B Demonstration of capability	68
CAR 21.603 Application	68
CAR 21.604 UAE TSO Authorisation for an Auxiliary Power Unit (APU)	68
CAR 21.605 Data requirements	69
CAR 21.606 Issue of UAE TSO authorisation	69
CAR 21.607 UAE TSO authorisation privileges	69
CAR 21.608 Declaration of Design and Performance (DDP)	69
CAR 21.609 Obligations of holders of UAE TSO authorisations	70
CAR 21.610 Approval for deviation	70
CAR 21.611 Design changes	70
CAR 21.613 Recordkeeping	71
CAR 21.615 Inspection by the Authority	71
CAR 21.619 Duration and continued validity	71
CAR 21.621 Transferability	71
<b>SUBPART P - PRMIT TO FLY</b>	<b>71</b>
CAR 21.701 Scope	71
CAR 21.703 Eligibility	72
CAR 21.705 - Reserved	73
CAR 21.707 Application for permit to fly	73
CAR 21.708 Flight conditions	73
CAR 21.709 Application for approval of flight conditions	74
CAR 21.710 Approval of flight conditions	74
CAR 21.711 Issue of a permit to fly	74
CAR 21.713 Changes	75
CAR 21.715 Language	75
CAR 21.719 Transferability	75
CAR 21.721 Inspections	75
CAR 21.723 Duration and continued validity	75

<b>CAR 21.725 Renewal of permit to fly</b>	<b>76</b>
<b>CAR 21.727 Obligations of the holder of a permit to fly</b>	<b>76</b>
<b>CAR 21.729 Record-keeping</b>	<b>76</b>
<b><u>SUBPART Q - IDENTIFICATION OF PRODUCTS, PARTS AND APPLIANCES</u></b>	<b><u>77</u></b>
<b>CAR 21.801 Identification of products</b>	<b>77</b>
<b>CAR 21.803 Handling of identification data</b>	<b>77</b>
<b>CAR 21.804 Identification of parts and appliances</b>	<b>78</b>
<b>CAR 21.805 Identification of critical parts</b>	<b>78</b>
<b>CAR 21.807 Identification of UAE TSO articles</b>	<b>78</b>
<b><u>Appendix I</u></b>	<b><u>79</u></b>
<b><u>ACCEPTABLE MEANS OF COMPLIANCE AND GUIDANCE MATERIAL</u></b>	<b><u>85</u></b>
<b><u>SUBPART A - GENERAL</u></b>	<b><u>87</u></b>
<b>GM 21.3(a) - The system for collection, investigation and analysis of data</b>	<b>87</b>
<b>AMC No 1 to 21.3(a) - Collection, investigation and analysis of data related to flammability reduction means (FRM) reliability</b>	<b>87</b>
<b>AMC No 2 to 21.3(a) Collection, investigation and analysis of data related to ETOPS significant occurrences</b>	<b>87</b>
<b>GM 21.3(b) - Occurrence reporting</b>	<b>88</b>
<b>AMC 21.3(b)(2) - Reporting to the authority</b>	<b>88</b>
<b>GM 21.3B(d)(4) - Defect correction - Sufficiency of proposed corrective action</b>	<b>88</b>
<b>AMC 21.3B(b) - Unsafe condition</b>	<b>97</b>
<b>GM 21.3B(b) - Determination of an unsafe condition</b>	<b>97</b>
<b>AMC 21.4 - Transferring of information on eligibility and approval status from the design holder to production organisations</b>	<b>103</b>
<b><u>SUBPART B - TYPE-CERTIFICATES</u></b>	<b><u>105</u></b>
<b>GM 21.14(b) - Eligibility for alternative procedures</b>	<b>105</b>
<b>AMC 21.14(b) - Alternative procedures</b>	<b>105</b>
<b>GM 21.16B - Special conditions</b>	<b>111</b>
<b>GM 21.33 - Investigation and tests</b>	<b>111</b>
<b>GM 21.35 - Flight tests</b>	<b>111</b>
<b>GM 21.35(b)(2) - Objective and content of function and reliability testing</b>	<b>112</b>
<b>GM 21.35(f)(1) - Flying time for function and reliability testing</b>	<b>112</b>
<b>GM 21.35(f)(2) - Flying time for function and reliability testing</b>	<b>112</b>
<b><u>SUBPART B1 -Type Acceptance Certificate</u></b>	<b><u>113</u></b>

<b>GM 21.70 Applicability</b>	<b>113</b>
<b>GM 21.72 Airworthiness Requirements</b>	<b>114</b>
<b>GM 21.74 Data Requirements</b>	<b>115</b>
<b>GM 21.76 Duration and continued validity</b>	<b>115</b>
<b><u>SUBPART C - RESERVED</u></b>	<b><u>116</u></b>
<b><u>SUBPART D - CHANGES TO TYPE CERTIFICATES</u></b>	<b><u>116</u></b>
<b>GM 21.91 - Classification of changes to a type design</b>	<b>116</b>
<b>Appendix A to GM 21.91: Examples of Major Changes per discipline</b>	<b>118</b>
<b>GM 21.93(b) - Major changes: Application</b>	<b>124</b>
<b>GM 21.101 Establishment of the type-certification basis of changed aeronautical products</b>	<b>124</b>
<b>Effective period for an application to change a type-certificate, CAR 21.101(e).</b>	<b>137</b>
<b>Appendix 1 to GM 21.101 - Classification of changes</b>	<b>138</b>
<b>Appendix 2 to GM 21.101 Procedure for evaluating impracticality of applying latest requirements to a changed product</b>	<b>178</b>
<b>Appendix 3 to GM 21.101 - The use of service experience in the certification process</b>	<b>188</b>
<b><u>SUBPART E – SUPPLEMENTAL TYPE-CERTIFICATES</u></b>	<b><u>192</u></b>
<b>GM 21.112B - Demonstration of capability for supplemental type-certificate cases</b>	<b>192</b>
<b><u>SUBPART F - PRODUCTION WITHOUT PRODUCTION ORGANISATION APPROVAL</u></b>	<b><u>196</u></b>
<b>GM No. 1 to 21.121 - Applicability - Individual product, part or appliance</b>	<b>196</b>
<b>GM No. 2 to 21.121 - Applicability - Applicable design data</b>	<b>196</b>
<b>AMC No. 1 to 21.122 - Eligibility - Link between design and production</b>	<b>196</b>
<b>AMC No. 2 to 21.122 - Eligibility - Link between design and production</b>	<b>198</b>
<b>GM 21.124(a) - Application – Application form</b>	<b>200</b>
<b>GM 21.124(b)(1)(i) - Applicability - Inappropriate approval under Subpart G</b>	<b>201</b>
<b>GM 21.124(b)(1)(ii) - Certification or approval needed in advance of the issue of a POA</b>	<b>201</b>
<b>GM 21.124(b)(2) - Application - Minimum information to include with the application</b>	<b>201</b>
<b>GM No. 1 to 21.125 - Letter of agreement - Meaning of individual</b>	<b>202</b>
<b>GM No. 1 to 21.125(b) - Letter of agreement - Contents of the manual</b>	<b>202</b>
<b>GM No. 2 to CAR 21.125(b) - Letter of agreement - Production inspection system: Functional tests</b>	<b>203</b>
<b>GM 21.125(c) - Letter of agreement - Assistance</b>	<b>204</b>
<b>GM No. 1 to CAR 21.125B(a) - Uncontrolled non-compliance with applicable design data</b>	<b>204</b>
<b>GM No. 2 to CAR 21.125B(a) - Examples for level one findings</b>	<b>204</b>
<b>GM 21.126 - Production Inspection System</b>	<b>204</b>

GM 21.126(a)(1) Production inspection system – Conformity of supplied parts, appliances and material	204
GM 21.126(a)(2) - Production inspection system - Identification of incoming materials and parts	205
GM No. 2 to 21.126(a)(3) - Production inspection system - Means of checking of the production processes	206
GM 21.126(b)(1) - Production inspection system - Inspection of parts in process	207
GM 21.126(b)(2) - Production inspection system – Suitable storage and protection	207
GM 21.126(b)(3) - Production inspection system – Use of derived data instead of original design data	208
GM 21.126(b)(4) - Production inspection system – Segregation of rejected material	208
GM 21.126(b)(5) - Production inspection system – Engineering and manufacturing review procedure	208
GM 21.126(b)(6) - Production inspection system – Recording and record keeping	208
GM 21.127 - Approved production ground and flight tests	210
GM No. 1 to 21.128 - Acceptable functional test - Engines	210
GM No. 2 to 21.128 - Acceptable functional test –Variable pitch propellers	210
GM No. 3 to 21.128 - Acceptable functional test - Engines and Propellers	210
GM 21.129(a) - Availability for inspection by the Authority	211
AMC No. 1 to 21.129(c) - Obligations of the manufacturer – Conformity of prototype models and test specimens	211
AMC No. 2 to 21.129(c) - Obligations of the manufacturer – Conformity with Applicable Design Data	211
AMC No. 3 to 21.129(c) - Obligations of the manufacturer – Condition for safe operation	211
AMC No. 1 to CAR 21.130(b) - Statement of conformity for complete aircraft	213
AMC No. 2 to 21.130(b)- Statement of Conformity for Products (other than complete aircraft), parts and/or appliances – The Authorised Release Certificate (AW Form 1)	216
AMC 21.130(c) - Validation of the statement of conformity	218
AMC 21.130(c)(1) - Initial transfer of ownership	218
<b><u>SUBPART G - PRODUCTION ORGANISATION APPROVAL FOR PRODUCTS, PARTS AND APPLIANCES</u></b>	<b><u>219</u></b>
GM 21.131 - Scope - Applicable design data	219
GM 21.133(a) Eligibility - Approval appropriate for showing conformity	219
AMC No. 1 to 21.133(b) and (c) - Eligibility - Link between design and production organisations	220
AMC No. 2 to CAR 21.133(b) and (c) - Eligibility - Link between design and production organisations	222
GM 21.134 - Application - Application form and manner	225
GM No. 1 to 21.139(a) - Quality system	225
GM No. 2 to CAR 21.139(a) - Quality system - Conformity of supplied parts or appliances	226
GM 21.139(b)(1) - Quality system - Elements of the quality system	227

AMC No. 1 to 21.139(b)(1)(ii) - Vendor and sub-contractor assessment, audit and control – Production Organisation Approval (POA) holder using documented arrangements with other parties for assessment and surveillance of a supplier.	228
AMC No. 2 to 21.139(b)(1)(ii) - Vendor and sub-contractor assessment, audit and control - Production Organisation Approval (POA) holder using other party supplier certification	230
GM No. 1 to CAR 21.139(b)(2) - Quality system - Independent quality assurance function	233
GM No. 2 to CAR 21.139(b)(2) - Quality system - Adequacy of procedures and monitoring function	233
GM 21.143 - Exposition - Production organisation exposition	233
GM 21.145(a) - Approval requirements	234
GM 21.145(b)(2) - Approval requirements - Airworthiness, noise, fuel venting and exhaust emissions /production data procedures	234
GM 21.145(c)(1) - Approval requirements - Accountable manager	234
GM 21.145(c)(2) - Approval requirements - Responsible managers	235
AMC 21.145(d)(1) - Approval requirements – Certifying staff	235
AMC 21.145(d)(2) - Approval requirements – Record of certifying staff	236
AMC 21.145(d)(3) - Approval requirements – Evidence of authorisation	237
GM 21.147(a) - Changes to the approved production organisation – Significant changes	237
AMC 21.148 - Changes of location – Management during change of location	238
GM 21.149 - Transferability	239
GM 21.151 - Terms of approval – Scope and categories	240
AMC 21.153 - Changes to the terms of approval – Application for a change to the terms of approval	242
GM 21.157 - Investigations – Arrangements	242
GM No. 1 to 21.158(a) - Uncontrolled non-compliance with applicable design data	243
GM No. 2 to 21.158(a) - Examples of level one findings	243
GM 21.159(a)(3) - Evidence of a lack of satisfactory control	243
AMC No 1 21.163(c) - Computer generated signature and electronic exchange of the AW Form 1	244
AMC No 2 to 21.163(c) – Completion of the AW Form 1	247
AMC 21.163(d) - Privileges - Maintenance	248
AMC 21.163(e) - Procedure for the issue of a permit to fly including approval of the flight conditions	249
GM 21.165(a) - Obligations of the holder – Basic working document	250
GM No. 1 to CAR 21.165(c) - Obligations of the holder – Conformity of prototype models and test specimens	250
GM No. 2 to CAR 21.165(c) - Obligations of holder – Conformity with type design	251
GM No. 3 to CAR 21.165(c) - Obligations of the holder – Condition for safe operation	251

<b>GM No. 4 to CAR 21.165(c) - Airworthiness release or conformity certificate</b>	<b>253</b>
<b>GM 21.165(d) and (h) - Obligations of the holder – Recording and archiving system</b>	<b>253</b>
<b><u>SUBPART H - AIRWORTHINESS CERTIFICATES</u></b>	<b>254</b>
<b><u>SUBPART I - NOISE CERTIFICATES</u></b>	<b>254</b>
<b><u>SUBPART J - DESIGN ORGANISATION APPROVAL</u></b>	<b>255</b>
<b>GM No. 1 to 21.239(a) - Design assurance system</b>	<b>255</b>
<b>GM No. 2 to CAR 21.239(a) - Design assurance system for minor changes to type design or minor repairs to products</b>	<b>260</b>
<b>AMC 21.239(a)(3) - Design assurance system - Independent system monitoring</b>	<b>261</b>
<b>AMC 21.239(b) - Design assurance system - Independent checking function of the showing of compliance</b>	<b>261</b>
<b>GM 21.239(c) - Design assurance system</b>	<b>261</b>
<b>AMC No. 1 to CAR 21.243(a) - Data requirements</b>	<b>262</b>
<b>AMC No. 2 to 21.243(a) - Data requirements - Model content of handbook for organisations designing minor changes to type design or minor repairs to products</b>	<b>264</b>
<b>GM No. 1 to 21.243(d) - Statement of qualifications and experience</b>	<b>265</b>
<b>GM No. 2 to 21.243(d) - Data requirements - Statement of the qualification and experience - Organisations designing minor changes to type design or minor repairs to products</b>	<b>268</b>
<b>GM No. 1 to 21.245 - Requirements for approval See CAR 21.245</b>	<b>268</b>
<b>GM No. 2 to 21.245 - Requirements for approval - Organisations designing minor changes to type design or minor repairs to products</b>	<b>269</b>
<b>GM 21.247- Significant changes in the design assurance system</b>	<b>270</b>
<b>GM 21.249 Transferability</b>	<b>271</b>
<b>GM No. 1 to 21.251 - Terms of approval</b>	<b>272</b>
<b>GM No. 2 to 21.251 - Terms of approval - Organisations designing minor changes to type design or minor repairs to products</b>	<b>272</b>
<b>GM 21.257(a) - Investigations</b>	<b>273</b>
<b>GM 21.263(b) - DOA privilege related to compliance documents</b>	<b>273</b>
<b>AMC 21.263(b)(1) - Compliance documents with conditions related to engine or propeller without a type-certificate or with unapproved changes and fitted on aircraft for which a permit to fly is requested</b>	<b>273</b>
<b>AMC No. 1 to CAR 21.263(c)(1) - Procedure for the classification of changes to type design and repairs as minor and major</b>	<b>274</b>
<b>AMC No. 2 to CAR 21.263(c)(1) - Privileges - Organisations designing minor changes to type design or minor repairs to products : classification procedure</b>	<b>276</b>
<b>AMC No. 1 to CAR 21.263(c)(2) - Procedure for the approval of minor changes to type design or minor repairs</b>	<b>277</b>

AMC No. 2 to CAR 21.263(c)(2) - Privileges - Organisations designing minor changes to type design or minor repairs to products : procedure for the approval of minor changes to type design or minor repairs	278
GM 21.263(c)(3) - Issue of information or instructions	279
GM 21.263(c)(4) - Procedure for the approval of documentary changes to the Aircraft Flight Manual	281
AMC 21.263(c)(6) - Procedure for the approval of the conditions for issue of a permit to fly	283
AMC 21.263(c)(7) - Procedure for the issue of a permit to fly	287
AMC 21.265(a) - Administration of the handbook	288
GM 21.265(b) - Use of the handbook	289
<b><u>SUBPART K - PARTS AND APPLIANCES</u></b>	<b><u>292</u></b>
AMC CAR 21.303(c) Standard parts	292
GM to 21.303(c) - Officially recognised standards	292
<b><u>SUBPART M - REPAIRS</u></b>	<b><u>293</u></b>
GM 21.431(a)	293
GM 21.431(d) Repairs to articles	293
AMC 21.433 (a) and 21.447 - Repair design and record keeping	294
GM 21.435(a) - Classification of repairs	295
GM 21.437 - Issue of repair design approval	296
GM 21.437(a) - Issue of repair design approval	297
AMC 21.437(b) - Issue of repair design approval	298
GM 21.439 - Production of repair parts	298
GM 21.441 - Repair embodiment	299
GM 21.443 - Limitations	299
GM 21.445 - Unrepaired damage	299
<b><u>SUBPART O - UAE TECHNICAL STANDARD ORDER AUTHORISATIONS</u></b>	<b><u>300</u></b>
AMC 21.602B(b)(2) - Procedures for UAE TSO authorisations	300
AMC 21.608 - Declaration of Design and Performance	301
GM to 21.611 - Design changes	304
<b><u>SUBPART P - PERMIT TO FLY</u></b>	<b><u>305</u></b>
GM 21.701(a) - Permit to fly when certificate of airworthiness or restricted certificate of airworthiness is not appropriate	309
GM 21.703 - Applicant for a permit to fly	311
GM 21.707(b) - Application	311
GM 21.708(b)(6) - Continuing airworthiness	311

<b>GM No. 1 to 21.708(c) - Safe flight</b>	<b>311</b>
<b>GM No. 2 to 21.708(c) - Substantiations</b>	<b>311</b>
<b>GM No. 3 to 21.708(c) - Operation of overweight aircraft</b>	<b>312</b>
<b>GM 21.708(d) - Control of aircraft configuration</b>	<b>314</b>
<b>AMC 21.709(b) - Submission of documentation supporting the establishment of flight conditions</b>	<b>314</b>
<b>GM 21.710 - Approval of flight conditions</b>	<b>316</b>
<b>GM 21.711(e) - Additional conditions and restrictions</b>	<b>316</b>
<b>GM 21.713 Changes</b>	<b>316</b>
<b><u>SUBPART Q - IDENTIFICATION OF PRODUCTS, PARTS AND APPLIANCES</u></b>	<b><u>317</u></b>
<b>GM 21.804(a)(1)</b>	<b>317</b>

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## REGULATIONS

### REQUIREMENTS FOR APPLICANTS AND ACQUIRED RIGHTS AND OBLIGATIONS

#### SUBPART A - GENERAL PROVISIONS

##### **CAR 21.1 Scope**

This Regulation establishes general provisions governing the rights and obligations of the applicant for, and holder of, any certificate issued or to be issued in accordance with this Regulation.

##### **CAR 21.2 Undertaking by another person than the applicant for, or holder of, a certificate**

The actions and obligations required to be undertaken by the holder of, or applicant for, a certificate for a product, part or appliance under this Regulation may be undertaken on his behalf by any other natural or legal person, provided the holder of, or applicant for, that certificate can show that it has made an agreement with the other person such as to ensure that the holder's obligations are and will be properly discharged.

##### **CAR 21.3A Failures, malfunctions and defects**

(a) System for Collection, Investigation and Analysis of Data.

The holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UAE Technical Standard Order (UAE TSO) authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation shall have a system for collecting, investigating and analyzing reports of and information related to failures, malfunctions, defects or other occurrences which cause or might cause adverse effects on the continuing airworthiness of the product, part or appliance covered by the type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation. Information about this system shall be made available to all known operators of the product, part or appliance and, on request, to any person authorised under other associated Regulations.

(b) Reporting to the Authority.

1. The holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation shall report to the Authority any failure, malfunction, defect or other occurrence of which it is aware related to a product, part, or appliance covered by the type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorisation, major repair design approval or any other relevant approval deemed to have been issued under this Regulation, and which has resulted in or may result in an unsafe condition.

2. These reports shall be made in a form and manner established by the Authority, as soon as practicable and in any case dispatched not later than 72 hours after the identification of the possible unsafe condition, unless exceptional circumstances prevent this.

(c) Investigation of Reported Occurrences.

1. When an occurrence reported under paragraph (b), or under points CAR 21.129(f)(2) or CAR 21.165(f)(2) results from a deficiency in the design, or a manufacturing deficiency, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UAE TSO authorisation, or any other relevant approval deemed to have been issued under this Regulation, or the manufacturer as appropriate, shall investigate the reason for the deficiency and report to the Authority the results of its investigation and any action it is taking or proposes to take to correct that deficiency.
2. If the Authority finds that an action is required to correct the deficiency, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UAE TSO authorisation, or any other relevant approval deemed to have been issued under this Regulation, or the manufacturer as appropriate, shall submit the relevant data to the Authority.

**CAR 21.3B Airworthiness directives**

- (a) An airworthiness directive means a document issued or adopted by the Authority which mandates actions to be performed on an aircraft to restore an acceptable level of safety, when evidence shows that the safety level of this aircraft may otherwise be compromised.
- (b) The Authority shall issue an airworthiness directive when:
  1. an unsafe condition has been determined by the Authority to exist in an aircraft, as a result of a deficiency in the aircraft, or an engine, propeller, part or appliance installed on this aircraft; and
  2. that condition is likely to exist or develop in other aircraft.
- (c) When an airworthiness directive has to be issued by the Authority to correct the unsafe condition referred to in paragraph (b), or to require the performance of an inspection, the holder of the type-certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, UAE TSO authorisation or any other relevant approval deemed to have been issued under this Regulation, shall:
  1. Propose the appropriate corrective action or required inspections, or both, and submit details of these proposals to the Authority for approval.
  2. Following the approval by the Authority of the proposals referred to under point (1), make available to all known operators or owners of the product, part or appliance and, on request, to any person required to comply with the airworthiness directive, appropriate descriptive data and accomplishment instructions.
- (d) An airworthiness directive shall contain at least the following information:
  1. An identification of the unsafe condition;

2. An identification of the affected aircraft;
3. The action(s) required;
4. The compliance time for the required action(s);
5. The date of entry into force.

#### **CAR 21.4 Coordination between design and production**

Each holder of a type-certificate, restricted type-certificate, supplemental type-certificate, UAE TSO authorisation, approval of a change to type-certificate or approval of a repair design, shall collaborate with the production organisation as necessary to ensure:

- (a) The satisfactory coordination of design and production required by CAR 21.122, CAR 21.130(b)(3) and (4), CAR 21.133 and CAR 21.165(c)(2) and (3) as appropriate, and
- (b) The proper support of the continued airworthiness of the product, part or appliance.

#### **CAR 21.5 Safety Management System**

As of November 14<sup>th</sup> 2013, a UAE based CAR 21 Design and Production organisations involved in design and production of a complete aircraft shall establish and implement safety management system as specified in CAR Part X

### **SUBPART B - TYPE-CERTIFICATES AND RESTRICTED TYPE-CERTIFICATES**

#### **CAR 21.11 Scope**

This Subpart establishes the procedural requirements for issuing type-certificates for products and restricted type-certificates for aircraft, and establishes the rights and obligations of the applicants for, and holders of, those certificates.

#### **CAR 21.13 Eligibility**

Any natural or legal person that has demonstrated, or is in the process of demonstrating, his capability in accordance with CAR 21.14 shall be eligible as an applicant for a type-certificate or a restricted type-certificate under the conditions laid down in this Subpart.

#### **CAR 21.14 Demonstration of capability**

- (a) Any organisation applying for a type-certificate or restricted type-certificate shall demonstrate its capability by holding a design organisation approval, issued by the Authority in accordance with Subpart J.
- (b) By way of derogation from point (a), as an alternative procedure to demonstrate his capability, an applicant may seek the agreement of the Authority for the use of procedures setting out the

specific design practices, resources and sequence of activities necessary to comply with this Regulation, when the product is one of the following:

1. an ELA2 aircraft;
2. an engine or propeller installed in ELA2 aircraft;
3. a piston engine;
4. a fixed or adjustable pitch propeller.

(c) By way of derogation from point (a), an applicant may choose for demonstration of capability by providing the Authority with the certification programme required by point CAR 21.20(b) when the product is one of the following:

1. an ELA1 aircraft;
2. an engine or propeller installed in an ELA1 aircraft.

### **CAR 21.15 Application**

- (a) An application for a type-certificate or restricted type-certificate shall be made in a form and manner established by the Authority.
- (b) An application for an aircraft type-certificate or restricted type-certificate shall be accompanied by a three-view drawing of that aircraft and preliminary basic data, including the proposed operating characteristics and limitations.
- (c) An application for an engine or propeller type-certificate shall be accompanied by a general arrangement drawing, a description of the design features, the operating characteristics, and the proposed operating limitations, of the engine, or propeller.
- (d) An application for a type-certificate or restricted type-certificate for an aircraft shall include, or be supplemented with, after the initial application, the application for approval of operational suitability data, consisting of, as applicable:
  1. the minimum syllabus of pilot type rating training, including determination of type rating;
  2. the definition of scope of the aircraft validation source data to support the objective qualification of simulator(s) associated to the pilot type rating training, or provisional data to support their interim qualification;
  3. the minimum syllabus of maintenance certifying staff type rating training, including determination of type rating;
  4. determination of type or variant for cabin crew and type specific data for cabin crew;
  5. the master minimum equipment list; and
  6. other type-related operational suitability elements.

### **CAR 21.16A Certification Specifications**

- (a) The Authority shall accept certification specifications, including certification specifications for operational suitability data, issued by EASA as standard means to demonstrate compliance of products, parts and appliances with the essential requirements. Such specifications shall be

sufficiently detailed and specific to indicate to applicants the conditions under which certificates will be issued.

- (b) The Authority may accept a set of certification specifications that conform with ICAO Annex 8 and provide equivalent level of safety to certification specifications issued by EASA.

#### **CAR 21.16B Special conditions**

- (a) The Authority shall prescribe special detailed technical specifications, named special conditions, for a product, if the related certification specifications do not contain adequate or appropriate safety standards for the product, because:
  - 1. The product has novel or unusual design features relative to the design practices on which the applicable certification specifications are based; or
  - 2. The intended use of the product is unconventional; or
  - 3. Experience from other similar products in service or products having similar design features, has shown that unsafe conditions may develop.
- (b) The special conditions shall contain such safety standards as the Authority finds necessary to establish a level of safety equivalent to that established in the applicable certification specifications.

#### **CAR 21.17A Type-certification basis**

- (a) The type-certification basis to be notified for the issuance of a type-certificate or a restricted type-certificate shall consist of:
  - 1. The applicable certification specifications established by the Authority that are effective on the date of application for type-certification, which shall be:
    - (i) otherwise specified by the Authority; or
    - (ii) compliance with certification specifications of later effective amendments is chosen by the applicant or required under points (c) and (d).
  - 2. Any special condition prescribed in accordance with point CAR 21.16B(a).
- (b) An application for type-certification of large aeroplanes and large rotorcraft shall be effective for five years and an application for any other type-certificate shall be effective for three years, unless an applicant shows at the time of application that his product requires a longer period of time for design, development, and testing, and the Authority approves a longer period.
- (c) In the case where a type-certificate has not been issued, or it is clear that a type-certificate will not be issued, within the time limit established under point (b); the applicant may:
  - 1. file a new application for a type-certificate and comply with all the provisions of point (a) applicable to an original application; or
  - 2. file for an extension of the original application and comply with the applicable certification specifications that were effective on a date, to be selected by the applicant, not earlier than the date which precedes the date of issue of the type-certificate by the time limit established under point (b) for the original application.

- (d) If an applicant chooses to comply with a certification specification of an amendment to the airworthiness codes that is effective after the filing of the application for a type-certificate, the applicant shall also comply with any other certification specification that the Authority finds is directly related.

**CAR 21.17B Operational suitability data certification basis**

- (a) The Authority shall notify to the applicant the operational suitability data certification basis. It shall consist of:
  - 1. the applicable certification specifications for operational suitability data issued in accordance with point CAR 21.16A that are effective on the date of application or application supplement, unless:
    - (i) the Authority accepts other means to demonstrate compliance with the relevant essential requirements or
    - (ii) compliance with certification specifications of later effective amendments is chosen by the applicant;
  - 2. any special condition prescribed in accordance with point CAR 21.16B(a).
- (b) If an applicant chooses to comply with an amendment to the certification specifications that is effective after the filing of the application for a type-certificate, the applicant shall also comply with any other certification specification that the Authority finds is directly related.

**CAR 21.18 Designation of applicable environmental protection requirements and certification specifications**

- (a) The applicable noise requirements for the issue of a type-certificate for an aircraft are prescribed according to the provisions of Chapter 1 of Annex 16, Volume I, Part II to the Chicago Convention and:
  - 1. for subsonic jet aeroplanes, in Volume I, Part II, Chapters 2, 3 and 4, as applicable;
  - 2. for propeller-driven aeroplanes, in Volume I, Part II, Chapters 3, 4, 5, 6 and 10, as applicable;
  - 3. for helicopters, in Volume I, Part II, Chapters 8 and 11, as applicable; and
  - 4. for supersonic aeroplanes, in Volume I, Part II, Chapter 12, as applicable.
- (b) The applicable emission requirements for the issue of a type-certificate for an aircraft and engine are prescribed in Annex 16 to the Chicago Convention:
  - 1. for prevention of intentional fuel venting, in Volume II, Part II, Chapter 2;
  - 2. for emissions of turbo-jet and turbofan engines intended for propulsion only at subsonic speeds, in Volume II, Part III, Chapter 2; and

3. for emissions of turbo-jet and turbofan engines intended for propulsion only at supersonic speeds, in Volume II, Part III, Chapter 3.

(c) The Authority shall accept certification specification issued by EASA providing for acceptable means to demonstrate compliance with the noise and the emission requirements laid down in paragraphs (a) and (b) respectively.

(d) The Authority may accept any other certification specification as indicated in paragraph (a) above.

#### **CAR 21.19 Changes requiring a new type-certificate**

Any natural or legal person proposing to change a product shall apply for a new type-certificate if the Authority finds that the change in design, power, thrust, or mass is so extensive that a substantially complete investigation of compliance with the applicable type-certification basis is required.

#### **CAR 21.20 Compliance with the type-certification basis, operational suitability data certification basis and environmental protection requirements**

(a) The applicant for a type-certificate or a restricted type-certificate shall demonstrate compliance with the applicable type-certification basis, the applicable operational suitability data certification basis and environmental protection requirements and shall provide to the Authority the means by which such compliance has been demonstrated.

(b) The applicant shall provide the Authority with a certification programme detailing the means for compliance demonstration. This document shall be updated as necessary during the certification process.

(c) The applicant shall record justification of compliance within compliance documents according to the certification programme established under point (b).

(d) The applicant shall declare that it has demonstrated compliance with all applicable type-certification basis and environmental protection requirements, according to the certification programme established under point (b).

(e) Where the applicant holds an appropriate design organisation approval, the declaration of point (b) shall be made according to the provisions of Subpart J.

#### **CAR 21.21 Issue of a type-certificate**

The applicant shall be entitled to have a product type-certificate issued by the Authority after:

(a) demonstrating his capability in accordance with point CAR 21.14;

(b) submitting the declaration referred to in point CAR 21.20(b); and

(c) it is shown that:

1. The product to be certificated meets the applicable type-certification basis and environmental protection requirements designated in accordance with point CAR 21.17A and CAR 21.18;

2. Any airworthiness provisions not complied with are compensated for by factors that provide an equivalent level of safety;
3. No feature or characteristic makes it unsafe for the uses for which certification is requested; and
4. The type-certificate applicant has expressly stated that it is prepared to comply with point CAR 21.44.

(d) In the case of an aircraft type-certificate, the engine or propeller, or both, if installed in the aircraft, have a type-certificate issued or determined in accordance with this Regulation.

(e) In the case of an aircraft type-certificate, it is demonstrated that the operational suitability data meets the applicable operational suitability data certification basis designated in accordance with point CAR 21.17B.

(f) By derogation from point (e), and at the request of the applicant included in the declaration referred to in point CAR 21.20(d), an aircraft type-certificate may be issued before compliance with the applicable operational suitability data certification basis has been demonstrated, subject to the applicant demonstrating compliance with the operational suitability data certification basis before the operational suitability data must actually be used.

#### **CAR 21.23 Issue of a restricted type-certificate**

(a) For an aircraft that does not meet the provisions of point CAR 21.21(c), the applicant shall be entitled to have a restricted type-certificate issued by the Authority after:

1. complying with the appropriate type-certification basis established by the Authority ensuring adequate safety with regard to the intended use of the aircraft, and with the applicable environmental protection requirements;
2. expressly stating that it is prepared to comply with point CAR 21.44.
3. in the case of an aircraft restricted type-certificate, it is demonstrated that the operational suitability data meets the applicable operational suitability data certification basis designated in accordance with point CAR 21.17B.

(b) By derogation from point 3 of point (a), and at the request of the applicant included in the declaration referred to in point CAR 21.20(d), a restricted type-certificate may be issued before compliance with the applicable operational suitability data certification basis has been demonstrated, subject to the applicant demonstrating compliance with the operational suitability data certification basis before the operational suitability data must actually be used.

(c) The engine or propeller installed in the aircraft, or both, shall:

1. have a type-certificate issued or determined in accordance with this Regulation; or
2. have been shown to be in compliance with the certification specifications necessary to ensure safe flight of the aircraft.

#### **CAR 21.31 Type design**

(a) The type design shall consist of:

1. The drawings and specifications, and a listing of those drawings and specifications, necessary to define the configuration and the design features of the product shown to comply with the applicable type-certification basis and environmental protection requirements;
2. Information on materials and processes and on methods of manufacture and assembly of the product necessary to ensure the conformity of the product;
3. An approved airworthiness limitations section of the instructions for continued airworthiness as defined by the applicable certification specifications; and
4. Any other data necessary to allow by comparison, the determination of the airworthiness, the characteristics of noise, fuel venting, and exhaust emissions (where applicable) of later products of the same type.

(b) Each type design shall be adequately identified.

#### **CAR 21.33 Investigation and tests**

- (a) The applicant shall perform all inspections and tests necessary to show compliance with the applicable type-certification basis and environmental protection requirements.
- (b) Before each test required by point (a) is undertaken, the applicant shall have determined:
  1. For the test specimen:
    - (i) That materials and processes adequately conform to the specifications for the proposed type design;
    - (ii) That parts of the products adequately conform to the drawings in the proposed type design;
    - (iii) That the manufacturing processes, construction and assembly adequately conform to those specified in the proposed type design; and
  2. That the test equipment and all measuring equipment used for tests are adequate for the test and are appropriately calibrated.
- (c) The applicant shall allow the Authority to make any inspection necessary to check compliance with point (b).
- (d) The applicant shall allow the Authority to review any report and make any inspection and to perform or witness any flight and ground test necessary to check the validity of the declaration of compliance submitted by the applicant under point CAR 21.20(b) and to determine that no feature or characteristic makes the product unsafe for the uses for which certification is requested.
- (e) For tests performed or witnessed by the Authority under point (d):
  1. The applicant shall submit to the Authority a statement of compliance with point (b); and
  2. No change relating to the test that would affect the statement of compliance may be made to a product, part or appliance between the time compliance with point (b) is shown and the time it is presented to the Authority for test.

**CAR 21.35 Flight Tests**

- (a) Flight testing for the purpose of obtaining a type-certificate shall be conducted in accordance with conditions for such flight testing specified by the Authority.
- (b) The applicant shall make all flight tests that the Authority finds necessary:
  - 1. To determine compliance with the applicable type-certification basis and environmental protection requirements, and
  - 2. For aircraft to be certificated under this section, except (i) hot-air balloons, free gas balloons, tethered gas balloons, sailplanes and powered sailplanes and (ii) airships and aeroplanes of 2 722 kg or less maximum take-off mass (MTOM), to determine whether there is reasonable assurance that the aircraft, its parts and appliances are reliable and function properly.
- (c) Reserved
- (d) Reserved
- (e) Reserved
- (f) The flight tests prescribed in subparagraph (b)(2) shall include:
  - 1. For aircraft incorporating turbine engines of a type not previously used in a type-certificated aircraft, at least 300 hours of operation with a full complement of engines that conform to a type-certificate; and
  - 2. For all other aircraft, at least 150 hours of operation.

**CAR 21.41 Type-certificate**

The type-certificate and restricted type-certificate shall include the type design, the operating limitations, the type-certificate data sheet for airworthiness and emissions, the applicable type-certification basis and environmental protection requirements with which the Authority records compliance, and any other conditions or limitations prescribed for the product in the applicable certification specifications and environmental protection requirements. The aircraft type-certificate and restricted type-certificate, in addition, shall both include the applicable operational suitability data certification basis, the operational suitability data and type-certificate data sheet for noise. The engine type-certificate data sheet shall include the record of emission compliance.

**CAR 21.44 Obligations of the holder**

Each holder of a type-certificate or restricted type-certificate shall:

- (a) undertake the obligations laid down in points CAR 21.3A, CAR 21.3B, CAR 21.4, CAR 21.55, CAR 21.57, CAR 21.61 and CAR 21.62; and, for this purpose, shall continue to meet the qualification requirements for eligibility under point CAR 21.14; and
- (b) specify the marking in accordance with Subpart Q.

**CAR 21.47 Transferability**

Transfer of a type-certificate or restricted type-certificate may only be made to a natural or legal person that is able to undertake the obligations under CAR 21.44, and, for this purpose, has demonstrated his ability to qualify under the criteria of CAR 21.14.

**CAR 21.51 Duration and continued validity**

- (a) A type-certificate and restricted type-certificate shall be issued for an unlimited duration. They shall remain valid subject to:
  - 1. The holder remaining in compliance with this Part; and
  - 2. The certificate not being surrendered or revoked under the applicable administrative procedures established by the Authority.
- (b) Upon surrender or revocation, the type-certificate and restricted type-certificate shall be returned to the Authority.

**CAR 21.55 Record-keeping**

All relevant design information, drawings and test reports, including inspection records for the product tested, shall be held by the type-certificate or restricted type-certificate holder at the disposal of the Authority and shall be retained in order to provide the information necessary to ensure the continued airworthiness, continued validity of the operational suitability data and compliance with applicable environmental protection requirements of the product.

**CAR 21.57 Manuals**

The holder of a type-certificate or restricted type-certificate shall produce, maintain and update master copies of all manuals required by the applicable type-certification basis, the applicable operational suitability data and environmental protection requirements for the product, and provide copies, on request, to the Authority.

**CAR 21.61 Instructions for continued airworthiness**

- (a) The holder of the type-certificate or restricted type-certificate shall furnish at least one set of complete instructions for continued airworthiness, comprising descriptive data and accomplishment instructions prepared in accordance with the applicable type-certification basis, to each known owner of one or more aircraft, engine or propeller upon its delivery or upon issue of the first certificate of airworthiness for the affected aircraft, whichever occurs later and thereafter make those instructions available on request to any other person required to comply with any of the terms of those instructions. The availability of some manual or portion of the instructions for continued airworthiness, dealing with overhaul or other forms of heavy maintenance, may be delayed until after the product has entered into service, but shall be available before any of the products reaches the relevant age or flight-hours/cycles.

- (b) In addition, changes to the instructions for continued airworthiness shall be made available to all known operators of the product and shall be made available on request to any person required to comply with any of those instructions. A program showing how changes to the instructions for continued airworthiness are distributed shall be submitted to the Authority.

#### **CAR 21.62 Availability of operational suitability data**

The holder of the type-certificate or restricted type-certificate shall make available:

- (a) at least one set of complete operational suitability data prepared in accordance with the applicable operational suitability certification basis, to all known UAE operators of the aircraft, before the operational suitability data must be used by a training organisation or an UAE operator; and
- (b) any change to the operational suitability data to all known UAE operators of the aircraft; and
- (c) on request, the relevant data referred to in points (a) and (b) above, to:
  - 1. the Authority responsible for verifying conformity with one or more elements of this set of operational suitability data; and
  - 2. any person required to comply with one or more elements of this set of operational suitability data.

#### **SUBPART B1 - TYPE ACCEPTANCE CERTIFICATE**

##### **CAR 21.70 Applicability**

Type Acceptance certification requirements apply to an aircraft model imported to the United Arab Emirates on or after 01 January 2006.

##### **CAR 21.72 Airworthiness requirements**

- (a) An applicant for a type acceptance certificate shall provide the Authority with evidence that the aircraft model meets the acceptable airworthiness codes, aircraft noise and engine emission standards effective at the date assigned in the foreign type certificate or an equivalent document.
- (b) The aircraft model meets any special conditions imposed under the foreign type certification and the special conditions specified by the Authority.
- (c) Any airworthiness requirement not complied with is compensated for by a factor that provides an equivalent level of safety.
- (d) There is no feature or characteristic of the product type that makes it unsafe for the intended use.
- (e) The exemptions granted in the foreign type certificate are acceptable to the Authority.

**CAR 21.74 Data requirements**

(a) An applicant for a type acceptance certificate for an aircraft model shall provide the Authority with:

1. evidence that;
  - (i) the type design has been approved by an ICAO contracting State of Design by the issue of a type certificate or an equivalent document.
  - (ii) the type certificate or equivalent document is considered to be valid by the State of Design.
2. details of the airworthiness requirements complied with, for the issue of the type certificate or equivalent document are acceptable to the Authority including:
  - (i) the airworthiness design standards.
  - (ii) the effective date of the standards.
  - (iii) any special condition imposed under the foreign type certification.
  - (iv) any requirement not complied with and any compensating factor that provides an equivalent level of safety acceptable to the Authority.
  - (v) any airworthiness limitation.
  - (vi) any exemption granted under foreign type certificate.
3. details of the information regarding aircraft noise and engine emission certification.
  - (i) a list identifying the data submitted for the issue of the type certificate or equivalent document showing compliance with the applicable airworthiness design standards.
  - (ii) a copy of the flight manual approved under the type certificate or equivalent document specified above.
  - (iii) a copy of the maintenance manual for the aircraft model.
  - (iv) a copy of the current service information issued by the manufacturer of the model.
  - (v) a copy of an illustrated parts catalogue for the model.
  - (vi) evidence that the manufacturer, or holder of the type certificate or equivalent document specified above, has agreed to provide the Authority with a copy of every amendment and re-issue of the documents prescribed in paragraphs (a)(5) to (a)(8).

(b) The information required in (a) (6) to (a) (8) must include the aircraft engine, and propeller, as applicable.

**CAR 21.76 Duration and continued validity**

- (a) A type acceptance certificate shall be issued for an unlimited duration. It shall remain valid subject to:
  1. The holder remaining in compliance with this Part; and
  2. The certificate not being surrendered or revoked under the applicable administrative procedures established by the Authority.
- (b) Upon surrender or revocation, the type acceptance certificate shall be returned to the Authority.

**SUBPART C - RESERVED****SUBPART D - CHANGES TO TYPE-CERTIFICATES AND RESTRICTED TYPE-CERTIFICATES****CAR 21.90A Scope**

This Subpart establishes the procedure for the approval of changes to type-certificates and establishes the rights and obligations of the applicants for, and holders of, those approvals. This Subpart also defines standard changes that are not subject to an approval process under this Subpart. In this Subpart, references to type-certificates include type-certificate and restricted type-certificate.

**CAR 21.90B Standard changes**

(a) Standard changes are changes to a type-certificate:

1. in relation to:
  - (i) aeroplanes of 5 700 kg Maximum Take-Off Mass (MTOM) or less;
  - (ii) rotorcraft of 3 175 kg MTOM or less;
  - (iii) sailplanes, powered sailplanes, balloons and airships, as defined in ELA1 or ELA2,
2. that follow design data included in certification specifications issued by the Authority, containing acceptable methods, techniques and practices for carrying out and identifying standard changes, including the associated instructions for continuing airworthiness; and
3. that are not in conflict with TC holders data.

(b) Points CAR 21.91 to CAR 21.109 are not applicable to standard changes.

**CAR 21.91 Classification of changes to a type-certificate**

Changes to a type-certificate are classified as minor and major. A "minor change" is one that has no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics, noise, fuel venting, exhaust emission, operational suitability data or other characteristics affecting the airworthiness of the product. Without prejudice to point CAR 21.19, all other changes are "major changes" under this Subpart. Major and minor changes shall be approved in accordance with points CAR 21.95 or CAR 21.97 as appropriate, and shall be adequately identified.

**CAR 21.92 Eligibility**

- (a) Only the type-certificate holder may apply for approval of a major change to a type-certificate under this Subpart; all other applicants for a major change to a type-certificate shall apply under Subpart E.
- (b) Any natural or legal person may apply for approval of a minor change to a type-certificate under this Subpart.

**CAR 21.93 Application**

An application for approval of a change to a type-certificate shall be made in a form and manner established by the Authority and shall include:

- (a) A description of the change identifying:
  - 1. All parts of the type design and the approved manuals affected by the change; and
  - 2. The certification specifications and environmental protection requirements with which the change has been designed to comply in accordance with CAR 21.101.
- (b) Identification of any re-investigations necessary to show compliance of the changed product with the applicable certification specifications and environmental protection requirements.
- (c) When the change affects the operational suitability data, the application shall include, or be supplemented after the initial application to include the necessary changes to the operational suitability data.

**CAR 21.95 Minor changes**

Minor changes to a type-certificate shall be classified and approved either:

- (a) By the Authority; or
- (b) By an appropriately approved design organisation under a procedure agreed with the Authority.

**CAR 21.97 Major changes**

- (a) An applicant for approval of a major change shall:
  - 1. Submit to the Authority substantiating data together with any necessary descriptive data for inclusion in the type design;
  - 2. Demonstrate that the changed product complies with applicable certification specifications and environmental protection requirements, as specified in point CAR 21.101;
  - 3. comply with points CAR 21.20(b), (c) and (d); and
  - 4. Where the applicant holds an appropriate design organisation approval, make the declaration referred to in point CAR 21.20(d) according to the provisions of Subpart J;
  - 5. Comply with point CAR 21.33 and, where applicable, point CAR 21.35.

- (b) Approval of a major change in a type-certificate is limited to that or those specific configuration(s) in the type-certificate upon which the change is made.

**CAR 21.101 Designation of applicable certification specifications and environmental protection requirements**

- (a) An applicant for a change to a type-certificate shall demonstrate that the changed product complies with the certification specifications that are applicable to the changed product and that are in effect at the date of the application for the change, unless compliance with certification specifications of later effective amendments is chosen by the applicant or required under points (e) and (f), and with the applicable environmental protection requirements laid down in point CAR 21.18.
- (b) By derogation from point (a), an applicant may show that the changed product complies with an earlier amendment of the certification specifications referred to in point (a), and of any other certification specification the Authority finds is directly related. However, the earlier amended certification specifications shall not precede the corresponding certification specifications incorporated by reference in the type-certificate. The applicant may show compliance with an earlier amendment of the certification specifications for any of the following:
  - 1. A change that the Authority finds not to be significant. In determining whether a specific change is significant, the Authority considers the change in context with all previous relevant design changes and all related revisions to the applicable certification specifications incorporated in the type-certificate for the product. Changes that meet one of the following criteria are automatically considered significant:
    - (i) The general configuration or the principles of construction are not retained.
    - (ii) The assumptions used for certification of the product to be changed do not remain valid.
  - 2. Each area, system, part or appliance that the Authority finds is not affected by the change.
  - 3. Each area, system, part or appliance that is affected by the change, for which the Authority finds that compliance with the certification specifications referred to in point (a) would not contribute materially to the level of safety of the changed product or would be impractical.
- (c) An applicant for a change to an aircraft (other than a rotorcraft) of 2722 kg (6000 lbs.) or less maximum weight or to a non-turbine rotorcraft of 1361 kg (3000 lbs.) or less maximum weight may show that the changed product complies with the type-certification basis incorporated by reference in the type-certificate. However, if the Authority finds that the change is significant in an area, the Authority may designate compliance with an amendment to the type-certification basis incorporated by reference in the type-certificate, in effect at the date of the application, and any certification specification that the Authority finds is directly related, unless the Authority also finds that compliance with that amendment or certification specification would not contribute materially to the level of safety of the changed product or would be impractical.
- (d) If the Authority finds that the certification specifications in effect at the date of the application for the change do not provide adequate standards with respect to the proposed change, the applicant shall also comply with any special conditions, and amendments to those special conditions,

prescribed under the provisions of point CAR 21.16B, to provide a level of safety equivalent to that established in the certification specifications in effect at the date of the application for the change.

- (e) An application for a change to a type-certificate for large aeroplanes and large rotorcraft is effective for five years, and an application for a change to any other type-certificate is effective for three years. In a case where the change has not been approved, or it is clear that it will not be approved under the time limit established under this point, the applicant may:
  - 1. File a new application for a change to the type-certificate and comply with all the provisions of point (a) applicable to an original application for a change; or
  - 2. File for an extension of the original application and comply with the provisions of point (a) for an effective date of application, to be selected by the applicant, not earlier than the date which precedes the date of approval of the change by the time period established under this point for the original application for the change.
- (f) If an applicant chooses to comply with a certification specification of an amendment to the certification specifications that is effective after the filing of the application for a change to a type, the applicant shall also comply with any other certification specification that the Authority finds is directly related.
- (g) When the application for a change to a type-certificate for an aircraft includes, or is supplemented after the initial application to include changes to the operational suitability data, the operational suitability data certification basis shall be designated in accordance with points (a), (b), (c), (d) and (f) above.

#### **CAR 21.103 Issue of approval**

- (a) The applicant shall be entitled to have a major change to a type-certificate approved by the Authority after:
  - 1. submitting the declaration referred to in point CAR 21.20(d); and
  - 2. It is demonstrated that:
    - (i) The changed product meets the applicable certification specifications and environmental protection requirements, as specified in point CAR 21.101;
    - (ii) Any airworthiness provisions not complied with are compensated for by factors that provide an equivalent level of safety; and
    - (iii) No feature or characteristic makes the product unsafe for the uses for which certification is requested.
  - 3. in the case of a change affecting the operational suitability data, it is demonstrated that the necessary changes to the operational suitability data meet the applicable operational suitability data certification basis designated in accordance with point CAR 21.101(g);
  - 4. by derogation from point 3, and at the request of the applicant included in the declaration referred to in point CAR 21.20(d), a major change to an aircraft type-certificate may be approved before compliance with the applicable operational suitability data certification

basis has been demonstrated, subject to the applicant demonstrating compliance with the operational suitability data certification basis before the operational suitability data must actually be used.

- (b) A minor change to a type-certificate shall only be approved in accordance with point CAR 21.95 if it is shown that the changed product meets the applicable certification specifications, as specified in point CAR 21.101.

#### **CAR 21.105 Record-keeping**

For each change, all relevant design information, drawings and test reports, including inspection records for the changed product tested, shall be held by the applicant at the disposal of the Authority and shall be retained in order to provide the information necessary to ensure the continued airworthiness, continued validity of the operational suitability data and compliance with applicable environmental protection requirements of the changed product.

#### **CAR 21.107 Instructions for continued airworthiness**

- (a) The holder of a minor change approval to type-certificate shall furnish at least one set of the associated variations, if any, to the instructions for continued airworthiness of the product on which the minor change is to be installed, prepared in accordance with the applicable type-certification basis, to each known owner of one or more aircraft, engine, or propeller incorporating the minor change, upon its delivery, or upon issuance of the first certificate of airworthiness for the affected aircraft, whichever occurs later, and thereafter make those variations in instructions available, on request, to any other person required to comply with any of the terms of those instructions.
- (b) In addition, changes to those variations of the instructions for continued airworthiness shall be made available to all known operators of a product incorporating the minor change and shall be made available, on request, to any person required to comply with any of those instructions.

#### **CAR 21.108 Availability of operational suitability data**

In the case of a change affecting the operational suitability data, the holder of the minor change approval shall make available:

- (a) at least one set of changes to the operational suitability data prepared in accordance with the applicable operational suitability certification basis, to all known UAE operators of the changed aircraft, before the operational suitability data must be used by a training organisation or a UAE operator; and
- (b) any further change to the affected operational suitability data, to all known UAE operators of the changed aircraft; and
- (c) on request, the relevant parts of the changes in points (a) and (b) above, to:

1. the competent authority responsible for verifying conformity with one or more elements of the affected operational suitability data; and
2. any person required to comply with one or more elements of this set of operational suitability data.

#### **CAR 21.109 Obligations and UAE PA marking**

The holder of a minor change approval to a type-certificate shall:

- (a) undertake the obligations laid down in points CAR 21.4, CAR 21.105, CAR 21.107 and CAR 21.108; and
- (b) specify the marking, including UAE PA (hereinafter "United Arab Emirates Part Approval") letters, in accordance with point CAR 21.804(a).

### **SUBPART E - SUPPLEMENTAL TYPE-CERTIFICATES**

#### **CAR 21.111 Scope**

This Subpart establishes the procedure for the approval of major changes to the type-certificate under supplemental type-certificate procedures, and establishes the rights and obligations of the applicants for, and holders of, those certificates.

#### **CAR 21.112A Eligibility**

Any natural or legal person ("organisation") that has demonstrated, or is in the process of demonstrating, its capability under CAR 21.112B shall be eligible as an applicant for a supplemental type-certificate under the conditions laid down in this Subpart.

#### **CAR 21.112B Demonstration of capability**

- (a) Any organisation applying for a supplemental type-certificate shall demonstrate its capability by holding a design organisation approval, issued by the Authority in accordance with Subpart J.
- (b) By way of derogation from paragraph (a), as an alternative procedure to demonstrate his capability, an applicant may seek Authority agreement for the use of procedures setting out the specific design practices, resources and sequence of activities necessary to comply with this Subpart.
- (c) By way of derogation from points (a) and (b), an applicant may choose for demonstration of capability through Authority approval of a certification programme detailing the means for compliance demonstration for an STC on an aircraft, engine and propeller defined in point CAR 21.14(c).

**CAR 21.113 Application for a supplemental type-certificate**

- (a) An application for a supplemental type-certificate shall be made in a form and manner established by the Authority.
- (b) An application for a supplemental type-certificate shall include the descriptions, identification, and changes to the operational suitability data required by point CAR 21.93. In addition, such an application shall include a justification that the information on which those elements are based is adequate either from the applicant's own resources, or through an arrangement with the type-certificate holder.

**CAR 21.114 Showing of compliance**

Any applicant for a supplemental type-certificate shall comply with CAR 21.97.

**CAR 21.115 Issue of a supplemental type-certificate**

The applicant shall be entitled to have a supplemental type-certificate issued by the Authority after:

- (a) Submitting the declaration referred to in point CAR 21.20(d); and
- (b) it is demonstrated that:
  - 1. the changed product meets the applicable certification specifications and environmental protection requirements, as specified in point CAR 21.101;
  - 2. any airworthiness provisions not complied with are compensated for by factors that provide an equivalent level of safety; and
  - 3. no feature or characteristic makes the product unsafe for the uses for which certification is requested.
- (c) demonstrating its capability in accordance with point CAR 21.112B;
- (d) where, under point CAR 21.113(b), the applicant has entered into an arrangement with the type-certificate holder,
  - 1. The type-certificate holder has advised that he has no technical objection to the information submitted under point CAR 21.93; and
  - 2. The type-certificate holder has agreed to collaborate with the supplemental type-certificate holder to ensure discharge of all obligations for continued airworthiness of the changed product through compliance with point CAR 21.44 and point CAR 21.118A.

**CAR 21.116 Transferability**

A supplemental type-certificate shall only be transferred to a natural or legal person that is able to undertake the obligations of CAR 21.118A and for this purpose has demonstrated his ability to qualify under the criteria of CAR 21.112B.

**CAR 21.117 Changes to that part of a product covered by a supplemental type-certificate**

- (a) Minor changes to that part of a product covered by a supplemental type-certificate shall be classified and approved in accordance with Subpart D.
- (b) Each major change to that part of a product covered by a supplemental type-certificate shall be approved as a separate supplemental type-certificate in accordance with this Subpart.
- (c) By way of derogation from paragraph (b), a major change to that part of a product covered by a supplemental type certificate submitted by the supplemental type-certificate holder itself may be approved as a change to the existing supplemental type-certificate.

**CAR 21.118A Obligations and UAE PA marking**

Each holder of a supplemental type-certificate shall:

- (a) undertake the obligations:
  1. Laid down in points CAR 21.3A, CAR 21.3B, CAR 21.4, CAR 21.105, CAR 21.119, CAR 21.120A and CAR 21.120B;
  2. Implicit in the collaboration with the type-certificate holder under point CAR 21.115(c)(2); and for this purpose continue to meet the criteria of point CAR 21.112B
- (b) specify the marking, including UAE PA letters, in accordance with point CAR 21.804(a).

**CAR 21.118B Duration and continued validity**

- (a) A supplemental type-certificate shall be issued for an unlimited duration. It shall remain valid subject to:
  1. The holder remaining in compliance with this Part; and
  2. the certificate not being surrendered or revoked under the applicable administrative procedures established by the Authority.
- (b) Upon surrender or revocation, the supplemental type-certificate shall be returned to the Authority.

**CAR 21.119 Manuals**

The holder of a supplemental type-certificate shall produce, maintain, and update master copies of variations in the manuals required by the applicable type-certification basis, the applicable operational suitability data certification basis and environmental protection requirements for the product, necessary to cover the changes introduced under the supplemental type-certificate, and furnish copies of those manuals to the Authority on request.

**CAR 21.120A Instructions for continued Airworthiness**

- (a) The holder of the supplemental type-certificate for an aircraft, engine, or propeller, shall furnish at least one set of the associated variations to the instructions for continued airworthiness, prepared

in accordance with the applicable type-certification basis, to each known owner of one or more aircraft, engine, or propeller incorporating the features of the supplemental type-certificate, upon its delivery, or upon issuance of the first certificate of airworthiness for the affected aircraft, whichever occurs later, and thereafter make those variations in instructions available, on request, to any other person required to comply with any of the terms of those instructions. Availability of some manual or portion of the variations to the instructions for continued airworthiness, dealing with overhaul or other forms of heavy maintenance, may be delayed until after the product has entered into service, but shall be available before any of the products reaches the relevant age or flight-hours/cycles.

- (b) In addition, changes to those variations of the instructions for continued airworthiness shall be made available to all known operators of a product incorporating the supplemental type-certificate and shall be made available, on request, to any person required to comply with any of those instructions. A program showing how changes to the variations to the instructions for continued airworthiness are distributed shall be submitted to the Authority.

#### **CAR 21.120B Availability of operational suitability data**

In the case of a change affecting the operational suitability data, the holder of the supplemental type-certificate shall make available:

- (a) at least one set of changes to the operational suitability data prepared in accordance with the applicable operational suitability certification basis, to all known UAE operators of the changed aircraft, before the operational suitability data must be used by a training organisation or an UAE operator; and
- (b) any further change to the affected operational suitability data, to all known UAE operators of the changed aircraft; and
- (c) on request, the relevant parts of the changes in points (a) and (b) above, to:
  - 1. the competent authority responsible for verifying conformity with one or more elements of the affected operational suitability data; and
  - 2. any person required to comply with one or more elements of this set of operational suitability data.

## **SUBPART F - PRODUCTION WITHOUT PRODUCTION ORGANISATION APPROVAL**

### **CAR 21.121 Scope**

- (a) This Subpart establishes the procedural requirements for demonstrating the conformity with the applicable design data of a product, part and appliance that is intended to be manufactured without a production organisation approval under Subpart G.
- (b) This Subpart establishes the rules governing the obligations of the manufacturer of a product, part, or appliance being manufactured under this Subpart.

### **CAR 21.122 Eligibility**

Any natural or legal person may apply to show conformity of individual products, parts or appliances under this Subpart, if;

- (a) it holds or has applied for an approval covering the design of that product, part or appliance, or
- (b) it has ensured satisfactory coordination between production and design, through an appropriate arrangement with the applicant for, or holder of, an approval of such a design.

### **CAR 21.124 Application**

- (a) Each application for an agreement to the showing of conformity of individual products, parts and appliances under this Subpart shall be made in a form and manner established by the Authority.
- (b) Such application shall contain:
  1. evidence which demonstrate, where applicable, that:
    - (i) the issuance of a production organisation approval under Subpart G would be inappropriate; or
    - (ii) the certification or approval of a product, part or appliance under this Subpart is needed pending the issuance of a production organisation approval under Subpart G.
  2. an outline of the information required in CAR 21.125A(b).

### **CAR 21.125A Issue of a letter of agreement**

The applicant shall be entitled to have a letter of agreement issued by the Authority agreeing to the showing of conformity of individual products, parts and appliances under this Subpart, after:

- (a) having established a production inspection system that ensures that each product, part or appliance conforms to the applicable design data and is in condition for safe operation;
- (b) having provided a manual that contains:

1. a description of the production inspection system required under (a);
2. a description of the means for making the determination of the production inspection system;
3. a description of the tests required in CAR 21.127 and CAR 21.128, and the names of persons authorised for the purpose of CAR 21.130(a);

(c) demonstrating that it is able to provide assistance in accordance with CAR 21.3 and CAR 21.129(d)

**CAR 21.125B Findings**

- (a) When objective evidence is found showing non-compliance of the holder of a letter of agreement with the applicable requirements of this regulation, the finding shall be classified as follows:
  1. A level one finding is any non-compliance with this Part which could lead to uncontrolled non-compliances with applicable design data and which could affect the safety of the aircraft.
  2. A level two finding is any non-compliance with this Part which is not classified as level one.
- (b) A level three finding is any item where it has been identified, by objective evidence, to contain potential problems that could lead to a non-compliance under paragraph (a).
- (c) After receipt of notification of findings according:
  1. In case of a level one finding, the holder of the letter of agreement shall demonstrate corrective action to the satisfaction of the Authority within a period of no more than 21 working days after written confirmation of the finding.
  2. In case of level two findings, the corrective action period granted by the Authority shall be appropriate to the nature of the finding but in any case initially shall not be more than six months. In certain circumstances and subject to the nature of the finding the Authority may extend the six month period subject to a satisfactory corrective action plan agreed by the Authority.
  3. A level three finding shall not require immediate action by the holder of the letter of agreement.
- (d) In case of level one or level two findings, the letter of agreement may be subject to a partial or full limitation, suspension and revocation. The holder of the letter of agreement shall provide confirmation of receipt of the notice of limitation, suspension or revocation of the letter of agreement in a timely manner.

**CAR 21.125C Duration and continued validity**

- (a) The letter of agreement shall be issued for a limited duration not exceeding one year. It shall remain valid unless:
  - 1. The holder of the letter of agreement fails to demonstrate compliance with the applicable requirements of this Subpart; or
  - 2. There is evidence that the manufacturer cannot maintain satisfactory control of the manufacture of products, parts, or appliances under the agreement; or
  - 3. The manufacturer no longer meets the requirements of CAR 21.122; or
  - 4. The letter of agreement has been surrendered, revoked, or has expired.
- (b) Upon surrender, revocation or expiry, the letter of agreement shall be returned to the Authority.

**CAR 21.126 Production inspection system**

- (a) The production inspection system required under CAR 21.125A(a) shall provide a means for determining that:
  - 1. Incoming materials, and bought or subcontracted parts, used in the finished product are as specified in the applicable design data.
  - 2. Incoming materials, and bought or subcontracted parts, are properly identified.
  - 3. Processes, manufacturing techniques and methods of assembly affecting the quality and safety of the finished product are accomplished in accordance with specifications accepted by the Authority.
  - 4. Design changes, including material substitutions, have been approved under Subpart D or E and controlled before being incorporated in the finished product.
- (b) The production inspection system required by CAR 21.125A(a), shall also be such as to ensure that:
  - 1. Parts in process are inspected for conformity with the applicable design data at points in production where accurate determinations can be made.
  - 2. Materials subject to damage and deterioration are suitably stored and adequately protected.
  - 3. Current design drawings are readily available to manufacturing and inspection personnel, and used when necessary.
  - 4. Rejected materials and parts are segregated and identified in a manner that precludes installation in the finished product.
  - 5. Materials and parts that are withheld because of departures from design data or specifications, and that are to be considered for installation in the finished product, are subjected to an approved engineering and manufacturing review procedure. Those materials and parts determined by this procedure to be serviceable shall be properly identified and re-inspected if rework or repair is necessary. Materials and parts rejected by this procedure shall be marked and disposed of to ensure that they are not incorporated in the final product.

6. Records produced under the production inspection system are maintained, identified with the completed product or part where practicable, and retained by the manufacturer in order to provide the information necessary to ensure the continued airworthiness of the product.

#### **CAR 21.127 Tests: aircraft**

- (a) Each manufacturer of an aircraft manufactured under this Subpart shall establish an approved production ground and flight test procedure and check-off forms, and in accordance with those forms, test each aircraft produced, as a means of establishing relevant aspects of compliance with CAR 21.125A(a).
- (b) Each production test procedure shall include at least the following:
  1. A check on handling qualities;
  2. A check on flight performance (using normal aircraft instrumentation);
  3. A check on the proper functioning of all aircraft equipment and systems;
  4. A determination that all instruments are properly marked, and that all placards and required flight manuals are installed after flight test;
  5. A check of the operational characteristics of the aircraft on the ground;
  6. A check on any other items peculiar to the aircraft being tested.

#### **CAR 21.128 Tests: engines and propellers**

Each manufacturer of engines, or propellers manufactured under this Subpart shall subject each engine, or variable pitch propeller, to an acceptable functional test as specified in the type-certificate holder's documentation, to determine if it operates properly throughout the range of operation for which it is type-certificated, as a means of establishing relevant aspects of compliance with CAR 21.125A(a).

#### **CAR 21.129 Obligations of the manufacturer**

Each manufacturer of a product, part or appliance being manufactured under this Subpart shall:

- (a) Make each product, part or appliance available for inspection by the Authority.
- (b) Maintain at the place of manufacture the technical data and drawings necessary to determine whether the product conforms to the applicable design data.
- (c) Maintain the production inspection system that ensures that each product conforms to the applicable design data and is in condition for safe operation.
- (d) Provide assistance to the holder of the type-certificate, restricted type-certificate or design approval in dealing with any continuing airworthiness actions that are related to the products, parts or appliances that have been produced.
- (e) Establish and maintain an internal occurrence reporting system in the interest of safety, to enable the collection and assessment of occurrence reports in order to identify adverse trends or to

address deficiencies, and to extract reportable occurrences. This system shall include evaluation of relevant information relating to occurrences and the promulgation of related information.

- (f)
  - 1. Report to the holder of the type-certificate, restricted type-certificate or design approval, all cases where products, parts or appliances have been released by the manufacturer and subsequently identified to have deviations from the applicable design data, and investigate with the holder of the type-certificate, restricted type-certificate or design approval to identify those deviations which could lead to an unsafe condition.
  - 2. Report to the Authority the deviations which could lead to an unsafe condition identified according to subparagraph (1). Such reports shall be made in a form and manner established by the Authority under CAR 21.3(b)(2).
  - 3. Where the manufacturer acts as supplier to another production organisation, report also to that other organisation all cases where it has released products, parts or appliances to that organisation and subsequently identified them to have possible deviations from the applicable design data.

#### **CAR 21.130 Statement of Conformity**

- (a) Each manufacturer of a product, part or appliance manufactured under this Subpart shall raise a Statement of Conformity, Form AWF-POA-52, for complete aircraft, or AW Form 1, for other products, parts or appliances. This statement shall be signed by an authorised person who holds a responsible position in the manufacturing organisation.
- (b) Statement of conformity shall include:
  - 1. for each product, part or appliance a statement that the product, part or appliance conforms to the approved design data and is in condition for safe operation;
  - 2. for each aircraft, a statement that the aircraft has been ground and flight checked in accordance with point CAR 21.127(a); and
  - 3. for each engine, or variable pitch propeller, a statement that the engine or propeller has been subjected by the manufacturer to a final functional test, in accordance with point CAR 21.128, and
  - 4. additionally in case of engines, a statement that the completed engine is in compliance with the applicable emissions requirements on the date of manufacture of the engine.
- (c) Each manufacturer of such a product, part or appliance shall:
  - 1. Upon the initial transfer by it of the ownership of such a product, part or appliance; or
  - 2. Upon application for the original issue of an aircraft certificate of airworthiness; or
  - 3. Upon application for the original issue of an airworthiness release document for an engine, a propeller, a part or appliance, present a current statement of conformity, for validation by the Authority.
- (d) The Authority shall validate by counter-signature the Statement of Conformity if it finds after inspection that the product, part or appliance conforms to the applicable design data and is in condition for safe operation.

## SUBPART G - PRODUCTION ORGANISATION APPROVAL

### **CAR 21.131 Scope**

This Subpart establishes:

- (a) The procedural requirements for the issuance of a production organisation approval for a production organisation showing conformity of products, parts and appliances with the applicable design data.
- (b) The rules governing the rights and obligations of the applicant for, and holders of, such approvals.

### **CAR 21.133 Eligibility**

Any natural or legal person ("organisation") shall be eligible as an applicant for an approval under this Subpart. The applicant shall:

- (a) justify that, for a defined scope of work, an approval under this Subpart is appropriate for the purpose of showing conformity with a specific design; and
- (b) hold or have applied for an approval of that specific design; or
- (c) have ensured, through an appropriate arrangement with the applicant for, or holder of, an approval of that specific design, satisfactory coordination between production and design.

### **CAR 21.134 Application**

Each application for a production organisation approval shall be made to the Authority in a form and manner established by the Authority, and shall include an outline of the information required by CAR 21.143 and the terms of approval requested to be issued under CAR 21.151.

### **CAR 21.135 Issue of production organisation approval**

An organisation shall be entitled to have a production organisation approval issued by the Authority when it has demonstrated compliance with the applicable requirements under this Subpart.

### **CAR 21.139 Quality system**

- (a) The production organisation shall demonstrate that it has established and is able to maintain a quality system. The quality system shall be documented. This quality system shall be such as to enable the organisation to ensure that each product, part or appliance produced by the organisation or by its partners, or supplied from or subcontracted to outside parties, conforms to the applicable design data and is in condition for safe operation, and thus exercise the privileges set forth in CAR 21.163.
- (b) The quality system shall contain:
  - 1. As applicable within the scope of approval, control procedures for:

- (i) Document issue, approval, or change.
- (ii) Vendor and subcontractor assessment audit and control.
- (iii) Verification that incoming products, parts, materials, and equipment, including items supplied new or used by buyers of products, are as specified in the applicable design data.
- (iv) Identification and traceability.
- (v) Manufacturing processes.
- (vi) Inspection and testing, including production flight tests.
- (vii) Calibration of tools, jigs, and test equipment.
- (viii) Non conforming item control.
- (ix) Airworthiness coordination with the applicant for, or holder of, the design approval.
- (x) Records completion and retention.
- (xi) Personnel competence and qualification.
- (xii) Issue of airworthiness release documents.
- (xiii) Handling, storage and packing.
- (xiv) Internal quality audits and resulting corrective actions.
- (xv) Work within the terms of approval performed at any location other than the approved facilities.
- (xvi) Work carried out after completion of production but prior to delivery, to maintain the aircraft in a condition for safe operation.
- (xvii) Issue of permit to fly and approval of associated flight conditions. The control procedures need to include specific provisions for any critical parts.

2. An independent quality assurance function to monitor compliance with, and adequacy of, the documented procedures of the quality system. This monitoring shall include a feedback system to the person or group of persons referred to in CAR 21.145(c)(2) and ultimately to the manager referred to in CAR 21.145 (c)(1) to ensure, as necessary, corrective action.

### **CAR 21.143 Exposition**

(a) The organisation shall submit to the Authority a production organisation exposition providing the following information:

1. A statement signed by the accountable manager confirming that the production organisation exposition and any associated manuals which define the approved organisation's compliance with this Subpart will be complied with at all times.
2. The title(s) and names of managers accepted by the Authority in accordance with CAR 21.145(c)(2).

3. The duties and responsibilities of the manager(s) as required by CAR 21.145(c)(2) including matters on which they may deal directly with the Authority on behalf of the organisation.
4. An organisational chart showing associated chains of responsibility of the managers as required by CAR 21.145(c)(1) and (2).
5. A list of certifying staff as referred to in CAR 21.145(d).
6. A general description of man-power resources.
7. A general description of the facilities located at each address specified in the production organisation's certificate of approval.
8. A general description of the production organisation's scope of work relevant to the terms of approval.
9. The procedure for the notification of organisational changes to the Authority.
10. The amendment procedure for the production organisation exposition.
11. A description of the quality system and the procedures as required by CAR 21.139(b)(1).
12. A list of those outside parties referred to in CAR 21.139(a).

(b) The production organisation exposition shall be amended as necessary to remain an up-to-date description of the organisation, and copies of any amendments shall be supplied to the Authority.

#### **CAR 21.145 Approval requirements**

The production organisation shall demonstrate, on the basis of the information submitted in accordance with CAR 21.143 that:

- (a) with regard to general approval requirements, facilities, working conditions, equipment and tools, processes and associated materials, number and competence of staff, and general organisation are adequate to discharge obligations under CAR 21.165.
- (b) with regard to all necessary airworthiness, noise, fuel venting and exhaust emissions data:
  1. The production organisation is in receipt of such data from the Authority, and from the holder of, or applicant for, the type-certificate, restricted type-certificate or design approval, to determine conformity with the applicable design data.
  2. The production organisation has established a procedure to ensure that airworthiness, noise, fuel venting and exhaust emissions data are correctly incorporated in its production data.
  3. Such data are kept up to date and made available to all personnel who need access to such data to perform their duties.
- (c) with regard to management and staff:
  1. A manager has been nominated by the production organisation, and is accountable to the Authority. His or her responsibility within the organisation shall consist of ensuring that all production is performed to the required standards and that the production organisation is

continuously in compliance with the data and procedures identified in the exposition referred to in CAR 21.143.

2. A person or group of persons have been nominated by the production organisation to ensure that the organisation is in compliance with the requirements of this Part, and are identified, together with the extent of their Authority. Such person(s) shall act under the direct Authority of the accountable manager referred to in subparagraph 1. The persons nominated shall be able to show the appropriate knowledge, background and experience to discharge their responsibilities.
3. Staff at all levels have been given appropriate Authority to be able to discharge their allocated responsibilities and that there is full and effective coordination within the production organisation in respect of airworthiness, noise, fuel venting and exhaust emission data matters.

(d) with regard to certifying staff, authorised by the production organisation to sign the documents issued under CAR 21.163 under the scope or terms of approval.

1. The knowledge, background (including other functions in the organisation), and experience of the certifying staff are appropriate to discharge their allocated responsibilities.
2. The production organisation maintains a record of all certifying staff which shall include details of the scope of their authorisation.
3. Certifying staff are provided with evidence of the scope of their authorisation.

#### **CAR 21.147 Changes to the approved production organisation**

- (a) After the issue of a production organisation approval, each change to the approved production organisation that is significant to the showing of conformity or to the airworthiness and characteristics of noise, fuel venting and exhaust emissions of the product, part or appliance, particularly changes to the quality system, shall be approved by the Authority. An application for approval shall be submitted in writing to the Authority and the organisation shall demonstrate to the Authority before implementation of the change that it will continue to comply with this Subpart.
- (b) The Authority shall establish the conditions under which a production organisation approved under this Subpart may operate during such changes unless the Authority determines that the approval should be suspended.

#### **CAR 21.148 Changes of location**

A change of the location of the manufacturing facilities of the approved production organisation shall be deemed of significance and therefore shall comply with CAR 21.147.

#### **CAR 21.149 Transferability**

Except as a result of a change in ownership, which is deemed significant for the purposes of CAR 21.147, a production organisation approval is not transferable.

**CAR 21.151 Terms of approval**

The terms of approval shall identify the scope of work, the products or the categories of parts and appliances, or both, for which the holder is entitled to exercise the privileges under CAR 21.163. Those terms shall be issued as part of a production organisation approval.

**CAR 21.153 Changes to the terms of approval**

Each change to the terms of approval shall be approved by the Authority. An application for a change to the terms of approval shall be made in a form and manner established by the Authority. The applicant shall comply with the applicable requirements of this Subpart.

**CAR 21.157 Investigations**

A production organisation shall make arrangements that allow the Authority to make any investigations, including investigations of partners and subcontractors, necessary to determine compliance and continued compliance with the applicable requirements of this Subpart.

**CAR 21.158 - Findings**

- (a) When objective evidence is found showing non compliance of the holder of a production organisation approval with the applicable requirements of this regulation, the finding shall be classified as follows:
  - 1. A level one finding is any non-compliance with this regulation which could lead to uncontrolled non-compliances with applicable design data and which could affect the safety of the aircraft.
  - 2. A level two finding is any non-compliance with this regulation which is not classified as level one.
- (b) A level three finding is any item where it has been identified, by objective evidence, to contain potential problems that could lead to a non-compliance under paragraph (a).
- (c) After receipt of notification of findings,
  - 1. In case of a level one finding, the holder of the production organisation approval shall demonstrate corrective action to the satisfaction of the Authority within a period of no more than 21 working days after written confirmation of the finding.
  - 2. In case of level two findings, the corrective action period granted by the Authority shall be appropriate to the nature of the finding but in any case initially shall not be more than six months. In certain circumstances and subject to the nature of the finding the Authority may extend the six month period subject to a satisfactory corrective action plan agreed by the Authority.

3. A level three finding shall not require immediate action by the holder of the production organisation approval.

(d) In case of level one or level two findings, the production organisation approval may be subject to a partial or full limitation, suspension or revocation. The holder of the production organisation approval shall provide confirmation of receipt of the notice of limitation, suspension or revocation of the production organisation approval in a timely manner.

#### **CAR 21.159 Duration and continued validity**

(a) A production organisation approval shall be issued for a period of one year duration. It shall remain valid unless:

1. The production organisation fails to demonstrate compliance with the applicable requirements of this Subpart; or
2. The Authority is prevented by the holder or any of its partners or subcontractors to perform the investigations in accordance with CAR 21.157; or
3. There is evidence that the production organisation cannot maintain satisfactory control of the manufacture of products, parts or appliances under the approval; or
4. The production organisation no longer meets the requirements of CAR 21.133; or
5. The certificate has been surrendered or revoked.

(b) Upon surrender or revocation, the certificate shall be returned to the Authority.

#### **CAR 21.163 Privileges**

Pursuant to the terms of approval issued under CAR 21.135, the holder of a production organisation approval may:

- (a) Perform production activities under this Part.
- (b) In the case of complete aircraft and upon presentation of a Statement of Conformity (Form AWF-POA-52) under CAR 21.174, obtain an aircraft certificate of airworthiness and a noise certificate without further showing.
- (c) In the case of other products, parts or appliances issue authorised release certificates (AW Form 1) without further showing.
- (d) Maintain a new aircraft that it has produced and issue a certificate of release to service (Form AWF-POA-53) in respect of that maintenance.
- (e) Under procedures agreed with the authority for production, for an aircraft it has produced and when the production organisation itself is controlling under its POA the configuration of the aircraft and is attesting conformity with the design conditions approved for the flight, to issue a permit to fly in accordance with CAR 21.711(c) including approval of the flight conditions in accordance with CAR 21.710 (b).

#### **CAR 21.165 Obligations of the holder**

The holder of a production organisation approval shall:

- (a) Ensure that the production organisation exposition furnished in accordance with point CAR 21.143 and the documents to which it refers, are used as basic working documents within the organisation.
- (b) Maintain the production organisation in conformity with the data and procedures approved for the production organisation approval.
- (c)
  - 1. Determine that each completed aircraft conforms to the type design and is in condition for safe operation prior to submitting Statements of Conformity to the Authority, or
  - 2. Determine that other products, parts or appliances are complete and conform to the approved design data and are in a condition for safe operation before issuing an AW Form 1 to certify conformity to approved design data and condition for safe operation,
  - 3. Additionally in case of engines, determine that the completed engine is in compliance with the applicable emissions requirements on the date of manufacture of the engine;
  - 4. Determine that other products, parts or appliances conform to the applicable data before issuing an AW Form 1 as a conformity certificate;
- (d) Record all details of work carried out.
- (e) Establish and maintain an internal occurrence reporting system in the interest of safety, to enable the collection and assessment of occurrence reports in order to identify adverse trends or to address deficiencies, and to extract reportable occurrences. This system shall include evaluation of relevant information relating to occurrences and the promulgation of related information.
- (f)
  - 1. Report to the holder of the type-certificate or design approval, all cases where products, parts or appliances have been released by the production organisation and subsequently identified to have possible deviations from the applicable design data, and investigate with the holder of the type-certificate or design approval in order to identify those deviations which could lead to an unsafe condition.
  - 2. Report to the Authority the deviations which could lead to an unsafe condition identified according to point (1). Such reports shall be made in a form and manner established by the Authority under point CAR 21.3(b)(2).
  - 3. Where the holder of the production organisation approval is acting as a supplier to another production organisation, report also to that other organisation all cases where it has released products, parts or appliances to that organisation and subsequently identified them to have possible deviations from the applicable design data.
- (g) Provide assistance to the holder of the type-certificate or design approval in dealing with any continuing airworthiness actions that are related to the products parts or appliances that have been produced.
- (h) Establish an archiving system incorporating requirements imposed on its partners, suppliers and subcontractors, ensuring conservation of the data used to justify conformity of the products, parts or appliances. Such data shall be held at the disposal of the Authority and be retained in order to provide the information necessary to ensure the continuing airworthiness of the products, parts or appliances.

- (i) Where, under its terms of approval, the holder issues a certificate of release to service, determine that each completed aircraft has been subjected to necessary maintenance and is in condition for safe operation, prior to issuing the certificate.
- (j) Where applicable, under the privilege of CAR 21.163(e), determine the conditions under which a permit to fly can be issued.
- (k) Where applicable, under the privilege of CAR 21.163(e), establish compliance with CAR 21.711(c) and (e) before issuing a permit to fly to an aircraft.

## **SUBPART H - CERTIFICATES OF AIRWORTHINESS AND RESTRICTED CERTIFICATES OF AIRWORTHINESS**

### **CAR 21.171 Scope**

This Subpart establishes the procedural requirements for issuing airworthiness certificates.

### **CAR 21.172 Eligibility**

Any natural or legal person under whose name an aircraft is registered or will be registered, or his representative, shall be eligible as an applicant for an airworthiness certificate for that aircraft under this Subpart.

### **CAR 21.173 Classification**

Airworthiness certificates shall be classified as follows:

- (a) Certificates of airworthiness shall be issued to aircraft which conform to a type-certificate or type acceptance certificate that has been issued in accordance with this regulation
- (b) Restricted certificates of airworthiness shall be issued to aircraft:
  - 1. which conform to a restricted type-certificate or type acceptance certificate that has been issued in accordance with this Regulation; or
  - 2. which have been shown to the Authority to comply with specific airworthiness specifications ensuring adequate safety.

### **CAR 21.174 Application**

- (a) Pursuant to CAR 21.172, an application for an airworthiness certificate shall be made in a form and manner established by the Authority.
- (b) Each application for a certificate of airworthiness or restricted certificate of airworthiness shall include:
  - 1. the class of airworthiness certificate applied for;
  - 2. with regard to new aircraft;

- (i) A statement of conformity:
  - issued under CAR 21.163(b), or
  - issued under CAR 21.130 and validated by the Authority,
  - or, for an imported aircraft, a statement signed by the exporting Authority that the aircraft conforms to a design approved by the Authority
- (ii) A weight and balance report with a loading schedule.
- (iii) The flight manual, when required by the applicable certification specifications for the particular aircraft.

3. with regard to used aircraft:

- a statement by the Authority of the State where the aircraft is, or was, registered, reflecting the airworthiness status of the aircraft on its register at time of transfer.
- a weight and balance report with a loading schedule.
- the flight manual when such material is required by the applicable airworthiness code for the particular aircraft.
- historical records to establish the production, modification, and maintenance standard of the aircraft, including all limitations associated with a restricted certificate of airworthiness..
- a recommendation for the issuance of a certificate of airworthiness or restricted certificate of airworthiness and an airworthiness review certificate following an airworthiness review in accordance with CAR M.

(c) Unless otherwise agreed, the statements referred to in subparagraphs (b)(2)(i) and (b)(3) shall be issued no more than 60 days before presentation of the aircraft to the Authority.

#### **CAR 21.175 Language**

(a) The manuals, placards, listings, and instrument markings and other necessary information required by applicable certification specifications shall be presented in English language.

#### **CAR 21.177 Amendment or modification**

An airworthiness certificate may be amended or modified only by the Authority.

#### **CAR 21.179 Transferability**

(a) Where the ownership of an aircraft has changed and if it remains on the register the certificate of airworthiness or restricted certificate of airworthiness conforming to restricted type certificate shall be transferred with the aircraft.

(b) Where ownership of an aircraft has changed and the aircraft has a restricted certificate of airworthiness not conforming to a restricted type certificate as per CAR 21.173(b)(2) shall be transferred together with the aircraft provided the aircraft remains on the register.

**CAR 21.180 Inspections**

The holder of the airworthiness certificate shall provide access to the aircraft for which that airworthiness certificate has been issued upon request by the Authority.

**CAR 21.181 Duration and continued validity**

- (a) An airworthiness certificate shall be issued for an unlimited duration. It shall remain valid subject to:
  - 1. compliance with the applicable type-design and continuing airworthiness requirements; and
  - 2. the type-certificate, restricted type-certificate or type acceptance certificate under which it is issued not being previously invalidated under CAR 21.51 or CAR 21.76.
  - 3. the certificate not being surrendered or revoked.
  - 4. ARC remains valid.
- (b) Upon surrender or revocation, the certificate shall be returned to the Authority.

**CAR 21.182 Aircraft identification**

Each applicant for an airworthiness certificate under this Subpart shall demonstrate that his aircraft is identified in accordance with Subpart Q of this regulation.

**CAR 21.183 Issue of certificates of airworthiness**

- (a) The Authority shall issue a certificate of airworthiness for:
  - 1. new aircraft:
    - (i) Upon presentation of the documentation required by CAR 21.174(b)(2).
    - (ii) When the aircraft conforms to an approved design and is in condition for safe operation. This may include inspections by the Authority.
  - 2. used aircraft:
    - (i) upon presentation of the documentation required by CAR 21.174(b)(3) demonstrating that:
      - the aircraft conforms to a type design approved under a type-certificate or type acceptance certificate and any supplemental type-certificate, change or repair approved in accordance with this Part, and to applicable airworthiness directives, and
      - the aircraft has been inspected in accordance with the applicable provisions of CAR M; and
    - (ii) when the aircraft conforms to an approved design and is in condition for safe operation. This may include inspections by the Authority.

**CAR 21.184 Issue of restricted certificates of airworthiness**

- (a) The Authority shall issue a restricted certificate of airworthiness for:

1. new aircraft, upon presentation of the documentation required by CAR 21.174(b)(2) demonstrating that the aircraft conforms to a design approved by the Authority under a restricted type-certificate or type acceptance certificate or in accordance with specific airworthiness specifications, and is in condition for safe operation.
2. used aircraft:
  - (i) upon presentation of the documentation required by CAR 21.174(b)(3) demonstrating that:
    - the aircraft conforms to a design approved by the Authority under a restricted type-certificate or type acceptance certificate or in accordance with specific certification specifications, and
    - the applicable airworthiness directives have been complied with, and
    - the aircraft has been inspected in accordance with the appropriate provisions of CAR M; and
  - (ii) when the Authority is satisfied that the aircraft conforms to the approved design and is in condition for safe operation. This may include inspections by the Authority.

(b) For an aircraft that cannot comply with the essential requirements referred to in the Regulation and which is not eligible for a restricted type-certificate, the Authority shall, as necessary to take account of deviations from these essential requirements:

1. issue and check compliance with specific airworthiness specifications ensuring adequate safety with regard to the intended use, and
2. specify limitations for use of this aircraft.

(c) Limitations for use will be associated with restricted certificates of airworthiness including airspace restrictions as necessary to take account of deviations from essential requirements for airworthiness laid down in the Regulation.

## SUBPART I - NOISE CERTIFICATES

### **CAR 21.201 Scope**

This Subpart establishes the procedural requirements for issuing noise certificates.

### **CAR 21.203 Eligibility**

Any natural or legal person under whose name an aircraft is registered or will be registered, or his representative, shall be eligible as an applicant for a noise certificate for that aircraft under this Subpart.

### **CAR 21.204 Application**

- (a) Pursuant to CAR 21.203, an application for a noise certificate shall be made in a form and manner established by the Authority.
- (b) Each application shall include:
  - 1. with regard to new aircraft:
    - (i) A statement of conformity:
      - issued under CAR 21.163(b), or
      - issued under CAR 21.130 and validated by the Authority
    - (ii) The noise information determined in accordance with the applicable noise requirements.
  - 2. with regard to used aircraft:
    - (i) The noise information determined in accordance with the applicable noise requirements, and
    - (ii) Historical records to establish the production, modification, and maintenance standard of the aircraft.
- (c) Unless otherwise agreed, the statements referred to in subparagraphs (b)(1) shall be issued no more than 60 days before presentation of the aircraft to the Authority.

### **CAR 21.205 Issue of noise certificates**

The Authority shall issue a noise certificate upon presentation of the documents required by CAR 21.204(b) and in accordance with CAR V chapter 1 section 4.

### **CAR 21.207 Amendment or modification**

A noise certificate may be amended or modified only by the Authority.

### **CAR 21.209 Transferability**

Where ownership of an aircraft has changed the noise certificate shall be transferred together with the aircraft.

**CAR 21.210 Inspections**

The holder of the noise certificate shall provide access to the aircraft for which that noise certificate has been issued upon request by the Authority for inspection.

**CAR 21.211 Duration and continued validity**

- (a) A noise certificate shall be issued for an unlimited duration. It shall remain valid subject to:
  - 1. compliance with the applicable type-design, environmental protection and continuing airworthiness requirements; and
  - 2. the type-certificate or restricted type-certificate under which it is issued not being previously invalidated under CAR 21.51.
  - 3. the certificate not being surrendered or revoked.
- (b) Upon surrender or revocation, the certificate shall be returned to the Authority.

**SUBPART J - DESIGN ORGANISATION APPROVAL****CAR 21.231 Scope**

This Subpart establishes the procedural requirements for the approval of design organisations and rules governing the rights and obligations of applicants for, and holders of, such approvals.

**CAR 21.233 Eligibility**

Any natural or legal person ("organisation") shall be eligible as an applicant for an approval under this Subpart:

- (a) in accordance with CAR 21.14, CAR 21.112B, CAR 21.432B or CAR 21.602B; or
- (b) for approval of minor changes or minor repair design, when requested for the purpose of obtaining privileges under CAR 21.263.

**CAR 21.234 Application**

Each application for a design organisation approval shall be made in a form and manner established by the Authority and shall include an outline of the information required by CAR 21.243, and the terms of approval requested to be issued under CAR 21.251.

**CAR 21.235 Issue of design organisation approval**

An organisation shall be entitled to have a design organisation approval issued by the Authority when it has demonstrated compliance with the applicable requirements under this Subpart.

**CAR 21.239 Design assurance system**

- (a) The design organisation shall demonstrate that it has established and is able to maintain a design assurance system for the control and supervision of the design, and of design changes, of products, parts and appliances covered by the application. This design assurance system shall be such as to enable the organisation:

1. To ensure that the design of the products, parts and appliances or the design change thereof, comply with the applicable type-certification basis, the applicable operational suitability data certification basis and environmental protection requirements; and
2. To ensure that its responsibilities are properly discharged in accordance with:
  - (i) The appropriate provisions of this Part; and
  - (ii) The terms of approval issued under CAR 21.251.
3. To independently monitor the compliance with, and adequacy of, the documented procedures of the system. This monitoring shall include a feed-back system to a person or a group of persons having the responsibility to ensure corrective actions.

(b) The design assurance system shall include an independent checking function of the showings of compliance on the basis of which the organisation submits compliance statements and associated documentation to the Authority.

(c) The design organisation shall specify the manner in which the design assurance system accounts for the acceptability of the parts or appliances designed or the tasks performed by partners or subcontractor according to methods which are the subject of written procedures.

#### **CAR 21.243 Data**

- (a) The design organisation shall furnish a handbook to the Authority describing, directly or by cross-reference, the organisation, the relevant procedures and the products or changes to products to be designed.
- (b) Where any parts or appliances or any changes to the products are designed by partner organisations or subcontractors, the handbook shall include a statement of how the design organisation is able to give, for all parts and appliances, the assurance of compliance required by CAR 21.239(b), and shall contain, directly or by cross-reference, descriptions and information on the design activities and organisation of those partners or subcontractors, as necessary to establish this statement.
- (c) The handbook shall be amended as necessary to remain an up-to-date description of the organisation, and copies of amendments shall be supplied to the Authority.
- (d) The design organisation shall furnish a statement of the qualifications and experience of the management staff and other persons responsible for making decisions affecting airworthiness and environmental protection in the organisation.

#### **CAR 21.245 Approval requirements**

The design organisation shall demonstrate, on the basis of the information submitted in accordance with point CAR 21.243 that, in addition to complying with point CAR 21.239:

- (a) The staff in all technical departments are of sufficient numbers and experience and have been given appropriate authority to be able to discharge their allocated responsibilities and these, together with the accommodation, facilities and equipment are adequate to enable the staff to achieve the airworthiness, operational suitability and environmental protection objectives for the product.

- (b) There is full and efficient coordination between departments and within departments in respect of airworthiness, operational suitability and environmental protection matters.

#### **CAR 21.247 Changes in design assurance system**

After the issue of a design organisation approval, each change to the design assurance system that is significant to the showing of compliance or to the airworthiness, operational suitability and environmental protection of the product, shall be approved by the Authority. An application for approval shall be submitted in writing to the Authority and the design organisation shall demonstrate to the Authority, on the basis of submission of proposed changes to the handbook, and before implementation of the change, that it will continue to comply with this Subpart after implementation.

#### **CAR 21.249 Transferability**

Except as a result of a change in ownership, which is deemed significant for the purposes of CAR 21.247, a design organisation approval is not transferable.

#### **CAR 21.251 Terms of approval**

The terms of approval shall identify the types of design work, the categories of products, parts and appliances for which the design organisation holds a design organisation approval, and the functions and duties that the organisation is approved to perform in regard to the airworthiness, operational suitability and characteristics of noise, fuel venting and exhaust emissions of products. For design organisation approval covering type-certification or UAE TSO authorisation for Auxiliary Power Unit (APU), the terms of approval shall contain in addition the list of products or APU. Those terms shall be issued as part of a design organisation approval.

#### **CAR 21.253 Changes to the terms of approval**

Each change to the terms of approval shall be approved by the Authority. An application for a change to the terms of approval shall be made in a form and manner established by the Authority. The design organisation shall comply with the applicable requirements of this Subpart.

#### **CAR 21.257 Investigations**

- (a) The design organisation shall make arrangements that allow the Authority to make any investigations, including investigations of partners and subcontractors, necessary to determine compliance and continued compliance with the applicable requirements of this Subpart.
- (b) The design organisation shall allow the Authority to review any report and make any inspection and perform or witness any flight and ground test necessary to check the validity of the compliance statements submitted by the applicant under CAR 21.239(b).

#### **CAR 21.258 - Findings**

- (a) When objective evidence is found showing non-compliance of the holder of a design organisation approval with the applicable requirements of this regulation, the finding shall be classified as follows:

1. A level one finding is any non-compliance with this regulation which could lead to uncontrolled non-compliances with applicable requirements and which could affect the safety of the aircraft.
2. A level two finding is any non-compliance with this Part which is not classified as level one.

(b) A level three finding is any item where it has been identified, by objective evidence, to contain potential problems that could lead to a non-compliance under paragraph (a).

(c) After receipt of notification of findings by the authority:

1. In case of a level one finding, the holder of the design organisation approval shall demonstrate corrective action to the satisfaction of the Authority within a period of no more than 21 working days after written confirmation of the finding.
2. In case of level two findings, the corrective action period granted by the authority shall be appropriate to the nature of the finding but in any case initially shall not be more than six months. In certain circumstances and subject to the nature of the finding the Authority may extend the six month period subject to a satisfactory corrective action plan agreed by the Authority.
3. A level three finding shall not require immediate action by the holder of the design organisation approval.

(d) In case of level one or level two findings, the design organisation approval may be subject to a partial or full suspension or revocation under the applicable administrative procedures established by the Authority. The holder of the design organisation approval shall provide confirmation of receipt of the notice of suspension or revocation of the design organisation approval in a timely manner.

#### **CAR 21.259 Duration and continued validity**

(a) A design organisation approval shall be issued for a period of one year duration. It shall remain valid unless:

1. The design organisation fails to demonstrate compliance with the applicable requirements of this Subpart; or
2. The Authority is prevented by the holder or any of its partners or subcontractors to perform the investigations in accordance with CAR 21.257; or
3. There is evidence that the design assurance system cannot maintain satisfactory control and supervision of the design of products or changes thereof under the approval; or
4. The certificate has been surrendered or revoked under the applicable administrative procedures established by the Authority.

(b) Upon surrender or revocation, the certificate shall be returned to the Authority.

**CAR 21.263 Privileges**

- (a) The holder of a design organisation approval shall be entitled to perform design activities under this Regulation and within its scope of approval.
- (b) Subject to CAR 21.257(b), the Authority shall accept without further verification the following compliance documents submitted by the applicant for the purpose of obtaining:
  - 1. the approval of flight conditions required for a permit to fly; or
  - 2. a type-certificate or approval of a major change to a type-certificate; or
  - 3. a supplemental type-certificate; or
  - 4. an UAE TSO authorisation under CAR 21.602B(b)(1) or
  - 5. a major repair design approval.
- (c) The holder of a design organisation approval shall be entitled, within his terms of approval and under the relevant procedures of the design assurance system:
  - 1. to classify changes to the type-certificate and repairs as "major" or "minor".
  - 2. to approve minor changes to the type-certificate and minor repairs.
  - 3. to issue information or instructions containing the following statement: The technical content of this document is approved under the authority of DOA ref. UAE.21J.[XXXX].
  - 4. to approve documentary changes to the aircraft flight manual and supplements, and issue such changes containing the following statement: Revision No [YY] to AFM (or supplement) ref. [ZZ], is approved under the authority of DOA ref. UAE.21J.[XXXX].
  - 5. to approve the design of major repairs to products for which it holds the type-certificate or the supplemental type-certificate.
  - 6. to approve the conditions under which a permit to fly can be issued in accordance with CAR 21.710(a)(2),
    - (i) except for initial flights of:- a new type of aircraft, or
      - an aircraft modified by a change that is or would be classified as a significant major change or significant STC, or
      - an aircraft whose flight and/or piloting characteristics may have been significantly modified;
    - (ii) except for permits to fly to be issued for the purpose of CAR 21.701(a)(15).
  - 7. to issue a permit to fly in accordance with CAR 21.711(b) for an aircraft it has designed or modified, or for which it has approved under CAR 21.263(c)(6) the conditions under which

the permit to fly can be issued, and when the design organisation itself is controlling under its Design Organisation Approval the configuration of the aircraft and is attesting conformity with the design conditions approved for the flight.

#### **CAR 21.265 Obligations of the holder**

The holder of a design organisation approval shall:

- (a) Maintain the handbook in conformity with the design assurance system;
- (b) Ensure that this handbook is used as a basic working document within the organisation;
- (c) Determine that the design of products, or changes or repairs thereof, as applicable, comply with applicable requirements and have no unsafe feature;
- (d) Except for minor changes or repairs approved under the privilege of CAR 21.263, provide to the Authority statements and associated documentation confirming compliance with paragraph (c); (e) Provide to the Authority information or instructions related to required actions under CAR 21.3B.
- (e) Provide to the Authority information or instructions related to required actions under point CAR 21.3B;
- (f) Where applicable, under the privilege of CAR 21.263(c)(6), determine the conditions under which a permit to fly can be issued.
- (g) Where applicable, under the privilege of CAR 21.263(c)(7), establish compliance with CAR 21.711(b) and (e) before issuing a permit to fly to an aircraft.

### **SUBPART K - PARTS AND APPLIANCES**

#### **CAR 21.301 Scope**

This Subpart establishes the procedural requirements relating to the approval of parts and appliances.

#### **CAR 21.303 Compliance with applicable requirements**

The showing of compliance of parts and appliances to be installed in a type-certificated product shall be made:

- (a) In conjunction with the type-certification procedural requirements of Subpart B, D or E for the product in which it is to be installed; or
- (b) Where applicable, under the UAE TSO authorisation procedural requirements of Subpart O; or
- (c) In the case of standard parts, in accordance with officially recognised Standards.

#### **CAR 21.305 Approval of parts and appliances**

In all cases where the approval of a part or appliance is explicitly required by law or Authority measures, the part or appliance shall comply with the applicable UAE TSO or with the specifications recognised as equivalent by the Authority in the particular case.

**CAR 21.307 Release of parts and appliances for installation**

No part or appliance (except a standard part), shall be eligible for installation in a type-certificated product unless it is:

- (a) Accompanied by an authorised release certificate (AW Form 1), certifying that the item was manufactured in conformity to approved design data and is in a condition for safe operation; and
- (b) Marked in accordance with Subpart Q.

**SUBPART L - RESERVED**

## **SUBPART M - REPAIRS**

### **CAR 21.431 Scope**

- (a) This Subpart establishes the procedural requirements for the approval of repair design, and establishes the rights and obligations of the applicants for, and holders of, those approvals.
- (b) A 'repair' means elimination of damage and/or restoration to an airworthy condition following initial release into service by the manufacturer of any product, part or appliance.
- (c) Elimination of damage by replacement of parts or appliances without the necessity for design activity shall be considered as a maintenance task and shall therefore require no approval under this Part.
- (d) A repair to an UAE TSO article shall be treated as a change to the UAE TSO design and shall be processed in accordance with CAR 21.611.

### **CAR 21.432A Eligibility**

- (a) Any natural or legal person that has demonstrated, or is in the process of demonstrating, its capability according to CAR 21.432B shall be eligible as an applicant for a major repair design approval under the conditions laid down in this Subpart.
- (b) Any natural or legal person shall be eligible to apply for approval of a minor repair design.

### **CAR 21.432B Demonstration of capability**

- (a) An applicant for a major repair design approval shall demonstrate his capability by holding a design organisation approval, issued by the Authority in accordance with Subpart J.
- (b) By way of derogation from paragraph (a), as an alternative procedure to demonstrate his capability, an applicant may seek the Authority agreement for the use of procedures setting out the specific design practices, resources and sequence of activities necessary to comply with this Subpart.

### **CAR 21.433 Repair design**

- (a) The applicant for approval of a repair design shall:
  1. Show compliance with the type-certification basis and environmental protection requirements incorporated by reference in the type-certificate or supplemental type-certificate, as applicable, or those in effect on the date of application (for repair design approval), plus any amendments to those certification specifications or special conditions the Authority finds necessary to establish a level of safety equal to that established by the type-certification basis incorporated by reference in the type-certificate or supplemental type-certificate.
  2. Submit all necessary substantiation data, when requested by the Authority.
  3. Declare compliance with the certification specifications and environmental protection requirements of subparagraph (a)(1).

- (b) Where the applicant is not the type-certificate or supplemental type-certificate holder, as applicable, the applicant may comply with the requirements of paragraph (a) through the use of his own resources or through an arrangement with the type-certificate or supplemental type-certificate holder as applicable.

#### **CAR 21.435 Classification of repairs**

- (a) A repair may be "major" or "minor". The classification shall be made in accordance with the criteria of point CAR 21.91 for a change in the type-certificate.
- (b) A repair shall be classified "major" or "minor" under paragraph (a) either:
  - 1. By the Authority, or
  - 2. By an appropriately approved design organisation under a procedure agreed with the Authority.

#### **CAR 21.437 Issue of a repair design approval**

When it has been declared and has been shown that the repair design meets the applicable certification specifications and environmental protection requirements of CAR 21.433(a)(1), it shall be approved:

- (a) by the Authority, or
- (b) by an appropriately approved organisation that is also the type-certificate or the supplemental type-certificate holder, under a procedure agreed with the Authority, or
- (c) for minor repairs only, by an appropriately approved design organisation under a procedure agreed with the Authority.

#### **CAR 21.439 Production of repair parts**

Parts and appliances to be used for the repair shall be manufactured in accordance with production data based upon all the necessary design data as provided by the repair design approval holder:

- (a) Under Subpart F, or
- (b) By an organisation appropriately approved in accordance with Subpart G, or
- (c) By an appropriately approved maintenance organisation.

#### **CAR 21.441 Repair embodiment**

- (a) The embodiment of a repair shall be made by an appropriately approved maintenance organisation, or by a production organisation appropriately approved in accordance with Subpart G, under CAR 21.163 privilege.
- (b) The design organisation shall transmit to the organisation performing the repair all the necessary installation instructions.

#### **CAR 21.443 Limitations**

A repair design may be approved subject to limitations, in which case the repair design approval shall include all necessary instructions and limitations. These instructions and limitations shall be transmitted by the repair design approval holder to the operator in accordance with a procedure agreed with the Authority.

**CAR 21.445 Unrepaired damage**

- (a) When a damaged product, part or appliance, is left unrepaired, and is not covered by previously approved data, the evaluation of the damage for its airworthiness consequences may only be made;
  - 1. by the Authority, or
  - 2. by an appropriately approved design organisation under a procedure agreed with the Authority. Any necessary limitations shall be processed in accordance with the procedures of CAR 21.443.
- (b) Where the organisation evaluating the damage under paragraph (a) is neither the Authority nor the type-certificate or supplemental type-certificate holder, this organisation shall justify that the information on which the evaluation is based is adequate either from its organisation's own resources or through an arrangement with the type-certificate or supplemental type-certificate holder, or manufacturer, as applicable.

**CAR 21.447 Record-keeping**

For each repair, all relevant design information, drawings, test reports, instructions and limitations possibly issued in accordance with CAR 21.443, justification for classification and evidence of the design approval, shall:

- (a) be held by the repair design approval holder at the disposal of the Authority, and
- (b) be retained by the repair design approval holder in order to provide the information necessary to ensure the continued airworthiness of the repaired products, parts or appliances.

**CAR 21.449 Instructions for continued airworthiness**

- (a) The holder of the repair design approval shall furnish at least one complete set of those changes to the instructions for continued airworthiness which result from the design of the repair, comprising descriptive data and accomplishment instructions prepared in accordance with the applicable requirements, to each operator of aircraft incorporating the repair. The repaired product, part or appliance may be released into service before the changes to those instructions have been completed, but this shall be for a limited service period, and in agreement with the Authority. Those changes to the instructions shall be made available on request to any other person required to comply with any of the terms of those changes to the instructions. The availability of some manual or portion of the changes to the instructions for continued airworthiness, dealing with overhaul or other forms of heavy maintenance, may be delayed until after the product has entered into service, but shall be available before any of the products reaches the relevant age or flight-hours/cycles.
- (b) If updates to those changes to the instructions for continued airworthiness are issued by the holder of the repair design approval after the repair has been first approved, these updates shall be furnished to each operator and shall be made available on request to any other person required to comply with any of the terms of those changes to the instructions. A program showing how updates to the changes to the instructions for continued airworthiness are distributed shall be submitted to the Authority.

**CAR 21.451 Obligations and UAE PA marking**

(a) Each holder of a major repair design approval shall:

1. undertake the obligations:
  - (i) laid down in CAR 21.3, CAR 21.3B, CAR 21.4, CAR 21.439, CAR 21.441, CAR 21.443, CAR 21.447 and CAR 21.449;
  - (ii) implicit in the collaboration with the type-certificate or supplemental type-certificate holder, or both, under CAR 21.433 (b), as appropriate.
2. specify the marking, including UAE PA ("UAE Part Approval") letters, in accordance with CAR 21.804(a).

(b) Except for type-certificate holders for which CAR 21.44 applies, the holder of a minor repair design approval shall:

1. undertake the obligations laid down in CAR 21.4, CAR 21.447 and CAR 21.449; and
2. specify the marking, including UAE PA letters, in accordance with CAR 21.804(a).

**SUBPART N - RESERVED**

**SUBPART O - UNITED ARAB EMIRATES (UAE) TECHNICAL STANDARD ORDER**  
**AUTHORISATIONS**

**CAR 21.601 Scope**

- (a) This Subpart establishes the procedural requirements for issuing UAE Technical Standard Order authorisations and the rules governing the rights and obligations of applicants for, or holders of, such authorisations.

**CAR 21.602A Eligibility**

Any natural or legal person that produces or is preparing to produce an UAE TSO article, and that has demonstrated, or is in the process of demonstrating, his capability under CAR 21.602B shall be eligible as an applicant for an UAE TSO authorisation.

**CAR 21.602B Demonstration of capability**

Any applicant for an UAE TSO authorisation shall demonstrate his capability as follows:

- (a) for production, by holding a production organisation approval, issued in accordance with Subpart G, or through compliance with Subpart F procedural requirements; and
- (b) for design:
  - 1. for an Auxiliary Power Unit, by holding a design organisation approval, issued by the Authority in accordance with Subpart J;
  - 2. for all other articles, by using procedures setting out the specific design practices, resources and sequence of activities necessary to comply with this Part.

**CAR 21.603 Application**

- (a) An application for an UAE TSO authorisation shall be made in a form and manner established by the Authority and shall include an outline of the information required by CAR 21.605.
- (b) When a series of minor changes in accordance with CAR 21.611 is anticipated, the applicant shall set forth in his application the basic model number of the article and the associated part numbers with open brackets after it to denote that suffix change letters or numbers (or combinations of them) will be added from time to time.

**CAR 21.604 UAE TSO Authorisation for an Auxiliary Power Unit (APU)**

With regard to UAE TSO authorisation for an Auxiliary Power Unit:

- (a) Points CAR 21.15, CAR 21.16B, CAR 21.17A, CAR 21.17B, CAR 21.20, CAR 21.21, CAR 21.31, CAR 21.33, CAR 21.44 shall apply by way of derogation from points CAR 21.603, CAR 21.606(c), CAR 21.610 and CAR 21.615, except that an UAE TSO Authorisation shall be issued in accordance with CAR 21.606 instead of the type-certificate;
- (b) Subpart D or Subpart E of this CAR 21 is applicable for the approval of design changes by way of derogation from point CAR 21.611. When Subpart E is used, a separate UAE TSO authorisation shall be issued instead of a supplemental type certificate.

**CAR 21.605 Data requirements**

The applicant shall submit the following documents, to the Authority:

- (a) A statement of compliance certifying that the applicant has met the requirements of this Subpart.
- (b) A Declaration of Design and Performance (DDP).
- (c) One copy of the technical data required in the applicable UAE TSO.
- (d) The exposition (or a reference to the exposition) referred to in CAR 21.143 for the purpose of obtaining an appropriate production organisation approval under Subpart G or the manual (or a reference to the manual) referred to in CAR 21.125A(b) for the purpose of manufacturing under Subpart F without production organisation approval.
- (e) For an APU, the handbook (or a reference to the handbook) referred to in CAR 21.243 for the purpose of obtaining an appropriate design organisation approval under Subpart J.
- (f) For all other articles, the procedures referred to in CAR 21.602B(b)(2).

**CAR 21.606 Issue of UAE TSO authorisation**

The applicant shall be entitled to have an UAE TSO authorisation issued by the Authority after:

- (a) demonstrating his capability in accordance with CAR 21.602B; and
- (b) demonstrating that the article complies with the technical conditions of the applicable UAE TSO, and submitting the corresponding statement of compliance.
- (c) Expressly stating that it is prepared to comply with CAR 21.609.

**CAR 21.607 UAE TSO authorisation privileges**

The holder of an UAE TSO authorisation is entitled to produce and to mark the article with the appropriate UAE TSO marking.

**CAR 21.608 Declaration of Design and Performance (DDP)**

- (a) The DDP shall contain at least the following information:
  1. Information corresponding to CAR 21.31(a) and (b), identifying the article and its design and testing standard.
  2. The rated performance of the article, where appropriate, either directly or by reference to other supplementary documents.
  3. A statement of compliance certifying that the article has met the appropriate UAE TSO.
  4. Reference to relevant test reports.
  5. Reference to the appropriate Maintenance, Overhaul and Repair Manuals.
  6. The levels of compliance, where various levels of compliance are allowed by the UAE TSO.
  7. List of deviations accepted in accordance with CAR 21.610.

- (b) The DDP shall be endorsed with the date and signature of the holder of the UAE TSO authorisation, or its authorised representative.

#### **CAR 21.609 Obligations of holders of UAE TSO authorisations**

The holder of an UAE TSO authorisation under this Subpart shall:

- (a) Manufacture each article in accordance with Subpart G or Subpart F that ensures that each completed article conforms to its design data and is safe for installation;
- (b) Prepare and maintain, for each model of each article for which an UAE TSO authorisation has been issued, a current file of complete technical data and records in accordance with CAR 21.613;
- (c) Prepare, maintain and update master copies of all manuals required by the applicable airworthiness specifications for the article;
- (d) Make available to users of the article and to the Authority on request those maintenance, overhaul and repair manuals necessary for the usage and maintenance of the article, and changes to those manuals;
- (e) Mark each article in accordance with CAR 21.807; and
- (f) Comply with CAR 21.3, CAR 21.3B and CAR 21.4.
- (g) Continue to meet the qualification requirements of CAR 21.602B.

#### **CAR 21.610 Approval for deviation**

- (a) Each manufacturer who requests approval to deviate from any performance standard of an UAE TSO shall demonstrate that the standards from which a deviation is requested are compensated for by factors or design features providing an equivalent level of safety.
- (b) The request for approval to deviate, together with all pertinent data, shall be submitted to the Authority.

#### **CAR 21.611 Design changes**

- (a) The holder of the UAE TSO authorisation may make minor design changes (any change other than a major change) without further authorisation by the Authority. In this case, the changed article keeps the original model number (part number changes or amendments shall be used to identify minor changes) and the holder shall forward to the Authority any revised data that are necessary for compliance with CAR 21.603(b).
- (b) Any design change by the holder of the UAE TSO authorisation that is extensive enough to require a substantially complete investigation to determine compliance with an UAE TSO is a major change. Before making such a change, the holder shall assign a new type or model designation to the article and apply for a new authorisation under CAR 21.603.
- (c) No design change by any natural or legal person other than the holder of the UAE TSO authorisation who submitted the statement of compliance for the article is eligible for approval under this Subpart O unless the person seeking the approval applies under CAR 21.603 for a separate UAE TSO authorisation.

**CAR 21.613 Record-keeping**

Further to the record keeping requirements appropriate to or associated with the quality system, all relevant design information, drawings and test reports, including inspection records for the article tested, shall be held at the disposal of the Authority and shall be retained in order to provide the information necessary to ensure the continued airworthiness of the article and of the type-certificated product in which it is fitted.

**CAR 21.615 Inspection by the Authority**

Upon a request of the Authority, each applicant for, or holder of an UAE TSO authorisation for an article shall allow the Authority to:

- (a) Witness any tests.
- (b) Inspect the technical data files on that article.

**CAR 21.619 Duration and continued validity**

- (a) An UAE TSO authorisation shall be issued for an unlimited duration. It shall remain valid unless:
  - 1. The conditions required when UAE TSO authorisation was granted are no longer being observed; or
  - 2. The obligations of the holder specified in CAR 21.609 are no longer being discharged; or
  - 3. The article has proved to give rise to unacceptable hazards in service; or
  - 4. The authorisation has been surrendered or revoked under the applicable administrative procedures established by the Authority.
- (b) Upon surrender or revocation, the certificate shall be returned to the Authority.

**CAR 21.621 Transferability**

Except for a change in ownership of the holder, which shall be regarded as a change of significance, and shall therefore comply with CAR 21.147 and CAR 21.247 as applicable, an UAE TSO authorisation issued under this Regulation is not transferable.

**SUBPART P - PRMIT TO FLY****CAR 21.701 Scope**

- (a) Permits to fly shall be issued in accordance with this Subpart to aircraft that do not meet, or have not been shown to meet, applicable airworthiness requirements but are capable of safe flight under defined conditions and for the following purposes within scope of Subpart G and Subpart J of this Regulation:
  - 1. development;

2. showing compliance with regulations or certification specifications;
3. design organisations or production organisations crew training;
4. production flight testing of new production aircraft;
5. flying aircraft under production between production facilities;
6. flying the aircraft for customer acceptance;
7. delivering or exporting the aircraft;
8. flying the aircraft for Authority acceptance;
9. market survey, including customer's crew training;
10. exhibition and air show;
11. flying the aircraft to a location where maintenance or airworthiness review are to be performed, or to a place of storage;
12. flying an aircraft at a weight in excess of its maximum certificated takeoff weight for flight beyond the normal range over water, or over land areas where adequate landing facilities or appropriate fuel is not available;
13. record breaking, air racing or similar competition;
14. flying aircraft meeting the applicable airworthiness requirements before conformity to the environmental requirements has been found;
15. for non-commercial flying activity on individual non-complex aircraft or types for which a certificate of airworthiness or restricted certificate of airworthiness is not appropriate.

(b) This Subpart establishes the procedure for issuing permits to fly and approving associated flight conditions, and establishes the rights and obligations of the applicants for, and holders of, those permits and approvals of flight conditions.

#### **CAR 21.703 Eligibility**

- (a) Any natural or legal person shall be eligible as an applicant for a permit to fly except for a permit to fly requested for the purpose of CAR 21.701(a)(15) where the applicant shall be the owner.
- (b) Any natural or legal person shall be eligible for application for the approval of the flight condition

**CAR 21.705 - Reserved****CAR 21.707 Application for permit to fly**

- (a) Pursuant to CAR 21.703 and when the applicant has not been granted the privilege to issue a permit to fly, an application for a permit to fly shall be made to the authority in a form and manner established by the authority.
- (b) Each application for a permit to fly shall include:
  - 1. the purpose(s) of the flight(s), in accordance with CAR 21.701;
  - 2. the ways in which the aircraft does not comply with the applicable airworthiness requirements;
  - 3. the flight conditions approved in accordance with CAR 21.710.
- (c) Where the flight conditions are not approved at the time of application for a permit to fly, an application for approval of the flight conditions shall be made in accordance with CAR 21.709.

**CAR 21.708 Flight conditions**

Flight conditions include:

- (a) the configuration(s) for which the permit to fly is requested;
- (b) any condition or restriction necessary for safe operation of the aircraft, including:
  - 1. the conditions or restrictions put on itineraries or airspace, or both, required for the flight(s);
  - 2. the conditions and restrictions put on the flight crew to fly the aircraft;
  - 3. the restrictions regarding carriage of persons other than flight crew;
  - 4. the operating limitations, specific procedures or technical conditions to be met;
  - 5. the specific flight test program (if applicable);
  - 6. the specific continuing airworthiness arrangements including maintenance instructions and regime under which they will be performed;
- (c) the substantiation that the aircraft is capable of safe flight under the conditions or restrictions of subparagraph (b);
- (d) the method used for the control of the aircraft configuration, in order to remain within the established conditions.

**CAR 21.709 Application for approval of flight conditions**

- (a) Pursuant to CAR 21.707(c) and when the applicant has not been granted the privilege to approve the flight conditions, an application for approval of the flight conditions shall be made to the Authority in a form and manner established by the Authority.
- (b) Each application for approval of the flight conditions shall include:
  - 1. the proposed flight conditions;
  - 2. the documentation supporting these conditions; and
  - 3. a declaration that the aircraft is capable of safe flight under the conditions or restrictions of paragraph CAR 21.708(b).

**CAR 21.710 Approval of flight conditions**

- (a) When approval of the flight conditions is related to the safety of the design, the flight conditions shall be approved by:
  - 1. the Authority; or
  - 2. an appropriately approved design organisation, under the privilege of CAR 21.263(c)(6).
- (b) When approval of the flight conditions is not related to the safety of the design, the flight conditions shall be approved by the Authority, or the appropriately approved organisation that will also issue the permit to fly.
- (c) Before approving the flight conditions, the Authority or the approved organisation must be satisfied that the aircraft is capable of safe flight under the specified conditions and restrictions. The Authority may make or require the applicant to make any necessary inspections or tests for that purpose.

**CAR 21.711 Issue of a permit to fly**

- (a) A permit to fly may be issued by the authority if it is satisfied that the applicable requirements of CAR 21 Subpart P have been met.
- (b) An appropriately approved design organisation may issue a permit to fly under the privilege granted under CAR 21.263(c)(7), when the flight conditions referred to in CAR 21.708 have been approved in accordance with CAR 21.710.
- (c) An appropriately approved production organisation may issue a permit to fly under the privilege granted under CAR 21.163(e), when the flight conditions referred to in CAR 21.708 have been approved in accordance with CAR 21.710.
- (d) Reserved.

- (e) The permit to fly shall specify the purpose(s) and any conditions and restrictions which have been approved in accordance with CAR 21.710.
- (f) For permits issued under (b), (c) or (d) a copy of the permit to fly and associated flight conditions shall be submitted to the Authority at the earliest opportunity but not later than 3 days.
- (g) Upon evidence that any of the conditions specified in CAR 21.723(a) are not met for a permit to fly that an organisation has issued pursuant to (b), (c) or (d), that organisation shall revoke that permit to fly immediately and inform without delay the Authority.

#### **CAR 21.713 Changes**

- (a) Any change that invalidates the flight conditions or associated substantiation established for the permit to fly shall be approved in accordance with CAR 21.710. When relevant an application shall be made in accordance with CAR 21.709.
- (b) A change affecting the content of the permit to fly requires the issuance of a new permit to fly in accordance with CAR 21.711.

#### **CAR 21.715 Language**

- (a) The manuals, placards, listings, and instrument markings and other necessary information required by applicable certification specifications shall be presented in English language.
- (b) Every safety related placards intended to be used by passengers and external emergency evacuation crew shall be in both Arabic and English scripts. Bilingual placards shall meet the applicable airworthiness requirements.

#### **CAR 21.719 Transferability**

- (a) A permit to fly is not transferable.
- (b) Notwithstanding subparagraph (a) for a permit to fly issued for the purpose of CAR 21.701(a)(15), where ownership of an aircraft has changed, the permit to fly shall be transferred together with the aircraft.

#### **CAR 21.721 Inspections**

The holder of, or the applicant for, a permit to fly shall provide access to the aircraft concerned at the request of the Authority.

#### **CAR 21.723 Duration and continued validity**

- (a) A permit to fly shall be issued for a maximum of 12 months and shall remain valid subject to:
  1. compliance with the conditions and restrictions of CAR 21.711(e) associated to the permit to fly;

2. the permit to fly not being surrendered or revoked;
3. the aircraft remaining on the same register.

(b) Notwithstanding subparagraph (a), a permit to fly issued for the purpose of CAR 21.701(a)(15) may be issued for unlimited duration.

(c) Upon surrender or revocation, the permit to fly shall be returned to the Authority.

**CAR 21.725 Renewal of permit to fly**

Renewal of the permit to fly shall be processed as a change in accordance with CAR 21.713.

**CAR 21.727 Obligations of the holder of a permit to fly**

The holder of a permit to fly shall ensure that all the conditions and restrictions associated with the permit to fly are satisfied and maintained.

**CAR 21.729 Record-keeping**

(a) All documents produced to establish and justify the flight conditions shall be held by the holder of the approval of the flight conditions at the disposal of the Authority and shall be retained in order to provide the information necessary to ensure the continued airworthiness of the aircraft.

(b) All documents associated to the issue of permits to fly under the privilege of approved organisations, including inspection records, documents supporting the approval of flight conditions and the permit to fly itself, shall be held by the related approved organisation at the disposal of the Authority and shall be retained in order to provide the information necessary to ensure the continued airworthiness of the aircraft.

## SUBPART Q - IDENTIFICATION OF PRODUCTS, PARTS AND APPLIANCES

### **CAR 21.801 Identification of products**

- (a) The identification of products shall include the following information:
  1. Manufacturer's name.
  2. Product designation.
  3. Manufacturer's Serial number.
  4. Any other information the Authority finds appropriate.
- (b) Any natural or legal person that manufactures an aircraft or engine under Subpart G or Subpart F shall identify that aircraft or engine by means of a fireproof plate that has the information specified in paragraph (a) marked on it by etching, stamping, engraving, or other approved method of fireproof marking. The identification plate shall be secured in such a manner that it is accessible and legible, and will not likely be defaced or removed during normal service, or lost or destroyed in an accident.
- (c) Any natural or legal person that manufactures a propeller, propeller blade, or propeller hub under Subpart G or Subpart F shall identify it by means of a plate, stamping, engraving, etching or other approved method of fireproof identification that is placed on it on a noncritical surface, contains the information specified in paragraph (a), and will not likely be defaced or removed during normal service or lost or destroyed in an accident.
- (d) For manned balloons, the identification plate prescribed in (b) shall be secured to the balloon envelope and shall be located, if practicable, where it is legible to the operator when the balloon is inflated. In addition, the basket, load frame assembly and any heater assembly shall be permanently and legibly marked with the manufacturer's name, part number, or equivalent, and serial number, or equivalent.

### **CAR 21.803 Handling of identification data**

- (a) No person shall remove, change, or place identification information referred to in CAR 21.801(a) on any aircraft, engine, propeller, propeller blade, or propeller hub, or in CAR 21.807(a) on an APU, without the approval of the Authority.
- (b) No person shall remove or install any identification plate referred to in CAR 21.801, or in CAR 21.807 for an APU, without the approval of the Authority.
- (c) By way of derogation from paragraphs (a) and (b), any natural or legal person performing maintenance work under the applicable associated implementing rules may, in accordance with methods, techniques and practices established by the Authority:
  1. Remove, change, or place the identification information referred to in CAR 21.801(a) on any aircraft, engine, propeller, propeller blade, or propeller hub, or in CAR 21.807(a) on an APU; or
  2. Remove an identification plate referred to in CAR 21.801, or CAR 21.807 for an APU, when necessary during maintenance operations.

(d) No person shall install an identification plate removed in accordance with subparagraph (c)(2) on any aircraft, engine, propeller, propeller blade, or propeller hub other than the one from which it was removed.

**CAR 21.804 Identification of parts and appliances**

(a) Each part or appliance shall be marked permanently and legibly with:

1. a name, trademark, or symbol identifying the manufacturer in a manner identified by the applicable design data; and
2. the part number, as defined in the applicable design data; and
3. the letters UAE PA for parts or appliances produced in accordance with approved design data not belonging to the type-certificate holder of the related product, except for UAE TSO articles.

(b) By way of derogation from paragraph (a), if the Authority agrees that a part or appliance is too small or that it is otherwise impractical to mark a part or appliance with any of the information required by paragraph (a), the authorised release document accompanying the part or appliance or its container shall include the information that could not be marked on the part.

**CAR 21.805 Identification of critical parts**

In addition to the requirement of CAR 21.804, each manufacturer of a part to be fitted on a type-certified product which has been identified as a critical part shall permanently and legibly mark that part with a part number and a serial number.

**CAR 21.807 Identification of UAE TSO articles**

(a) Each holder of an UAE TSO authorisation under Subpart O shall permanently and legibly mark each article with the following information:

1. The name and address of the manufacturer;
2. The name, type, part number or model designation of the article;
3. The serial number or the date of manufacture of the article or both; and
4. The applicable UAE TSO number.

(b) By way of derogation from paragraph (a), if the Authority agrees that a part is too small or that it is otherwise impractical to mark a part with any of the information required by paragraph (a), the authorised release document accompanying the part or its container shall include the information that could not be marked on the part.

(c) Each person who manufactures an APU under Subpart G or Subpart F shall identify that APU by means of a fireproof plate that has the information specified in paragraph (a) marked on it by etching, stamping, engraving, or other approved method of fireproof marking. The identification plate shall be secured in such a manner that it is accessible and legible, and will not likely be defaced or removed during normal service, or lost or destroyed in an accident.

**Appendix I****Authorised Release Certificate - AW Form 1 referred CAR 21**

1. Approving Authority / Country		2. <b>AUTHORISED RELEASE CERTIFICATE</b> AW FORM 1			3. Form Tracking Number
4. Organisation Name and Address:					5. Work Order/Contract/Invoice
6. Item	7. Description	8. Part No.	9. Qty.	10. Serial No.	11. Status/Work
12. Remarks					
13a. Certifies that the items identified above were manufactured in conformity to: ü approved design data and are in a condition for safe operation ü non-approved design data specified in block 12		14a ü CAR145.A.50 Release to Service ü Other regulation specified in block 12 Certificates that unless otherwise specified in block 12, the work identified in block 11 and described in block 12, was accomplished in accordance with CAR145 and in respect to that			
13b. Authorised Signature		13c. Approval/ Authorisation Number	14b Authorised Signature		14c Certificate/Approval Ref. No.
13d. Name		13e. Date (dd mmm yyyy)	14d Name		14e Date (dd mmm yyyy)
USER/INSTALLER RESPONSIBILITIES  This certificate does not automatically constitute authority to install the item(s).  Where the user/installer performs work in accordance with regulations of an airworthiness authority different than the airworthiness authority specified in block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts items from the airworthiness authority specified in block 1.					

## Instructions for the use of AW Form 1

These instructions relate only to the use of the AW Form 1 for production purposes. Attention is drawn to Appendix II to CAR M which covers the use of the AW Form 1 for maintenance purposes.

### 1. PURPOSE AND USE

1.1. A primary purpose of the certificate is to declare the airworthiness of new aviation products, parts and appliances (hereafter referred to as "item (s)").

1.2. Correlation must be established between the certificate and the item(s). The originator must retain a certificate in a form that allows verification of the original data.

1.3. The certificate is acceptable to many airworthiness authorities, but may be dependent on bilateral agreements and/or the policy of the airworthiness authority. The "approved design data" mentioned in this certificate then means approved by the airworthiness authority of the importing country.

1.4. The certificate is not a delivery or shipping note. 1.5. Aircraft are not to be released using the certificate.

1.6. The certificate does not constitute approval to install the item on a particular aircraft, engine, or propeller but helps the end user determine its airworthiness approval status.

1.7. A mixture of production released and maintenance released items is not permitted on the same certificate.

1.8. A mixture of items certified in conformity with "approved data" and to "non-approved data" is not permitted on the same certificate.

### 2. GENERAL FORMAT

2.1. The certificate must comply with the format attached including block numbers and the location of each block. The size of each block may however be varied to suit the individual application, but not to the extent that would make the certificate un-recognisable.

2.2. The certificate must be in "landscape" format but the overall size may be significantly increased or decreased so long as the certificate remains recognisable and legible. If in doubt consult the authority.

2.3. The User/Installer responsibility statement can be placed on either side of the form. 2.4. All printing must be clear and legible to permit easy reading.

2.5. The certificate may either be pre-printed or computer generated but in either case the printing of lines and characters must be clear and legible and in accordance with the defined format.

2.6. The certificate should be in English.

2.7. The details to be entered on the certificate may be either machine/- computer printed or hand-written using block letters and must permit easy reading.

2.8. Limit the use of abbreviations to a minimum, to aid clarity.

2.9. The space remaining on the reverse side of the certificate may be used by the originator for any additional information but must not include any certification statement. Any use of the reverse side of the certificate must be referenced in the appropriate block on the front side of the certificate.

### 3. COPIES

3.1. There is no restriction in the number of copies of the certificate sent to the customer or retained by the originator.

### 4. ERROR(S) ON A CERTIFICATE

4.1. If an end-user finds an error(s) on a certificate, he must identify it/them in writing to the originator. The originator may issue a new certificate if they can verify and correct the error(s).

4.2. The new certificate must have a new tracking number, signature and date.

4.3. The request for a new certificate may be honored without re-verification of the item(s) condition. The new certificate is not a statement of current condition and should refer to the previous certificate in block 12 by the following statement: "This certificate corrects the error(s) in block(s) [enter block(s) corrected] of the certificate [enter original tracking number] dated [enter original issuance date] and does not cover conformity/condition/release to service'. Both certificates should be retained according to the retention period associated with the first.

### 5. COMPLETION OF THE CERTIFICATE BY THE ORIGINATOR

*Block 1 Approving Authority/country*

State the name and country of the authority under whose jurisdiction this certificate is issued.

*Block 2 AW Form 1 header*

"AUTORISED RELEASE CERTIFICATE AW FORM 1'

*Block 3 Form Tracking Number*

Enter the unique number established by the numbering system/procedure of the organisation identified in block 4; this may include alpha/numeric characters.

*Block 4 Organisation Name and Address*

Enter the full name and address of the production organisation releasing the item(s) covered by this certificate. Logos etc. of the organisation are permitted if they can be contained within the block.

*Block 5 Work Order/Contract/Invoice*

To facilitate customer traceability of the item(s), enter the work order number, contract number, invoice number, or similar reference number.

*Block 6 Item*

Enter line item numbers when there is more than one line item. This block permits easy cross-referencing to the Remarks block 12.

*Block 7 Description*

Enter the name or description of the item. Preference should be given to the term used in the instructions for continued airworthiness or maintenance data (e.g. Illustrated Parts Catalogue, Aircraft Maintenance Manual, Service Bulletin, Component Maintenance Manual).

*Block 8 Part Number*

Enter the part number as it appears on the item or tag/packaging. In case of an engine or propeller the type designation may be used.

*Block 9 Quantity*

State the quantity of items.

*Block 10 Serial Number*

If the item is required by regulation to be identified with a serial number, enter it here.

Additionally, any other serial number not required by regulation may also be entered. If there is no serial number identified on the item, enter 'N/A'.

*Block 11 Status/Work*

Enter either 'PROTOTYPE' or 'NEW'. Enter 'PROTOTYPE' for:

- (i) The production of a new item in conformity with non-approved design data.
- (ii) Re-certification by the organisation identified in block 4 of the previous certificate after alteration or rectification work on an item, prior to entry into service, (e.g. after incorporation of a design change, correction of a defect, inspection or test, or renewal of shelf-life.) Details of the original release and the alteration or rectification work are to be entered in block 12.

Enter 'NEW' for:

- (i) The production of a new item in conformity with the approved design data.
- (ii) Re-certification by the organisation identified in block 4 of the previous certificate after alteration or rectification work on an item, prior to entry into service, (e.g. after incorporation of a design change, correction of a defect, inspection or test, or renewal of shelf-life.) Details of the original release and the alteration or rectification work are to be entered in block 12.
- (iii) Re-certification by the product manufacturer or the organisation identified in block 4 of the previous certificate of items from 'prototype' (conformity only to non-approved data) to 'new' (conformity to approved data and in a condition for safe operation), subsequent to approval of the applicable design data, provided that the design data has not changed. The following statement must be entered in block 12: RE-CERTIFICATION OF ITEMS FROM  
'PROTOTYPE' TO 'NEW':

THIS DOCUMENT CERTIFIES THE APPROVAL OF THE DESIGN DATA [INSERT TC/STC NUMBER, REVISION LEVEL], DATED [INSERT DATE IF NECESSARY FOR IDENTIFICATION OF REVISION STATUS], TO WHICH THIS ITEM (THESE ITEMS) WAS (WERE) MANUFACTURED.

The box 'approved design data and are in a condition for safe operation' should be marked in block 13a.

(iv) The examination of a previously released new item prior to entry into service in accordance with a customer-specified standard or specification (details of which and of the original release are to be entered in block 12) or to establish airworthiness (an explanation of the basis of release and details of the original release are to be entered in block 12).

*Block 12 Remarks*

Describe the work identified in block 11, either directly or by reference to supporting documentation, necessary for the user or installer to determine the airworthiness of item(s) in relation to the work being certified. If necessary, a separate sheet may be used and referenced from the AW Form 1. Each statement must clearly identify which item(s) in block 6 it relates to. If there is no statement, state 'None'. Enter the justification for release to non-approved design data in block 12 (e.g. pending type-certificate, for test only, pending approved data). If printing the data from an electronic AW Form 1 any data not appropriate in other blocks should be entered in this block.

*Block 13a*

Mark only one of the two boxes:

1. Mark the 'approved design data and are in a condition for safe operation' box if the item(s) were manufactured using approved design data and found to be in a condition for safe operation.
2. Mark the 'non-approved design data specified in block 12' box if the item(s) were manufactured using applicable non-approved design data. Identify the data in block 12 (e.g. pending type-certificate, for test only, pending approved data). Mixtures of items released against approved and non-approved design data are not permitted on the same certificate.

*Block 13b Authorised Signature*

This space shall be completed with the signature of the authorised person. Only persons specifically authorised under the rules and policies of the competent authority are permitted to sign this block. To aid recognition, a unique number identifying the authorised person may be added.

*Block 13c Approval/Authorisation Number*

Enter the approval/authorisation number/reference. This number or reference is issued by the authority.

*Block 13d Name*

Enter the name of the person signing block 13b in a legible form.

*Block 13e Date*

Enter the date on which block 13b is signed, the date must be in the format dd = 2 digit day, mmm = first 3 letters of the month, yyyy = 4 digit year.

***Block 14a-14e***

General Requirements for blocks 14a-14e: Not used for production release. Shade, darken, or otherwise mark to preclude inadvertent or unauthorised use.

***User/Installer Responsibilities***

Place the following statement on the certificate to notify end users that they are not relieved of their responsibilities concerning installation and use of any item accompanied by the form:

"THIS CERTIFICATE DOES NOT AUTOMATICALLY CONSTITUTE AUTHORITY TO INSTALL. WHERE THE USER/INSTALLER PERFORMS WORK IN ACCORDANCE WITH REGULATIONS OF AN AIRWORTHINESS AUTHORITY DIFFERENT THAN THE AIRWORTHINESS AUTHORITY SPECIFIED IN BLOCK 1, IT IS ESSENTIAL THAT THE USER/INSTALLER ENSURES THAT HIS/HER AIRWORTHINESS AUTHORITY ACCEPTS ITEMS FROM THE AIRWORTHINESS AUTHORITY SPECIFIED IN BLOCK 1. STATEMENTS IN BLOCKS 13A AND 14A DO NOT CONSTITUTE INSTALLATION CERTIFICATION. IN ALL CASES AIRCRAFT MAINTENANCE RECORDS MUST CONTAIN AN INSTALLATION CERTIFICATION ISSUED IN ACCORDANCE WITH THE NATIONAL REGULATIONS

BY THE USER/INSTALLER BEFORE THE AIRCRAFT MAY BE FLOWN

**ACCEPTABLE MEANS OF COMPLIANCE  
AND  
GUIDANCE MATERIAL**

Acceptable Means of Compliance and Guidance Material for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations

*Intentionally Left Blank*

**SUBPART A - GENERAL****GM 21.3(a) - The system for collection, investigation and analysis of data**

In the context of that requirement the word “Collection” means, the setting up, of systems and procedures which will enable relevant malfunctions, failures and defects to be properly reported when they occur.

**AMC No 1 to 21.3(a) - Collection, investigation and analysis of data related to flammability reduction means (FRM) reliability**

Holders of a type certificate, restricted type certificate, supplemental type certificate and of any other relevant approval deemed to have been issued under CAR 21 and which have included a FRM in their design should assess on an ongoing basis the effects of aeroplane component failures on FRM reliability. This should be part of the system for collection, investigation and analysis of data required by 21.3 (a). The applicant/holder should do the following:

- (a) Demonstrate effective means to ensure collection of FRM reliability data. The means should provide data affecting FRM reliability, such as component failures.
- (b) Unless alternative reporting procedures are approved by the Authority, provide a report to the Authority every six months for the first five years after service introduction. After that period, continued reporting every six months may be replaced with other reliability tracking methods found acceptable to the Authority or eliminated if it is established that the reliability of the FRM meets, and will continue to meet, the exposure specifications of paragraph M25.1 of appendix M to CS25.
- (c) Develop service instructions or revise the applicable aeroplane manual, according to a schedule approved by the Authority, to correct any failures of the FRM that occur in service that could increase any fuel tank's Fleet Average Flammability Exposure to more than that specified by paragraph M25.1 of appendix M to CS25.

**AMC No 2 to 21.3(a) Collection, investigation and analysis of data related to ETOPS significant occurrences**

(1) Holders of a type-certificate, restricted type-certificate, supplemental type-certificate or any other relevant approval deemed to have been issued under CAR 21 and which includes extended range operation with two-engine aeroplane (ETOPS) capability should implement a specific tracking, reporting and resolution system for ETOPS significant occurrences, suitable to ensure the initial and continued fleet compliance with the applicable ETOPS reliability objectives. This system should be part of the system for collection, investigation and analysis of data required by 21.3(a). Appropriate coordination should exist between Engine TC holder, propeller TC holder and APU UAE TSO approval holder with the aircraft TC holder to ensure compliance with the ETOPS reliability objectives.

(2) For tracking, reporting and resolution of ETOPS significant occurrences refer to applicable guidelines.

**GM 21.3(b) - Occurrence reporting**

For occurrence reporting, refer to EASA AMC 20-8, in AMC 20.

**AMC 21.3(b)(2) - Reporting to the authority**

Within the overall limit of 72 hours the degree of urgency for submission of a report should be determined by the level of hazard judged to have resulted from the occurrence.

Where an occurrence is judged by the person identifying the possible unsafe condition to have resulted in an immediate and particularly significant hazard the Authority expects to be advised immediately and by the fastest possible means (telephone, fax, email, telex, etc.) of whatever details are available at that time. This initial report shall be followed up by a full written report within 72 hours. A typical example would be an uncontained engine failure resulting in damage to aircraft primary structure.

Where the occurrence is judged to have resulted in a less immediate and less significant hazard, report submission may be delayed up to the maximum of three days in order to provide more details.

**GM 21.3B(d)(4) - Defect correction - Sufficiency of proposed corrective action**

This GM provides guidelines to assist in establishing rectification campaigns to remedy discovered defects.

**1. Status**

This document contains GM of a general nature for use in conjunction with engineering judgment, to aid airworthiness engineers in reaching decisions in the state of technology at the material time.

While the main principles of this GM could be applied to small private airplanes, helicopters, etc. the numerical values chosen for illustration are appropriate to large airplanes for public transport.

**2. Introduction**

2.1 Over the years, target airworthiness risk levels underlying airworthiness requirements have developed on the basis of traditional qualitative airworthiness approaches; they have been given more precision in recent years by being compared with achieved airworthiness levels (judged from accident statistics) and by the general deliberations and discussions which accompanied the introduction of rational performance requirements, and more recently, the Safety Assessment approach in requirements. Although the target airworthiness risk level tends to be discussed as a single figure (a fatal accident rate for airworthiness reasons of not more than 1 in 10,000,000 flights/flying hours for large airplanes) it has to be recognised that the requirements when applied to particular aircraft types will result in achieved airworthiness levels at certification lying within a band around the target level and that thereafter, for particular aircraft types and for particular aircraft, the achieved level will vary within that band from time to time.

2.2 The achieved airworthiness risk levels can vary so as to be below the target levels, because it is difficult if not impossible to design to the minimum requirements without being in excess of requirements in many areas; also because aircraft are not always operated at the critical conditions (e.g., aircraft weight, cg position and operational speeds; environmental conditions - temperature, humidity, degree of turbulence). The achieved level may vary so as to be above the target level because of undetected variations in material standards or build standards, because of design deficiencies, because of encountering unforeseen combinations of failures and/or combinations of events, and because of unanticipated operating conditions or environmental conditions.

2.3 There is now a recognition of the need to attempt to monitor the conditions which tend to increase the level and to take appropriate corrective action when the monitoring indicates the need to do so in order to prevent the level rising above a predetermined "ceiling".

2.4 The Authority also has a duty in terms of providing the public with aviation services and therefore should consider the penalties associated with curtailment or even removal (by "grounding") of aviation services when establishing the acceptability of any potential variation in airworthiness level.

2.5 Thus, the purpose of this GM is:

- (a) To postulate basic principles which should be used to guide the course of actions to be followed so as to maintain an adequate level of airworthiness risk after a defect has occurred which, if uncorrected, would involve a potential significant increase of the level of risk for an aircraft type.
- (b) For those cases where it is not possible fully and immediately to restore an adequate level of airworthiness risk by any possible alleviating action such as an inspection or limitation, to state the criteria which should be used in order to assess the residual increase in risk and to limit it to an appropriate small fraction of the mean airworthiness through life risk.

### **3. Discussion**

3.1 Several parameters are involved in decisions on safety matters. In the past the cost of proposed action has often been compared with the notional 'risk cost', i.e. the cost of a catastrophe multiplied by its probability of occurrence.

3.2 This can be a useful exercise, but it should be held within the constraint of acceptable airworthiness risk levels, i.e., within airworthiness risk targets which represent the maximum levels of risk with which an aircraft design shall comply, i.e., in the upper part of the 'band'. Currently for large airplanes the mean airworthiness risk level is set at a catastrophe rate for airworthiness reasons of not more than one in every ten- million flights/flying hours. The constraint is overriding in that any option, which could be permitted on risk cost considerations, or other grounds, is unacceptable if it leads to significant long-term violation of this safety requirement.

3.3 While it should clearly be the objective of all to react to and eliminate emergency situations, i.e., those involving a potentially significant increase of airworthiness risk levels, without unreasonable delay, the Authority should be able finally to rule on what is a minimum acceptable campaign program. It has therefore seemed desirable to devise guidelines to be used in judging whether a proposed campaign of corrective actions is sufficient in airworthiness terms, and clearly this ought to be based on determining the summation of the achieved airworthiness risk levels for the aircraft and passengers during any periods of corrective action and comparing them with some agreed target.

3.4 As the period of corrective action will not be instantaneous (unless by grounding), there is potentially an increase in the achieved airworthiness risk level possibly to and, without controls, even above the higher part of the 'band', and the amount by which the level is above the mean target figure, and the period for which it should be allowed to continue, has been a matter of some arbitrary judgment.

3.5 It would appear desirable to try to rationalise this judgment. For example, if an aircraft were to spend 10% of its life at a level such that the risk of catastrophe was increased by an order of magnitude, the average rate over its whole life would be doubled which may not be in the public interest. A more suitable criterion is perhaps one which would allow an average increase in risk of, say one third on top of the basic design risk when spread over the whole life of the aircraft an amount which would probably be acceptable within the concept (See Figure 1). It would then be possible to regard the 'through life' risk to an aircraft - e.g., a mean airworthiness target of not more than one airworthiness catastrophe per 10 millions ( $10^7$ ) hours, as made up of two parts, the first being 3/4 of the total and catering for the basic design risk and the other being 1/4 of the total, forming an allowance to be used during the individual aircraft's whole life for unforeseen campaign situations such as described above.

3.6 Investigation has shown that a total of ten such occasions might arise during the life of an individual aircraft.

3.7 Using these criteria, there could then be during each of these emergency periods (assumed to be ten in number) a risk allowance contributed by the campaign alone of:

$1 \times 10^{-7}$  for 2.5% of the aircraft's life; or  
 $5 \times 10^{-7}$  for 0.5% of the aircraft's life; or  
 $1 \times 10^{-6}$  for 0.25% of the aircraft's life; or  
 $1 \times 10^{-5}$  for 0.025% of the aircraft's life, etc.

Without exceeding the agreed 'allowance' set -aside for this purpose.

3.8 Thus a 'reaction table' can be created as indicated in Table 1 (the last two columns assuming A typical aircraft design life of 60,000 hours and an annual utilization of 3000 hours per annum) showing the flying or calendar time within which a defect should be corrected if the suggested targets are to be met.

Table 1

Estimated catastrophe rate to aircraft due to the defect under n (per a/	Average reaction time for aircraft at risk (hours)	On a calendar basis
$4 \times 10^{-8}$	3750	15 months
$5 \times 10^{-8}$	3000	12 months
$1 \times 10^{-7}$	1500	6 months
$2 \times 10^{-7}$	150	3 months
$5 \times 10^{-7}$	15	6 weeks
<sup>6</sup> $1 \times 10^{-5}$		3 weeks
		Return to base

3.9 These principles may be applied to a single aircraft or a number of aircraft of a fleet but in calculating risk, all the risk should be attributed to those aircraft which may carry it, and should not be diluted by including other aircraft in the fleet which are known to be free of risk. (It is permissible to spread the risk over the whole fleet when a source is known to exist without knowing where). Where a fleet of aircraft is involved Column 2 may be interpreted as the mean time to rectification and not the time to the last one.

3.10 There is one further constraint. However little effect a situation may have on the 'whole life' risk of an aircraft, the risk should not be allowed to reach too high a level for any given flight. Thus while a very high risk could be tolerated for a very short period without unacceptable degradation of the overall airworthiness target, the few flights involved would be exposed to a quite unacceptable level of risk. It is therefore proposed that the Table 1 should have a cut-off at the  $2 \times 10^{-6}$  level so that no flight carries a risk greater than 20 times the target. At this level the defect is beginning to contribute to a greater likelihood of catastrophe than that from all other causes, including non-airworthiness causes, put together. If the situation is worse than this, grounding appears to be the only alternative with possibly specially authorised high-risk ferry flights to allow the aircraft to return to base empty. Figures 2 and 3 show a visualization chart equivalent to Table 1, giving average rectification time (either in flight hours or months) based on probability of defect that shall be corrected.

3.11 It will be seen that the above suggestions imply a probability of catastrophe from the campaign alone of 1.5/10,000 per aircraft during each separate campaign period (i.e.,  $p = 0.015$  per 100 aircraft fleet).

3.12 In addition, in order to take into account large fleet size effect, the expected probability of the catastrophic event during the rectification period on the affected fleet shall not exceed 0.1. See Figure 4.

3.13 It should also be noted that in assessing campaign risks against 'design risk', an element of conservatism is introduced, since the passenger knows only 'total risk' (i.e. airworthiness plus operations risks) and the fatal accident rate for all reasons is an order of magnitude greater than that for airworthiness

reasons only (i.e.,  $10^{-6}$  as against  $10^{-5}$ ). The summated campaign risk allowance proposed by this GM is therefore quite a small proportion of the total risk to which a passenger is subject. When operating for short periods at the limit of risk proposed ( $2 \times 10^{-6}$  per hour) the defect is however contributing 100% more risk than all other causes added together.

3.14 A similar approach is proposed to cover the case of defects associated to hazardous failure conditions for which the safety objectives defined by the applicable airworthiness requirements are not met. According to CS 25.1309, the allowable probability for each hazardous failure condition is set at  $10^{-7}$  per flight hour compared to  $10^{-9}$  per flight hour for a catastrophic failure condition. Figure 5 is showing a visualization chart giving average rectification time based on probability of defect that should be corrected. This is similar to figure 2 but with lower and upper boundaries adapted to cover the case of hazardous failure conditions (probabilities of  $10^{-7}$  and  $2 \times 10^{-4}$  respectively).

3.15 In addition, in order to take into account large fleet size effect, the expected probability of the hazardous event during the rectification period on the affected fleet shall not exceed 0.5. See Figure 6.

#### 4. Guidelines

4.1 The above would lead to the following guidelines for a rectification campaign to remedy a discovered defect associated to a catastrophic failure condition without grounding the aircraft:

- (i) Establish all possible alleviating action such as inspections, crew drills, route restrictions, and other limitations.
- (ii) Identify that part of the fleet, which is exposed to the residual risk, after compliance has been established with paragraph (i).
- (iii) Using reasonably cautious assumptions, calculate the likely catastrophic rate for each aircraft carrying the risk in the affected fleet.
- (iv) Compare the speed with which any suggested campaign will correct the deficiency with the time suggested in Figure 2. The figure should not be used beyond the  $2 \times 10^{-6}$  level, except for specially authorised flights.
- (v) Also ensure that the expected probability of the catastrophic event during the rectification period on the affected fleet is in accordance with Figure 4.

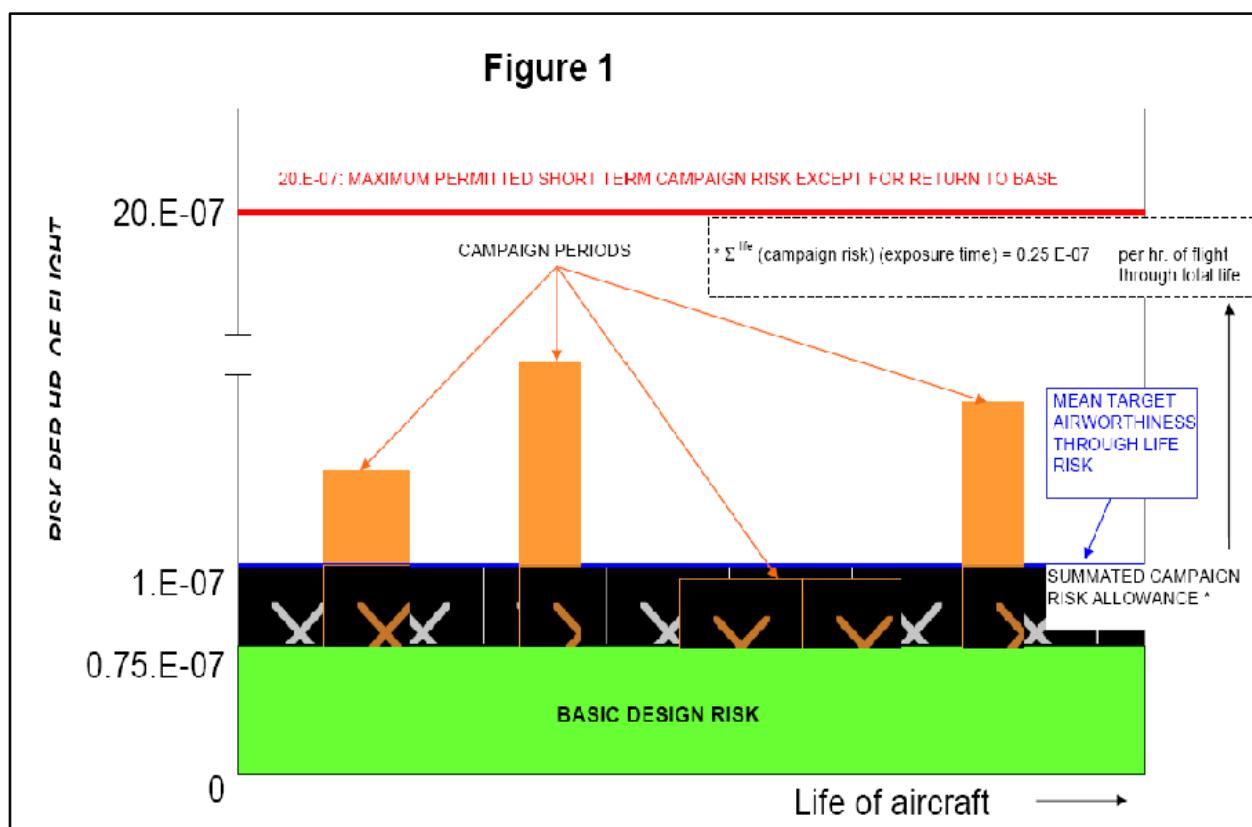
4.2 Similarly, the following guidelines would be applicable for a rectification campaign to remedy a discovered defect associated to a hazardous failure condition without grounding the aircraft:

- (i) Establish all possible alleviating action such as inspections, crew drills, route restrictions, and other limitations.
- (ii) Identify that part of the fleet, which is exposed to the residual risk, after compliance has been established with paragraph (i).

- (iii) Using reasonably cautious assumptions, calculate the likely hazardous rate for each aircraft carrying the risk in the affected fleet.
- (iv) Compare the speed with which any suggested campaign will correct the deficiency with the time suggested in Figure 5.
- (v) Also ensure that the expected probability of the hazardous event during the rectification period on the affected fleet is in accordance with Figure 6.

4.3 It shall be stressed that the benefit of these guidelines will be to form a datum for what is considered to be the theoretically maximum reaction time. A considerable amount of judgment will still be necessary in establishing many of the input factors and the final decision may still need to be tempered by non-numerical considerations, but the method proposed will at least provide a rational 'departure point' for any exercise of such judgment.

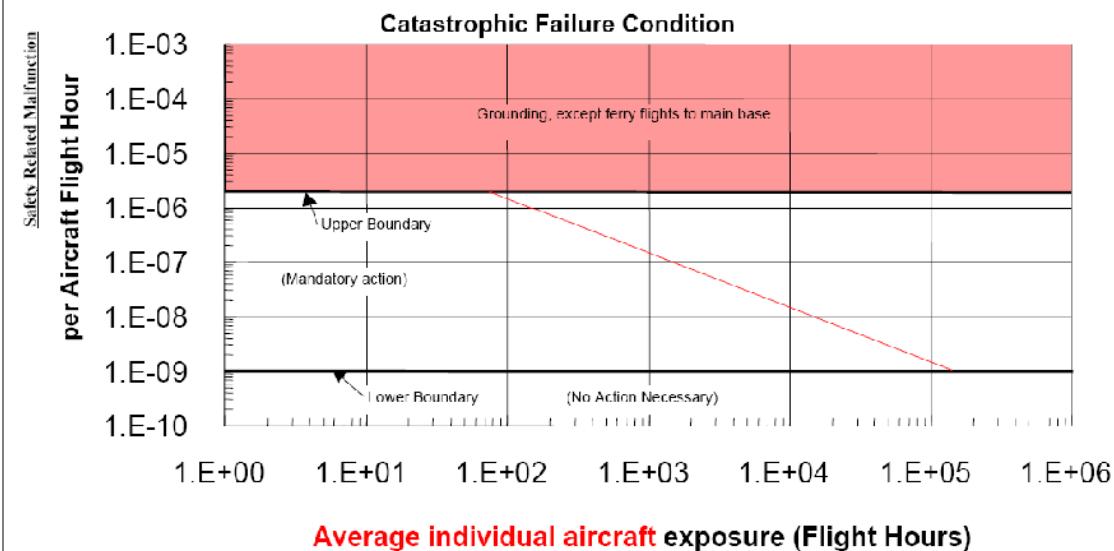
4.4 It is not intended that the method should be used to avoid quicker reaction times where these can be accommodated without high expense or disruption of services.



**Figure 2 - Visualisation Chart for CS-25 (Flight hours)**

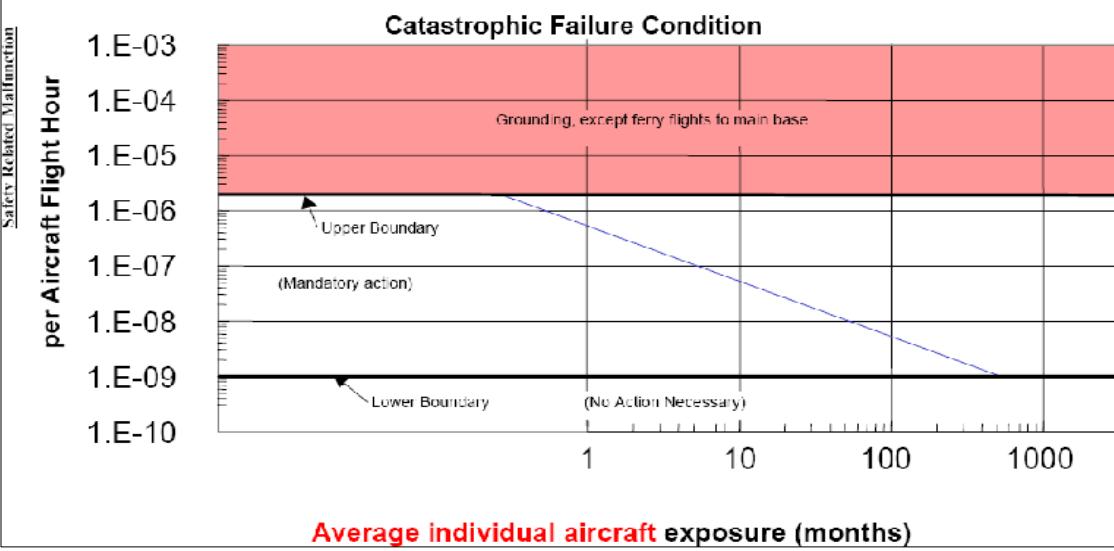
Assumptions:

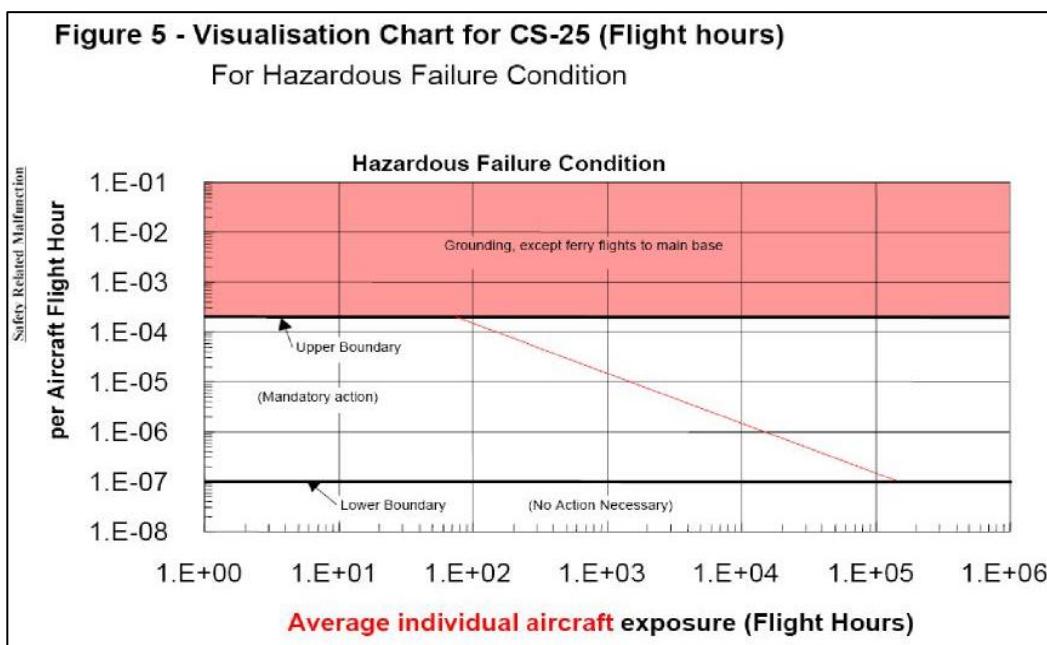
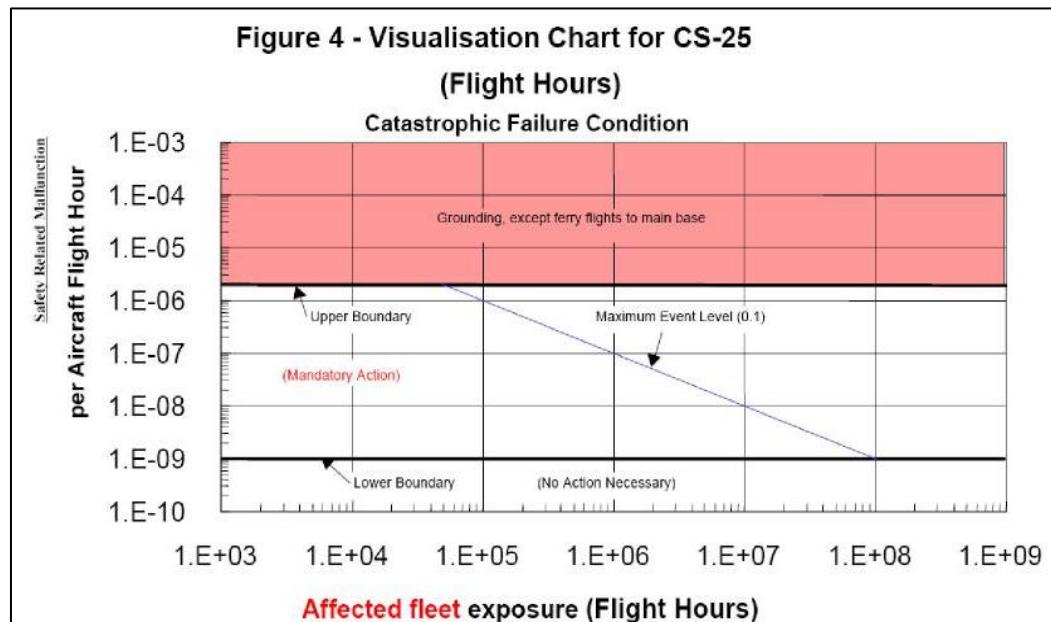
- aircraft life of 60,000 hours
- 10 'catastrophic events' campaigns

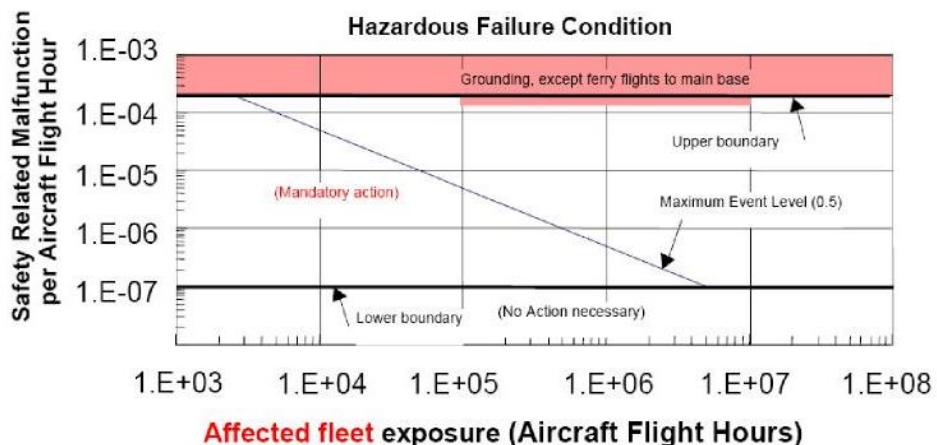
**Figure 3 - Visualisation Chart for CS-25 (Calendar basis)**

Assumptions:

- aircraft life of 60,000 hours, 3000 hours per year
- 10 'catastrophic events' campaigns





**Figure 6 - Visualisation Chart for CS-25 (Flight Hours)**

**AMC 21.3B(b) - Unsafe condition**

An unsafe condition exists if there is factual evidence (from service experience, analysis or tests) that:

- (a) An event may occur that would result in fatalities, usually with the loss of the aircraft, or reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be:
  - (i) A large reduction in safety margins or functional capabilities, or
  - (ii) Physical distress or excessive workload such that the flight crew cannot be relied upon to perform their tasks accurately or completely, or
  - (iii) Serious or fatal injury to one or more occupants unless it is shown that the probability of such an event is within the limit defined by the applicable airworthiness requirements, or
- (b) There is an unacceptable risk of serious or fatal injury to persons other than occupants, or
- (c) Design features intended to minimise the effects of survivable accidents are not performing their intended function.

**Note 1:** Non-compliance with applicable airworthiness requirements is generally considered as an unsafe condition, unless it is shown that possible events resulting from this non-compliance do not constitute an unsafe condition as defined under paragraphs (a), (b) and (c).

**Note 2:** An unsafe condition may exist even though applicable airworthiness requirements are complied with.

**Note 3:** The above definition covers the majority of cases where the Authority considers there is an unsafe condition. There may be other cases where overriding safety considerations may lead the Authority to issue an airworthiness directive.

**Note 4:** There may be cases where events can be considered as an unsafe condition if they occur too frequently (significantly beyond the applicable safety objectives) and could eventually lead to consequences listed in paragraph (a) in specific operating environments. Although having less severe immediate consequences than those listed in paragraph (a), the referenced events may reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions to the extent that there would be, for example, a significant reduction in safety margins or functional capabilities, a significant increase in crew workload, or in conditions impairing crew efficiency, or discomfort to occupants, possibly including injuries.

**GM 21.3B(b) - Determination of an unsafe condition**

It is important to note that these guidelines are not exhaustive. However, this material is intended to provide guidelines and examples that will cover most cases, taking into account the applicable certification requirements.

## 1. Introduction

Certification or approval of a product, part or appliance is a demonstration of compliance with requirements which are intended to ensure an acceptable level of safety. This demonstration however includes certain accepted assumptions and predicted behaviors, such as:

- fatigue behavior is based on analysis supported by test,
- modeling techniques are used for Aircraft Flight Manual performances calculations,
- the systems safety analyses give predictions of what the systems failure modes, effects and probabilities may be,
- the system components reliability figures are predicted values derived from general experience, tests or analysis,
- the crew is expected to have the skill to apply the procedures correctly, and
- the aircraft is assumed to be maintained in accordance with the prescribed instructions for continued airworthiness (or maintenance program), etc.

In service experience, additional testing, further analysis, etc., may show that certain initially accepted assumptions are not correct. Thus, certain conditions initially demonstrated as safe, are revealed by experience as unsafe. In this case, it is necessary to mandate corrective actions in order to restore a level of safety consistent with the applicable certification requirements. See AMC 21.3B(b) for definition of "unsafe condition" used in CAR 21.3(b).

## 2. Guidelines for establishing if a condition is unsafe

The following paragraphs give general guidelines for analyzing the reported events and determining if an unsafe condition exists, and are provided for each type of product, part or appliance subject to a specific airworthiness approval: type-certificates (TC) or supplemental type-certificates (STC) for aircraft, engines or propellers, or UAE Technical Standard Orders (UAE TSO).

This analysis may be qualitative or quantitative, i.e. formal and quantitative safety analyses may not be available for older or small aircraft. In such cases, the level of analysis should be consistent with that required by the airworthiness requirements and may be based on engineering judgment supported by service experience data.

### 2.1 Analysis method for aircraft

2.1.1 Accidents or incidents without any aircraft, engines, system, propeller or part or appliance malfunction or failure when an accident/incident does not involve any component malfunction or failure but when a crew human factor has been a contributing factor, this should be assessed from a man-machine interface standpoint to determine whether the design is adequate or not. Paragraph 2.5 gives further details on this aspect.

2.1.2 Events involving an aircraft, engines, system, propeller or part or appliance failure, malfunction or defect.

The general approach for analysis of in service events caused by malfunctions, failures or defects will be to analyze the actual failure effects, taking into account previously unforeseen failure modes or improper or unforeseen operating conditions revealed by service experience.

These events may have occurred in service, or have been identified during maintenance, or been identified as a result of subsequent tests, analyses, or quality control.

These may result from a design deficiency or a production deficiency (non conformity with the type design), or from improper maintenance. In this case, it should be determined if improper maintenance is limited to one aircraft, in which case an airworthiness directive may not be issued, or if it is likely to be a general problem due to improper design and/or maintenance procedures, as detailed in paragraph 2.5.

#### 2.1.2.1 Flight

An unsafe condition exists if:

- There is a significant shortfall of the actual performance compared to the approved performance (taking into account the accuracy of the performance calculation method), or
- The handling qualities, although having been found to comply with the applicable airworthiness requirements at the time of initial approval, are subsequently shown by service experience not to comply.

#### 2.1.2.2 Structural or mechanical systems

An unsafe condition exists if the deficiency may lead to a structural or mechanical failure which:

- Could exist in a Principal Structural Element that has not been qualified as damage tolerant. Principal Structural Elements are those which contribute significantly to carrying flight, ground, and pressurization loads, and whose failure could result in a catastrophic failure of the aircraft. Typical examples of such elements are listed for large airplanes in EASA AMC 25.571(a) "damage tolerance and fatigue evaluation of structure", and in the equivalent material for rotorcraft.
- Could exist in a Principal Structural Element that has been qualified as damage tolerant, but for which the established inspections, or other procedures, have been shown to be, or may be, inadequate to prevent catastrophic failure.

- Could reduce the structural stiffness to such an extent that the required flutter, divergence or control reversal margins are no longer achieved.
- Could result in the loss of a structural piece that could damage vital parts of the aircraft, cause serious or fatal injuries to persons other than occupants.
- Could, under ultimate load conditions, result in the liberation of items of mass that may injure occupants of the aircraft.
- Could jeopardise proper operation of systems and may lead to hazardous or catastrophic consequences, if this effect has not been taken adequately into account in the initial certification safety assessment.

#### 2.1.2.3 Systems

The consequences of reported systems components malfunctions, failures or defects should be analyzed.

For this analysis, the certification data may be used as supporting material, in particular systems safety analyses.

The general approach for analysis of in service events caused by systems malfunctions, failures or defects will be to analyze the actual failure effects.

As a result of this analysis, an unsafe condition will be assumed if it cannot be shown that the safety objectives for hazardous and catastrophic failure conditions are still achieved, taking into account the actual failure modes and rates of the components affected by the reported deficiency.

The failure probability of a system component may be affected by:

- A design deficiency (the design does not meet the specified reliability or performance).
- A production deficiency (non conformity with the certified type design) that affects either all components, or a certain batch of components.
- Improper installation (for instance, insufficient clearance of pipes to surrounding structure).
- Susceptibility to adverse environment (corrosion, moisture, temperature, vibrations etc.). - Ageing effects (failure rate increase when the component ages).
- Improper maintenance.

When the failure of a component is not immediately detectable (hidden or latent failures), it is often difficult to have a reasonably accurate estimation of the component failure rate since the only data available are usually results of maintenance or flight crew checks. This failure probability should therefore be conservatively assessed.

As it is difficult to justify that safety objectives for the following systems are still met, a deficiency affecting these types of systems may often lead to a mandatory corrective action:

- back up emergency systems, or
- fire detection and protection systems (including shut off means).

Deficiencies affecting systems used during an emergency evacuation (emergency exits, evacuation assist means, emergency lighting system ...) and to locate the site of a crash (Emergency Locator Transmitter) will also often lead to mandatory corrective action.

#### 2.1.2.4        Others

In addition to the above, the following conditions are considered unsafe:

- There is a deficiency in certain components which are involved in fire protection or which are intended to minimise/retard the effects of fire / smoke in a survivable crash, preventing them to perform their intended function (for instance, deficiency in cargo liners or cabin material leading to non-compliance with the applicable flammability requirements).
- There is a deficiency in the lightning or High Intensity Radiated Fields protection of a system which may lead to hazardous or catastrophic failure conditions.
- There is a deficiency which could lead to a total loss of power or thrust due to common mode failure.

If there is a deficiency in systems used to assist in the enquiry following an accident or serious incident (e.g., Cockpit Voice Recorder, Flight Data Recorder), preventing them to perform their intended function, the Authority may take mandatory action.

## 2.2 Engines

The consequences and probabilities of engine failures have to be assessed at the aircraft level in accordance with paragraph 2.1, and also at the engine level for those failures considered as Hazardous in CS E-510 or applicable airworthiness standard.

The latter will be assumed to constitute unsafe conditions, unless it can be shown that the consequences at the aircraft level do not constitute an unsafe condition for a particular aircraft installation.

## 2.3        Propellers

The consequences and probabilities of propeller failures have to be assessed at the aircraft level in accordance with paragraph 2.1, and also at the propeller level for those failures considered as hazardous in CS P-70 or applicable airworthiness standard.

The latter will be assumed to constitute unsafe conditions, unless it can be shown that the consequences at the aircraft level do not constitute an unsafe condition for a particular aircraft installation.

## 2.4 Parts and appliances

The consequences and probabilities of equipment failures have to be assessed at the aircraft level in accordance with paragraph 2.1.

## 2.5 Human factors aspects in establishing and correcting unsafe conditions

This paragraph provides guidance on the way to treat an unsafe condition resulting from a maintenance or crew error observed in service.

It is recognised that human factors techniques are under development. However, the following is a preliminary guidance on the subject.

Systematic review should be used to assess whether the crew or maintenance error raises issues that require regulatory action (whether in design or other areas), or should be noted as an isolated event without intervention. This may need the establishment of a multidisciplinary team (designers, crews, human factors experts, maintenance experts, operators etc.)

The assessment should include at least the following:

- Characteristics of the design intended to prevent or discourage incorrect assembly or operation;
- Characteristics of the design that allow or facilitate incorrect operation;
- Unique characteristics of a design feature differing from established design practices;
- The presence of indications or feedback that alerts the operator to an erroneous condition;
- The existence of similar previous events, and whether or not they resulted (on those occasions) in unsafe conditions;
- Complexity of the system, associated procedures and training (has the crew a good understanding of the system and its logic after a standard crew qualification program?);
- Clarity/accuracy/availability/currency and practical applicability of manuals and procedures;
- Any issues arising from interactions between personnel, such as shift changeover, dual inspections, team operations, supervision (or lack of it), or fatigue.

Apart from a design change, the corrective actions, if found necessary, may consist of modifications of the manuals, inspections, training programs, and/or information to the operators about particular design features. The Authority may decide to make mandatory such corrective action if necessary.

#### **AMC 21.4 - Transferring of information on eligibility and approval status from the design holder to production organisations**

Where there is a need to provide (normally outside the design organisation) a visible statement of approved design data or airworthiness or environmental protection data associated with the approved design data, the following minimum information shall be provided. The need for a visible statement may be in relation to Company holding a production organisation approval (POA) in relation to 21.163(c).

The procedures related to the use of forms or other electronic means to provide this information shall be agreed with the Authority.

**Information to be provided:**

**Company name:** the name of the responsible design organisation (TC, STC, approval of repair or minor change design, UAE TSO authorisation holder) issuing the information.

**Date:** the date at which the information is released.

**Eligibility:** indicate the specific products or articles, in case of UAE TSO authorisation, for which data have been approved.

**Identification:** the part number of the part or appliance. Preference should be given to the use of the Illustrated Parts Catalogue (IPC) designation. Alternatively the reference to the instruction for continued airworthiness (e.g., SB, AMM, etc.) could be stated. Marking requirements of CAR 21 Subpart Q should be taken into account.

**Description:** the name or description of the part or document should be given. In the case of a part or appliance preference should be given to use of IPC designation. The description is to include reference to any applicable UAE TSO authorisation or EPA marking, or previous national approvals still valid.

**Purpose of data:** the reason for the provision of the information should be stated by the design approval holder.

Examples:

- (a) Provision of approved design data to a production organisation to permit manufacture (AMC No 1 to 21.133(b) and (c))
- (b) Information regarding eligibility for installation (replacement parts, repair, modification, etc.)
- (c) Direct Delivery Authorisation (AMC No 1 to 21.133(b) and (c))

If the data is in support of a change or repair, then reference to the aircraft level approval should be given (make reference to the approved STC, change or repair).

**Limitations/Remarks:** state any information, either directly or by reference to supporting documentation that identifies any particular data or limitations (including specific importing requirements) needed by a production organisation to complete Block 13 of the AW Form 1.

**Approval:** provide reference information related to the approval of the data (Authority document or UAE DOA privilege).

**Authorised signature:** name and hand-written normal or electronic signature of a person who has written authority from the design organisation, as indicated in the procedures agreed with the Authority.

## SUBPART B - TYPE-CERTIFICATES

### **GM 21.14(b) - Eligibility for alternative procedures**

Design organisations approved under CAR 21 Subpart J (“Subpart J DOA”) should be the normal approach for type certification, supplemental type certification, approval of major changes to type design or approval of major repair design, except when agreed otherwise by the Authority in accordance with CAR 21.14, CAR 21.112B and CAR 21.432B.

The acceptance of alternative procedures, as defined in AMC 21.14(b), should be limited where the Authority finds it more appropriate for the conduct of type certification, supplemental type certification, approval of changes to type design, approval of repair design.

### **AMC 21.14(b) - Alternative procedures**

Alternative procedures are acceptable means to demonstrate design capability in the cases described in CAR 21.14, CAR 21.112B or CAR 21.432B. This concept is the implementation, in the context of specific projects, of procedures required in Subpart J DOA, to ensure that the applicant will perform relevant activities as expected by the Authority, but without the requirements on the organisation itself that can be found in Subpart J. The establishment of these alternative procedures may be seen as a starting phase for a Subpart J DOA, allowing at a later stage, at the discretion of the applicant, to move towards a full Subpart J DOA by the addition of the missing elements.

### **1 Scope**

1.1 As alternative to UAE DOA, a manual of procedures shall set out specific design practices, resources and sequence of activities relevant for the specific projects, taking account of CAR 21 requirements.

1.2 These procedures shall be concise and limited to the information needed for quality and proper control of activities by the applicant/holder, and by the Authority.

### **2 Management of the (supplemental) type certification process**

2.1 For a particular project, at the beginning of the process, the applicant shall propose to the Authority for acceptance a certification program that includes:

Part 1

Procedures for the management of the certification program: creation and update all along the certification process to integrate the progress of the activities, distribution. This part shall also include the milestones of the project development up to the type certification or approval of the major change, with the minimum administrative delays imposed by the Authority when necessary.

## Part 2

The attribution of responsibilities, as follows:

- names of the persons having specific responsibilities in the frame of the certification program.
- the description of their tasks, responsibilities and associated competences.
- scope of authority of signatories.

## Part 3

The airworthiness requirements applicable to the project, corresponding interpretations, and the equivalence of safety or other specific cases related to the applicable requirements.

## Part 4

Working methods for showing of compliance and providing to the Authority the means by which such compliance has been shown.

This includes all or part of the following, depending on the complexity of the product:

- the means by which compliance will be shown (means of compliance), in relation with the requirements and/or their detailed interpretation
- the technical criteria associated with the means of compliance
- milestones specific to particular technical areas in relation with the general planning of the project
- the decision process, especially the key points where an Authority decision is needed before further action
- the flow of information to the Authority
- the configuration control, especially of the test specimen used to show compliance - the organisation of the work for the interfaces or multidisciplinary subjects
- those compliance documents that will be subject to verification by the Authority
- the establishment of the compliance documentation, including the time schedule and availability to the Authority
- the control of the time schedule, for the accomplishment of the tasks in due time.

The applicant shall submit all revisions of the certification program to the Authority for acceptance. 2.2 The applicant shall establish procedures for creating compliance documents in such a way that:

- the kind of document and the technical objectives for each document are determined at the beginning of the process
- the production of the documents is carefully managed all along the process, in accordance with the milestones defined in the certification program
- the various issues of a document are controlled.

Each document shall contain:

- the reference of the requirements covered by the document
- data showing compliance and a statement by the applicant declaring compliance with these requirements

A numbering system to identify the compliance documents shall be defined in order to have an adequate link with the certification program.

Except as otherwise agreed with the Authority, all compliance documents shall be produced before issuance of the final statement of compliance required by CAR 21.20(b) or CAR 21.97(a)(3).

2.3 There are no privileges associated with alternative procedures, however the Authority will decide on the extent of its involvement in the verification of compliance documents. This involvement may vary according to the Authority knowledge of the applicant from previous and ongoing activities and the resulting assessment of competence, and shall be addressed in the certification program.

### **3 Management of design changes**

#### **3.1 Approval of changes to type design, repairs and production deviations from the approved design data**

The TC or STC applicant shall provide procedures acceptable to the Authority for classification and approval of changes to type design (see paragraphs 3.2 and 3.3), and repairs and production deviations from the approved design data (see paragraph 3.4).

#### **3.2 Classification**

##### *3.2.1 Content*

The procedure shall address the following points:

- identification of changes to type design
- airworthiness classification
- changes to type design initiated by subcontractors
- documents to justify the classification - authorised signatories

Criteria used for classification shall be in compliance with CAR 21.91 and corresponding interpretations.

### *3.2.2 Identification of changes to type design*

The procedure shall indicate how the following are identified: - major changes to type design

- those minor changes to type design where additional work is necessary to show compliance with the airworthiness requirements
- other minor changes to type design requiring no further showing of compliance.

### *Airworthiness classification*

The procedure shall show how the effects on airworthiness are analyzed, from the very beginning, by reference to the applicable requirements.

If no specific requirements are applicable to the change, the above review shall be carried out at the level of the part or system where the change is integrated and where specific requirements are applicable.

### *3.2.4 Control of changes to type design initiated by subcontractors*

The procedure shall indicate, directly or by cross-reference to written procedures, how changes to type design initiated by subcontractors are controlled.

### *3.2.5 Documents to justify the classification*

All decisions of classification of changes to type design shall be documented and approved by the Authority. It may be in the format of meeting notes or register.

### *3.2.6 Authorised signatories*

The procedure should identify the persons authorised to sign the proposed classification before release to the Authority for approval.

## **3.3 Approval of changes to type design**

### *3.3.1 Content*

The procedure shall address the following points: - compliance documentation

- approval process
- authorised signatories

### *3.3.2 Compliance documentation*

For major changes and those minor changes to type design where additional work to show compliance with the applicable airworthiness requirements is necessary, compliance documentation shall be established following guidelines of paragraph 2.2.

### *3.3.3 Approval process*

- A For the approval of major changes to type design, a certification program as defined in paragraph 2.1 shall be established.
- B For major changes and those minor changes to type design where additional work to show compliance with the applicable airworthiness requirements is necessary, the procedure should define a document to support the approval process.

This document shall include at least:

- identification and brief description of the change and its classification
- applicable requirements
- reference to the compliance documents
- effects, if any, on limitations and on the approved documentation
- authorised signatory
- C For the other minor changes, the procedure shall define a means:
  - to identify the change
  - to present the change to the Authority for approval.

### *3.3.4 Authorised signatories*

The procedure shall identify the persons authorised to sign the change before release to the Authority for approval.

## *3.4 Repairs and production deviations from the approved design data*

A procedure following the principles of paragraphs 3.2 and 3.3 shall be established for the classification and approval of repairs and unintentional deviations from the approved design data occurring in production (concessions or non-conformance's). For repairs, the procedure shall be

established in accordance with CAR 21 Subpart M and associated acceptable means of compliance (AMC) or guidance material (GM).

## 4 Issue of information and instructions to owners

### 4.1 General

The information or instructions issued by a TC, STC, approval of changes to type design, approval of repair design holder are intended to provide the owners of a product with all necessary data to implement a change on the product, or a repair, or to inspect it.

The information or instructions may be issued in a format of a Service Bulletin as defined in ATA 100 system, or in Structural Repair Manuals, Maintenance Manuals, Engine and Propeller Manuals, etc.

The preparation of this data involves design, production and inspection. The three aspects should be properly addressed and a procedure should exist.

### 4.2 Procedure

The procedure should address the following points: - preparation

- verification of technical consistency with corresponding approved change(s), repair(s) or approved data, including affectivity, description, effects on airworthiness, especially when limitations are changed
- verification of the feasibility in practical applications.

The persons authorised to sign before release of information and instructions to the Authority for approval should be identified in the procedure.

The procedure should include the information or instructions prepared by subcontractors or vendors, and declared applicable to its products by the TC, STC, approval of changes to type design or approval of repair design holders.

### 4.3 Statement

The information and instructions should contain a statement showing Authority approval.

## 5 Obligations addressed in CAR 21.44 (TC holder), CAR 21.118A (STC holder) or 21.451 (repair design approval holder)

The applicant should establish the necessary procedures to show to the Authority how it will fulfil the obligations required under CAR 21.44, CAR 21.118A or CAR 21.451, as appropriate.

## 6 Control of design subcontractors

The applicant should establish the necessary procedures to show to the Authority how it will control design subcontractors.

### **GM 21.16B - Special conditions**

CAR 21.16B introduces 3 categories of Special Conditions:

- 1      Novel and unusual design features;
- 2      Unconventional use of product;
- 3      Service experience has shown that unsafe conditions may exist.

However, the need for a Special Condition based on in-service experience should be judged by using the following points as benchmarks:

- The words “unsafe conditions” are used in GM 21.3B(b) to justify the basis for an airworthiness directive.
- The words “continued safe flight and landing”, according to AMC 25.1309, mean the capability for continued controlled flight and landing, possibly using emergency procedures, but without requiring exceptional pilot skill or strength. Some aircraft damage may be associated with a failure condition, during flight or upon landing.

### **GM 21.33 - Investigation and tests**

The requirements of CAR 21.33(a) should not preclude the applicant requesting the Authority to make flight or other tests of particular aspects of the product during its development and before the type design is fully defined and a Declaration of Compliance can be issued for all the applicable airworthiness standards. However in case of flight test the applicant should have performed subject tests before the Authority tests and should ensure that no features of the product preclude the safe conduct of the evaluation requested. The Authority may require to repeat any such tests once the type design is fully defined to ensure that subsequent changes have not adversely affected the conclusions from any earlier evaluation. A statement of compliance with sub-paragraph CAR 21.33(b) is also required for the above tests.

### **GM 21.35 - Flight tests**

Detailed material on flight testing is included in the applicable airworthiness standards.

**GM 21.35(b)(2) - Objective and content of function and reliability testing****1      Objective**

The objective of this testing is to expose the aircraft to the variety of uses, including training, that are likely to occur when in routine service to provide an assurance that it performs its intended functions to the standard required for certification and should continue to do so in service.

**2      Content of function and reliability testing**

The testing should cover both routine operations and some simulation of abnormal conditions. The details of the program should be agreed with the Authority prior to commencement of testing.

It may be possible to combine this testing with any required to show compliance with the applicable CS. This will be agreed on a case-by-case basis with the Authority.

Where possible, testing conditions should be defined with the co-operation of an operator. A substantial proportion of the flying should be on a single aircraft. The flying should be carried out to a continuous schedule on an aircraft that is very close to the final type design, operated as though it were in service and should include a range of representative ambient operating conditions and airfields.

**GM 21.35(f)(1) - Flying time for function and reliability testing**

All flying carried out with engines and associated systems not significantly different from the final type-certificate standard may count towards the 300 hours airframe flight time required by CAR 21.35(f)(1). At least 150 of the 300 flying hours should be conducted on a dedicated production configured aircraft. The requirement for 300 hours relevant flight time whenever a new turbine engine is incorporated applies regardless of whether the airframe/engine combination is subject to a new type-certificate or is to be certificated as a change or supplement to an existing type-certificate.

**GM 21.35(f)(2) - Flying time for function and reliability testing**

All flying carried out on an aircraft not significantly different from the final type design may count towards the 150 hours airframe flight time required by CAR 21.35(f)(2).

## SUBPART B1 –Type Acceptance Certificate

### **GM 21.70 Applicability**

1. With the introduction of UAE Civil Aviation Regulation (CAR) 21, the GCAA has provisions in place for the issuance of UAE type acceptance for foreign type certificated aircraft models, as a pre-requisite for the issuance of the UAE Certificate of Airworthiness (C of A).

For the purpose of this GM, a model refers to an aircraft model as defined in its type certificate (TC) and type certificate data sheet (TCDS), and should not be mixed with aircraft series or marketing designations.

2. An application for the UAE type acceptance should be submitted by the aircraft type certificate (TC) holder online, through the GCAA E-Services (requires a one off creation of a profile and registration) portal available on the GCAA website <http://www.gcaa.gov.ae/en/pages/default.aspx>.

The application should be accompanied with a brief description of the aircraft model, a copy of the TC issued by the primary type certificating authority and the TCDS reflecting TC basis, the Noise Certificate, the intended utilisation and the schedule for importation in the UAE.

In return, the GCAA will confirm the receipt of the application and notify the applicant of the UAE requirements and request additional documents along with the mention of the items of specific interest.

3. After receiving the application through E-Services, the GCAA will send an invoice to the applicant reflecting the applicable fees and charges current at that time.

Other costs such as visits and audits of the TC holders' facilities are not covered in the type acceptance fee and therefore will be invoiced separately.

4. The UAE type acceptance requirement was introduced on 01 January 2006 and accordingly, all the aircraft models which were on the UAE aircraft register before 01 January 2006 are eligible for UAE type acceptance under grandfather provisions, even if the subject models were deregistered later.

The applications for UAE type acceptance based on grandfather provisions should be submitted by the aircraft TC holder online, through the GCAA E-Services portal available on the GCAA website. The GCAA will require a reduced set of information and documents for such model, and there are no fees associated with the type acceptance based on grandfather provisions.

**Grandfather Clause:** Grandfather clause is an exception to allow an old rule to continue to apply in some existing cases, whereas a new rule is applied to all future cases. Often, such provisions are used as a compromise to effect new rules without disturbing the existing situations.

5. All enquiries related to type acceptance should be addressed to:

*Manager Engineering Safety,  
General Civil Aviation Authority  
PO Box: 30500,  
Marrakesh Street (Behind RTA building)  
Um Ramool Area,  
Dubai, United Arab Emirates.  
Fax: +971 4 282 0847  
Email: [airworthiness@gcaa.gov.ae](mailto:airworthiness@gcaa.gov.ae)*

## GM 21.72 Airworthiness Requirements

1. The type acceptance is a lengthy and complex activity and therefore a lead time of 6 to 12 months should be expected. The applicants should keep long lead times required for type acceptance into consideration before deciding date for issue of UAE certificate of airworthiness.
2. The GCAA will not accept a type acceptance application, unless there is a UAE based operator intending to acquire UAE certificate of airworthiness.
3. The UAE type acceptance of an aircraft model by the GCAA, to a large extent, relies on the findings of the national aviation authority of the state of design.
4. The current regulations in the UAE allow Type acceptance based on EASA, FAA or Transport Canada type certificates only, and accordingly the airworthiness requirements defined by EASA, FAA or Transport Canada are acceptable for the respective state of design type certificates.

For aircraft carrying multiple type certificates, only the TC issued by the national aviation authority of the state of design is accepted. The following list elaborates it further:

- a. *For aircraft for which the USA is the state of design, and FAA is type certificating authority (e.g. Boeing, HawkerBeechcraft, Cessna aircraft models) - the GCAA bases its type acceptance on the TC issued by the FAA.*
- b. *For aircraft for which EASA is either the type certificating authority or has accepted type certificates issued by member States (e.g. Airbus, Dassault aircraft models) - the GCAA's Type Acceptance will be based on the TC issued / accepted by EASA*
- c. *For aircraft for which Canada is the state of design, and Transport Canada – Civil Aviation (TCCA) is type certificating authority (e.g. Bombardier aircraft models) - The GCAA's type acceptance will be based on the TC issued by the TCCA.*
- d. *For all other aircraft models, the GCAA's type acceptance will be based on the TC issued by EASA (e.g. Embraer EMB-145MP having TC issued by ANAC of Brazil as well as by EASA).*
5. For type acceptance purposes, engines and propellers will be approved as part of the aircraft type acceptance by reference and no separate type acceptance will be issued.
6. The type acceptance activity includes working through the GCAA type acceptance requirements with the TC holder and the national aviation authority, and there may be a need of meeting(s).

The visit of the GCAA type acceptance team would also facilitate review of the design and certification activities of the TC holder and their manufacturing facilities, in addition to establishing mutual working relationships.

The GCAA will coordinate a convenient time and place for these meetings at an appropriate stage during the type acceptance process. The expenses related to any such visit(s) are not part of the UAE type acceptance fee and need to be paid separately prior to the visit in accordance with the GCAA policy.

7. The GCAA requires the TC holder to provide model-specific basic and type training to its staff (i.e. engineering, airworthiness and flight operations inspectors) on case to case basis enabling them to discharge their oversight responsibilities.

All the training related expenses are to be borne by the TC holder, and are not included in the type acceptance fee.

#### **GM 21.74 Data Requirements**

1. After receiving the application through E-Services along with the basic data (e.g. aircraft TC, TCDS and a detailed introduction to the aircraft), the GCAA will send a formal letter to the applicant, listing initial requirements.
2. Depending on the type of aircraft, the requirements should be categorised into the following:
  - a. Aircraft Certification (including engines and propellers) e.g. TC, TC Data Sheet, Issue Papers or Certification Review Items, Special Conditions, Equivalent Levels of Safety, Certification Compliance Listing etc.
  - b. Free and unconditional access to the TC Holder's online documents portal for in-service and operating documents (e.g. Airplane Flight Manual, Flight Crew operating Manual, Cabin Crew Manual, Master Minimum Equipment List, Configuration Deviation List, Structure Repair Manual (SRM) etc.). Any documents that are not available on the TC Holder's portal should be provided on a digital media (e.g. CD or DVD, USB stick etc).
3. No further approval action is required for foreign Type Certificate exemptions accepted as part of Type Acceptance.
4. Depending on the type of aircraft GCAA will require additional information or participation in the following areas:
  - a. *Approval of Cabin arrangement and safety equipment*
  - b. *Participation in Joint Operation Evaluation Board (JOEB) activities*
  - c. *Participation in Maintenance Review Board (MRB) activities*

The GCAA will require the final board reports, if JOEB and MRB activities are already over.

5. Following compliance with the GCAA requirements, a GCAA type acceptance will be issued.

#### **GM 21.76 Duration and continued validity**

1. Once issued, the GCAA type acceptance is valid as long as the TC referenced in the type acceptance is valid.
 

The GCAA may however cancel and revoke the type acceptance anytime at its discretion.
2. If a TC holder is taken over or merged with another TC holder, the GCAA type acceptance will remain valid because the type acceptance is aircraft model specific. The new TC holder shall however request the GCAA to issue a new type acceptance bearing its new name.
3. Type Acceptance Certificate contains delivery requirements for individual serial number aircraft of the model. The Type Acceptance Certificate holder is required to comply with these requirements.

**SUBPART C - RESERVED****SUBPART D - CHANGES TO TYPE CERTIFICATES****GM 21.91 - Classification of changes to a type design****1. Purpose of classification**

Classification of changes to a type design into MAJOR or MINOR is to determine the approval route to be followed in CAR 21 Subpart D, i.e., either CAR 21.95 or CAR 21.97, or alternatively whether application and approval has to be made in accordance with CAR 21 Subpart E.

**2. Introduction**

2.1 CAR 21.91 proposes criteria for the classification of changes to a type design as minor and major.

(i) This GM is intended to provide guidance on the term appreciable effect affecting the Airworthiness of the product from CAR 21.91, where "airworthiness" is interpreted in the context of a product in conformity with type design and in condition for safe operation. It provides complementary guidelines to assess a design change in order to fulfil the requirements of CAR 21.91 and CAR 21.117 where classification is the first step of a procedure.

Note: For classification of Repairs see GM 21.435.

(ii) Although this GM provides guidance on the classification of major changes, as opposed to minor changes as defined in CAR 21.91, the GM and CAR 21.91 are deemed entirely compatible.

2.2 For an UAE TSO authorisation, CAR 21.611 gives specific additional requirements for design changes to UAE TSO articles. For APU, this GM should be used.

**3 Assessment of a design change for classification****3.1 Changes to the type design**

CAR 21.31 defines what constitutes the type design. Alteration to any of the data included within the scope of CAR 21.31 is considered a change to the type design.

**3.2 Classification Process (see attached diagram)**

CAR 21.91 requires all changes to be classified as either major or minor, using the criteria of CAR 21.91 and the complementary guidance of paragraph 3.3.

On some occasions, the classification process is initiated at a time when some data necessary to make a classification decision are not yet available. Therefore, the applicant should wait for availability of data before making a decision.

Wherever there is doubt as to the classification of a change, the Authority should be consulted for clarification.

When the strict application of the paragraph 3.3 criteria results in a major classification, the applicant may request re-classification, if justified, and Authority could take the responsibility in reclassifying the change. A simple design change planned to be mandated by an airworthiness directive may be reclassified minor due to the involvement of the Authority in the continued airworthiness process. Reasons for a classification decision should be recorded.

### 3.3 Complementary guidance for classification of changes.

A change to the type design is judged to have an “appreciable effect on other characteristics affecting the airworthiness of the product” and therefore should be classified major, in particular but not only, when one or more of the following conditions are met:

- (i) Where the change requires an adjustment of the type-certification basis (such as special condition, equivalent safety finding, elect to comply, exemption, reversion, later requirements).
- (ii) Where the applicant proposes a new interpretation of the requirements used for the type type-certification basis, that has not been published as AMC material or otherwise agreed with the Authority.
- (iii) Where the demonstration of compliance uses methods that have not been previously accepted as appropriate for the nature of the change to the product or for similar changes to other products designed by the applicant.
- (iv) Where the extent of new substantiation data necessary to comply with the applicable airworthiness requirements and the degree to which the original substantiation data has to be reassessed and re-evaluated is considerable.
- (v) The change alters the Airworthiness Limitations or the Operating Limitations.
- (vi) The change is made mandatory by an airworthiness directive or the change is the terminating action of an airworthiness directive (ref. CAR 21.3B). See note 1.
- (vii) Where the change introduces or affects functions where the failure effect is classified catastrophic or hazardous.

Note 1: The design change previously classified minor and approved prior to the airworthiness directive issuance decision needs no re-classification. However, the Authority retains the right to review the change and re-classify/re-approve if found necessary.

Note 2: These above conditions are an explanation of the criteria noted in CAR 21.91. For an understanding of how to apply the above conditions it is useful to take note of the examples given in Appendix A to GM 21.91.

### **Appendix A to GM 21.91: Examples of Major Changes per discipline**

The information below is intended to provide a few major change examples per discipline, resulting from application of CAR 21.91 and paragraph 3.3 conditions. It is not intended to present a comprehensive list of all major changes. Examples are categorised per discipline and are applicable to all products (aircraft, engines and propellers). However a particular change may involve more than one discipline, e.g., a change to engine controls may be covered in engines and systems (software).

Those involved with classification should always be aware of the interaction between disciplines and the consequences this will have when assessing the effects of a change (i.e., operations and structures, systems and structures, systems and systems, etc.; see example in paragraph 2 (ii)).

Specific rules may exist which override the guidance of these examples.

In the CAR 21 a negative definition is given of minor changes only. However in the following list of examples it was preferred to give examples of major changes.

Where in this list of examples the words "has effect" or "affect(s)" are used, they have always to be understood as being the opposite of "no *appreciable* effect" as in the definition of minor change in CAR 21.91. Strictly speaking the words "has appreciable effect" and "appreciably affect(s)" should have been used, but this has not been done to improve readability.

#### **1 Structure**

- (i) changes such as a cargo door cut-out, fuselage plugs, change of dihedral, addition of floats;
- (ii) changes to materials, processes or methods of manufacture of primary structural elements, such as spars, frames and critical parts;
- (iii) changes that adversely affect fatigue or damage tolerance or life limit characteristics;
- (iv) changes that adversely affect aeroelastic characteristics.

#### **2 Cabin safety**

(i) changes which introduce a new cabin layout of sufficient change to require a reassessment of emergency evacuation capability or which adversely affect other aspects of passenger or crew safety.

Items to consider include, but are not limited to:

- changes to or introduction of dynamically tested seats.
- change to the pitch between seat rows.
- change of distance between seat and adjacent obstacle like a divider.
- changes to cabin lay outs that affect evacuation path or access to exits.
- installation of new galleys, toilets, wardrobes, etc.
- installation of new type of electrically powered galley insert.

(ii) changes to the pressurization control system which adversely affect previously approved limitations.

### **3 Flight**

Changes which adversely affect the approved performance, such as high altitude operation, brake changes that affect braking performance.

Changes which adversely affect the flight envelope.

Changes which adversely affect the handling qualities of the product including changes to the flight controls function (gains adjustments, functional modification to software) or changes to the flight protection or warning system.

### **4 Systems**

For systems assessed under CS 25.1309, the classification process is based on the functional aspects of the change and its potential effects on safety.

(i) Where failure effect is 'Catastrophic' or 'Hazardous', the change should be classified as major.

(ii) Where failure effect is 'major', the change should be classified as major if:

- aspects of the compliance demonstration use means that have not been previously accepted for the nature of the change to the system; or
- the change affects the pilot/system interface (displays, controls, approved procedures); or

- the change introduces new types of functions/systems such as GPS primary, TCAS, Predictive wind shear, HUD.

The assessment of the criteria for software changes to systems also needs to be performed. When software is involved, account should be taken also of the following guidelines:

Where a change is made to software produced in accordance with the guidelines of EUROCAE ED12B/RTCA DO-178B "Software Considerations in Airborne Systems and Equipment Certification", the change should be classified as major if either of the following apply, and the failure effect is Catastrophic, Hazardous or Major:

- (1) the executable code for software, determined to be Level A or Level B in accordance with the guidelines, is changed unless that change involves only a variation of a parameter value within a range already verified for the previous certification standard; or
- (2) the software is upgraded to or downgraded from Level A, Level B or Level C; or
- (3) the executable code, determined to be level C, is deeply changed, e.g., after a software reengineering process accompanying a change of processor.

For software developed to guidelines other than ED-12B/DO-178B, the applicant should assess changes in accordance with the foregoing principles.

For other codes the principles noted above may be used. However, due consideration should be given to specific requirements/interpretations.

## 5 Propellers

Changes to:

- (i) diameter
- (ii) airfoil
- (iii) planform
- (iv) material
- (v) blade retention system, etc.

## 6. Engines

Changes:

- (i) that adversely affect operating speeds, temperatures, and other limitations.

- (ii) that affect or introduce parts identified by CS E-510 or applicable airworthiness requirements where the failure effect has been shown to be hazardous.
- (iii) that affect or introduce engine critical parts (CS E-515 or applicable airworthiness requirements) or their life limits.
- (iv) to a structural part which requires a re-substantiation of the fatigue and static load determination used during certification.
- (v) to any part of the engine which adversely affects the existing containment capability of the structure.
- (vi) that adversely affect the fuel, oil and air systems, which alter the method of operation, or require reinvestigation against the type-certification basis.
- (vii) that introduce new materials or processes, particularly on critical components.

## 7 Rotors and drive systems

Changes that:

- (i) adversely affect fatigue evaluation unless the service life or inspection interval are unchanged. This includes changes to materials, processes or methods of manufacture of parts, such as
  - rotor blades
  - rotor hubs including dampers and controls
  - gears
  - drive shafts
  - couplings
- (ii) affect systems the failure of which may have hazardous or catastrophic effects. The design assessment will include:
  - cooling system
  - lubrication system - rotor controls
- (iii) adversely affect the results of the rotor drive system endurance test, the rotor drive system being defined in CS 27/29-917.
- (iv) adversely affect the results of the shafting critical speed analysis required by CS 27/29-931 or other applicable airworthiness requirements.

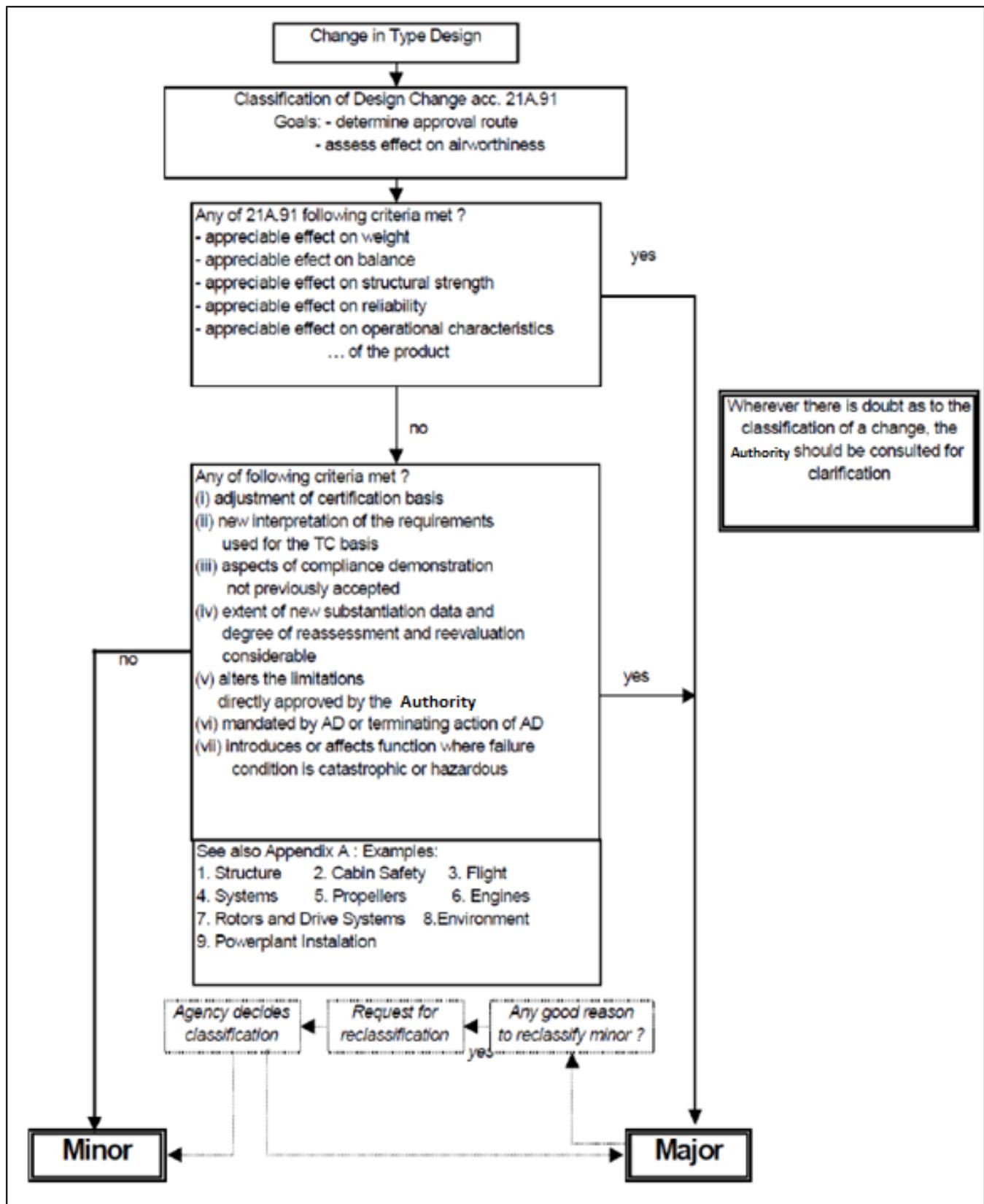
## 8 Environment

A change that introduces an increase in noise or emissions.

## **9 Power plant Installation**

Changes which include:

- (i) control system changes which affect the engine/propeller/airframe interface;
- (ii) new instrumentation displaying operating limits;
- (iii) modifications to the fuel system and tanks (number, size and configuration);
- (iv) change of engine/propeller type.

Classification process

## **GM 21.93(b) - Major changes: Application**

Identification of re-investigations necessary to show compliance does not mean the showing of compliance itself, but the list of affected type design requirement paragraphs for which a new demonstration is necessary, together with the means (calculation, test or analysis) by which it is proposed to show compliance.

## **GM 21.101 Establishment of the type-certification basis of changed aeronautical products**

### **1. Purpose**

a. This GM provides guidance for establishing the type-certification basis for changed aeronautical products and identifying the conditions under which it will be necessary to apply for a new type certificate. CAR 21.19 identifies the conditions under which an applicant for a design change is required to make application for a new type-certificate. CAR 21.101 requires an applicant for a change to a type certificate to meet the latest requirements except where the change is not significant, where areas of the product are not affected, where it would be impractical, or where it would not contribute materially to the level of safety of the changed product. This GM explains the criteria of CAR 21.19 and CAR 21.101, and their application.

(1) It provides guidance as to the assessment of "significant" vs. "not significant" changes to the type-certified product. This document also provides guidance for the determination of "substantial" vs. "significant" changes.

b. The intent of CAR 21.101 is to enhance safety through the incorporation of the latest requirements in the type-certification basis of changed products. This GM describes the application of the latest airworthiness requirements for the certification of significant design changes to aircraft, aircraft engines and propellers. Significant changes are generally distinct from the vast majority of major changes. In the assessment of whether a level change is significant, all previous relevant design changes need to be taken into consideration along with any previous updates to the type-certification basis. All changes shall be approved by the Authority. An applicant may comply with earlier amendments of the requirements based upon a finding by the Authority that the change is not significant, an area is not affected by a change or compliance with the latest requirements is impractical or does not materially contribute to the level of safety. Each change shall be judged on its own merit when making the final determination of the type-certification basis.

### **2. Applicability**

a. This GM is applicable to all major changes to type design of aircraft, engines and propellers. For the purposes of this GM an application for a change to a type-certificate (type design) described in CAR 21.101(a) and CAR 21.90 is considered as an application for a major change. Minor changes as defined in CAR 21.91 are considered to have no appreciable effect on airworthiness and are therefore by definition not significant. This GM applies equally to applications made for type-certificates amendments, supplemental type-certificates, or amended supplemental type-certificates. b. This GM is also applicable to

all significant changes to aircraft (other than rotorcraft) of 2722 kg (6,000 lbs.) or less maximum weight, or to a non-turbine rotorcraft of 1361 kg (3,000 lbs.) or less maximum weight. Unless the Authority finds the change significant in an area, an applicant may show that the changed product complies with the requirements incorporated in the type-certificate.

### 3. Related CAR 21 paragraphs

- a. CAR 21.16B Special Conditions
- b. CAR 21.17 Type-certification basis
- c. CAR 21.19 Changes requiring a new type-certificate
- d. CAR 21.91 Classification of changes in type design
- e. CAR 21.101 Applicable CS and environmental protection requirements or applicable airworthiness requirements

### 4. Explanation of terminology

The following is a summary of the terminology used throughout this advisory or guidance material. Further explanations of some of these terms can be found in paragraphs 5, 6, 7, and 8.

- a. Type-certification basis: the applicable airworthiness codes as established in CAR 21.17 and CAR 21.101, as appropriate, special conditions, equivalent level of safety findings; and deviation applicable to the product to be certificated.

Note: This GM is not intended for determining the applicable aircraft environmental protection requirements for changed products.

- b. Earlier requirements: the requirements in effect prior to the date of application for the change, but not prior to the existing type-certification basis.
- c. Existing type-certification basis: the requirements incorporated by reference in the type-certificate of the product to be changed.
- d. Latest requirements: the requirements in effect on the date of application for the change.
- e. Previous relevant design changes: previous design changes, the cumulative effect of which could result in a product significantly or substantially different from the original product or model, when considered from the last time the latest requirements were applied.
- f. Product level change: a change or combination of changes that makes the product distinct from other models of the product (e.g., range, payload, speed). Product level change is defined at the aircraft, engine or propeller level of change.

- g. Significant change: a product level change to the type-certificate to the extent that it changes one or more of the following: general configuration; principles of construction; or the assumptions used for the certification criteria, but not to the extent to be considered a substantial change. Not all product level changes are significant.
- h. Substantial change: a product level design change which is so extensive that a substantially complete investigation of compliance with the applicable requirements is required, and consequently a new type-certificate, in accordance with CAR 21.19.

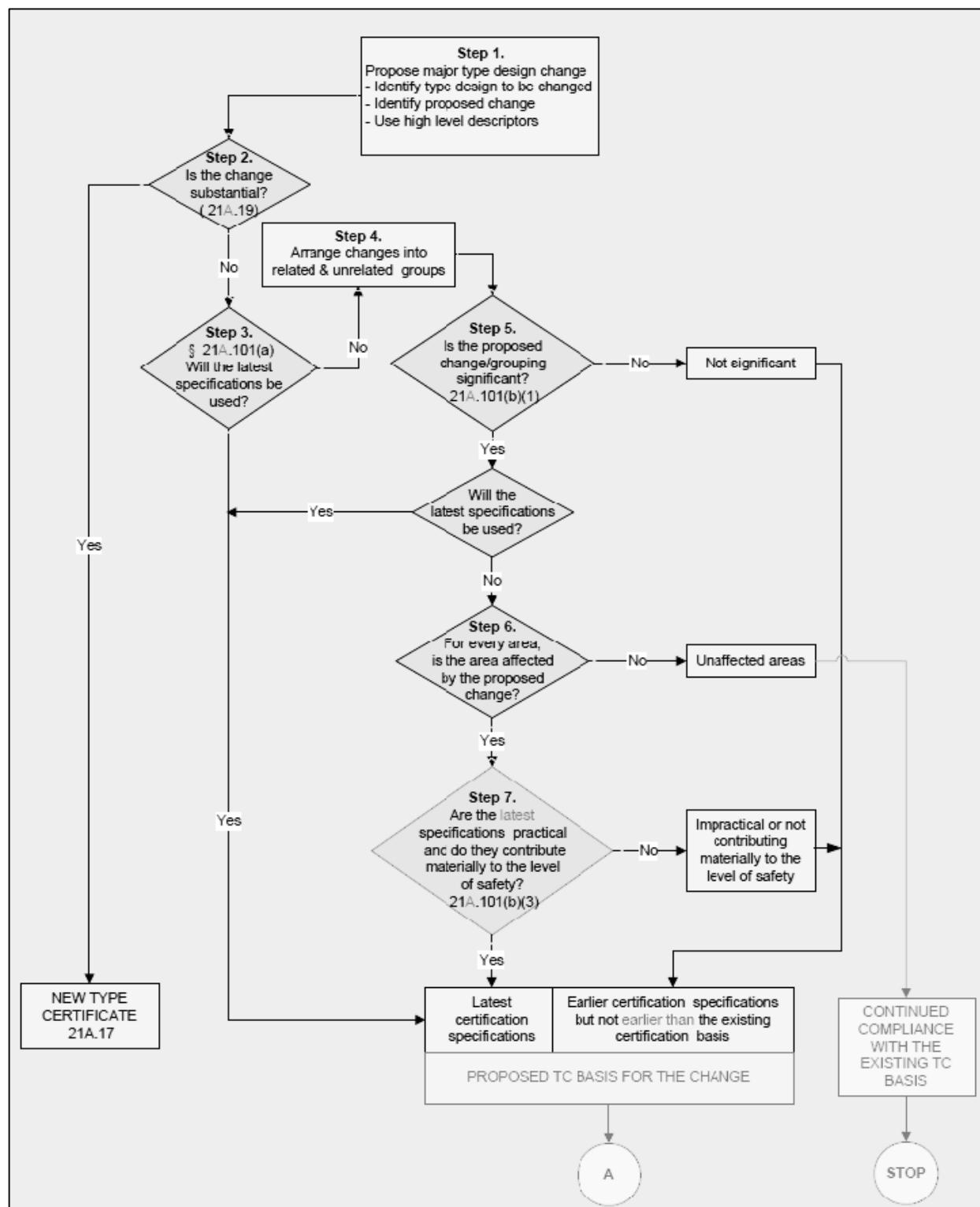
## 5. General overview of CAR 21.101

- a. CAR 21.19 specifies changes that require a new type-certificate. When a new type-certificate is required, CAR 21.17 specifies the applicable type-certification basis for the changed product.
- b. When an application for a new type-certificate is not required by CAR 21.19, CAR 21.101 defines the designation of applicable requirements for determining the type-certification basis for the changed product.
- c. CAR 21.101(a) requires a change to a type-certified product to comply with the latest requirements, unless the change meets the criteria for the exceptions identified in CAR 21.101(b) and (c). The type-certification basis should not be dependent on whether the holder of a type certificate or an applicant for a supplemental type-certificate is originating the change. Where compliance with a later amendment for a significant change does not contribute materially to the level of safety, would be impractical, or is in an area not affected by the change, the applicant may comply with earlier requirements. However the applicant may not use requirements prior to those specified by the existing type-certification basis.
- d. CAR 21.101(b) pertains to changes for which earlier requirements provide adequate standards. Earlier requirements may be used when the change is not significant. In cases where design changes that involve features that have no associated regulatory standards in the existing type certification basis, the Authority will review the proposed certification plan to ensure adequacy of the requirements against the proposed design change.
- e. CAR 21.101(b)(1) allows the applicant to show compliance with an earlier amendment when the Authority determines the change is not significant. CAR 21.101(b)(1)(i) and (ii) pertains to changes that meet the automatic criteria where the change is significant. CAR 21.101(b)(2) and (b)(3) allows the use of earlier requirements for significant changes for areas of the product not affected by the change and for cases where compliance to the latest requirements would not contribute materially to the level of safety or would be impractical. Note that earlier amendments may not precede the corresponding requirement incorporated in the type-certificate.
- f. CAR 21.101(c) provides an exception to the requirements of CAR 21.101(a). An applicant for a change to an aircraft (other than rotorcraft) of 2 722 kg (6 000 lbs) or less maximum weight, or to a nonturbine rotorcraft of 1 361 kg (3 000 lbs) or less maximum weight may show that the changed product complies with the type-certification basis incorporated by reference in the

type-certificate. The applicant may elect to comply with the later requirements. If the Authority finds that the change is significant in an area, the Authority may designate compliance with a later amendment to the requirements incorporated by reference in the type-certificate that applies to the change and any requirement the Authority finds is directly related. Reference paragraph 9.

- g. CAR 21.101(d) provides for the use of special conditions as prescribed under CAR 21.16B when the existing type-certification basis or the latest requirements do not provide adequate standards with respect to the proposed change.
- h. CAR 21.101(e) prescribes the effective period an application to remain valid for a change to a type certificate, which is consistent with the requirements of CAR 21.17 for a new type-certificate.
- i. Figure 1 provides a flowchart of the process to determine the applicable type-certification basis for a proposed design change under CAR 21.101, following a determination that the proposed design change is not substantial under CAR 21.19.

Figure 1: Establishing the type-certification basis for changed products



Note 1: In the vast majority of cases the applicant will proceed to Step 4 as the initial step in the process. See paragraph 6 for guidance.

Note 2: For excepted products under CAR 21.101(c) see paragraph 9. For special conditions under CAR 21.101(d) see paragraph 10.

## **6. Establishing the type-certification basis for changed products, CAR 21.101(b)(1).**

- a. The administrative burden for the applicant is to demonstrate, and the Authority to find, that a change to a product is significant or not significant, and to determine the resulting type certification basis. The type-certification basis can vary depending on the magnitude and scope of the change. The steps below present a streamlined approach of making this determination. In addition to assisting in the determination of significance, this guidance will help establish the appropriate amount of coordination required between the applicant and the Authority.
- b. Classifications of typical changes are provided in the tables of Appendix 1 to GM 21.101. For instructions on how to use Appendix 1 to GM 21.101 tables, proceed to step 4 below. In cases where the classification in Appendix 1 is not applicable or immediately obvious for the proposed change, the following steps should be used in conjunction with Figure 1 to determine the appropriate type-certification basis for the changed product.

Step 1 of Figure 1. Identify the Proposed Change to an Aeronautical Product.

- a. The applicant shall, as a first step, identify the proposed change to the aeronautical product. An applicant for a change to a type-certificate shall consider all previous related design changes to the aeronautical product. Changes to a product can include physical design changes, changes to an operating envelope, and/or performance changes. The change may be a single change, or a collection of changes.
- b. For each change, it is important that the effects of the change on other systems, components, equipment, or appliances of the product are properly assessed. The characteristics affected by the change are not only physical changes. The intent is to encompass all aspects where there is a need for re-evaluation, that is, where the substantiation presented for the product being changed should be reviewed, updated, or rewritten. All other areas of the aircraft are considered to be unchanged or not affected by the change.

Step 2 of Figure 1. Is the Change Substantial?

- a. CAR 21.19 requires that an applicant obtain a new type-certificate for a changed product if the change in design, power, thrust, or weight is so extensive that a substantially complete investigation of compliance with the applicable requirements is required. A new type certificate could be required for either an extensive change to a previously type-certified product or for a new design derived through a series of design changes from a previously type-certified product. The need for a new type-

certificate may be obvious when the change is first considered or may need a more extensive evaluation through application of CAR 21.101.

- b. A "substantially complete investigation" of compliance is required when most of the existing substantiation is not applicable to the changed product. The question of whether a change is substantial should be addressed at the beginning of the process. However, if at any point while developing the type-certification basis, it becomes clear that the proposed change is a substantial change, the process ceases to be an amendment process under CAR 21 Subpart D and becomes a new type-certification process under CAR 21 Subpart B.
- c. If it is not initially clear that a new type-certificate is required, Appendix 1 to GM 21.101 provides some examples of substantial changes to aid in this classification. d. In considering the above, a substantial change will require a new type-certificate; CAR 21.19 applies. If the change is not substantial, CAR 21.101 applies.

**Step 3 of Figure 1. Will the Latest Requirements Be Used?**

- a. Where the latest requirements are used, the intent of CAR 21.101 has been met including the case where the applicable requirements have not changed since the previous update of the type certification basis or where the applicant elects to comply with the latest amendments.

**Step 4 of Figure 1. Is the Proposed Change Significant? CAR 21.101(b)(1)**

- a. Significant changes are product level changes and by their very nature, distinct from the vast majority of major changes. In general, these changes are either the result of a accumulation of changes or occur through an isolated extensive major change rising to the product level that make the changed product distinct from others. Additionally, CAR 21.101(b)(1) defines a significant change based on whether or not one or more of three automatic criteria applies: (1) the general configuration is not retained, (2) the principles of construction are not retained, and (3) the assumptions used for certification of the product do not remain valid. In many cases a significant change will involve more than one of these criteria and will, by its very nature, be obvious and distinct from other product improvements or production changes.
- b. The applicant may use the tables in Appendix 1 to GM 21.101 and the criteria described in paragraph 7 as guidance to make the classification of significance.
- c. Previous relevant design changes of the product can trigger one or more of the automatic criteria listed in CAR 21.101(b)(1)(i) and (ii) for the proposed design change. When assessing the design change, either singularly or collectively, the cumulative effect of previous relevant design changes should be considered. These design changes may have been incorporated through earlier changes in the type-certificate on areas related to the current proposed change and the associated areas, systems, components, equipment, or appliance. The collective result may be a product considerably different from the latest updated type certification basis for the product or model. Two examples of previous relevant airplanes design changes

address those incremental increases in weight or thrust that, while individually not significant (e.g., 2%, 4%, 5% discrete increases), can, through a series of changes, achieve a significant product level change.

- d. The assessment of a proposed design change together with any previous relevant design changes is based on whether any of the three automatic criteria are triggered. CAR 21.101(b) states that changes that meet one of the three criteria are automatically considered significant. The examples of significant and not significant changes in Appendix 1 to GM 21.101 are predicated upon more than 10 years international certification experience. The concept of having only three criteria fits these examples and is therefore considered that no other criteria apply. Therefore, only when one or more of the three criteria is affected is the design change considered significant. The starting point to begin accumulating previous relevant design changes is the time the latest applicable requirements were applied in the affected area, system, component, equipment, or appliance.
- e. Typically, a change to a single area, system or component will not result in a product level change. However, there may be distinct cases where the change to a single system or component may result in a significant change due to its effect on the product level certification assumptions.

## 7. **Using the criteria to determine significance (CAR 21.101(b)(1)(i) and (ii)) (Step 4):**

- a. Typically, significant product level changes result in a model change necessitating an amendment to the type-certificate or an STC that rises to the level of an amended type certificate.

Note that applications for a new model not associated with hardware changes, i.e. commercial considerations are not an indication of a significant change under CAR 21.101. All changes are considered in light of the change itself and its classification.

- b. The following definitions build upon the criteria identified in CAR 21 and provide additional guidance on how to apply the criteria when classifying product level changes. In cases of doubt, and to ensure a consistent outcome, the applicant is encouraged to seek the advice of the Authority.

### **(1) Changes where the general configuration is not retained (significant change to general configuration)**

A change to the general configuration at the product level that is likely to require a new model designation because of the need to distinguish the different product with other product models, e.g., performance, interchangeability of major components, etc.

### **(2) Changes where the principles of construction are not retained (significant change to principles of construction)**

A change at the product level to the materials and/or construction methods that affects the overall product's operating characteristics or inherent strength and would require extensive re-investigation to show compliance.

**(3) Changes that invalidate the assumptions used for certification (significant change to the assumptions used for certification)**

A change to the product level assumptions associated with the compliance demonstration, performance, or operating envelope that by itself is so different that the original assumptions are invalidated.

Examples may include:

- (a) Change of an aircraft from an unpressurised to pressurised fuselage,
- (b) Change of operation of a fixed wing aircraft from land based to water based, and
- (c) Operation envelope expansions that are outside the existing design parameters and capabilities.

Note: Merely operating a product to an expanded envelope for which it was originally designed is generally not a significant change. In this case, the assumptions used for certification of the basic product remain valid and the results can be applied to cover the changed product with predictable effects or can be demonstrated without significant physical changes to the product.

Note: The word "assumptions" in CAR 21.101 bears a meaning different from CS E-30 and CSP-30. CS-E and CS-P or other applicable airworthiness requirements address the conditions that may be imposed on the engine or propeller when it is eventually installed in the aircraft and are published in the installation manual.

- c. The above criteria are used to determine if a change is significant. In applying the automatic criteria and the examples in Appendix 1, the applicant shall concentrate on the change itself. Consideration of only the latest certification requirements is not reason enough to cause a classification of significance under CAR 21.101.
- d. Appendix 1 includes tables of typical changes for large airplanes, small airplanes, rotorcraft, and engines/propellers that meet the definition of significant change for each product line. The appendix also includes typical changes that do not achieve the significant level. The tables may be used in one of two ways:
  - (1) To classify a proposed change that is listed in the table, or
  - (2) In conjunction with the three automatic criteria, to help classify a proposed change not listed in the table.
- e. If, based on Appendix 1 and/or the automatic criteria, the change is classified as:

- (1) Significant (CAR 21.101 (b) (1) and (2)). The applicant will comply with the latest amendments of the applicable requirements for the certification of the changed product. The applicant can use the exceptions provided in CAR 21.101(b)(2) and/or (3) to show compliance with earlier amendments. The final type-certification basis may consist of a combination of the latest, and earlier or existing requirements for the change.
- (2) Not significant (CAR 21.101(b)(1)). The applicable requirements are those contained in the existing type-certification basis. The applicant may elect to comply with later amendments.

Note: In cases where no regulatory standards are defined in the existing type-certification basis for the design change but applicable regulatory standards exists in a subsequent amendment to the requirements, the subsequent amendment will be made part of the type certification basis.

f. Making the Classification

A classification of significant or not significant can be made (the application of CAR 21.101(b)) in one of two ways;

- (1) By the Authority agreeing to appropriate controls and procedures that enable the applicant to make a declaration of not significant. In all cases the Authority retains the option to become involved. An appropriate declaration by the applicant to the Authority would be acceptable for this purpose.
- (2) By the Authority accepting the determination of significance relevant to a major modification based on the applicant's submission.

At this point the determination of "significant" or "not significant" has been made. For significant changes, if the applicant proposes to show compliance with an earlier requirement, the procedure outlined in Section 8 should be used.

**8. Showing compliance with an earlier requirement, CAR 21.101(b) (2) and (3)**

- a. For a design change that has been determined to be significant, CAR 21.101(b)(2) and (3) provide the exceptions from the requirement of CAR 21.101(a) to meet the latest requirements for design changes.
- b. CAR 21.101(b)(2) and (3) identify conditions under which an applicant may show that the changed product complies with an earlier amendment level or with the existing type certification basis and, therefore, would not be required to comply with latest requirements. The earlier amendment level with which the applicant intends to show compliance may not precede the corresponding requirements in the existing type-certification basis. An applicant may elect to show compliance with an earlier amendment level or with the existing type certification basis for areas not affected by the change, and areas affected by the change for which compliance with the latest

requirements would not contribute materially to the level of safety or would be impractical. It is incumbent upon the applicant to demonstrate to the Authority that compliance with the latest requirements does not materially contribute to the level of safety, or is impractical.

- c. The following steps should be used in conjunction with Figure 1, when an applicant wishes to comply with an earlier requirement for a significant change.

Step 5 of Figure 1. For every area, is the area affected by the proposed change? CAR 21.101 (b)(2).

- a. A "not affected area" is any area, system, component, equipment, or appliance that is not affected by the proposed product level change. For a product level change, it is important that the effects of such change on other systems, components, equipment, or appliances of the product are properly assessed because areas that have not been changed may be affected. If the significant change does not affect the area, then the type-certification basis for that area need not be revisited.
- b. In assessing not affected areas, it may be necessary to identify secondary changes resulting from a product level change. The secondary changes may be changes in both physical aspects and/or performance characteristics that are not part of, but consequential to, the overall product level change. Secondary changes may be evaluated to the existing type-certification basis for the product being changed; however, care should be taken to ensure that affected areas are not overlooked. The intent is to encompass all aspects where there is a need for re-evaluation.
- c. The following aspects of a product level change should be considered:
  - (1) Physical aspects. The physical aspects include, but are not limited to, structures, systems, equipment, components and appliances (physical aspects can cover both "hardware" and "software"). When evaluating the physical aspects, it is necessary to make a distinction between the product level change and the resulting secondary effects. An example of a secondary effect may be the lengthening and re-routing of the various airplane circuits as a result of the fuselage plug.
  - (2) Performance/functional characteristics. The less obvious aspect of the word "areas" covers general characteristics of the type-certified product such as performance features, handling qualities, emergency provisions, fire protection, structural integrity, aero elastic characteristics, or crashworthiness. These characteristics may be affected by a product level change. For example, adding a fuselage plug could significantly affect performance and handling qualities
- d. All areas affected by the proposed design change should comply with the latest requirements, unless the applicant shows that demonstrating compliance with an amendment of a requirement would not contribute materially to the level of safety or would be impractical.

Step 6 provides further explanation.

Step 6 of Figure 1. Are the new requirements practical and/or do they contribute materially to the level of safety, CAR 21.101(b) (3)?

- a. Not contributing materially to the level of safety. Compliance with the latest requirements could be considered “not to contribute materially to the level of safety” if the change to type design and/or relevant experience demonstrates a level of safety comparable to that provided by the latest requirements, or if compliance may compromise the existing level of safety for that particular changed product. The applicant should provide sufficient justification to allow the Authority to make this determination. This exception could be applicable in the situations described in the paragraphs below.

- (1) Design. This provision gives the opportunity to consider the consistency of design.

For example, when a small fuselage plug is added, additional seats and overhead bins are likely to be installed, and the lower cargo hold extended. These additional seats, bins, extended lower cargo hold and structural plug may be identical to the existing parts. Applying the latest requirements only to the changed parts may not contribute materially to the level of safety, as the entire design as modified may not necessarily be any safer than the original design. It also may be inappropriate to require compliance to the latest requirements for the entire fuselage, seats, bins, doors and cargo holds. For this reason, compliance of the new fuselage structure, seats, bins and cargo hold area with the requirements in effect when the original fuselage, seats, bins and cargo hold area were certified may be acceptable.

- (2) However, the extent of the fuselage change may be large relative to the original certificated structure, seats, bins, doors and cargo compartment, and/or the change may require a new compliance substantiation that is comparable with that required for a new model airplane. Here, it would be expected that the proposed type certification basis would encompass the requirements in effect at the date of application for the entire fuselage, seats, bins, doors and cargo hold. In the example above, it would be incumbent upon the applicant to show that compliance with the latest requirements does not materially contribute to the level of safety.

- (3) Service experience

- (a) This provision permits the use of relevant service experience, such as fleet hours, to demonstrate that compliance with the latest requirements would not contribute materially to the level of safety, and as such the use of earlier requirements may be appropriate. Appendix 3 provides additional guidance on the use of service experience, along with examples.
- (b) There may be cases for rotorcraft and small airplanes where sufficient and relevant data may not be available because of the reduced utilization and the different amount and type of data available. In such cases, other service history information may provide sufficient data to justify the use of earlier requirements, such as: warranty, repair and parts usage data; accident, incident and service difficulty

reports; service bulletins; airworthiness directives; or other pertinent and sufficient data collected by the manufacturers, authorities, or other entities.

- (c) The service experience levels necessary to demonstrate the appropriate level of safety as they relate to the proposed design change would have to be reviewed and agreed to by the Authority.
- (4) Other exceptions. Compliance with later requirements would not be required where the amendment is of an administrative nature and has been made only to correct errors or omissions, consolidate text or clarify an existing requirement.

b. Impractical. Compliance with the latest requirements may be considered impractical if the applicant can substantiate that it would result in additional resource requirements that are not commensurate with the safety benefits. The additional resource requirements could include those arising from design changes required for compliance and the effort required to demonstrate compliance, but would not include resource expenditures for prior product changes.

- (1) Substantiating data and analyses shall support an applicant's position that compliance is impractical, and the Authority shall agree with this position. In evaluating an applicant's position and substantiating data regarding impracticality the Authority may consider other factors (e.g., the costs and safety benefits for a comparable new design).
- (2) A review of transport category projects showed that in certain cases, where an earlier amendment to applicable requirements was allowed, design changes were made to nearly comply with the latest amendments. In these cases the applicant successfully demonstrated that full compliance would require a substantial increase in the outlay of resources with a very small increase in the level of safety. These cases reflect an appropriate application of "impracticality" to a changed product.
- (3) A proposal that a product design change would be impractical would be used, in most cases, where compliance with the latest requirements would contribute materially to the level of safety, but this contribution may not be commensurate with the associated resource expenditures.
- (4) Appendix 2 to GM 21.101 provides additional guidance and examples for determining impracticality.

c. This completes the step by step process used in the determination of the type-certification basis for the changed product.

## 9. Excepted products under CAR 21.101(c)

- a. An applicant for a change to an aircraft (other than rotorcraft) of 6 000 pounds or less maximum weight, or to a non-turbine rotorcraft of 3 000 pounds or less maximum weight may show that the changed product complies with the requirements incorporated by reference in the type-certificate. The applicant may elect to comply

with the later requirements. If the Authority finds that the change is significant in an area, the Authority may designate compliance with an amendment to the type certification basis incorporated by reference in the type-certificate that applies to the change and any requirement that the Authority finds is directly related. Beginning with the existing type-certification basis, the Authority will step through each progressive requirement to determine the amendment appropriate for the change. However, if the Authority also finds that compliance with the amendment or requirement would not contribute materially to the level of safety of the changed product, or would be impractical, the Authority may allow compliance with an earlier amendment to that requirement initially designated or with the existing type-certification basis, depending on the proposed design change.

For a change that contains new design features that are novel and unusual, the Authority will designate the applicable special conditions at the appropriate amendment level beginning with the existing type-certification basis and progress to the most appropriate later amendment level for the change. For a change that contains new features, which are not covered in the existing type certification basis, the Authority will designate the applicable airworthiness requirements at the appropriate amendment level, beginning with the existing type-certification basis and progress to the most appropriate later amendment level for the change.

- b. The exception for products under CAR 21.101(c) applies at the aircraft level only. Design changes to engines and propellers installed on these excepted aircraft are assessed as separate products using CAR 21.101(a) and (b).

#### **10. Special conditions, CAR 21.101(d).**

CAR 21.101(d) allows for the application of special conditions, or for changes to existing special conditions, to address the changed design. The objective is to achieve, for the significant change, a level of safety consistent with that provided by the requirements in effect on the date of application for the design change. The application of special conditions to a design change is not in itself a reason for it to be classified as either a substantial change or a significant change. When the change is not significant, the Special Conditions should be consistent with the agreed type-certification basis.

#### **Effective period for an application to change a type-certificate, CAR 21.101(e).**

CAR 21.101(e) is intended to ensure that, at the time the changed product is certificated, no longer than three or five years, as appropriate to the product, has elapsed from the date of application. This is to ensure that the type-certification basis for the changed product is as current as practical. This is consistent with the requirements of CAR 21.17 for a new type-certificate and prescribes the process of updating the type-certification basis if these limits are exceeded.

## 11. Documentation

All changes that result in a revision to the product's type-certification basis should be reflected on the type-certificate data sheet. Similarly, the type-certification basis should be noted on all STCs.

### Appendix 1 to GM 21.101 - Classification of changes

Appendix 1 includes tables of typical changes for small airplanes (figure 1), large airplanes (figure 2), rotorcraft (figure 3), and engines/propellers (figure 4) that meet the definition of a significant change or substantial change for each product line. The Appendix also includes typical changes that do not achieve the significant level.

- a) The examples in the tables were developed from data collected from regulatory files and included industry review and input. They clearly are changes that we have seen in the past and will likely continue to see in the future. The Authority has made the determination, based on applying the automatic criteria, that these changes are significant or not significant.
- b) The columns "Change to General Configuration", "Change to Principles of Construction" and "Assumptions of Certification" reflect the automatic criteria of CAR 21.101(b)(1)(i) and (ii). The "Notes" column provides typical rationales that are considered in evaluating the designation of the criteria.
- c) The tables may be used in one of two ways:
  - (i) to classify a proposed change that is listed in the table, or
  - (ii) in conjunction with the three automatic criteria, to understand the logic used in the table to help classify a proposed change not in the table.
- d) The classification may change due to cumulative effects and/or combinations of individual changes.

**Figure 1. Table of examples of changes for small aeroplanes: The following are examples of substantial changes:**

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been initiated?	Notes
Change in wing location (tandem, forward, canard, high/low)	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Fixed wing to tilt wing	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Increase in the number of engines from one to two	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Replacement of piston or turbo-prop engines with turbojet or turbofan engines	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Change in engine configuration (tractor to pusher)	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

Change from an all metal airplane to all composite primary structure (fuselage, wing, empennage).	No	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Increase from subsonic to supersonic flight regime	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

The following are examples of significant changes:

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been initiated?	Notes
Conventional tail to T-tail or Y-tail, or vice versa	Yes	No	Yes	<p>Change in general configuration.</p> <p>Requires extensive structural, flying qualities and performance re-investigation.</p> <p>Requires new AFM to address performance and flight characteristics.</p>

Changes in wing configuration (addition of tail strakes or change in dihedral, or changes in wing span, flap or aileron span, angle of incidence of the tail, addition of winglets, or wing sweep of more than 10%)	Yes	No	Yes	Change in general configuration. Likely requires extensive changes to wing structure. Requires new AFM to address performance and flight characteristics. Note: Small changes to wingtip are not significant changes. See table for not significant changes.
Tricycle / tailwheel undercarriage change or addition of floats	Yes	No	No	Change in general configuration. Likely, at airplane level, general configuration and certification assumptions remain valid.
Increase in seating capacity resulting in a different certification category (e.g., from normal to commuter category where configuration or principles of construction changes or assumptions do not remain valid.	Yes	Yes	Yes	Change in general configuration. Change in principles of construction. Requires extensive construction re-assessment. Change in certification assumptions. Requires new AFM and pilot type rating.

Passenger to freighter configuration conversion which involves the introduction of a cargo door or an increase in floor loading of more than 20%, or provision for carriage of passengers and freight together	Yes	No	Yes	Change in general configuration affecting load paths, aeroelastic characteristics, aircraft related systems, etc..  Change in design assumptions.
A fuselage stretch would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification	Yes	No	Yes	Likely extensive changes to fuselage structure, aerodynamics, aircraft systems performance, and operating envelope.  Requires new AFM to address performance and flight characteristics.
Replace reciprocating engines with the same number of turbo-propeller engines where the operating envelope is expanded	No	No	Yes	Invalidates certification assumptions.  Requires new AFM to address performance and flight characteristics.
Addition of a turbo-charger that changes the power envelope, operating range, or limitations appreciably.	No	No	Yes	Invalidates certification assumptions due to changes in operating envelope and limitations.  Requires new AFM to address performance and flight characteristics.

The replacement of an engine of higher rated power or increase thrust would be considered significant if it would invalidate the existing substantiation, or would change the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the assumptions of certification	No	Yes	Yes	Invalidates certification assumptions. Requires new AFM to address performance and flight characteristics. Likely changes to primary structure. Requires extensive Construction re-investigation.
A change in the type of material, such as composites in place of metal (or one composite fibre material system with another (e.g., carbon for fibreglass), for primary structure would normally be assessed as a significant change.	No	Yes	Yes	Change in principles of construction and design from conventional practices. Likely change in design/certification assumptions.
Change involving appreciable increase in design speeds $V_d$ , $V_{mo}$ , $V_c$ , or $V_a$	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.
STOL kit	No	No	Yes	Certification assumptions invalidated. Requires new AFM to address performance and flight characteristics.

A change in the rated power or thrust is likely to be regarded as significant if the design speeds are thereby changed so that compliance needs to be re-justified with a majority of requirements.	No	No	Yes	Certification assumptions invalidated.  Requires new AFM to address performance and flight characteristics.
Fuel state: such as compressed gaseous fuels, or fuel cells. This could completely alter the fuel storage and handling systems and possibly affect the aeroplane structure.	No	No	Yes	Changes in design/certification assumptions.  Extensive alteration of fuel storage and handling systems.
A design change that alters the aircraft flight characteristics or performance from the type design would normally be significant if it appreciably changes the kinematics or dynamics of the aeroplane.	No	No	Yes	Certification assumptions invalidated.  Requires new AFM to address performance and flight characteristics.
Change involving Weight increase which places the aircraft into the commuter category (i.e., above 12500 lbs.)	No	No	Yes	Certification assumptions invalidated.  Requires new AFM.

A change in the flight control concept for an aircraft, for example to fly by wire (FBW) and side-stick control, or a change from hydraulic to electronically actuated flight controls, would in isolation normally be regarded as a significant change.	No	No	Yes	Changes in design and certification assumptions. Requires extensive systems architecture and integration re-investigation. Requires new AFM.
Addition of cabin pressurisation	No	Yes	Yes	Extensive airframe changes affecting load paths, fatigue evaluation, aero elastic characteristics, etc. Requires extensive construction re-investigation. Invalidates design assumptions.
Changes in types and number of emergency exits or an increase in passenger capacity in excess of maximum passenger capacity demonstrated for the aircraft type.	No	No	Yes	Emergency egress requirements exceed those previously substantiated. Invalidates assumptions of certification.
A change in the required number of flight crew, which necessitates a complete cockpit re-arrangement, and/or an increase in pilot workload would be a significant change.	No	No	Yes	Extensive changes to avionics and aircraft systems. Invalidates certification assumptions. Requires new AFM.

An appreciable expansion of an aircraft's operating envelope or operating capability would normally be a significant change. e.g., an increase in maximum altitude limitation, approval for flight in known icing conditions, an increase in airspeed limitations	No	No	Yes	<p>Invalidates certification assumptions.</p> <p>Requires new AFM to address performance and flight characteristics.</p>
A major flight deck upgrade	No	No	Yes	<p>Extensive changes to avionics and electrical systems design.</p> <p>Invalidates certification assumptions.</p> <p>Extensive re-assessments of systems integration, flight crew workload, human factors evaluation are required.</p> <p>Requires new AFM.</p>
Introduction of autoland	No	No	Yes	Invalidates original design assumptions
Conventional tail to T-tail or Y-tail, or vice versa	Yes	No	Yes	<p>Change in general configuration.</p> <p>Requires extensive structural, flying qualities and performance re-investigation.</p> <p>Requires new AFM to address performance and flight characteristics.</p>

The following are examples of not significant changes:

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Addition of wingtip modifications (not winglets)	No	No	No	Although a major change to the airplane. Likely the original general configuration, principles of construction and certification assumptions remain
Installation of skis or wheel skis	No	No	No	valid Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
FLIR or surveillance camera installation.	No	No	No	Additional flight or structural evaluation may be necessary but the change does not alter basic airplane certification.
Litter, berth and cargo tie down device installation	No	No	No	Not an airplane level change.
Increased tire size, including tundra tires	No	No	No	Not an airplane level change.
Replacement of one propeller type with another irrespective of increase in number of blades)	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.

Addition of a turbo- charger that does not appreciably change the power envelope, operating range, or limitations (e.g., a turbo— normalised engine), (e.g., where the additional power is used to enhance high altitude or hot day performance.)	No	No	No	Not an airplane level change.
Replace a petrol engine with a diesel engine or approximately the same horsepower.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Substitution of one method of bonding for another (e.g., change in type of adhesive)	No	No	No	Not an airplane level change.
Substitution of one type of metal for another	No	No	No	Not an airplane level change.
Any change in construction or fastening not involving primary structure	No	No	No	Not an airplane level change.
A new fabric type for fabric skinned aircraft	No	No	No	Not an airplane level change.
Increase in flap speed or undercarriage limit speed	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.

Structural strength increases	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
IFR upgrades involving installation of components (where the original certification does not indicate that the aeroplane is not suitable as an IFR platform, e.g., special handling concerns).	No	No	No	Not an airplane level change.
Fuel lines, where engine horsepower is increased but fuel flow is not increased beyond the certified maximum amount.	No	No	No	Not an airplane level change.
Fuel tanks, where fuel is changed from gasoline to diesel fuel and tank support loads are small enough that an extrapolation from the previous analysis would be valid. Chemical compatibility would have to be substantiated	No	No	No	Not an airplane level change.

Limited changes in a pressurisation system, e.g., number of outflow valves, type of controller, or size of pressurised compartment, but the system shall be re- substantiated if the original test data is invalidated.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Install a quieter exhaust system	No	No	No	Not an airplane level change.
Changes in engine cooling or cowling	No	No	No	Not an airplane level change.
Fuel type: AvGas to Diesel/Jet A, AvGas to Ethanol/Methanol. Changing to Multiple fuel systems containing fuel types (other than systems used for starting): such systems using as AvGas/Ethanol, or Jet A/Autogas (turbine). Unrestricted mixtures in one fuel system of different fuel types: Such as AvGas/Diesel or Jet A/Ethanol.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.

<p>Fuels of substantially the same type: Such as AvGas to AutoGas, AvGas (80/87) to AvGas (100LL), Ethanol to Isopropyl Alcohol, Jet B to Jet A (although Jet A to Jet B may be considered significant due to the fact that Jet B is considered potentially more explosive).</p>	No	No	No	<p>Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.</p>
<p>Fuels that specify different levels of "conventional" fuel additives that do not change the primary fuel type. Different additive levels (controlled) of MTBE, ETBE, Ethanol, Amines, etc. in AvGas would not be considered a significant change.</p>	No	No	No	<p>Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.</p>
<p>A change to the maximum take-off weight of less than 5% unless assumptions made in justification of the design are thereby invalidated.</p>	No	No	No	<p>Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.</p>
<p>An additional aileron tab (e.g. on the other wing)</p>	No	No	No	<p>Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.</p>

Larger diameter flight control cables with no change in routing, or other system design	No	No	No	Not an airplane level change.
Autopilot installation (for IFR use, where the original certification does not indicate that the aeroplane is not suitable as an IFR platform)	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.
Increased battery capacity or relocate battery	No	No	No	Not an airplane level change.
Replace generator with alternator	No	No	No	Not an airplane level change.
Additional lighting (e.g., navigation lights, strobes)	No	No	No	Not an airplane level change.
Higher capacity brake assemblies	No	No	No	Not an airplane level change.
Increase in fuel tank capacity	No	No	No	Not an airplane level change.
Addition of an oxygen system	No	No	No	Not an airplane level change.
Relocation of a galley.	No	No	No	Not an airplane level change.
Passenger to freight (only) conversion with no change to basic fuselage structure.	No	No	No	Although a major change to the airplane, likely the original general configuration, principles of construction and certification assumptions remain valid.  Requires certification substantiation applicable to freighter

Installation of new seat belt or shoulder harness	No	No	No	Requirements. Not an airplane level change.
A small increase in cg range.	No	No	No	At airplane level, no change in general configuration, principles of construction & certification assumptions.
APU Installation that is not flight essential	No	No	No	A major change to the airplane level, likely the original general configuration, principles of construction and certification assumptions remain valid.  Requires certification substantiation applicable to APU installation
An alternative autopilot	No	No	No	requirements. Not an airplane level change.
Addition of Class B Terrain Awareness and Warning Systems (TAWS)	No	No	No	Not an airplane level change.

**Figure 2. Table of examples of changes for large aeroplanes.****The following are examples of substantial changes:**

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Change in the number or location of engines, e.g., four to two wing-mounted engines or two wing-mounted to two body-mounted engines.	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Change from a high wing to low wing configuration.	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Change from an all metal airplane to all composite primary structure (fuselage, wing, empennage).	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

**The following are examples of significant changes:**

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Derivative model, e.g., increased passenger payload, freighter version or complete update of a certified aeroplane.	Yes	Yes	Yes	Multiple changes packaged into a new model. Updated aeroplane could change principles of construction.

Reduction in the number of flight crew (In conjunction with flight deck update).	Yes	No	No	Extensive changes to avionics and aircraft systems. Impact to crew workload and human factors, pilot type rating.
Modify an aeroplane for flight in known icing conditions by adding systems for ice detection and elimination	Yes	No	Yes	New aircraft operating envelop. Requires major new systems installation and aircraft evaluation. Operating envelope changed.
Conversion – passenger or combi to all freighter including cargo door, redesign floor structure and 9g net or rigid barrier	Yes	No	Yes	Extensive airframe changes affecting load paths, aeroelastic characteristics, aircraft related systems for fire protection, etc. Design assumptions changed from passenger to freighter.
Change to pressurised cabin including the introduction of a pressurization system.	No	No	Yes	Essentially a re-certification of airframe and systems associated with operating envelope change.
Addition of leading edge slats	Yes	No	No	Requires extensive changes to wing structure, adds aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Fuselage length change – lengthen or shorten fuselage	Yes	No	No	Requires extensive changes to fuselage structure, affects aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.

Extensive structural airframe modification, such as installation of a large telescope with large opening in fuselage.	Yes	No	No	Requires extensive changes to fuselage structure, affects aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Changing the number of axles or number of landing gear done in context with a product level change which involves changing the aeroplane gross weight.	Yes	No	No	Requires extensive changes to aircraft structure, affects aircraft I systems and requires AFM changes.
Primary structure changes from metallic material to composite material.	No	Yes	No	Change in principles of construction and design from conventional practices.
Typically, an increase in design weight of more than 10%	No	No	Yes	When it requires extensive resubstantiation of aircraft structure, aircraft performance and flying qualities and associated systems.
Wing changes in span, sweep, and tip designs or wing chord. (Note: Potentially substantial if it is a change from a high wing to a low wing, or a new wing.) Change in type or number of emergency exits in conjunction with an increase in the number of passengers demonstrated.	Yes	No	No	When it requires extensive changes to wing structure, adds aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
	No	No	Yes	The new emergency egress requirements exceed those previously substantiated.

Comprehensive flight deck upgrade.	No	No	Yes	Affects electrical systems integration and architecture concepts and philosophies. This drives a reassessment of flight crew workload and other human factors issues, and requires a re-evaluation of the original design assumptions used.
Change in primary flight controls to fly by wire (FBW) system. (Some airplanes have some degree of FBW. Achieving full FBW may be a not significant change on some airplanes.)	Yes	No	Yes	for the cockpit When the degree of change is so extensive that it affects basic aircraft systems integration and architecture concepts and philosophies. This drives a complete re-assessment of flight crew workload, handling qualities, and performance evaluation, which are different from the original design assumptions.
Replace reciprocating with turbo-propeller engines	Yes	No	No	Requires extensive changes to airframe structure, adds aircraft level systems, and requires a new aeroplane flight manual to address performance and flight characteristics.
Typically a thrust increase of more than 10%	No	No	Yes	When it requires extensive re-substantiation of powerplant installation, and has a marked effect on aircraft performance and flying qualities.
Initial installation of an autoland system	No	No	Yes	Baseline airplane not designed for autoland operation, potential crew work load and systems compatibility issues

Installation of a new fuel tank, e.g., horizontal stabilizer tank or auxiliary fuel tank in the fuselage outside the wing in conjunction with increased maximum takeoff weight and takeoff thrust.	No	No	Yes	Requires changes to airframe, systems and AFM. Results in performance changes.
Main deck cargo door installation.	Yes	No	No	Redistribution of internal loads, change in aeroelastic characteristics, system changes.
Conversion from a passenger floor to a cargo floor and installation of a cargo handling system.	No	No	Yes	Completely new floor loading and design. Redistribution of internal loads, change in cabin safety requirements, system changes.
Initial installation of an APU essential for aircraft flight operation.	No	No	Yes	Changes emergency electrical power requirements, change in flight manual and operating.

The following are examples of not significant changes:

Description of change	Is there a Change to the 21.101(b)(1)(i)	Is there a Change to the Principles 21.101(b)(1)(i)	Have the assumptions used Certification been invalidated? 21.101(b)(1)(ii)	Notes
Alternate engine installation or hush kit at same position	No	No	No	Although an aeroplane level change, it is not significant so long as there is not more than a 10% increase in thrust or a change in the principles of propulsion.

Fuselage length change – lengthen or shorten fuselage	No	No	No	A small change reasons, where such changes do
Re-fairing of wing tip caps (e.g., for lights, fuel dump pipes) and addition of splitter plates to the trailing edge thickness of the cruise airfoil.	No	No	No	Does changes.
Additional power used to enhance high altitude or hot day performance	No	No	No	Usually no change in basic operating envelope. Existing cert data can product the additional power is demand engine due to
General avionics changes.	No	No	No	These modifications are generally adaptive* in nature, and do not change the original certification assumptions, alter basic cockpit design architecture concepts and philosophies, and do not have a major impact on crew workload or man/machine. *Adaptive means the change adapts to the existing airplane buses, power, structure.
Initial installation of an autopilot system	No	No	No	Modification is generally adaptive in nature, with no change to original certification assumptions.
Integrated modular avionics	No	No	No	The basic functionality unchanged. No change from analogue to digital.
Installation or rearrangement of an interior in an aircraft.	No	No	No	Special conditions could be used for new and novel

Change from assembled primary structure to monolithic or integrally machined structure	No	No	No	Method of construction is well understood.
Modification to ice protection systems	No	No	No	Re-certification required, but type-certification basis is adequate.
Brakes: design or material change, e.g., steel to carbon	No	No	No	Re-certification required, but type-certification basis is adequate.
Redesign floor structure	No	No	No	By itself, this is not a significant product level change. It could be a significant change if part of a cargo converted passenger airplane.
Novel or unusual method of construction of a component.	No	No	No	Special conditions could be required if there are no existing requirements that adequately address these features. The component change does not rise to the product level change.
Initial installation of a non-essential APU	No	No	No	A stand-alone initial APU installation on an airplane originally designed to use ground/airport supplied electricity, and air-conditioning. In this case, the APU would be an option to be independent of airport power.

**Figure 3. Table of examples of changes for rotorcraft** The following are examples of substantial changes:

Description of change	Is there a Change to the General Configuration ?	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Change from the number and or configuration of rotors (e.g., main & tail rotor system to two main rotors.)	Yes	No	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.
Change from an all-metal rotorcraft to all composite rotorcraft.	Yes	Yes	Yes	Proposed change in design is so extensive that a substantially complete investigation of compliance with the applicable requirements is required.

The following are examples of significant changes:

Description of change	Is there a Change to the General Configuration ? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Comprehensive Flight Deck Upgrade	Yes	No	Yes	The degree of change is so extensive that it affects basic avionics and electrical systems integration and architecture concepts and philosophies. This drives a complete reassessment of flight crew workload and other human factor issues, and requires a re-evaluation of the original design assumptions used for the cockpit.

Certification for flight into known icing conditions.	No	No	Yes	
(Fixed) flying controls from mechanical to fly by wire	Yes	Yes	Yes	
Addition of an engine; e.g., from single to twin or reduction of the number of engines; e.g., from twin to single	Yes	No	Yes	May be Substantial - depend upon project details
A fuselage modification that changes the primary structure, aerodynamics, or operating envelope sufficiently to invalidate the certification assumptions.	Yes	No	Yes	
Application of an approved primary structure to a different approved model (e.g., installation on a former model of the main rotor approved on a new model that results in increased performance)	No	Yes	Yes	
Extensive Primary structure changes from metallic material to composite material.	No	Yes	Yes	Change in principles of construction and assumptions used for certification for the product level change. Changes of a few individual elements from metal to composite are not typically considered a significant change .

Emergency Medical Service Configuration with primary structural changes sufficiently to invalidate the certification assumptions	Yes	No	Yes	Any EMS configuration will not be classified as significant. Modifications made for EMS is typically internal and the general external configuration is normally not affected. These changes should not automatically be classified as significant
Skid landing gear to wheel landing gear or wheel landing to skid	Yes	No	Yes	If the rotorcraft is such that the skid or wheel configuration is inherent in the basic certification design, the change may be not significant.
Change of the number of rotor blades	Yes	No	No	The addition/deletion of rotor blades may not be significant provided the remainder of the basic propulsion system remains essentially
Change tail anti-torque device (e.g., tail rotor, ducted fan or other technology)	Yes	Yes	No	unchanged

The following are examples of not significant changes:

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Emergency floats	No	No	No	Shall Comply to the specific applicable requirements for emergency floats. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certified product level.
FLIR or surveillance camera installation	No	No	No	Additional flight or structural evaluation may be necessary but the change does not alter the basic rotorcraft certification
Helicopter Terrain Awareness Warning System (HTAWS) for operational credit	No	No	No	Certified per rotorcraft HHTAWS AC guidance material
Health Usage Monitoring System (HUMS) for Maintenance Credit	No	No	No	Certified per rotorcraft HUMS AC guidance material

Expanded limitations with minimal or no design changes, following further tests/justifications or different mix of limitations (CG limits, oil temperatures, altitude, minimum/max mum weight, minimum/max external temperatures, speed, ratings)	No	No	No	Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certified product level.
Installation of a new engine type, equivalent to the former one; leaving a/c installation and limitations substantially unchanged	No	No	No	Refer to AC 27-1 or AC 29-2 for guidance
Windscreen installation	No	No	No	Does not change the rotorcraft overall product configuration
Snow skis, "Bear Paws"	No	No	No	Shall comply with specific requirements associated with the change. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certified product

External Cargo Hoist	No	No	No	Shall level Comply to the specific applicable requirements for external loads. This installation, in itself, does not change the rotorcraft configuration, overall performance, or operational capability. Expanding an operating envelope (such as operating altitude and temperature) and mission profile (such as passenger carrying operations to external load operations, or flight over water, or operations in snow conditions) are not by themselves so different that the original certification assumptions are no longer valid at the type-certificated
IFR upgrades involving installation of components (where the original certification does not indicate that the rotorcraft is not suitable as an IFR platform, e.g., special handling concerns).	No	No	No	Product level. Not a rotorcraft level change.
An upgrade to CAT A certification approval	No	No	No	Typically these are engine and drive systems rating changes appropriate for CAT A and rotorcraft performance requirements. Rotorcraft modifications, if any necessary, do not typically invalidate the certification assumptions, or change the general configuration of principles.

Reducing the number of pilots for IFR from 2 to 1	No	No	No	May be significant if construction there are extensive equipment and design changes such that the certification assumptions are invalidated or the general configuration of the rotorcraft is changed.
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**Figure 4. Engines and propellers**

**The following are examples of significant changes:**

**Turbine engines**

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Traditional turbofan to geared-fan engine	Yes	No	Yes	<p>This change would affect the engine in terms of FOD ingestion, containment, etc...</p> <p>Note that this change is most likely substantial under 21.19</p>
Low bypass ratio engine to high bypass ratio engine with an increased inlet area.	Yes	No	Yes	<p>Change in general configuration.</p> <p>Likely change in model designation Not interchangeable Assumptions for certification may no longer be valid in terms of ingestion, icing, etc.</p> <p>Note that this change is most likely substantial under 2119</p>

Turbojet to Turbofan	Yes	No	Yes	<p>Change in general configuration.</p> <p>Likely change in model designation Not interchangeable Assumptions for certification may no longer be valid ingestion, icing, blade out criteria, etc.</p> <p>Note that this change is most likely substantial under 21.19</p>
Turbo-shaft to turbo-propeller	Yes	No	Yes	<p>Change in configuration such as an additional gearbox.</p> <p>Change in model designation.</p> <p>Change in mission profile. Assumptions for certification may no longer be valid in terms of flight envelope, ratings, etc</p> <p>Note that this change is most likely substantial under 2119</p>
Conventional ducted fan to unducted fan	Yes	Yes	Yes	<p>Change in configuration.</p> <p>Change in Type. Not interchangeable.</p> <p>Assumptions for certification may no longer be valid.</p> <p>Note that this change is most likely substantial under 21.19</p>

Conventional engine for subsonic operation to after-burning engine for supersonic operation	Yes	Yes	Yes	<p>Change in configuration .</p> <p>Change in Type</p> <p>Not interchangeable</p> <p>Assumptions for certification may no longer be valid</p> <p>Change in operating envelope</p> <p>Note that this change is I most likely substantial under 21.19</p>
Increase/decrease in the number of compressor/turbine stages with resultant change in approved limitations*. (* excludes life limits)	No	No	Yes	<p>Change is associated with other changes that would affect performance envelope and may affect the dynamic behavior in terms of backbone bending, torque spike effects on casing, surge and stall characteristics, etc</p>
New design fan blade and fan hub, or a bladed fan disk to a blisk or a fan diameter change that could not be retrofitted,	Yes	No	Yes	<p>Likely change in model designation</p> <p>Change is associated with other changes that would affect engine thrust/power limitations and have affected the dynamic behaviour of the engine in terms of backbone bending, torque spike effects on casing, foreign object ingestion behaviour, burst model protection for the aircraft.</p> <p>If there is a diameter change, installation will be also affected.</p>

Hydro-Mechanical to FADEC/EEC without hydro-mechanical backup	Yes	Yes	Yes	Change in engine control configuration Likely change in model designation Not interchangeable. Likely Assumptions used for certification are no longer valid.
A change in the containment case from hard-wall to composite or vice-versa, that could not be retrofitted without additional major changes to the engine or restrictions in the initial limitations in the installation manual	No	Yes	No	Change in methods of construction that have affected inherent strength, backbone bending, blade to case clearance retention, containment wave effect on installation, effect on burst model, torque spike effects.
Replacement of the gas generator (core) with a different one that is associated with changes in approved limitations* (* excludes life limits)	No	No	Yes	Change is associated with other changes that would affect performance envelope and may affect the dynamic behaviour of the engine. Assumptions used for certification may no longer be valid

**Piston engines**

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Convert from Mechanical to Electronic Control System	Yes	Yes	No	Change in engine control configuration: Installation interface of engine changed Changes to principles of construction: Digital controllers and sensors require new construction techniques and environmental testing.
Add Turbocharger that increases performance and changes in overall product	Yes	No	Yes	Change in general configuration: Installation interface of engine changed (exhaust system) Certification assumptions invalidated. Change in engine configuration Change in operating envelope and performance

Convert from air-cooled cylinders to liquid cooled cylinders.	Yes	No	Yes	Change in general configuration: Installation interface of engine Certification assumptions invalidated. Change in operating envelope and engine temperature requirements.
Convert from spark-ignition to compression-ignition	Yes	No	Yes	Change in general configuration: Installation interface of engine changed (no mixture lever) Certification assumptions invalidated: Change in operating envelope and performance.

### Propellers

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated?   21.101(b)(1)(ii)	Notes
Introduction of a different principle of blade retention	Yes	Yes	No	Change in propeller configuration. Likely change in model Propeller's operating characteristics and inherent strength require re-evaluation

**Figure 4. Engines and propellers**

The following are examples of not significant changes: Turbine engines

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
Change in the material from one type of metal to another type of metal of a compressor drum	No	No	No	No change in performance.  No likely change in model designation Assumptions are still valid
Increase/decrease in the number of compressor/turbine stages without resultant change in performance envelope	No	No	No	No change in performance.  Model designation may or may not change  Assumptions are still valid
New components internal to the FADEC/EEC the introduction of which does not change the function of the system	No	No	No	No change in configuration Retrofitable  Assumptions used for certification are still valid  Possible changes in principles of construction are insignificant
Software changes	No	No	No	
Rub-strip design changes	No	No	No	Component Level Change
A new combustor that does not change the approved limitations*, dynamic behaviour (* excludes life limits)	No	No	No	Component Level Change
Bearing changes	No	No	No	Component Level Change

New blade designs with similar material that can be retrofitted	No	No	No	Component Level Change
Fan blade re-design that can be retrofitted	No	No	No	Component Level Change
Oil tank re-design	No	No	No	Component Level Change
Change from one hydro-mechanical control to another hydro-mechanical control	No	No	No	Component Level Change
Change to limits on life limited components	No	No	No	Component Level Change
Changes to limits on exhaust gas temperature	No	No	No	
Changes in certification maintenance requirements (CMR) with no configuration changes	No	No	No	
Bump ratings within the product's physical capabilities that may be enhanced with gas path changes that are limited to such changes as blade re-stagger, cooling hole patterns, blade coating changes,	No	No	No	

ec. A change in principal physical properties and mechanics of load transfer of a material of primary structure or highly loaded components. For example, change from traditional metal to either an exotic alloy or a composite material on a highly loaded component	No	No	No	Component Level Change
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**Piston engines**

Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated? 21.101(b)(1)(ii)	Notes
A change in principal physical properties and mechanics of load transfer of a material of primary structure or highly loaded components. For example, change from traditional metal to either an exotic alloy or a composite material on a highly loaded component	No	No	No	Component Level Change
New or redesigned cylinder head, or valves or pistons.	No	No	No	Component Level Change
Changes in crankshaft	No	No	No	Component Level Change
Changes in crankcase	No	No	No	Component Level Change

Changes in carburettor	No	No	No	Component Level Change
Changes in mechanical fuel injection system	No	No	No	No controversy-No comments
Changes in mechanical fuel injection pump	No	No	No	Component Level Change
Engine model change to accommodate new airplane installation. No change in principles of operation of major subsystems; no significant expansion in power or operating envelopes or in limitations	No	No	No	
No change in basic principles of operation, or a simple mechanical change. For example, change from dual magneto to two single magnetos on a model	No	No	No	
Subsystem change produces no change in base input parameters, and previous analysis can be reliably extended. For example, a change in turbocharger where induction system inlet conditions remain unchanged, or if changed, the effects can be reliably extrapolated	No	No	No	

Change in material of secondary structure or not highly loaded component. For example, a change from metal to composite material in a non-highly loaded component, such as an oil pan that is not used as a mount pad	No	No	No	Component Level Change
Change in material that retains the physical properties and mechanics of load transfer. For example, a change in trace elements in a metal casting for ease of pouring or to update to a newer or more readily available alloy with similar mechanical properties	No	No	No	Component Level Change

### Propellers

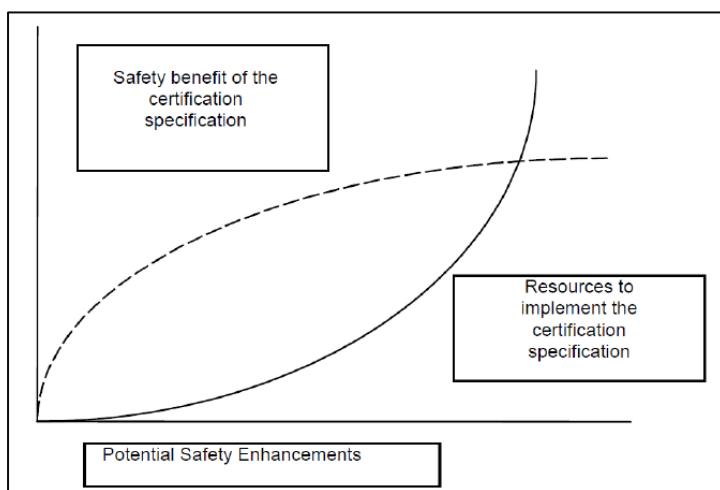
Description of change	Is there a Change to the General Configuration? 21.101(b)(1)(i)	Is there a Change to the Principles of Construction? 21.101(b)(1)(i)	Have the assumptions used for Certification been invalidated?	Notes
Change in the material of a blade bearing	No	No	21. No	Component Level Change
Change to a component in the control system	No	No	No	Component Level Change
Change to a de-icer boot	No	No	No	Component Level Change

## Appendix 2 to GM 21.101 Procedure for evaluating impracticality of applying latest requirements to a changed product

### 1. Introduction

The basic tenet of the changed product rule is that compliance of significant changes with the latest requirements will enhance the level of safety of these aviation products. However, in certain cases the cost of complying fully with a later requirement may not be commensurate with a small safety benefit achieved. It is also understood that the existing fleet and newly produced airplanes, engines and propellers are safe, and that any unsafe condition is immediately addressed through the airworthiness directive process. These concepts form the basis of finding it to be impractical to comply with a later requirement, allowing compliance with an earlier requirement is acceptable. This appendix gives one method of determining if compliance with a later requirement is impractical; however this does not preclude the use of other methods that have as a goal improving the safety of aeronautical products.

This GM recognises that other procedures have been used for some products and have been historically been accepted on a case-by-case basis. These procedures have not been fully harmonised and may not be acceptable for all products. It is envisaged that other methods will be developed and become part of this GM. Regardless of which method is used, the fundamental premise of these methods shall be for the applicant to demonstrate a resource effective type certification basis showing a positive safety benefit for the overall product. In this regard, any method used shall also encourage incorporating the safety enhancements that will have the most dramatic impact on the accident rate and recognise the effective utilization of limited resources. This important point is illustrated graphically in the accompanying figure. This figure notionally shows the interrelation between the total resources required for incorporating each potential safety enhancement with the corresponding net increase in safety benefit. Typically one will find that there are proposals that will produce a positive safety benefit that can be introduced very resource effectively. Conversely, there are those that may produce small safety benefit but may require a large amount of resources to implement. Clearly, there will be a point where a large percentage of the potential safety benefit can be achieved with a reasonable expenditure of resources. The focus of the methods used should be to determine the most appropriate set of safety-significant regulatory standards relative to the respective cost to reach this point.



This Appendix to GM 21.101 provides procedural guidance that maybe used as a starting point to determine the practicality of applying a requirement at a particular amendment level to a changed product. This guidance can be used for evaluating the safety benefit and resource impact of implementing the latest airworthiness requirements in the type-certification basis of a changed product. The procedure is generic in nature and describes the steps and necessary inputs that any applicant may use on any project to develop a position.

- a. The procedure is intended to be used, along with good engineering judgment, to evaluate the relative merits of a changed product complying with the latest requirements.
- b. This procedure provides a means, but not the only means, for an applicant to present its position in regards to impracticality.
- c. The type-certification basis for a change to a product will not be at an amendment level earlier than the existing type-certification basis. Therefore, when determining the impracticality of applying a requirement at the latest amendment level only the increase in safety benefits and costs beyond compliance with the existing type-certification basis should be considered.
- d. The following are steps to determine the impracticality of applying a requirement at a particular amendment level. The first step will be to identify the regulatory change being evaluated.

Step 1: Identify the Regulatory Change Being Evaluated In this step it will be necessary to document:

The specific requirement (e.g., CS 25.365 or equivalent airworthiness requirements), The amendment level of the existing type-certification basis for the requirement, and The latest amendment level of the requirement.

Step 2: Identify the Specific Hazard that the Requirement Addresses

- a. Each requirement and requirement amendment is intended to address a hazard or hazards. In this step the specific hazard(s) are identified. This identification will allow for a comparison of the effectiveness of amendment levels of the requirement at addressing the hazard.
- b. In many cases the hazard and the cause of the hazard will be obvious. When the hazard and its related cause are not immediately obvious it may be necessary to review the explanatory note and comment/response document to the NPA and discuss the hazard with the Authority.

Step 3: Review the Consequences of the Hazard(s)

- a. Once the hazard has been identified it is possible to identify the types of consequences that may occur because of the presence of the hazard. More than one consequence can be attributed for the same hazard. Typical examples of consequences would include, but not be limited to,:
  - (1) Incidents where only injuries occurred,

- (2) Accidents where less than 10% of the passengers succumbed to their injuries,
- (3) Accidents where 10% or more passengers succumbed to their injuries, and
- (4) Accidents where a total hull loss occurred.

b. The explanatory note and comment/response document to the NPA may provide useful information regarding the consequences of the hazard the requirement is intended to address.

**Step 4: Identify the Historical and Predicted Frequency of each Consequence**

- a. Another input in determining impracticality is the historical record of the consequences of the hazard that led to a requirement or an amendment to a requirement. From this data a frequency of occurrence for the hazard can be determined. It is important to recognise that the frequency of occurrence may be higher or lower in the future. Therefore, it also is necessary to predict the frequency of future occurrences.
- b. More than one consequence can be attributed for the same hazard. Therefore, when applicable, the combination of consequences and frequencies of those consequences should be considered together.
- c. The explanatory note and comment/response document to the NPA may provide useful information regarding the frequency of occurrence.

**Step 5: Determine How Effective Full Compliance with the Latest Amendment of the Requirement would be at Addressing the Hazard**

- a. When each amendment is promulgated it is expected that compliance with the requirement would be completely effective at addressing the associated hazard. It is expected that the hazard would be eliminated, avoided, or dealt with. However, in a limited number of situations this may not be the case. It is also possible that earlier amendment levels may have addressed the hazard but were not completely effective. Therefore, in comparing the benefits of compliance with the existing type certification basis to the latest amendment level it is useful to estimate the effectiveness of both amendment levels in dealing with the hazard.
- b. It is recognised that the determination of levels of effectiveness is normally of a subjective nature. Therefore, prudence should be exercised when making these determinations. In all cases it is necessary to document the assumptions and data that support the determination.
- c. The following five levels of effectiveness are provided as a guideline.
  - (1) Fully effective in all cases

Compliance with the requirement eliminates the hazard or provides a means to completely avoid the hazard.

(2) Considerable potential for eliminating or avoiding the hazard

Compliance with the requirement eliminates the hazard or provides a means to completely avoid the hazard for all probable or likely cases. However it does not cover all situations or scenarios.

(3) Adequately deals with the hazard

Compliance with the requirement eliminates the hazard or provides a means to completely avoid the hazard in many cases. However, the hazard is not eliminated or avoided in all probable or likely cases. Usually this action only addresses a significant part of a larger or broader hazard.

(4) Hazard only partly addressed

In some cases compliance with the requirement partly eliminates the hazard or does not completely avoid the hazard. The hazard is not eliminated or avoided in all probable or likely cases. Usually this action only addresses part of a hazard.

(5) Hazard only partly addressed but action has negative side effect

Compliance with the requirement does not eliminate or avoid the hazard or may have negative safety side effects. The action is of questionable benefit.

Step 6: Determine Resource Costs and Cost Avoidance

- a. There is always a cost associated with complying with a requirement. This cost may range from minimal administrative efforts to the resource expenditures necessary to support full scale testing or the redesign of a large portion of an aircraft. However, there are also potential cost savings from compliance with a requirement. For example, compliance with a requirement may avoid aircraft damage or accidents and the associated costs to the manufacturer for investigating accidents. Compliance with the latest amendment of a requirement may also facilitate certification of a product by the Authority of a third country.
- b. When determining the impracticality of applying a requirement at the latest amendment level only the increase in costs, and safety benefits from complying with the existing type-certification basis should be considered.
- c. When evaluating the cost, it may be beneficial for the applicant to compare the increase in cost to comply with the latest requirements to the cost to incorporate the same design feature in a new airplane. In many cases, an estimate for the cost of incorporation in a new airplane is provided in the regulatory evaluation by the Authority that was presented when the corresponding requirement was first promulgated. Incremental costs of retrofit/incorporation on existing designs may be higher than that for production. Examples of costs may include, but are not limited to,:

- (1) Costs: The accuracies of fleet size projections, utilization, etc. may be different than that experienced in actuality for derivative product designs and shall be validated.

- (a) Labour: Work carried out in the design, fabrication, inspection, operation or maintenance of a product for the purpose of incorporating or demonstrating compliance with a proposed action. Non-recurring labour requirements, including training should be considered.
- (b) Capital: Construction of new, modified or temporary facilities for design, production, tooling, training or maintenance.
- (c) Material: Cost associated with product materials, product components, inventory, kits and spares.

Operating Costs: Costs associated with fuel, oil, fees and expendables.

- (d) Revenue/Utility Loss: Costs resulting from earning/usage capability reductions from departure delays, product downtime, capability reductions of performance loss due to seats, cargo, range or airport restrictions.

(2) Cost Avoidance

- (a) Avoiding cost of accidents including investigation of accidents, lawsuits, public relations activities, insurance, and lost revenue.
- (b) Foreign Certification: Achieve a singular effort that would demonstrate compliance with the requirements of most competent authorities, thus minimizing certification costs.

Step 7: Document Conclusion Regarding Practicality

- a. Once the information from previous steps has been documented and reviewed, the applicant's position and rationale regarding practicality can be documented. Examples of possible positions would include, but are not limited to:
  - (1) Compliance with the latest requirement is necessary. The applicant would pursue the change at the latest amendment level.
  - (2) Compliance with an amendment level between the existing type-certification basis and the latest amendment would adequately address the hazard at an acceptable cost, while meeting the latest amendment level would be impractical. The applicant would then propose the intermediate amendment level of the requirement.
  - (3) The increased level of safety is not commensurate with the increased costs associated with meeting the latest amendment instead of the existing type-certification basis. Therefore, the applicant would propose the existing type-certification basis.

(4) The results of this analysis were inconclusive. Further discussions with the Authority are warranted.

Note: This process may result in a required type-certification basis that renders the proposed modification economically not viable.

## 2 Examples

The following examples are for large airplanes and are illustrative of the typical process followed by an applicant. The process will be the same for all product types.

### 2.1 Example 1: 25.963 Fuel tank access covers

(Note: This example is taken from a FAA certification, so references are made to FAR sections and amendments.)

- a. This change is part of a significant transport airplane model change that increases passenger payload and gross weight by extending the fuselage 20 feet. The model change will feature increased thrust engines, strengthened wing and fuselage, and a completely redesigned landing gear. To accommodate the higher design weights, increased braking requirements and to reduce runway loading, the applicant will change the landing gear from a two-wheel to four-wheel configuration. The new model airplane will be required to comply with the latest applicable requirements based on the date of application.
- b. The wing will be strengthened locally at the side of the body and at the attachment of engines and landing gear, but the applicant would not like to alter wing access panels and the fuel tank access covers. Although the applicant recognises that the scatter pattern and impact loading on the wing from debris being thrown from the landing gear will change, it proposes that it would be impractical to redesign the fuel tank access covers.
- c. The applicant proposes to change the landing gear from a two-wheel configuration to a four-wheel configuration. This changes the debris scatter on the wing from the landing gear.

#### Step 1: Identify the Regulatory Change Being Evaluated

- a. The existing type-certification basis of the airplane that is being changed is part 25 prior to amendment 69.
- b. Amendment 25-69 added the requirement that fuel tank access covers on transport category airplanes be designed to minimise penetration by likely foreign objects, and be fire resistant.

#### Step 2: Identify the Specific Hazard that the Requirement Addresses

Fuel tank access covers have failed in service due to impact with high-energy objects such as failed tire tread material and engine debris following engine failures. In one accident, debris from the runway impacted a

fuel tank access cover, causing its failure and subsequent fire, which resulted in fatalities and loss of the airplane. Amendment 25-69 will ensure that all access covers on all fuel tanks are designed or located to minimise penetration by likely foreign objects, and are fire resistant.

Step 3: Review the History of the Consequences of the Hazard(s) Occurrences with injuries, and with more than 10% deaths

Step 4: Identify the Historical and Predicted Frequency of Each Consequence

- a. In 200 million departures of large jets,
  - (1) 1 occurrence with more than 10% deaths, and
  - (2) 1 occurrence with injuries.
- b. There is no reason to believe that the future rate of accidents will be significantly different than the historical record.

Step 5: Determine How Effective Full Compliance with the Latest Amendment of the Requirement would be at addressing the Hazard

Considerable potential for eliminating or avoiding the hazard

Compliance with amendment 25-69 eliminates the hazard or provides a means to completely avoid the hazard for all probable or likely cases. However, it does not cover all situations or scenarios.

Step 6: Determine Resource Costs and Cost Avoidance

- a. Costs:
  - (1) For a newly developed airplane there would be minor increases in labor resulting from design and fabrication.
  - (2) There would be a negligible increase in costs related to materials, operating costs, and revenue utility loss.
- b. Cost avoidance:
  - (1) There were 2 accidents in 200 million departures. The applicant believes that it will manufacture more than 2000 of these airplanes or derivatives of these airplanes. These airplanes would average 5 flights a day. Therefore, statistically there will be accidents in the future if the hazard is not alleviated. Compliance will provide cost benefits related to avoiding lawsuits, accident investigations and public relation costs.

(2) There are cost savings associated with meeting a single type-certification basis for FAA and foreign requirements.

#### Step 7: Document Conclusion Regarding Practicality

It is concluded that compliance with the latest requirement increases the level of safety at a minimal cost to the applicant. Based on the arguments and information presented by the applicant through the issue paper process, the Authority determined that meeting the latest amendment would not be impractical.

#### 2.2 Example 2: 25.365 Pressurised compartment loads

(Note: This example is taken from a FAA certification, so references are made to FAR sections and amendments.)

- a. For the product change described in Example 1, the lengthened fuselage affects the size of the main deck passenger compartment and the lower centre cargo compartment. The applicant plans to comply fully with the latest pressurised compartment loads except for one interior partition for which the applicant believes compliance would be impractical.
- b. The applicant proposes to increase the length of the fuselage by installing fuselage plugs. This change affected the size of the main deck passenger compartment and the lower center cargo compartment.

#### Step 1: Identify the Regulatory Change Being Evaluated

- a. The existing type-certification basis of the airplane that is being changed includes § 25.365 at amendment 25-54. The initial release of § 25.365 required that interior structure of passenger compartments be designed to withstand the effects of a sudden release of pressure through an opening resulting from the failure or penetration of an external door, window, or windshield panel, or from structural fatigue or penetration of the fuselage, unless shown to be extremely remote.
- b. Amendment 25-54 revised § 25.365 to require that the interior structure be designed for an opening resulting from penetration by a portion of an engine, an opening in any compartment of a size defined by § 25.365(e)(2), or the maximum opening caused by a failure not shown to be extremely improbable.
- c. Amendment 25-71 extended the requirement to all pressurised compartments, not just passenger compartments, and to the pressurization of unpressurised areas. The later requirement had previously been identified as an unsafe feature under CAR 21.21(b)(2).

#### Step 2: Identify the Specific Hazard that the Requirement Addresses

The hazard is a catastrophic structure and/or system failure produced by a sudden release of pressure through an opening in any compartment in flight. This opening could be caused by an uncontained engine failure, an opening of a prescribed size due to the inadvertent opening of an external door in flight, or by an

opening caused by a failure not shown to be extremely improbable. The opening could be produced by an event that has yet to be identified.

**Step 3: Review the History of the Consequences of the Hazard(s)**

Occurrences with injuries, less than 10% deaths, and more than 10% deaths

**Step 4: Identify the Historical and Predicted Frequency of Each Consequence**

a. In 200 million departures of large jets,

(1) 2 occurrences with more than 10% deaths,

(2) 1 occurrence with less than 10% deaths, and

(3) 1 occurrence with injuries.

b. There is no reason to believe that the future rate of accidents will be significantly different than the historical record.

**Step 5: Determine How Effective Full Compliance with the Latest Amendment of the Requirement would be at addressing the Hazard**

a. Fully effective in all cases

Compliance with amendment 25-71 eliminates the hazard or provides a means to completely avoid the hazard.

b. Considerable potential for eliminating or avoiding the hazard

Compliance with amendment 25-54 eliminates the hazard or provides a means to completely avoid the hazard for all probable or likely cases. However, it does not cover all situations or scenarios.

c. Adequately deals with the hazard

Compliance with the original type-certification basis eliminates the hazard or provides a means to completely avoid the hazard in many cases. However, the hazard is not eliminated or avoided in all probable or likely cases. Usually this action only addresses a significant part of a larger or broader hazard.

d. Design changes made to the proposed derivative airplane bring it nearly into compliance with § 25.365 amendment 25-71. Analyses show that one interior partition would fail when subjected to the pressure differential defined by the latest requirement. However, its failure would not have an impact on continued safe flight and landing. This is because none of the critical or essential systems are affected by failure of this partition and its failure would not present a hazard to a crewmember. Design solutions were considered for this partition, including structural reinforcement and additional venting area, but all were found to require substantial changes. With

this design the applicant believes that most of the safety benefits have been achieved and that no appreciable increase in safety would be achieved by complying fully with amendment 25-71.

Step 6: Determine Resource Costs and Cost Avoidance

a. Costs:

- (1) For a newly developed airplane there would be a significant increase in costs related to labor and capital to comply with amendment 25-71 instead of the original type-certification basis.
- (2) There would be a negligible increase in costs related to materials, operating costs, and revenue utility loss.
- (3) There would be savings in both labor and capital costs if compliance were shown to amendment 25-54 instead of amendment 25-71.

b. Cost Avoidance:

- (1) There were 4 accidents in 200 million departures. The applicant believes that it will manufacture more than 2000 of these airplanes or derivatives of these airplanes. These airplanes would average 5 flights a day. Therefore, statistically there will be accidents in the future if the hazard is not alleviated. Compliance will provide cost benefits related to avoiding lawsuits, accident investigations and public relation costs.
- (2) There are cost savings associated with meeting a single type-certification basis for FAA and foreign requirements.

Step 7: Document Conclusion Regarding Practicality

The design is in compliance with §25.365 amendment 25-54, and nearly in full compliance to amendment 25-71. The design would adequately address the hazard at an acceptable cost. Therefore, based on arguments of impracticality discussed in an issue paper, the Authority accepts the applicant's proposal to comply with §25.365 amendment 25-54.

## Appendix 3 to GM 21.101 - The use of service experience in the certification process

### 1. Introduction

Service experience may be utilised to support the application of an earlier type-certification basis if the earlier type-certification basis in conjunction with the applicable service experience and other compliance measures provides a level of safety comparable to that provided by the latest requirements. It is incumbent on the applicant to provide sufficient substantiation to allow the Authority to make this determination. A statistical approach may be used, subject to the availability and relevance of data, however sound engineering judgment shall be used. For service history to be acceptable, the data shall be both sufficient and pertinent.

The essentials of the process involve:

- a. A clear understanding of the requirement change and the purpose for the change;
- b. A determination based on detailed knowledge of the proposed design feature;
- c. The availability of pertinent and sufficient service experience data, and
- d. A comprehensive review of that service experience data.

### 2. Guidelines

The Certification Review Item (CRI) procedure would be used and the applicant should provide documentation to support the following:

- a. The identification of the differences between the requirement in the existing basis and the requirement as amended, and the effect of the change in the requirement.
- b. A description as to what aspect of the latest requirements the proposed changed product would not meet.
- c. Evidence showing that the proposed type-certification basis for the changed product, together with applicable service experience, provides a level of safety consistent with complying with the latest requirements.
- d. A description of the design feature and its intended function
- e. Data for the product pertinent to the requirement:
  - (1) Service experience from such sources as the following
    - (a) Accident Reports
    - (b) Incident Reports

- (c) Service Bulletins
- (d) Airworthiness directives
- (e) Repairs
- (f) Modifications
- (g) Flight hours/cycles for fleet leader and total fleet
- (h) World Airline Accident Summary (WAAS) Data
- (i) Service Difficulty Reports
- (j) Reports from Accident Investigation Bureau
- (k) Warranty, repair and parts usage data

(2) Show that the data presented represents all relevant service experience for the product, including the results of any operator surveys, and is comprehensive enough to be representative

(3) Show that the service experience is relevant to the issue.

(4) Identification and evaluation of each of the main areas of concern, with regard to:

- (a) recurring and/or common failure modes
- (b) cause
- (c) probability, by qualitative reasoning
- (d) measures already taken and their effects

(5) Relevant data pertaining to aircraft of similar design and construction may be included

(6) Evaluation of failure modes and consequences through analytical processes. The analytical processes should be supported by:

- (a) A review of previous test results; and
- (b) Additional detailed testing.

- f. A conclusion that draws together the data and the rationale
- g. These guidelines are not intended to be limiting, either in setting required minimum elements or in precluding alternative forms of submission. Each case may be different, based on the particulars of the system being examined and the requirement to be addressed.

3. Example

The following example is for large airplanes and is illustrative of the typical process followed by an applicant. The process will be the same for all product types.

a. Transport Airplanes: § 25.1141(f) Auxiliary Power Unit (APU) Fuel Valve Position Indication

(Note: This example is taken from a FAA certification, so references are made to FAR sections and amendments.)

- b. This example comes from a new generation model transport airplane where extensive changes were made to the main airframe components, engines and systems. The baseline airplane has an extensive service history. The purpose of the example is to show how the use of service experience is used to support a finding that compliance with the latest requirement would not contribute materially to the level of safety, and that application of the existing type-certification basis (or earlier amendment) would be appropriate. The example is for significant derivatives of transport airplanes with extensive service history. It is provided to illustrate the process, following the guidelines given in this Appendix, but does not include the level of detail that would normally be required.

- (1) The differences between the requirement in the existing type-certification basis and the requirement as amended, and the effect of the change in the requirement. The existing type-certification basis of the airplane that is being changed is the initial release of part 25. Amendment 25-40 added the requirement §25.1141(f) that power assisted valves shall have a means to indicate to the flight crew when the valve is in the fully open or closed position, or is moving between these positions.
- (2) What aspect of the latest requirements the proposed changed product would not be met. The proposed APU fuel valve position indication system does not provide the flight crew with fuel valve position or transition indication, and therefore does not comply with the requirements of §25.1141(f).
- (3) Evidence that the proposed type-certification basis for the changed product, together with applicable service experience and other compliance measures provide an acceptable level of safety.

The APU fuel shut off valve and actuator are unchanged from those used on the current family of airplanes, and have been found to comply with the earlier amendment 25-11 of §25.1141(f). The existing fleet has achieved approximately xx flights during which service experience of the existing design has been found to

be acceptable. If one assumes a complete APU cycle, i.e. start up and shutdown for each flight, the number of APU fuel shut off valve operations would be over 108 cycles, which demonstrates that the valve successfully meets its intended function and complies with the intent of the requirement. In addition, the system design for the changed product incorporates features, which increase the level of functionality and safety.

(4) A description of the design feature and its intended function.

The fuel shut off valve, actuator design, and operation is essentially unchanged, with the system design ensuring that the valve is monitored for proper cycling from closed to open at start initiation. If the valve is not in the appropriate position (i.e., closed) then the APU start is terminated, an indication is displayed on the flight deck and any further APU starts are prevented. Design improvements using the capability of the APU Electronic Control Unit (ECU) have been incorporated in this proposed product change. These design changes ensure that the fuel valve indication system will indicate failure of proper valve operation to the flight crew, albeit the system does not indicate valve position as required by §25.1141(f).

(5) Data for the product pertinent to the requirement.

An issue paper was coordinated which included data, or referenced reports, documenting relevant service experience that has been compiled from incident reports, fleet flight hour/cycle data, and maintenance records. The issue paper also discussed existing and proposed design details, failure modes, and analyses showing to what extent the proposed airplane complies with the latest amendment of §25.1141. Information is presented to support the applicant's argument that compliance with the latest amendment would not materially increase the level of safety. Comparative data pertaining to aircraft of similar design and construction are also presented.

(6) Conclusion drawing together the data and rationale.

The additional features incorporated in the APU fuel shut off valve will provide a significant increase in safety to an existing design with satisfactory service experience. The applicant proposes that compliance with the latest amendment would not materially increase the level of safety, and that compliance with §25.1141 at amendment 25-11 would provide an acceptable level of safety for the proposed product change.

**SUBPART E – SUPPLEMENTAL TYPE-CERTIFICATES****GM 21.112B - Demonstration of capability for supplemental type-certificate cases**

See also AMC 21.14(b) for the details of the alternative procedures. The following examples of major changes to type design (ref: CAR 21.91) are classified in two groups. Group 1 contains cases where a design organisation approved under CAR 21 Subpart J ("Subpart JDOA") should be required, and Group 2 cases where the alternative procedure may be accepted. They are typical examples but each STC case should be addressed on its merits and there would be exceptions in practice. This classification is valid for new STCs, not for evolution of STCs, and may depend upon the nature of the STC (complete design or installation).

Product	Discipline	Kind of SIC	Group
<b>CS-23 (products where UAE DOA is required for IC)</b>			
<b>Notes :</b>			
* STC which <b>leads to reassess the loads</b> on large parts of primary structure should be in group 1. * 2/1 means that an assessment of consequences in terms of handling qualities, performance or complexity of showing of compliance may lead to classification in group 1.			
	<b>Aircraft</b>		
	Conversion to tail wheel configuration		1
	Auxiliary fuel tank installations		2/1
	<b>Glass fibre wing tips</b>		2/1
	Fairings: nacelle, landing gear		2
	Gap seals: aileron, flap, empennage, doors		2
	Vortex generators		2/1
	Spoiler installation		1
	Increase in MTOW		1
	<b>Structures</b>		
	Stretcher installation		2
	Change to seating configuration		2
	Windshield replacement (heated, single piece, etc)		2
	Light weight floor panels		2
	<b>Ski installations</b>		2/1
<b>Propulsion</b>			
	Engine model change		1

	Fixed pitch propeller installation	2	
	Constant speed propeller installation	2/1	
	Installation of exhaust silencer	2	
	Installation of Graphic engine monitor	2	
	Installation of fuel flow meter	2	
	Accessory replacement (alternator, magnetos, etc.)	2	
	Inlet modifications: oil cooler; induction air	2	
<b>Equipment</b>			
	Avionics upgrades (EFIS, GPS, etc)	2/1	
	Engine instrument replacements	2	
	Carburettor ice detection system	2	
	Autopilot system installation	1	
	Wing tip landing light; recognition lights	2	
	WX radar installation	2	
	Aeromedical system installations	2	
	De- and anti-ice system installations	1	
	Emergency power supply installations	2	
<b>CS-25</b>			
<b>Cabin Safety</b>			
<b>Note :</b> Basically all changes related configuration	to cabin in Group 2.	Cabin layout (installation of seats (16G), galleys, single class or business / economy class, etc)	2
		Floor path marking	2
		Crew rest compartment	1
		Change of cargo compartment classification (from class D to class C)	1
<b>Structure</b>			
<b>Note :</b> STC which leads to reassess large parts of primary in Group	the loads on structure should be	Cargo door	1
		Change from Passenger to Freighter configuration	1
<b>Avionics</b>			

Notes :	CVR	2
For CS-25 products, the existence taken into account for the classification Impact on aircraft performance, influence of aircraft performance the classification ; Subjective factors is considered for determination	of UAE TSO is not ; and are criteria to assess assessment of human of classification.	
	VHF	2
	NAV (ADF, VOR, GPS, BRNAV)	2
	Autopilot, HUD, EFIS, FMS	1
	DFDR	2/1
	Meteo radar	2
	ILS Cat 3	1
	RVSM	1
	TCAS, EGPWS	1
	GPWS	2
<b>Powerplant</b>		
	Auxiliary fuel tanks	1
	Thrust Reverser system	1
	Hushkit	1
	Fire detection	1
	Fuel gauging	1
	Change of Engine or Propeller	1
<b>CS-27 or 29</b>	<b>All disciplines</b>	
<b>Note :</b> <b>2/1 means that an assessment of consequences in terms of handling qualities and performance may lead to classification in Group 1.</b>	Main rotor or tail rotor blades replacement	1
	Autopilot	1
	Engine type change	1
	GPS installation	2
	Jettisonable overhead raft installation	2
	Utility basket installation	2/1
	Nose or side mount camera installation	2/1
	Passenger access step installation	2/1
	Protection net & handle installation (parachuting)	2

	VIP cabin layout	2
	Navigation system installation	2
	Fuel boost pump automatic switch-on installation	2
	Decrease of maximum seating capacity	2
	Agricultural spray kit installation	2/1
	Long exhaust pipe installation	2
	Flotation gear installation	2/1
	Wipers installation	2
	Engine oil filter installation	2
	Skid gear covering installation	2/1
	Gutter installation (top pilot door)	2
	Cable cutter installation	2
	Auxiliary fuel tank fixed parts installation	2
	Cabin doors windows replacement	2
	Radio-altimeter aural warning installation	2
	Stand-by horizon autonomous power supply	2
	Fire attack system	2/1
	Hoisting system installation	2/1
	External loads hook installation	2
	Emergency flotation gear installation	2/1
	Heating/demisting (P2 supply)	2

## **SUBPART F - PRODUCTION WITHOUT PRODUCTION ORGANISATION APPROVAL**

### **GM No. 1 to 21.121 - Applicability - Individual product, part or appliance**

In this context, “demonstrating the conformity with the applicable design data of a product, part and appliance” means that conformity with the applicable design data has to be established and shown for each and every product, part or appliance.

### **GM No. 2 to 21.121 - Applicability - Applicable design data**

Applicable design data is defined as all necessary drawings, specifications and other technical information provided by the applicant for, or holder of a design organisation approval, TC, STC, approval of repair or minor change design, or UAUAE TSO authorisation (or equivalent when CAR 21 Subpart F is used for production of products, parts or appliances, the design of which has been approved other than according to CAR 21), and released in a controlled manner to the manufacturer producing under CAR 21 Subpart F. This should be sufficient for the development of production data to enable manufacture in conformity with the design data.

Prior to issue of the TC, STC, approval of repair or minor change design or UAE TSO authorisation, or equivalent, design data is defined as ‘not approved’, but parts and appliances may be released with an AW Form 1 as a certificate of conformity.

After issue of the TC, STC, approval of repair or minor change or UAE TSO authorisation, or equivalent, this design data is defined as ‘approved’ and items manufactured in conformity are eligible for release on an AW Form 1 for airworthiness purposes.

### **AMC No. 1 to 21.122 - Eligibility - Link between design and production**

An “arrangement” is considered suitable if it is documented and satisfies the Authority that coordination is satisfactory.

To achieve satisfactory co-ordination the documented arrangements shall at least define the following aspects irrespective of whether the design organisation and the person producing or intending to produce under CAR 21 Subpart F are separate legal entities or not:

- 1            The responsibilities of a design organisation which assure correct and timely transfer of up-to-date applicable design data (e.g., drawings, material specifications, dimensional data, processes, surface treatments, shipping conditions, quality requirements, etc.);
- 2            The responsibilities and procedures of the manufacturer for receiving, managing and using the applicable design data provided by the design organisation.

- 3 The responsibilities and procedures of the manufacturer for developing, where applicable, its own manufacturing data in compliance with the applicable design data package.
- 4 The responsibilities of the manufacturer to assist the design organisation in dealing with continuing airworthiness matters and for required actions (e.g., traceability of parts in case of direct delivery to users, retrofitting of modifications, traceability of processes' outputs and approved deviations for individual parts as applicable, technical information and assistance, etc.);
- 5 The scope of the arrangements covering Subpart F requirements, in particular: CAR 21.126(a)(4) and CAR 21.129(d) and (f) and any associated GM or AMC.
- 6 The responsibilities of the manufacturer, in case of products prior to type certification to assist a design organisation in showing compliance with CS (access and suitability of production and test facilities for manufacturing and testing of prototype models and test specimen);
- 7 The procedures to deal adequately with production deviations and non conforming parts;
- 8 The means to achieve adequate configuration control of manufactured parts, to enable the manufacturer to make the final determination and identification for conformity or airworthiness release and eligibility status;
- 9 The identification of responsible persons/offices who controls the above.
- 10 The acknowledgment by the holder of the TC/STC/repair or change approval/UAE TSO authorisation that the approved design data provided, controlled and modified in accordance with the arrangement are recognised as approved.

In many cases the person producing or intending to produce under CAR 21 Subpart F may receive the approved design data through an intermediate production organisation. This is acceptable provided an effective link between the design approval holder and the production organisation can be maintained to satisfy the intent of CAR 21.122.

When the design organisation and the manufacturer are two separate legal entities a Direct Delivery Authorisation should be available for direct delivery to end users in order to guarantee continued airworthiness control of the released parts and appliances.

Where there is no general agreement for Direct Delivery Authorisation, specific permissions may be granted (see AMC 21.4).

**AMC No. 2 to 21.122 - Eligibility - Link between design and production**

In accordance with AMC No.1 to CAR 21.122 the person producing or intending to produce under CAR 21 Subpart F should demonstrate to the authority that it has entered into an arrangement with the design organisation. The arrangement shall be documented irrespective of whether the two organisations are separate legal entities or not.

The documented arrangement shall facilitate the person producing or intending to produce under CAR 21 Subpart F to demonstrate compliance with the requirement of CAR 21.122 by means of written documents agreed.

In the case where the design organisation and the person producing or intending to produce under CAR 21 Subpart F are part of the same legal entity these interfaces may be demonstrated by company procedures accepted by the Authority.

In all other cases to define such a design/production interface the following sample format is offered:

## Arrangement Sample Form

<b>ARRANGEMENT</b>		relevant procedures	interface
<b>IAW. 21.122</b>			
The undersigned agree on the following commitments:			
<p>The design organisation [NAME] takes responsibility to</p> <ul style="list-style-type: none"> <li>assure correct and timely transfer of up-to-date applicable design data (e.g., drawings, material specifications, dimensional data, processes, surface treatments, shipping conditions, quality requirements, etc.) to the person producing under CAR 21 Subpart F [NAME]</li> </ul>			
<p>The person producing under CAR 21 Subpart F [NAME] takes responsibility to</p> <ul style="list-style-type: none"> <li>assist the design organisation [Name] in dealing with continuing airworthiness matter and for required actions</li> <li>assist the design organisation [Name] in case of products prior to type certification in showing compliance with airworthiness requirements</li> <li>develop, where applicable, its own manufacturing data in compliance with the airworthiness data package</li> </ul>			
<p>The design organisation [Name] and the person producing under CAR 21 Subpart F [Name] take joint responsibility to</p> <ul style="list-style-type: none"> <li>deal adequately with production deviations and non conforming parts in accordance with the applicable procedures of the design organisation and the manufacturer producing under CAR 21 Subpart F.</li> <li>achieve adequate configuration control of manufactured parts, to enable the manufacturer producing under CAR 21 Subpart F to make the final determination and identification for conformity or airworthiness release and eligibility status.</li> </ul>			
<p>The scope of production covered by this arrangement is detailed in ... [DOCUMENT REFERENCE/ ATTACHED LIST]</p>			
<p>[When the design organisation is not the same legal entity as the manufacturer producing under CAR 21 Subpart F ] Transfer of approved design data</p>			
<p>The TC/STC/ UAE TSO authorisation holder [NAME] acknowledges that the approved design data provided, controlled and modified in accordance with the arrangement are recognised as approved.</p>			
<p>[When the design organisation is not the same legal entity as the manufacturer producing under CAR 21 Subpart F] Direct Delivery Authorisation</p>			
<p>This acknowledgment includes also [OR does not include] the general agreement for direct delivery to end users in order to guarantee continued airworthiness control of the released parts and appliances.</p>			
for the [NAME of the design organisation/DOA holder]	for the [NAME of the person producing under CAR 21 Subpart F]		
date	signature	date	signature
XX.XX.XXXX		XX.XX.XXXX	

**Instructions for completion:**

**Title:** The title of the relevant document shall clearly indicate that it serves the purpose of a design/production interface arrangement in accordance with CAR 21.122.

**Commitment:** The document shall include the basic commitments between the design organisation and the manufacturer producing under CAR 21 Subpart F as addressed in AMC CAR 21.4 and AMC No. 1 to RCA 21.122.

**Relevant Procedures:** Identify an entry point into the documentary system of the organisations with respect to the implementation of the arrangement (for example a contract, quality plan, handbooks, common applicable procedures, working plans etc.).

**Scope of arrangement:** The scope of arrangement shall state by means of a list or reference to relevant documents those products, parts or appliances that are covered by the arrangement. **Transfer of approved design data:** Identify the relevant procedures for the transfer of the applicable design data required by CAR 21.122 and AMC No. 1 to CAR 21.122 from the design organisation to the person producing under CAR 21 Subpart F. The means by which the design organisation advises the person producing under CAR 21 Subpart F whether such data is approved or not approved shall also be identified (ref. CAR 21.4 / AMC 21.4).

**Direct Delivery Authorisation:** Where the design organisation and the person producing under CAR 21 Subpart F are separate legal entities the arrangement shall clearly identify whether authorisation for direct delivery to end users is permitted or not. Where any intermediate production/design organisation is involved in the chain between the original design organisation and the person producing under CAR 21 Subpart F, evidence shall be available that this intermediate organisation has received authority from the design organisation to grant Direct Delivery Authorisation.

**Signature:** AMC No. 1 to CAR 21.122 requests the identification of the responsible persons/offices who control the commitments laid down in the arrangement. Therefore the basic document shall be signed mutually by the authorised representatives of the design organisation and the manufacturer producing under CAR 21 Subpart F in this regard.

**GM 21.124(a) - Application – Application form**

GCAA approved Form shall be obtained from the Authority and completed by the applicant.

An application may be accepted from:

- An individual applying on his or her own behalf, or
- In the case of an organisation, an individual with the authority to make agreements on behalf of the organisation.

The completed form should be forwarded to the Authority.

**GM 21.124(b)(1)(i) - Applicability - Inappropriate approval under Subpart G**

The issue of a letter of agreement of production under CAR 21 Subpart F may be agreed by the Authority when:

- 1 The applicant produces or intends to produce aeronautical products, parts, appliances intended for airborne use as part of a type-certificated product (this excludes simulators, ground equipment and tools), and
- 2 The Authority determines that CAR 21 Subpart G would be inappropriate, and consequently CAR 21 Subpart F applies. The main difference between CAR 21 Subparts G and F is that Subpart G requires the existence of a Quality System which provides the Authority with the necessary confidence to grant to the manufacturer the privileges of certifying its own production. There are situations where a Quality System, including independent monitoring and continuous internal evaluation functions, is not justified and /or feasible. In making the determination that Subpart F may apply, the Authority may take into account one or a combination of parameters such as the following:
  - no flow production (infrequent or low volume of production).
  - simple technology (enabling effective inspection phases during the manufacturing process).
  - very small organisation.

**GM 21.124(b)(1)(ii) - Certification or approval needed in advance of the issue of a POA**

In cases where CAR 21 Subpart G is applicable, but when some time is needed for the organisation to achieve compliance with Subpart G, i.e., to establish the necessary documented quality system, the Authority may agree to use CAR 21 Subpart F for a limited period (transient phase).

In cases where CAR 21 Subpart G is applicable, such as to produce UAE TSO articles, a letter of agreement to produce under CAR 21 Subpart F should not be given unless an application has been made for organisation approval under Subpart G, and reasonable progress is being made towards compliance with Subpart G. Long-term production under CAR 21 Subpart F will not be permitted.

**GM 21.124(b)(2) - Application - Minimum information to include with the application**

At this early stage, provision of the complete manual is not necessary, but at least the following items should be covered:

- 1 Table of Contents of the Manual (including list of existing inspection system documents or procedures)
- 2 Description of items to be manufactured (including intended quantities /deliveries)
- 3 List of possible suppliers
- 4 General description of facilities
- 5 General description of production means
- 6 Human resources

**GM No. 1 to 21.125 - Letter of agreement - Meaning of individual**

“Individual” means that each part number or type of item (i.e., product, part or appliance) to be produced should be specifically referenced, either directly or through a referenced capability list, in the letter of agreement from the Authority. The letter may also specify any limitation in the production rate.

**GM No. 1 to 21.125(b) - Letter of agreement - Contents of the manual**

The manual referred in 21.125(b) should include, at least the following information:

- 1 Declaration by the applicant of undertaking in respect of
  - 1.1 the requirements defined in CAR 21 Subpart F
  - 1.2 the procedures contained in the manual and in the documentation mentioned herein
  - 1.3 every legal provision laid down for the carrying on of the business activities (statutory declaration).
- 2 Declaration by the applicant certifying the conformity of the manual to the requirements defined in CAR 21 Subpart F
- 3 Jobs, power and responsibilities of the accountable personnel
- 4 Organisation chart, if required by the Authority
- 5 Description of the resources, including human resources, with an indication of the personnel qualification criteria

- 6 Description of location and equipment
- 7 Description of the scope of work, the production processes and techniques, and reference to the “capability list”
- 8 Communications with the Authority, and specifically those required by CAR 21.125(c)
- 9 Assistance and communication with the design approval holder, and the means of compliance with CAR 21.125 (c)
- 10 Amendments to the Manual
- 11 Description of the Inspection System (including test, see GM No. 2 to CAR 21.125(b), and CAR 21.127 and CAR 21.128), and the procedures to meet CAR 21.126 and associated GM
- 12 List of suppliers
- 13 Issuing of the Statement of Conformity and Authority inspection for validation If the information is listed in the Manual in a different order a cross reference to the above list should be made available in the Manual.

**GM No. 2 to CAR 21.125(b) - Letter of agreement - Production inspection system: Functional tests**

All items produced should be subject to inspection to be carried out at suitable phases which permit an effective verification of conformity with the design data.

These inspections may provide for the execution of tests to measure performances as set out in the applicable design data.

Considerations of complexity of the item and/or its integration in the next level of production will largely determine the nature and time for these tests, for example:

- ❑ appliances - will require full functional testing to the specifications
- ❑ parts - will at least require basic testing to establish conformity, but due allowance may be made for further testing carried out at the next level of production
- ❑ material - will require verification of its stated properties.

**GM 21.125(c) - Letter of agreement - Assistance**

The Authority should be provided with material which defines the means of providing assistance as required by CAR 21.125(c). Suitable descriptive material should be included in the Manual, as described in GM No. 1 to CAR 21.125(b).

**GM No. 1 to CAR 21.125B(a) - Uncontrolled non-compliance with applicable design data**

An uncontrolled non-compliance with applicable design data is a non-compliance:

- ❑ that cannot be discovered through systematic analysis or
- ❑ that prevents identification of affected products, parts, appliances, or material

**GM No. 2 to CAR 21.125B(a) - Examples for level one findings**

Examples for level 1 findings are non-compliances with any of the following paragraphs, that could affect the safety of the aircraft:

CAR 21.126, CAR 21.127, CAR 21.128, CAR 21.129.

It should be anticipated that a non-compliance with these paragraphs is only considered a level one finding when objective evidence has been found that this finding is an uncontrolled noncompliance that could affect the safety of the aircraft.

**GM 21.126 - Production Inspection System**

GM 21.126 (a) and (b) has been developed for persons producing under CAR 21 Subpart F on the long term basis as defined in CAR 21.124(b)(1)(i).

For those persons producing under CAR 21 Subpart F as a transient phase under CAR 21.124(b)(1)(ii), compliance with CAR 21.126 may also be demonstrated to the satisfaction of the Authority by using the equivalent CAR 21 Subpart G AMC/GM.

**GM 21.126(a)(1) Production inspection system – Conformity of supplied parts, appliances and material**

1. The person producing under Subpart F is responsible for determining and applying acceptance standards for physical condition, configuration status and conformity, as appropriate, of raw materials, subcontracted works, and supplied products, parts, appliances or material, whether

to be used in production or delivered to customers as spare parts. This responsibility also includes BFE (Buyer Furnished Equipment) items.

2. Control may be based upon use of the following techniques, as appropriate:

- 2.1 first article inspection, including destruction if necessary, to verify that the article conforms to the applicable data for new production line or new supplier,
- 2.2 incoming inspections and tests of supplied parts or appliances that can be satisfactorily inspected on receipt,
- 2.3 identification of incoming documentation and data relevant to the showing of conformity to be included in the certification documents,
- 2.4 any additional work, tests or inspection which may be needed for parts or appliances which are to be delivered as spare parts and which are not subject to the checks normally provided by subsequent production or inspection stages.

3. The person producing under CAR 21 Subpart F may rely upon an AW Form 1 issued in accordance with CAR 21 if provided as evidence of conformity with applicable design data

4. For suppliers not holding a POA the inspection system of the person producing under CAR 21 Subpart F should establish a system for control of incoming materials and bought or subcontracted items which provides for inspections and tests of such items by the person producing under CAR 21 Subpart F at the supplier's facility, if the item cannot or will not be completely inspected upon receipt.

**GM 21.126(a)(2) - Production inspection system - Identification of incoming materials and parts**

All parts and materials coming from external parties should be identified and inspected to ascertain that they have not been damaged during transport or unpacking, that the incoming parts and materials have the appropriate and correct accompanying documentation and that the configuration and condition of the parts or materials is as laid down in that documentation'.

Only on completion of these checks and of any incoming further verifications laid down in the procurement specification, may the part or material be accepted for warehousing and used in production.

This acceptance should be certified by an inspection statement.

A suitable recording system should allow reconstruction at any time of the history of every material or part.

The areas where the incoming checks are carried out and the materials or parts are stored pending completion of the checks should be physically segregated from other departments.

**GM No. 1 to 21.126(a)(3) - Production inspection system - List of specifications**

It is the responsibility of:

- 1 The designer, to define all necessary processes, techniques and methods to be followed during manufacture (CAR 21.31) and this information will be provided as part of the applicable design data.
- 2 The manufacturer, to ensure that all processes are carried out strictly in accordance with the specifications provided as part of the applicable design data.

**GM No. 2 to 21.126(a)(3) - Production inspection system - Means of checking of the production processes**

The Production Inspection System should be provided with appropriate means of checking that production processes, whether performed by the person producing under CAR 21 Subpart F or by subcontractors under its control, are carried out in accordance with applicable data, including:

- 1 A system for the control and authorised amendment of data provided for the production, inspection and test to ensure that it is complete and up-to-date at the point of use
- 2 Availability of personnel with suitable qualification, experience, and training for each required production, inspection, and test task. Special attention should be paid to tasks requiring specialised knowledge and skill, e.g., NDT/NDI, welding...
- 3 A working area where the working conditions and environment are controlled as appropriate in respect of: cleanliness, temperature, humidity, ventilation, lighting, space/access, protection against noise and pollution
- 4 Equipment and tools sufficient to enable all specified tasks to be accomplished in a safe and effective manner without detrimental effect on the items under production. Calibration control of equipment and tools which affect critical dimensions and values shall show compliance with, and be traceable to, recognised national or international standards.

**GM 21.126(a)(4) - Production inspection system – Applicable design/production data procedures**

- 1 When a person producing under CAR 21 Subpart F is developing its own manufacturing data from the design data package delivered by a Design holder, procedures should demonstrate the correct transcription of the original design data.

- 2 Procedures should define the manner in which applicable design data is used to issue and update the production/inspection data, which determines the conformity of products, parts, appliances and materials. The procedure should also define the traceability of such data to each individual product, part, appliance or material for the purpose of stating the condition for safe operation and for issuing a Statement of Conformity.
- 3 During execution, all works should be accompanied by documentation giving either directly or by means of appropriate references, the description of the works as well as the identification of the personnel in charge of inspection and execution tasks for each of the different work phases.

#### **GM 21.126(b)(1) - Production inspection system - Inspection of parts in process**

The purpose of the Production Inspection System is to check at suitable points during production and provide objective evidence that the correct specifications are used, and that processes are carried out strictly in accordance with the specification.

During the manufacturing process, each article should be inspected in accordance with a plan which identifies the nature of all inspections required and the production stages at which they occur. The plan should also identify any particular skills or qualification required of person(s) carrying out the inspections (e.g., NDT personnel). A copy of the plan should be included in, or referenced by, the manual required by CAR 21.125(b).

If the parts are such that, if damaged, they could compromise the safety of the aircraft, additional inspections for such damage should be performed at the completion of each production stage.

#### **GM 21.126(b)(2) - Production inspection system – Suitable storage and protection**

1. Storage areas should be protected from dust, dirt, or debris, and adequate blanking and packaging of stored items should be practiced.
2. All parts should be protected from extremes of temperatures and humidity and, where needed, temperature-controlled or full air-conditioned facilities should be provided.
3. Racking and handling equipment should be provided such as to allow storage, handling and movement of parts without damage.
4. Lighting should be such as to allow safe and effective access and handling, but should also cater for items which are sensitive to light e.g., rubber items.
5. Care should be taken to segregate and shield items which can emit fumes (e.g., wet batteries), substances or radiation (e.g., magnetic items) which are potentially damaging to other stored items.

6. Procedures should be in place to maintain and record stored parts identities and batch information.
7. Access to storage areas should be restricted to authorised personnel who are fully trained to understand and maintain the storage control arrangements and procedures.
8. Provisions should be made for segregated storage of non conforming items pending their disposition (see GM 21.126(b)(4)).

#### **GM 21.126(b)(3) - Production inspection system – Use of derived data instead of original design data**

Where derived data, e.g., worksheets, process sheets, fabrication/inspection instructions, etc., is used instead of original design drawings, documents identification and control procedures should be used to ensure that the documentation in use is always accurate and current.

#### **GM 21.126(b)(4) - Production inspection system – Segregation of rejected material**

All materials and parts which have been identified at any stage in the manufacturing process as not conforming to the specific working and inspection instructions shall be suitably identified by clearly marking or labelling, to indicate their non-conforming status.

All such non-conforming material or parts should be removed from the production area and held in a restricted access segregated area until an appropriate disposition is determined in accordance with CAR 21.126(b)(5).

#### **GM 21.126(b)(5) - Production inspection system – Engineering and manufacturing review procedure**

1. The procedure should permit to record the deviation, to present it to the Design holder under the provisions of CAR 21.122, and to record the results of the review and actions taken consequently as regards the part/product.
2. Any unintentional deviation from the manufacturing/inspection data should be recorded and handled in accordance with CAR 21 Subpart D or E as changes to the approved design.

#### **GM 21.126(b)(6) - Production inspection system – Recording and record keeping**

1. Records within a production environment satisfy two purposes. Firstly, they should, during the production process to ensure that products, parts, or appliances are in conformity with the controlling data throughout the manufacturing cycle. Secondly, certain records of milestone events are needed to subsequently provide objective evidence that all prescribed stages of the production

process have been satisfactorily completed and that compliance with the applicable design data has been achieved.

Therefore, the person producing under CAR 21 Subpart F should implement a system for the compilation and retention of records during all stages of manufacture, covering short-term and long-term records appropriate to the nature of the product and its production processes.

The management of such information should be subject to appropriate documented procedures in the Manual required by CAR 21.125(b).

All forms of recording media are acceptable (paper, film, magnetic ..) provided they can meet the required duration for archiving under the conditions provided.

2. The related procedures should:

2.1 Identify records to be kept.

2.2 Describe the organisation of and responsibility for the archiving system (location, compilation, format) and conditions for access to the information (e.g., by product, subject).

2.3 Control access and provide effective protection from deterioration or accidental damage.

2.4 Ensure continued readability of the records.

2.5 Demonstrate to the Authority proper functioning of the records system.

2.6 Clearly identify the persons involved in conformity determination.

2.7 Define an archiving period for each type of data taking into account importance in relation to conformity determination subject to the following:

- a. Data which supports conformity of a product, part, or appliance should be kept for not less than three years from the issue date of the related Statement of Conformity or Authorised Release Certificate.
- b. Data considered essential for continuing airworthiness should be kept throughout the operational life of the product, part or appliance.

2.8 Data related to supplied parts may be retained by the supplier if the supplier has a system agreed under CAR 21 Subpart F by the Authority. The manufacturer should, in each case, define the archiving period and satisfy himself or herself and the Authority that the recording media are acceptable.

**GM 21.127 - Approved production ground and flight tests**

The production ground and flight tests for new aircraft will be specified by the aircraft design organisation.

**GM No. 1 to 21.128 - Acceptable functional test - Engines**

The functional test required for a new engine will be specified by the engine design organisation and will normally include at least the following:

- 1 Break-in runs that include a determination of fuel and oil consumption and a determination of power characteristics at rated maximum continuous power or thrust and, if applicable, at rated takeoff power or thrust.
- 2 A period of operation at rated maximum continuous power or thrust. For engines having a rated takeoff power or - thrust, part of that period should be at rated takeoff power or - thrust.

The test equipment used for the test run should be capable of output determination of accuracy sufficient to assure that the engine output delivered complies with the specified rating and operation limitations.

**GM No. 2 to 21.128 - Acceptable functional test –Variable pitch propellers**

The functional tests required for a new propeller will be specified by the propeller design organisation and should normally include a number of complete cycles of control throughout the propeller pitch and rotational speed ranges. In addition, for feathering and/or reversing propellers, several cycles of feathering operation and reversing operation from the lowest normal pitch to the maximum reverse pitch, should normally be required.

**GM No. 3 to 21.128 - Acceptable functional test - Engines and Propellers**

After functional test, each engine or propeller should be inspected to determine that the engine or propeller is in condition for safe operation. Such inspection will be specified by the design organisation and should normally include internal inspection and examination. The degree of internal inspections will normally be determined on the basis of the positive results of previous inspections conducted on the first production engines, and on the basis of service experience.

### **GM 21.129(a) - Availability for inspection by the Authority**

Each product, part or appliance should be made available for inspection at any time at the request of the Authority.

It is recommended that a pre-defined plan of inspection points be established and agreed with the Authority to be used as a basis for such inspections.

The manufacturer should provide such documentation, tools, personnel, access equipment etc. as necessary to enable the Authority to perform the inspections.

### **AMC No. 1 to 21.129(c) - Obligations of the manufacturer – Conformity of prototype models and test specimens**

CAR 21.33 requires determination of conformity of prototype models and test specimens to the applicable design data. For a complete aircraft a 'conformity document', that has to be validated by the Competent Authority, should be provided as part of the assistance to the design approval applicant. For products other than a complete aircraft, and for parts and appliances, an AW Form 1 validated by the Competent Authority may be used as a conformity document as part of the assistance to the design approval applicant.

### **AMC No. 2 to 21.129(c) - Obligations of the manufacturer – Conformity with Applicable Design Data**

Individual configurations are often based on the needs of the customer and improvements or changes which may be introduced by the type-certificate holder. There are also likely to be unintentional divergences (concessions or non-conformances) during the manufacturing process. All these changes are required to have been approved by the design approval applicant/holder, or when necessary by the Authority.

### **AMC No. 3 to 21.129(c) - Obligations of the manufacturer – Condition for safe operation**

Before issue of the Statement of Conformity to the Authority the manufacturer under this Subpart should make an investigation so as to be satisfied in respect to each of the items listed below. The documented results of this investigation should be kept on file by the manufacturer. Certain of these items may be required to be provided (or made available) to the operator or owner of the aircraft, and, for validation of the statement of conformity, to the Authority.

- 1      Equipment or modifications which do not meet the requirements of the state of manufacture but have been accepted by the Authority of the importing country.
- 2      Identification of products, parts or appliances which:
  - 2.1    Are not new

2.2 Are furnished by the buyer or future operator (including those identified in CAR 21.801 and CAR 21.805).

3 Technical records which identify the location and serial numbers of components that have traceability requirements for continued airworthiness purposes including those identified in CAR 21.801 and CAR 21.805.

4 Log book and a modification record book for the aircraft as required by the Authority.

5 Log books for products identified in CAR 21.801 installed as part of the type design as required by the Authority.

6 A weight and balance report for the completed aircraft.

7 A record of missing items or defects which do not affect airworthiness these for example could be furnishing or BFE (Items may be recorded in a technical log or other suitable arrangement such that the operator and Authority are formally aware).

8 Product support information required by other associated implementing rules and CS or GM, such as a Maintenance Manual, a Parts Catalogue, or MMEL all of which are to reflect the actual build standard of the particular aircraft. Also an Electrical load analysis and a wiring diagram.

9 Records which demonstrate completion of maintenance tasks appropriate to the test flight flying hours recorded by the aircraft. These records should show the relationship of the maintenance status of the particular aircraft to the manufacturers recommended maintenance task list and the Maintenance Review Board (MRB) document/report.

10 Details of the serviceability state of the aircraft in respect of, a) the fuel and oil contents, b) provision of operationally required emergency equipment such as life rafts, etc.

11 Details of the approved interior configuration if different from that approved as part of the type design.

12 An approved Flight Manual which conforms to the build standard and modification state of the particular aircraft should be available.

13 Show that inspections for foreign objects at all appropriate stages of manufacture have been satisfactorily performed.

14 The registration has been marked on the exterior of the aircraft as required by national legislation. Where required by national legislation fix a fireproof owners nameplate.

15 Where applicable, there should be a certificate for noise and, for the aircraft radio station.

- 16 The installed compass and / or compass systems have been adjusted and compensated and a deviation card displayed in the aircraft.
- 17 Software criticality list.
- 18 A record of rigging and control surface movement measurements.
- 19 Details of installations which will be removed before starting commercial air transport operations (e.g. ferry kits for fuel, radio or navigation).
- 20 List of all applicable Service Bulletins and airworthiness directives that have been implemented.

**AMC No. 1 to CAR 21.130(b) - Statement of conformity for complete aircraft**

**1 PURPOSE AND SCOPE**

The description under this AMC refers only to the use of the aircraft Statement of Conformity issued under CAR 21 Subpart F. Statement of Conformity under CAR 21 Subpart F for products other than complete aircraft, and for parts and appliances is described in AMC No. 2 to CAR 21.130(b). Use of the aircraft Statement of Conformity issued by an approved production organisation is described in CAR 21.163(b) under CAR 21 Subpart G and the completion instructions are to be found in the Appendices to CAR 21.

The purpose of the aircraft Statement of Conformity (GCAA Form AWF-POA-52) issued under CAR 21 Subpart F is to present to the Authority a complete aircraft. The Authority only validates the Statement of Conformity if it finds, as described in CAR 21.130 and its associated GM, that the aircraft conforms with the type design and is in condition for safe operation.

**2 GENERAL**

The Statement of Conformity shall comply with the format attached including block numbers and the location of each Block. The size of each Block may however be varied to suit the individual application, but not to the extent that would make the Statement of Conformity unrecognisable. If in doubt consult the Authority.

The Statement of Conformity shall either be pre-printed or computer generated but in either case the printing of lines and characters shall be clear and legible. Pre-printed wording is permitted in accordance with the attached model but no other certification statements are permitted. Statements of Conformity shall be issued in one or more of the official language(s) of the issuing Authority with translations in English shown below, if required. Completion may be either machine/computer printed or hand-written using block letters to permit easy reading. A copy of the Statement of Conformity and all referenced attachments are to be retained by the manufacturer. A copy of the validated Statement of Conformity is to be retained by the Authority.

### 3 COMPLETION OF THE AIRCRAFT STATEMENT OF CONFORMITY BY THE ORIGINATOR

There shall be an entry in all Blocks to make the document a valid Statement.

A Statement of Conformity shall not be issued for validation by the Authority, unless the design of the aircraft and its installed products are approved.

The information required in Blocks 9, 10, 11, 12, 13 and 14 may be by reference to separate identified documents held on file by the manufacturer, unless the Authority agrees otherwise.

This Statement of Conformity is not intended to provide for the complete equipment fit required by the applicable operational rules. However, some of these individual items may be included in Block 10 or in the approved type design. Operators are therefore reminded of their responsibility to ensure compliance with the applicable operational rules for their own particular operation.

Block 1 Enter name of the State of manufacture.

Block 2 The Authority under which authority the Statement of Conformity is issued.

Block 3 A unique serial number should be pre-printed in this Block for Statement control and traceability purposes. Except that in the case of a computer generated document the number need not be pre-printed where the computer is programmed to produce and print a unique number.

Block 4 The full name and location address of the manufacturer issuing the statement.  
This Block may be pre-printed. Logos, etc., are permitted if the logo can be contained within the Block.

Block 5 The aircraft type in full as defined in the type-certificate and its associated data sheet.

Block 6 The type-certificate reference numbers and issue for the subject aircraft.

Block 7 If the aircraft is registered then this mark will be the registration mark. If the aircraft is not registered then this will be such a mark that is accepted by the Authority of the Member State and, if applicable, by the Authority of a third country.

Block 8 The identification number assigned by the manufacturer for control and traceability and product support. This is sometimes referred to as a Manufacturers Serial No or Constructors No.

Block 9 The engine and propeller type(s) in full as defined in the relevant type-certificate and its associated data sheet. Their manufacturer identification No and associated location should also be shown.

Block 10 Approved design changes to the Aircraft Definition.

Block 11 A listing of all applicable airworthiness directives (or equivalent) and a declaration of compliance, together with a description of the method of compliance on the subject individual aircraft including products and installed parts, appliances and equipment. Any future compliance requirement time should be shown.

Block 12 Approved unintentional deviation to the approved type design sometimes referred to as concessions, divergences, or non-conformances.

Block 13 Only agreed exemptions, waivers or derogations may be included here..

Block 14 Remarks: Any statement, information, particular data or limitation which may affect the airworthiness of the aircraft. If there is no such information or data, state; 'NONE'.

Block 15 Enter 'Certificate of Airworthiness' or 'Restricted Certificate of Airworthiness' for the Certificate of Airworthiness requested.

Block 16 Additional Requirements such as those notified by an importing country should be noted in this Block.

Block 17 Validity of the Statement of Conformity is dependent on full completion of all Blocks on the form. A copy of the flight test report together with any recorded defects and rectification details should be kept on file by the manufacturer. The report should be signed as satisfactory by the appropriate certifying staff and a flight crew member, e.g., test pilot or flight test engineer. The flight tests performed are those required by CAR 21.127 and GM 21.127, to ensure that the aircraft conforms to the applicable design data and is in condition for safe operation.

The listing of items provided (or made available) to satisfy the safe operation aspects of this statement should be kept on file by the manufacturer.

Block 18 The Statement of Conformity may be signed by the person authorised to do so by the manufacturer in accordance with CAR 21.130(a). A rubber stamp signature should not be used.

Block 19 The name of the person signing the certificate should be typed or printed in a legible form.

Block 20 The date the Statement of Conformity is signed shall be given.

Block 21 For production under CAR 21 Subpart F, state "N/A"

Additionally, for production under CAR 21 Subpart F, this Block shall include validation by the Authority. For this purpose, the validation statement below should be included in the Block 21 itself, and not referred in a separate document. The statement can be pre-printed, computer generated or stamped, and should be followed by the signature of the representative of the Authority validating the certificate, the name and the position/identification of such representative of the Authority, and the date of such validation by the Authority.

#### VALIDATION STATEMENT:

“After due inspection the *<identify the issuing Authority>* is satisfied that this document constitutes an accurate and valid Statement of Conformity in accordance with CAR 21 Subpart F.”

### **AMC No. 2 to 21.130(b)- Statement of Conformity for Products (other than complete aircraft), parts and/or appliances – The Authorised Release Certificate (AW Form 1)**

#### A. INTRODUCTION

This AMC relates specifically to the use of the AW Form 1 for manufacturing purposes under CAR 21 Subpart F. It can be used as a supplement to the completion instructions in CAR 21, Appendix I which covers the use of the AW Form 1.

#### 1. PURPOSE AND USE

The AW Form 1 is prepared and signed by the manufacturer. For production under CAR 21 Subpart F it is presented for validation by the authority. Under Subpart F the Certificate may only be issued by the authority. A mixture of items released under Subpart G and under Subpart F of CAR 21 is not permitted on the same certificate.

#### 2. GENERAL FORMAT Refer to CAR 21 Appendix I.

#### 3. COPIES

Refer to CAR 21 Appendix I.

The CAR 21 Subpart F originator shall retain a copy of the certificate in a form that allows verification of original data.

#### 4. ERROR(S) ON THE CERTIFICATE

If an end user finds an error(s) on a certificate, they shall identify it/them in writing to the originator. The originator may prepare and sign a new certificate for validation by the authority if they can verify and correct the error(s).

The new certificate shall have a new tracking number, signature and date.

The request for a new certificate may be honoured without reverification of the item(s) condition. The new certificate is not a statement of current condition and should refer to the previous certificate in block 12 by the following statement: 'This certificate corrects the error(s) in block(s) [enter block(s) corrected] of the certificate [enter original tracking number] dated [enter original issuance date] and does not cover conformity/condition/release to service.' Both certificates should be retained according to the retention period associated with the first.

## 5. COMPLETION OF THE CERTIFICATE BY THE ORIGINATOR

Refer to CAR 21 Appendix I for completion of the certificate. Specific CAR 21 Subpart F instructions that differ from the CAR 21 Appendix I are provided below.

### Block 1 – Approving Authority

State the name and country of the authority under whose jurisdiction this certificate is issued. When the competent authority is the Authority shall be stated.

### Block 12 – Remarks

Examples of conditions which would necessitate statements in block 12 are:

When the certificate is used for prototype purposes, the following statement shall be entered at the beginning of block 12:

'NOT ELIGIBLE FOR INSTALLATION ON IN-SERVICE TYPE-CERTIFIED AIRCRAFT'.

Re-certification of items from 'prototype' (conformity only to non-approved data) to 'new' (conformity to approved data and in a condition for safe operation) once the applicable design data is approved.

The following statement shall be entered in block 12: RE-CERTIFICATION OF ITEMS FROM 'PROTOTYPE' TO 'NEW':

THIS DOCUMENT CERTIFIES THE APPROVAL OF THE DESIGN DATA [INSERT TC/STC NUMBER, REVISION LEVEL], DATED [INSERT DATE IF NECESSARY FOR IDENTIFICATION OF REVISION STATUS], TO WHICH THIS ITEM (THESE ITEMS) WAS (WERE) MANUFACTURED.

When a new certificate is issued to correct error(s), the following statement shall be entered in block 12:

'THIS CERTIFICATE CORRECTS THE ERROR(S) IN BLOCK(S) [ENTER BLOCK(S) CORRECTED] OF THE CERTIFICATE [ENTER ORIGINAL TRACKING NUMBER] DATED [ENTER ORIGINAL ISSUANCE DATE] AND DOES NOT COVER CONFORMITY/CONDITION/RELEASE TO SERVICE'.

Additionally, for production under Subpart F, this block shall include the Statement of Conformity by the manufacturer under CAR 21.130. For this purpose, the appropriate Block 13a statement shall be included in the block 12 and not referenced in a separate document. The statement may be pre-printed, computer

generated or stamped, and shall be followed by the signature of the manufacturer's authorised person under CAR 21.130(a), the name and the position/identification of such person and the date of the signature.

#### Block 13b – Authorised Signature

This space shall be completed with the signature of the authority representative validating the block 12 manufacturer Statement of Conformity, under CAR 21.130(d). To aid recognition, a unique number identifying the representative may be added.

#### Block 13c – Approval/Authorisation Number

Enter the authorisation number reference. This number or reference is given by the competent authority to the manufacturer working under CAR 21 Subpart F.

### **AMC 21.130(c) - Validation of the statement of conformity**

It is the responsibility of the applicant to ensure that each and every product, part and appliance conforms to the applicable design data and is in condition for safe operation before issuing and signing the relevant Statement of Conformity. During manufacture, the applicant is expected to use such facilities, systems, processes and procedures as are described in the Manual and have been previously agreed with the Authority.

The Authority shall then make such inspection and investigation of records and product, part or appliance as are necessary to determine that the agreed facilities, systems, processes and procedures have been used, and that the Statement of Conformity may be regarded as a valid document.

To enable timely inspection and investigation by the Authority, the Statement of Conformity shall be prepared and submitted to the Authority immediately upon satisfactory completion of final production inspection and test.

### **AMC 21.130(c)(1) - Initial transfer of ownership** Upon transfer of ownership:

- a) For a complete aircraft, whether or not an application for a Certificate of Airworthiness is to be made, an GCAA Form AWF-POA-52 shall be completed and submitted to the Authority for validation.
- b) For anything other than a complete aircraft an GCAA Form AWF-POA-52 is inappropriate, and an AW Form 1 shall be completed and submitted to the Authority for validation.

Note: If there is any significant delay between the last production task and presentation of the GCAA Form AWF-POA-52 or AW Form 1 to the Authority, then additional evidence relating to the storage, preservation and maintenance of the item since its production shall be presented to the Authority.

**SUBPART G - PRODUCTION ORGANISATION APPROVAL FOR PRODUCTS, PARTS AND APPLIANCES****GM 21.131 - Scope - Applicable design data**

Applicable design data is defined as all necessary drawings, specifications and other technical information provided by the applicant for, or holder of a design organisation approval, TC, STC, approval of repair or minor change design, or UAE TSO authorisation (or equivalent when CAR 21 Subpart G is used for production of products, parts or appliances, the design of which has been approved other than according to CAR 21) and released in a controlled manner to a production organisation approval holder. This should be sufficient for the development of production data to enable repeatable manufacture to take place in conformity with the design data.

Prior to issue of the TC, STC, approval of repair or minor change design or UAE TSO authorisation, or equivalent, design data is defined as 'not approved' but parts and appliances may be released with an AW Form 1 as a certificate of conformity.

After issue of the TC, STC, approval of repair or minor change or UAE TSO authorisation, or equivalent, this design data is defined as 'approved' and items manufactured in conformity are eligible for release on an AW Form 1 for airworthiness purposes.

**GM 21.133(a) Eligibility - Approval appropriate for showing conformity** 'Appropriate' should be understood as follows:

- The applicant produces or intends to produce aeronautical products, parts and /or appliances intended for airborne use as part of a type-certificated product (this excludes simulators, ground equipment and tools).
- The applicant will be required to show a need for an approval, normally based on one or more of the following criteria:
  - 1 Production of aircraft, engines or propellers (except if the Authority considers a POA inappropriate)
  - 2 Production of UAE TSO articles and parts marked EPA
  - 3 Direct delivery to users such as owners or operators maintenance organisations with the need for exercising the privileges of issuing Authorised Release Certificates – AW Form 1
  - 4 Participation in an international co-operation program where working under an approval is considered necessary by the Authority

5 Criticality and technology involved in the part, or appliance being manufactured.

6 Approval in this case may be found by the Authority as the best tool to exercise its duty in relation to airworthiness control

6 Where an approval is otherwise determined by the Authority as being required to satisfy the essential requirements of the Regulation.

- It is not the intent of the Authority to issue approvals to manufacturing firms that perform only sub-contract work for main manufacturers of products and are consequently placed under their direct surveillance.
- Where standard parts, materials, processes or services are included in the applicable design data (see guidance on applicable design data in GM 21.131) their standards should be controlled
- by the POA holder in a manner which is satisfactory for the final use of the item on the product, part
- or appliance. Accordingly, the manufacturer or provider of the following will not at present be considered for production organisation approval:
- consumable materials
- raw materials
- standard parts
- parts identified in the product support documentation as 'industry supply' or 'no hazard'
- non-destructive testing or inspection
- processes (heat treatment, surface finishing, shot peening, etc.)

**AMC No. 1 to 21.133(b) and (c) - Eligibility - Link between design and production organisations**

An arrangement is considered appropriate if it is documented and satisfies the Authority that co-ordination is satisfactory.

To achieve satisfactory coordination the documented arrangements shall at least define the following aspects irrespective of whether the two organisations are separate legal entities or not:

- The responsibilities of a design organisation which assure correct and timely transfer of up to-date airworthiness data (e.g., drawings, material specifications, dimensional data, processes, surface treatments, shipping conditions, quality requirements, etc.);
- The responsibilities and procedures of a POA holder/applicant for developing, where applicable, its own manufacturing data in compliance with the airworthiness data package;

- The responsibilities of a POA holder/applicant to assist the design organisation in dealing with continuing airworthiness matters and for required actions (e.g., traceability of parts in case of direct delivery to users, retrofitting of modifications, traceability of processes' outputs and approved deviations for individual parts as applicable, technical information and assistance, etc.);
- The scope of the arrangements shall cover CAR 21 Subpart G requirements and associated AMC and GM, in particular: CAR 21.145(b), CAR 21.165(c), (f) and (g);
- The responsibilities of a POA holder/applicant, in case of products prior to type certification to assist a design organisation in showing compliance with CS or applicable airworthiness standards (access and suitability of production and test facilities for manufacturing and testing of prototype models and test specimen);
- The procedures to deal adequately with production deviations and non conforming parts;
- The procedures and associated responsibilities to achieve adequate configuration control of manufactured parts, to enable the production organisation to make the final determination and identification for conformity or airworthiness release and eligibility status;
- The identification of the responsible persons/offices who control the above;
- The acknowledgment by the holder of the TC/STC/repair or change approval/UAE TSO authorisation that the approved design data provided, controlled and modified in accordance with the arrangement are recognised as approved.

In many cases the production organisation may receive the approved design data through an intermediate production organisation. This is acceptable provided an effective link between the design approval holder and the production organisation can be maintained to satisfy the intent of CAR 21.133.

When the design and production organisations are two separate legal entities a Direct Delivery Authorisation shall be available for direct delivery to end users in order to guarantee continued airworthiness control of the released parts and appliances.

Where there is no general agreement for Direct Delivery Authorisation, specific permissions may be granted (refer to AMC 21.4).

**AMC No. 2 to CAR 21.133(b) and (c) - Eligibility - Link between design and production organisations**

In accordance with AMC No.1 to CAR 21.133(b) and (c) the POA holder shall demonstrate to the Authority that it has entered into an arrangement with the design organisation. The arrangement shall be documented irrespective of whether the two organisations are separate legal entities or not.

The documented arrangement shall facilitate the POA holder to demonstrate compliance with the requirement of CAR 21.133(b) and (c) by means of written documents agreed.

In the case where the design organisation and POA holder are part of the same legal entity these interfaces may be demonstrated by company procedures accepted by the Authority.

In all other cases to define such a design/production interface the following sample format is offered:

ARRANGEMENT	
IAW 21.133(b) and (c)	
The undersigned agree on the following commitments:	Relevant interface procedures
<p>The design organisation [NAME] takes responsibility to:</p> <ul style="list-style-type: none"> <li>assure correct and timely transfer of up-to-date applicable design data (e.g. drawings, material specifications, dimensional data, processes, surface treatments, shipping conditions, quality requirements, etc.) to the production organisation approval holder [NAME],</li> <li>provide visible statement(s) of approved design data.</li> </ul>	
<p>The production organisation approval holder [NAME] takes responsibility to:</p> <ul style="list-style-type: none"> <li>assist the design organisation [Name] in dealing with continuing airworthiness matter and for required actions,</li> <li>assist the design organisation [Name] in case of products prior to type certification in showing compliance with airworthiness requirements,</li> <li>develop, where applicable, its own manufacturing data in compliance with the airworthiness data package.</li> </ul>	
<p>The design organisation [Name] and the POA holder [Name] take joint responsibility to:</p> <ul style="list-style-type: none"> <li>deal adequately with production deviations and non conforming parts in accordance with the applicable procedures of the design organisation and the production organisation approval holder,</li> <li>achieve adequate configuration control of manufactured parts, to enable the POA holder to make the final determination and identification for conformity.</li> </ul>	
The scope of production covered by this arrangement is detailed in ... [DOCUMENT REFERENCE/ ATTACHED LIST]	

Then the design organisation is not the same legal entity as the production organisation approval holder]

Transfer of approved design data

The TC/STC/UAE TSO holder [NAME] acknowledges that the approved design data provided, controlled and modified in accordance with the arrangement are recognised as approved by the Authority and therefore the parts and appliances manufactured in accordance with these data and found in a condition for safe operation may be released certifying that the item was manufactured in conformity to approved design data and is in a condition for safe operation.

[When the design organisation is not the same legal entity as the production organisation approval holder]

Direct Delivery Authorisation

This acknowledgment includes also [OR does not include] the general agreement for direct delivery to end users in order to guarantee continued airworthiness control of the released parts and appliances.

for the [NAME of the design organisation/DOA holder]	for the [NAME of the POA holder]
date	date
<b>XX.XX.XXXX</b>	<b>XX.XX.XXXX</b>
([NAME in block letters])	([NAME in block letters])

Instructions for completion:

**Title:** The title of the relevant document shall clearly indicate that it serves the purpose of a design/production interface arrangement in accordance with CAR 21.133(b) and (c).

**Commitment:** The document shall include the basic commitments between the design organisation and the POA holder as addressed in AMC 21.4 and AMC No. 1 to CAR 21.133(b) and (c).

**Relevant Procedures:** Identify an entry point into the documentary system of the organisations with respect to the implementation of the arrangement (for example a contract, quality plan, handbooks, common applicable procedures, working plans etc.).

**Scope of arrangement:** The scope of arrangement shall state by means of a list or reference to relevant documents those products, parts or appliances that are covered by the arrangement. **Transfer of applicable design data:** Identify the relevant procedures for the transfer of the applicable design data required by CAR 21.131 and AMC 21.131 from the design organisation to the POA holder. The means by which the design organisation advises the POA holder whether such data is approved or not approved shall also be identified (ref. CAR 21.4/AMC 21.4).

**Direct Delivery Authorisation:** Where the design organisation and the POA holder are separate legal entities the arrangement shall clearly identify whether authorisation for direct delivery to end users is permitted or not.

Where any intermediate production/design organisations are involved in the chain between the original design organisation and the POA holder evidence shall be available that this intermediate organisation has received authority from the design organisation to grant Direct Delivery Authorisation.

**Signature:** AMC No. 1 to CAR 21.133(b) and (c) requests the identification of the responsible persons/offices who control the commitments laid down in the arrangement. Therefore the basic document shall be signed mutually by the authorised representatives of the design organisation and the POA holder in this regard.

**GM 21.134 - Application - Application form and manner**

The application shall be made on the GCAA approved Form should be obtained from the Authority, and completed by the accountable manager of the organisation.

The completed form, an outline of the production organisation exposition, and details of the proposed terms of approval are to be forwarded to the Authority.

**GM No. 1 to 21.139(a) - Quality system**

The quality system is an organisational structure with responsibilities, procedures, processes, and resources which implement a management function to determine and enforce quality principles.

The quality system should be documented in such a way that the documentation can be made easily available to personnel who need to use the material for performing their normal duties, in particular:

- procedures, instructions, data to cover the issues of CAR 21.139(b)(1) are available in a written form,
- distribution of relevant procedures to offices/persons is made in a controlled manner,
- procedures which identify persons responsible for the prescribed actions are established,
- the updating process is clearly described.

The manager responsible for ensuring that the quality system is implemented and maintained should be identified.

The Authority will verify on the basis of the exposition and by appropriate investigations that the production organisation has established and can maintain their documented quality system.

#### **GM No. 2 to CAR 21.139(a) - Quality system - Conformity of supplied parts or appliances**

The POA holder is responsible for determining and applying acceptance standards for physical condition, configuration status and conformity of supplied products, parts or appliances, whether to be used in production or delivered to customers as spare parts. This responsibility also includes BFE (Buyer Furnished Equipment) items.

To discharge this responsibility the quality system needs an organisational structure and procedures to adequately control suppliers. Elements of the quality system for the control of suppliers may be performed by other parties provided that the conditions of AMC No. 1 or No. 2 to 21.139(b)(1)(ii) are met.

Control can be based upon use of the following techniques (as appropriate to the system or product orientation necessary to ensure conformity).

- qualification and auditing of supplier's quality system,
- evaluation of supplier capability in performing all manufacturing activities, inspections and tests necessary to establish conformity of parts or appliances to type design,
- first article inspection, including destruction if necessary, to verify that the article conforms to the applicable data for new production line or new supplier,
- incoming inspections and tests of supplied parts or appliances that can be satisfactorily inspected on receipt,

- identification of incoming documentation and data relevant to the showing of conformity to be included in the certification documents,
- a vendor rating system which gives confidence in the performance and reliability of this supplier,
- any additional work, tests or inspection which may be needed for parts or appliances which are to be delivered as spare parts and which are not subjected to the checks normally provided by subsequent production or inspection stages.
- The POA holder may rely on inspection/tests performed by supplier if it can establish that:
  - personnel responsible in charge of these tasks satisfy the competency standards of the POA quality system,
  - quality measurements are clearly identified,
  - the records or reports showing evidence of conformity are available for review and audit.

The control of suppliers holding a POA for the parts or appliances to be supplied can be reduced, to a level at which a satisfactory interface between the two quality systems can be demonstrated. Thus, for the purpose of showing conformity, a POA holder can rely upon documentation for parts or appliances released under a suppliers CAR 21.163 privileges.

A supplier who does not hold a POA is considered as a sub-contractor under the direct control of the POA quality system.

The POA holder retains direct responsibility for inspections/tests carried out either at its own facilities or at supplier's facilities.

#### **GM 21.139(b)(1) - Quality system - Elements of the quality system**

1. The control procedures covering the elements of CAR 21.139(b)(1) should document the standards to which the production organisation intends to work.
2. An organisation having a Quality system designed to meet a recognised Standard such as ISO 9002 (relevant to the scope of approval being requested) should expand it to include at least the following additional topics, as appropriate, in order to show compliance with the requirements of CAR 21 Subpart G:
  - Mandatory Occurrence Reporting and continued airworthiness as required by CAR 21.165(e)
  - Control of work occasionally performed (outside the POA facility by POA personnel)

- Co-ordination with the applicant for, or holder of, an approved design as required by CAR 21.133(b) and (c) and CAR 21.165(g)
- Issue of certifications within the scope of approval for the privileges of CAR 21.163
- Incorporation of airworthiness data in production and inspection data as required in CAR 21.133(b) and (c) and CAR 21.145(b)
- When applicable, ground test and/or production flight test of products in accordance with procedures defined by the applicant for, or holder of, the design approval
- Procedures for traceability including a definition of clear criteria of which items need such traceability. Traceability is defined as a means of establishing the origin of an article by
  - reference to historical records for the purpose of providing evidence of conformity
- Personnel training and qualification procedures especially for certifying staff as required in CAR 21.145(d).

3. An organisation having a quality system designed to meet a recognised aerospace quality standard will still need to ensure compliance with all the requirements of Subpart G of CAR 21. In all cases, the Authority will still need to be satisfied that compliance with CAR 21 Subpart G is established.

**AMC No. 1 to 21.139(b)(1)(ii) - Vendor and sub-contractor assessment, audit and control – Production Organisation Approval (POA) holder using documented arrangements with other parties for assessment and surveillance of a supplier.**

**1 General**

**Note**

*For the purpose of this AMC, vendors and sub-contractors are hereafter referred to as "suppliers", regardless of whether or not they hold a POA and audit and control is hereafter referred to as "surveillance".*

The production organisation is required by CAR 21 to demonstrate that it has established and maintains a quality system that enables the organisation to ensure that each item produced conforms to the applicable design data and is in a condition for safe operation. To discharge this responsibility, the quality system should have, among other requirements, procedures to adequately carry out the assessment and surveillance of suppliers.

The use of Other Parties (OP), such as a consulting firm or quality assurance company, for supplier assessment and surveillance does not exempt the POA holder from its obligations under CAR 21.165. The supplier assessment and surveillance, corrective action and follow-up activity conducted at any of its supplier's facilities may be performed by OP.

The purpose of using an OP cannot be to replace the assessment, audit and control of the POA Holder. It is to allow an element (i.e. the assessment of the quality system) to be delegated to another organisation under controlled conditions.

The use of OP to perform supplier assessments and surveillance should be part of the production organisation quality system and fulfil the conditions of this AMC.

This AMC is applicable to a method whereby a POA holder has a documented arrangement with OP for the purpose of assessing and/or surveying a POA's supplier.

## **2 Approval by the authority.**

Implementing or changing procedures for using OP for supplier assessment and surveillance is a significant change to the quality system and requires approval in accordance with CAR 21.147.

## **3 Conditions and criteria for the use of OP to perform supplier assessment and surveillance.**

(a) The POA holder should include the use of OP for supplier assessment and surveillance in the POA holders' quality system to demonstrate compliance with the applicable requirements of CAR 21.

(b) Procedures required for using OP for supplier assessment and surveillance should be consistent with other procedures of the POA holders' quality system.

(c) Procedures of the POA holder that uses OP to perform supplier assessment and surveillance should include the following:

(1) Identification of the OP that will conduct supplier assessment and surveillance.

(2) A listing of suppliers under surveillance by the OP. This listing should be maintained by the POA holder and made available to the Authority upon request.

(3) The method used by the POA holder to evaluate and monitor the OP. The method should include the following as a minimum:

(i) Verification that standards and checklists used by the OP are acceptable for the applicable scope.

- (ii) Verification that the OP is appropriately qualified and have sufficient knowledge, experience and training to perform their allocated tasks.
- (iii) Verification that the OP surveillance frequency of the suppliers is commensurate with the complexity of the product and with the surveillance frequency established by the POA holder's suppliers control program.
- (iv) Verification that the suppliers' assessment and surveillance is conducted on-site by the OP.
- (v) Verification that the OP has access to applicable proprietary data to the level of detail necessary to survey suppliers functions.

Where the POA holder uses an OP accredited by a signatory to the European cooperation for Accreditation (EA) Multilateral Agreement and working in accordance with an aviation standard (e.g. EN 9104 series of requirements) that describes requirements for the other party assessment and surveillance, the items (ii) and (iv) shall be deemed to be complied with.

- (4) A definition to what scope the OP will conduct suppliers surveillance on behalf of the POA holder. If the OP replaces surveillance in part, the POA holder should identify the functions that will continue to be surveyed by the POA holder.
- (5) The procedures used by the OP to notify the POA holder of nonconformities discovered at the suppliers facility, corrective action and follow-up.
- (d) The POA should make arrangements that allow the Authority to make investigation in accordance with CAR 21.157 to include OP activities.

**AMC No. 2 to 21.139(b)(1)(ii) - Vendor and sub-contractor assessment, audit and control - Production Organisation Approval (POA) holder using other party supplier certification**

**1 General**

**Note**

*For the purpose of this AMC, vendors and sub-contractors are hereafter referred to as "suppliers", regardless of whether or not they hold a POA and audit and control is hereafter referred to as "surveillance".*

Other party supplier certification is a method whereby a supplier contracts with an appropriately recognised or accredited Other Party (OP) for the purpose of obtaining a certification from that OP. Certification indicates that the supplier has satisfactorily demonstrated to meet the applicable standard on a continuing basis. OP certification results in placing the supplier on the OP list of certified organisations, or in the supplier receiving a certificate identifying the requirements that have been met. Periodic follow-up evaluations are

conducted by the OP to verify continued compliance with the requirements of the applicable standard.

The production organisation is required by CAR 21 to demonstrate that it has established and maintains a quality system that enables the organisation to ensure that each item produced conforms to the applicable design data and is in a condition for safe operation. To discharge this responsibility, the quality system should have, among other requirements, procedures to adequately carry out the assessment and surveillance of suppliers.

The assessment and surveillance of suppliers by an OP should be deemed to satisfy the requirements of CAR 21.139(b)(1)(ii) when the conditions of this AMC are satisfied. The assessment and surveillance of suppliers by OP as part of supplier certification does not exempt the POA holder from its obligations under CAR 21.165. The supplier assessment and surveillance, corrective action and follow-up activity conducted at any of its supplier's facilities may be performed by OP.

The purpose of using an OP cannot be to replace the assessment, audit and control of the POA Holder. It is to allow an element (i.e. the assessment of the quality system) to be delegated to another organisation under controlled conditions.

The use of suppliers that are certified by OP in accordance with this AMC should be part of a production organisation quality system.

## **2 Approval by the authority.**

Implementing or changing procedures for using suppliers that are certified by an OP is a significant change to the quality system and requires approval in accordance with CAR 21.147.

## **3 Conditions and criteria for using supplier certification for the supplier assessment and surveillance.**

- (a) The POA holder should include the use of supplier certification for the supplier assessment and surveillance in the POA holder's quality system to demonstrate compliance with the applicable requirements of CAR 21.
- (b) Procedures required for use of supplier certification for the supplier assessment and surveillance should be consistent with other procedures of the POA holders' quality system.
- (c) Procedures of the POA holder that uses supplier certification for the supplier assessment and surveillance should include the following:
  - (1) Listing of the OP that has certified or will certify suppliers and will conduct supplier assessment and surveillance or the scheme under which the accreditation of the OP is controlled. This listing should be maintained by the POA holder and made available to the Authority upon request.

(2) A listing of the certified suppliers under surveillance by the OP and used by the POA holder. This listing should be maintained by the POA holder and made available to the Authority upon request.

(3) The method used by the POA holder to evaluate and monitor the certification process of any OP certification body or OP certification scheme used. This applies not only to new suppliers, but also to any decision by the POA holder to rely on OP certification of current suppliers. The method should include the following as a minimum:

(i) Verification that certification standards and checklists are acceptable and applied to the applicable scope.

(ii) Verification that the OP is appropriately qualified and has sufficient knowledge, experience and training to perform its allocated tasks.

(iii) Verification that the OP surveillance frequency of the suppliers is commensurate with the complexity of the product and with the surveillance frequency established by the POA holder's suppliers control program.

(iv) Verification that the suppliers' surveillance is conducted on-site by the OP.

(v) Verification that the surveillance report will be made available to the Authority upon request.

(vi) Verification that the OP continues to be recognised or accredited.

(vii) Verification that the OP has access to applicable proprietary data to the level of detail necessary to survey suppliers functions.

Where the POA holder uses an OP accredited by a signatory to the European cooperation for Accreditation (EA) Multilateral Agreement and working in accordance with an aviation standard (e.g. EN 9104 series of requirements) that describes requirements for the OP certification, the items (ii), (iv) and (v) shall be deemed to be complied with.

(4) A definition to what scope the OP will conduct suppliers surveillance on behalf of the POA holder. If the OP replaces surveillance in part, the POA holder should identify the functions that will continue to be surveyed by the POA holder.

(5) Procedures that ensure that the POA is aware of the loss of an existing certification.

(6) Procedures that ensure that the POA holder is aware of nonconformities and has access to detailed information of these nonconformities.

(7) Procedures to evaluate the consequences of nonconformities and take appropriate actions.

(d) The POA should make arrangements that allow the Authority to make investigation in accordance with CAR 21.157 to include OP activities

**GM No. 1 to CAR 21.139(b)(2) - Quality system - Independent quality assurance function**

The quality assurance function which is part of the organisation is required to be independent from the functions being monitored. This required independence relates to the lines of reporting, authority and access within the organisation and assumes an ability to work without technical reliance on the monitored functions.

**GM No. 2 to CAR 21.139(b)(2) - Quality system - Adequacy of procedures and monitoring function**

Adequacy of procedures means that the quality system, through the use of the procedures as set forth, is capable of meeting the conformity objectives identified in CAR 21.139(a).

The quality assurance function to ensure the above should perform planned continuing and systematic evaluations or audits of factors that affect the conformity (and, where required, safe operation) of the products, parts or appliances to the applicable design. This evaluation should include all elements of the quality system in order to show compliance with CAR 21 Subpart G.

**GM 21.143 - Exposition - Production organisation exposition**

The purpose of the POE is to set forth in a concise document format the organisational relationships, responsibilities, terms of reference, and associated authority, procedures, means and methods of the organisation.

The information to be provided is specified in CAR 21.143(a). Where this information is documented and integrated in manuals, procedures and instruction, the POE should provide a summary of the information and an appropriate cross reference.

The Authority requires the POE to be an accurate definition and description of the production organisation. The document does not require approval in itself, but it will be considered as such by virtue of the approval of the organisation.

When changes to the organisation occur, the POE is required to be kept up to date per a procedure, laid down in the POE. Significant changes to the organisation (as defined in GM 21.147(a)) should be approved by the Authority prior to update of the POE.

When an organisation is approved against any other implementing rule containing a requirement for an exposition, a supplement covering the differences may suffice to meet the requirements of CAR 21 Subpart G except that the supplement should have an index identifying where those parts missing from the supplement are covered. Those items then formally become part of the POE. In any combined documents the POE should be easily identifiable.

**GM 21.145(a) - Approval requirements**

A facility is a working area where the working conditions and the environment are controlled as appropriate in respect of: cleanliness, temperature, humidity, ventilation, lighting, space/access, noise, air pollution.

Equipment and tools should be such as to enable all specified tasks to be accomplished in a repeatable manner without detrimental effect. Calibration control of equipment and tools which affect critical dimensions and values should show compliance with, and be traceable to, national or international standards.

Sufficient personnel means that the organisation has for each function according to the nature of the work and the production rate, a sufficient quantity of qualified personnel to accomplish all specified manufacturing tasks and to attest the conformity. Their number should be such that airworthiness consideration may be applied in all areas without undue pressure.

An evaluation of the competence of personnel is performed as part of the quality system. This should include, where appropriate, verification that specific qualification standards have been implemented, for example NDT, welding, etc. Training should be organised to establish and maintain the personal competence levels determined by the organisation to be necessary.

**GM 21.145(b)(2) - Approval requirements - Airworthiness, noise, fuel venting and exhaust emissions /production data procedures**

- 1 When a POA holder/applicant is developing its own manufacturing data, such as computer based data, from the design data package delivered by a design organisation, procedures are required to demonstrate the right transcription of the original design data.
- 2 Procedures are required to define the manner in which airworthiness, noise, fuel venting and exhaust emissions data is used to issue and update the production/quality data, which determines the conformity of products, parts and appliances. The procedure shall also define the traceability of such data to each individual product, part or appliance for the purpose of certifying condition for safe operation and issuing a Statement of Conformity or AW Form 1.

**GM 21.145(c)(1) - Approval requirements - Accountable manager**

Accountable manager means the manager who is responsible, and has corporate authority for ensuring that all production work is carried out to the required standard. This function may be carried out by the Chief Executive or by another person in the organisation, nominated by him or her to fulfil the function provided his or her position and authority in the organisation permits to discharge the attached responsibilities.

The manager is responsible for ensuring that all necessary resources are available and properly used in order to produce under the production approval in accordance with CAR 21 Subpart G.

The manager needs to have sufficient knowledge and authority to enable him or her to respond to the Authority regarding major issues of the production approval and implement necessary improvements.

The manager needs to be able to demonstrate that he or she is fully aware of and supports the quality policy and maintains adequate links with the quality manager.

#### **GM 21.145(c)(2) - Approval requirements - Responsible managers**

The person or persons nominated should represent the management structure of the organisation and be responsible for all functions as specified in CAR 21 Subpart G. It therefore follows that, depending on the size of the CAR 21 Subpart G organisation, the functions may be subdivided under individual managers (and in fact may be further subdivided) or combined in a variety of ways.

The Authority requires the nominated managers to be identified and their credentials submitted on an GCAA Form AWF-POS-4 to the Authority in order that they may be seen to be appropriate in terms of relevant knowledge and satisfactory experience related to the nature of the production activities as performed by the CAR 21 Subpart G organisation.

The responsibilities and the tasks of each individual manager are required to be clearly defined, in order to prevent uncertainties about the relations, within the organisation. In the case of organisation structures where staff-members are responsible to more than one person, as for instance in matrix and project organisations, responsibilities of the managers should be defined in such a way that all responsibilities are covered.

Where a CAR 21 Subpart G organisation chooses to appoint managers for all or any combination of the identified CAR 21 functions because of the size of the undertaking, it is necessary that these managers report ultimately to the accountable manager. In cases where a manager does not directly report to the accountable manager, he or she should have a formally established direct access to the accountable manager.

One such manager, normally known as the quality manager is responsible for monitoring the organisation's compliance with CAR 21 Subpart G and requesting remedial action as necessary by the other managers or the accountable manager as appropriate. He or she should have a direct access to the accountable manager.

#### **AMC 21.145(d)(1) - Approval requirements – Certifying staff**

1 Certifying Staff are nominated by the production organisation to ensure that products, parts, and / or appliances qualify for Statements of Conformity or Release Certificates. Certifying Staff positions and numbers are to be appropriate to the complexity of the product and the production rate.

2 The qualification of certifying staff is based on their knowledge, background and

experience and a specific training (or testing) established by the organisation to ensure that it is appropriate to the product, part, or appliance to be released.

- 3 Training shall be given to develop a satisfactory level of knowledge of organisation procedures, aviation legislation, and associated implementing rules, CS and GM, relevant to the particular role.
- 4 For that purpose, in addition to general training policy, the organisation shall define its own standards for training, including pre-qualification standards, for personnel to be identified as certifying staff.
- 5 Training policy is part of the Quality System and its appropriateness forms part of investigation by the Authority within the organisation approval process and subsequent surveillance of persons proposed by managers.
- 6 The training shall be updated in response to experience gained and changes in technology.
- 7 A feedback system to ascertain that the required standards are being maintained shall be put in place to ensure the continuing compliance of personnel to authorisation requirements.
- 8 For release of products, parts or appliances, the responsibilities to issue statements of conformity/release certificates (AW Form 1) or permit to fly including approval of flight conditions are allocated to the certifying staff identified in CAR 21.145 (d)(2).
- 9 The Authority holds the right to reject those personnel, appointed by the organisation, if found to have inappropriate experience or not to otherwise comply with its requirements.

#### **AMC 21.145(d)(2) - Approval requirements – Record of certifying staff**

- 1 The following is the minimum information to be recorded in respect of each certifying person:
  - a Name
  - b Date of Birth
  - c Basic Training and standard attained
  - d Specific Training and standard attained
  - e If appropriate – Continuation Training

- f Experience
- g Scope of the authorisation
- h Date of first issue of the authorisation
- i If appropriate – expiry date of the authorisation
- j Identification Number of the authorisation

2 The record may be kept in any format and shall be controlled by an internal procedure of the organisation. This procedure forms part of the quality system.

3 Persons authorised to access the system shall be maintained at a minimum to ensure that records cannot be altered in an unauthorised manner and that confidential records cannot become accessible to unauthorised persons.

4 The certifying person shall be given reasonable access on request to his or her own records.

5 Under the provision of CAR 21.157 the Authority has a right of access to the data held in such a system.

6 The organisation shall keep the record for at least two years after the certifying person has ceased employment with the organisation or withdrawal of the authorisation, whichever is the sooner.

**AMC 21.145(d)(3) - Approval requirements – Evidence of authorisation**

1 The authorisation document shall be in a style that makes its scope clear to the certifying staff and any authorised person who may require to examine the authorisation. Where codes are used to define scope, an interpretation document should be readily available.

2 Certifying staff are not required to carry the authorisation document at all times but should be able to make it available within a reasonable time of a request from an authorised person. Authorised persons include the Authority.

**GM 21.147(a) - Changes to the approved production organisation – Significant changes**

1 Changes to be approved by the Authority include:

- Significant changes to production capacity or methods.

- Changes in the organisation structure especially those parts of the organisation in charge of quality.
- A change of the accountable manager or of any other person nominated under CAR 21.145 (c)(2).
- Changes in the production or quality systems that may have an important impact on the conformity/airworthiness of each product, part or appliance.
- Changes in the placement or control of significant sub-contracted work or supplied parts.

2 To ensure that changes do not result in non-compliance with CAR 21 Subpart G it is in the interest of both the Authority and the approval holder to establish a relationship and exchange information that will permit the necessary evaluation work to be conducted before the implementation of a change. This relationship should also permit agreement on the need for variation of the terms of approval (ref CAR 21.143(a)(9)).

3 Where a change of name or ownership results in the issue of a new approval the investigation will normally take account of the Authority's knowledge and information from the preceding approval.

4 Changes of location are addressed in CAR 21.148 and changes of ownership in CAR 21.149, change of scope of approval in CAR 21.153.

#### **AMC 21.148 - Changes of location – Management during change of location**

1 The relocation of any work, to an unapproved location, or a location with inappropriate scope of approval, constitutes a change of significance to the organisation and requires approval by the Authority as prescribed in CAR 21.147. An unapproved relocation will invalidate the production organisation approval, and may necessitate re-application for any similar approval required at the new location. However, suitable transitional arrangements may be agreed with the Authority, in advance of the relocation, which can allow continuation of the approval.

2 When an organisation expands its facility to include a new production location or moves parts of its production to a new location the production organisation approval may continue in force, but the approval does not include the new location until the Authority has indicated its satisfaction with the arrangements.

3 For a change in location, taking an extended period of time, suitable transitional arrangements would require preparation of a co-ordination plan for the removal. The plan shall, at least, identify the following:

a A clearly identified person, or group of persons, responsible for coordinating the removal and acting as focal point for communication with all parties, including the Competent Authority.

- b The basis of the co-ordination plan, e.g., whether by product or area.
- c Planned timing of each phase of relocation.
- d Arrangements for maintaining the standards of the approval up to the point where the production area is closed down.
- e Arrangements for verifying continued production quality upon resumption of work at the new location.
- f Arrangements for check and/or re-calibration of inspection aids or production tools and jigs before resuming production.
- g Procedures which ensure that goods are not released from the new location until their associated production and quality systems have been verified.
- h Arrangements for keeping the Authority informed of progress with the relocation.

4 From the co-ordination plan, the Authority can determine the points at which it wishes to conduct investigation.

5 If an agreed co-ordination plan is in operation, the Authority will normally allow the existing approval to remain in force and will, where appropriate, grant an additional approval to cover the new address for the duration of the move.

#### **GM 21.149 - Transferability**

Transfer of approval would normally only be agreed in cases where the ownership changes but the organisation itself remains effectively unchanged. For example:

An acceptable transfer situation could be a change of company name (supported by the appropriate certificate from the National Companies Registration Office or equivalent) but with no changes to site address, facilities, type of work, staff, accountable manager or person nominated under CAR 21.145.

Alternatively, in the event of receivership (bankruptcy, insolvency or other equivalent legal process) there may be good technical justification for continuation of the approval provided that the company continues to function in a satisfactory manner in accordance with their POE. It is likely that at a later stage the approval might be voluntarily surrendered or the organisation transferred to new owners in which case the former paragraphs apply. If it does not continue to operate satisfactorily then the Authority could suspend or revoke the approval under applicable administrative procedures.

In order for the Authority to agree to a transfer of approval, it will normally prescribe it as a condition in accordance with CAR 21.147(b) that the obligations and responsibilities of the former organisation should

be transferred to the new organisation, otherwise transfer is not possible and application for a new approval will be required.

#### GM 21.151 - Terms of approval – Scope and categories

Terms of approval document(s) will be issued by the Competent Authority under CAR 21.135 to identify the scope of work, the products, and/or categories for which the holder is entitled to exercise the privileges defined in CAR 21.163.

The codes shown against each scope of work item are intended for use by the Competent Authority for purposes such as managing, administering and filing details of approvals. It may also assist in the production and publication of a list of approval holders.

The scope of work, the Products, Parts, or Appliances for which the POA holder is entitled to exercise the privileges defined in CAR 21.163 will be described by the Authority as follows:

For Products:

1 General area, similar to the titles of the corresponding certification codes.

2 Type of Product, in accordance with the type-certificate.

For Parts and Appliances:

1 General area, showing the expertise, e.g., mechanical, metallic structure.

2 Generic type, e.g., wing, landing gear, tyres.

	PRODUCTS/CATEGORIES
A1 Large Aeroplanes	State types
A2 Small Aeroplanes	"
A3 Large Helicopters	"
A4 Small Helicopters	"
A5 Gyroplanes	"
A6 Sailplanes	"
A7 Motor Gliders	"
A8 Manned Balloons	"
A9 Airships	"
A11 Very Light Aeroplanes	"

B1 Turbine Engines B2 Piston Engines B3 APU's B4 Propellers	“ “ “ “
C1 Appliances:  C2 Parts:	<p>State appliance generic types (e.g., Tyres, Altimeter, etc.) Examples include: Avionic, Com/Nav/Pulse Computer System, Aircraft/Engine/Avionic Instruments, Mechanical/Electrical/ Gyroscopic/Electronic Mechanical/Hydraulic/Pneumatic</p> <p>State part generic types (e.g., Wing, Landing Gear, etc.) Examples include: Structural, Metallic/non-metallic Mechanical/Hydraulic/Pneumatic Electrical Electronic</p>
D1 Maintenance  D2 Issue of permit to fly	<p>State aircraft types State aircraft types</p>

**AMC 21.153 - Changes to the terms of approval – Application for a change to the terms of approval**

GCAA Form AWF-POA-51 shall be obtained from the Authority and completed in accordance with the procedures of the POE.

The information entered on the form is the minimum required by the Authority to assess the need for change of the production organisation approval.

The completed form and an outline of the changed production organisation exposition, and details of the proposed change to POA terms of approval shall be forwarded to the Competent Authority.

**GM 21.157 - Investigations – Arrangements**

The arrangements made by the applicant for, or holder of an approval under CAR 21 Subpart G should allow the Authority to make investigations that include the complete production organisation including partners, sub-contractors and suppliers, whether they are in the State of the applicant or not.

The investigation may include; audits, enquiries, questions, discussions and explanations, monitoring, witnessing, inspections, checks, flight and ground tests and inspection of completed products, parts or appliances produced under the POA.

In order to maintain its confidence in the standards achieved by a POA holder or applicant the Authority may make an investigation of a sample product part or appliance and its associated records, reports and certifications.

The arrangements should enable the organisation to give positive assistance to the Competent Authority and co-operate in performing the investigation during both initial assessment and for the subsequent surveillance to maintain the POA.

Co-operation in performing investigation means that the Authority has been given full and free access to the facilities and to any information relevant to show compliance to CAR 21 Subpart G requirements, and assistance (personnel support, records, reports, computer data, etc, as necessary).

Assistance to the Authority includes all appropriate means associated with the facilities of the production organisation to allow the Authority to perform these investigations, such as the availability of a meeting room, office and personnel support, documentation and data, and communication facilities, all properly and promptly available as necessary.

The Authority seeks to have an open relationship with the organisation and suitable liaison personnel should be nominated to facilitate this, including suitable representative(s) to

accompany Authority staff during visits not only at the organisations own facilities but also at sub-contractors, partners or suppliers.

### **GM No. 1 to 21.158(a) - Uncontrolled non-compliance with applicable design data**

An uncontrolled non-compliance with applicable design data is a non-compliance:

- that can not be discovered through systematic analysis; or
- that prevents identification of affected products, parts, appliances, or material.

### **GM No. 2 to 21.158(a) - Examples of level one findings**

Examples of level one findings are non-compliances with any of the following paragraphs, that could affect the safety of the aircraft:

CAR 21.139, 21.145, 21.147, 21.148, 21.151, 21.163, 21.165(b), (c), (d), (e), (f) and (g).

It should be anticipated that a non-compliance with these paragraphs is only considered a level one finding when objective evidence has been found that this finding is an uncontrolled noncompliance that could affect the safety of the aircraft.

In addition, the failure to arrange for investigations under CAR 21.157, in particular to obtain access to facilities, after denial of one written request should be classified as a level one finding.

### **GM 21.159(a)(3) - Evidence of a lack of satisfactory control**

A positive finding by the Authority of:

- 1 an uncontrolled non-compliance with type design data affecting the airworthiness of product part or appliance
- 2 an incident/accident identified as caused by POA holder
- 3 non-compliance with the POE and its associated procedures which could affect conformity of manufactured items to design data
- 4 insufficient competence of certifying staff
- 5 insufficient resources in respect of facilities, tools and equipment

- 6 insufficient means to ensure good production work standards
- 7 a lack of effective and timely response to prevent a recurrence of any of paragraph 1 to 6.

## **AMC No 1 21.163(c) - Computer generated signature and electronic exchange of the AW Form 1**

### **1 Submission to the Authority**

Any POA holder/applicant intending to implement an electronic signature procedure to issue AW Form 1 and/or to exchange electronically such data contained on the AW Form 1, should document it and submit it to the Authority as part of the documents attached with its exposition.

### **2 Characteristics of the electronic system generating the AW Form 1**

The electronic system Should :

- guarantee secure access for each certifying staff; - provide for a "personal" signature;
- ensure integrity and accuracy of the data certified by the signature of the Form and be able to show evidence of the authenticity of the AW Form 1 (recording and record keeping) with suitable security, safeguards and backups;
- be active only at the location where the part is being released with a AW Form 1;
- not permit to sign a blank form;
- provide a high degree of assurance that the data has not been modified after signature (if modification is necessary after issuance, i.e., re-certification of a part, a new form with a new number and reference to the initial issuance should be made);
- provide for a 'personal' electronic signature, identifying the signatory. The signature should be generated only in the presence of the signatory.

An electronic signature means data in electronic form which are attached to or logically associated with other electronic data and which serve as a method of authentication and should meet the following criteria:

- ☒ it is uniquely linked to the signatory;
- ☒ it is capable of identifying the signatory;
- ☒ it is created using means that the signatory can maintain under their sole control.

The electronic signature is defined as an electronically generated value based on a cryptographic algorithm and appended to data in a way to enable the verification of the data's source and integrity.

POA holders/applicants are reminded that additional national requirements may need to be satisfied when operating electronic systems.

The electronic system should be based on a policy and management structure (confidentiality, integrity and availability), such as:

administrators, signatories;

scope of authorisation, rights;

password and secure access, authentication, protections, confidentiality;

track changes;

minimum blocks to be completed, completeness of information;

archives; etc.

The electronic system generating the AW Form 1 may contain additional data such as:

manufacturer code;

customer identification code;

workshop report;

inspection results; etc.

### **3 Characteristics of the AW Form 1 generated from the electronic system**

To facilitate understanding and acceptance of the AW Form 1 released with an electronic signature, the following statement should be in Block 13b: 'Electronic Signature on File'.

In addition to this statement, it is accepted to print or display a signature in any form such as a representation of the hand-written signature of the person signing (i.e. scanned signature) or their name.

When printing the electronic form, the AW Form 1 should meet the general format as specified in Appendix I to CAR 21. A watermark-type 'PRINTED FROM ELECTRONIC FILE' should be printed on the document.

When the electronic file contains a hyperlink to data, required to determine the airworthiness of the item(s), the data associated to the hyperlink, when printed, should be in a legible format and be identified as a reference from the AW Form 1.

Additional information not required by the AW Form 1 completion instructions may be added to the printed copies of AW Form 1 as long as the additional data do not prevent a person from filling out, issuing, printing, or reading any portion of the AW Form 1. This additional data should be provided only in block 12 unless it is necessary to include it in another block to clarify the content of that block.

#### **4. Electronic exchange of the electronic AW Form 1**

The electronic exchange of the electronic AW Form 1 should be accomplished on a voluntary basis. Both parties (issuer and receiver) should agree on electronic transfer of the AW Form 1.

For that purpose, the exchange needs to include:

- all data of the AW Form 1, including data referenced from the AW Form 1;
- all data required for authentication of the AW Form 1. In addition, the exchange may include:
  - data necessary for the electronic format;
  - additional data not required by the AW Form 1 completion instructions, such as manufacturer code, customer identification code.

The system used for the exchange of the electronic AW Form 1 should provide:

- a high level of digital security; the data should be protected, unaltered or uncorrupted;
- traceability of data back to its source should be possible.

Trading partners wishing to exchange AW Form 1 electronically should do so in accordance with these means of compliance stated in this document. It is recommended that they use an established, common, industry method such as Air Transport Association (ATA) Spec 2000 Chapter 16.

The applicant(s) is/are reminded that additional applicable requirements may need to be satisfied when operating the electronic exchange of the electronic AW Form 1.

The receiver should be capable of regenerating the AW Form 1 from the received data without alteration; if not the system should revert back to the paper system.

When the receiver needs to print the electronic form, refer to the subparagraph 3 above.

**AMC No 2 to 21.163(c) – Completion of the AW Form 1****AW Form 1 Block 8 'Part Number'**

The part number as it appears on the item, is usually defined in the design data; however in the case of a kit of parts, media containing software or any other specific condition of supply may be defined in production data developed from design data. Information about the contents of the kit or media may be given in block 12 or in a separate document cross-referenced from block 12.

**AW Form 1 Block 12 'Remarks'**

Examples of conditions which would necessitate statements in block 12 are:

When the certificate is used for prototype purposes the following statement shall be entered at the beginning of block 12:

**'NOT ELIGIBLE FOR INSTALLATION ON IN-SERVICE TYPE-CERTIFIED AIRCRAFT'.**

Re-certification of items from 'prototype' (conformity only to non-approved data) to 'new' (conformity to approved data and in a condition for safe operation) once the applicable design data is approved.

The following statement shall be entered in block 12: RE-CERTIFICATION OF ITEMS FROM 'PROTOTYPE' TO 'NEW':

THIS DOCUMENT CERTIFIES THE APPROVAL OF THE DESIGN DATA [INSERT TC/STC NUMBER, REVISION LEVEL], DATED [INSERT DATE IF NECESSARY FOR IDENTIFICATION OF REVISION STATUS], TO WHICH THIS ITEM (THESE ITEMS) WAS (WERE) MANUFACTURED.

When a new certificate is issued to correct error(s) the following statement shall be entered in block 12:

**'THIS CERTIFICATE CORRECTS THE ERROR(S) IN BLOCK(S) [ENTER BLOCK(S) CORRECTED] OF THE CERTIFICATE [ENTER ORIGINAL TRACKING NUMBER] DATED [ENTER ORIGINAL ISSUANCE DATE] AND DOES NOT COVER CONFORMITY/CONDITION/RELEASE TO SERVICE'.**

Examples of data to be entered in this block as appropriate:

For complete engines, a statement of compliance with the applicable emissions requirements current at the date of manufacture of the engine.

For UAE TSO articles, state the applicable UAE TSO number.

Modification standard.

Compliance or non-compliance with airworthiness directives or Service Bulletins. Details of repair work carried out, or reference to a document where this is stated. Shelf life data, manufacture date, cure date, etc.

Information needed to support shipment with shortages or re-assembly after delivery. References to aid traceability, such as batch numbers.

#### **AMC 21.163(d) - Privileges - Maintenance**

The applicant may apply for terms of approval, which cover maintenance of a new aircraft that it has manufactured, as necessary to keep it in an airworthy condition, but not beyond the point at which the applicable operational rules require maintenance to be performed by an approved maintenance organisation. If the production organisation intends to maintain the aircraft beyond that point, it would have to apply for and obtain an appropriate maintenance approval.

When the Authority is satisfied that the procedures required by CAR 21.139 are satisfactory to control maintenance activities so as to ensure that the aircraft is airworthy, this capability will be stated in the terms of approval.

#### **MAINTENANCE OF AIRCRAFT**

Examples of such maintenance activities are:

- Preservation, periodic inspection visits, etc.
- Embodiment of a Service Bulletin.
- Application of airworthiness directives.
- Repairs.
- Maintenance tasks resulting from special flights.
- Maintenance tasks to maintain airworthiness during flight training, demo flights and other non-revenue flights.

Any maintenance activities shall be recorded in the Aircraft Log Book. It shall be signed by certifying staff for attesting the conformity of the work to the applicable airworthiness data. In some cases the Aircraft Log Book is not available, or the production organisation prefers to use a separate form (for instance for a large work package or for delivery of the aircraft to the customer). In these cases, production organisations shall use GCAA Form AWF-POA-53 which shall subsequently become part of the aircraft maintenance records.

#### **Maintenance of components outside the POA capability**

Such maintenance activity outside the capability of the Aircraft POA holder may still be accomplished under the production approval of the original release organisation. In such circumstances the engine(s), propeller(s), parts and appliances will require re-release in accordance with GM 21.163(c) (AW Form 1).

Records relevant to continued airworthiness or retirement lives, such as engine runs, flight hours, landings, etc., which affect part retirement of maintenance schedules shall be specified on any re-release.

As an alternative the engine, propeller, part or appliance may be maintained by the holder of an approval in accordance with CAR 145, classified and released as 'used'.

### **AMC 21.163(e) - Procedure for the issue of a permit to fly including approval of the flight conditions**

#### **1 Intent**

This acceptable means of compliance provides means to develop a procedure for the issue of a permit to fly including approval of the flight conditions.

Each POA applicant or holder shall develop its own internal procedure following this AMC, in order to obtain the privilege of CAR 21.163(e) to issue permits to fly for an aircraft under procedures agreed with its competent authority for production, when the production organisation itself is controlling under its POA the configuration of the aircraft and is attesting conformity with the design conditions approved for the flight.

#### **2 Procedure for the issue of a permit to fly**

##### **2.1 Content**

The procedure shall address the following points:

- as relevant, in accordance with CAR 21.710(b), the approval of flight conditions;
- conformity with approved conditions;
- issue of the permit to fly under the POA privilege;
- authorised signatories;
- interface with the local authority for the flight.

##### **2.2 Approval of the flight conditions (when relevant)**

The procedure shall include the process to establish and justify the flight conditions, in accordance with CAR 21.708 and how compliance with CAR 21.710(c) is established, and include the GCAA Form AWF-PtF-18B as defined in AMC 21.709(b) for the approval under the POA privilege.

### **2.3 Conformity with approved conditions**

The procedure shall indicate how conformity with approved conditions is made, documented and attested by an authorised person.

### **2.4 Issue of the permit to fly under the POA privilege**

The procedure shall describe the process to prepare the GCAA Form AWF-PtF-20b and how compliance with CAR 21.711(c) and (e) is established before signature of the permit to fly.

### **2.5 Authorised signatories**

The person(s) authorised to sign the permit to fly under the privilege of CAR 21.163(e) shall be identified (name, signature and scope of authority) in the procedure, or in an appropriate document linked to the Production Organisation Exposition.

### **2.6 Interface with the local authority for the flight**

The procedure shall include provisions describing the communication with the local authority for compliance with the local requirements which are outside the scope of the conditions of CAR 21.708(b) (see CAR 21.711(e)).

#### **GM 21.165(a) - Obligations of the holder – Basic working document**

Compliance with the production organisation exposition (POE) is a prerequisite for obtaining and retaining a production organisation approval.

The organisation should make the POE available to its personnel where necessary for the performance of their duties. A distribution list should therefore be established. Where the POE mainly refers to separate manuals or procedures, the distribution of the POE could be limited.

The organisation should ensure that personnel have access to and are familiar with that part of the content of the POE or the referenced documents, which covers their activities.

Monitoring of compliance with the POE is normally the responsibility of the quality assurance function.

#### **GM No. 1 to CAR 21.165(c) - Obligations of the holder – Conformity of prototype models and test specimens**

CAR 21.33 requires determination of conformity of prototype models and test specimens to the applicable design data. The AW Form 1 may be used as a conformity certificate as part of the assistance a POA holder/applicant provides to a design approval holder/applicant.

**GM No. 2 to CAR 21.165(c) - Obligations of holder – Conformity with type design**

Individual configurations are often based on the needs of the customer and improvements or changes which may be introduced by the type-certificate holder. There are also likely to be unintentional divergences (concessions or non-conformances) during the manufacturing process. All these changes should have been approved by the design approval holder, or when necessary by the Authority.

**GM No. 3 to CAR 21.165(c) - Obligations of the holder – Condition for safe operation**

Before issue of the Statement of Conformity to the Authority of the Member State of registry, the holder of a production organisation approval should make an investigation so as to be satisfied in respect of each of the items listed below. The documented results of this investigation should be kept on file by the POA holder. Certain of these items may be required to be provided (or made available) to the operator or owner of the aircraft (and in some cases the Authority of the Member State of registry):

- 1      Equipment or modifications which do not meet the requirements of the State of manufacture but have been accepted by the Authority of the importing country.
- 2      Identification of products, parts or appliances which:
  - a      Are not new.
  - b      Are furnished by the buyer or future operator (including those identified in CAR 21.801 and CAR 21.805).
- 3      Technical records which identify the location and serial numbers of components that have special traceability requirements for continued airworthiness purposes including those identified in CAR 21.801 and CAR 21.805.
- 4      Log book and a modification record book for the aircraft as required by the Authority.
- 5      Log books for products identified in CAR 21.801 installed as part of the type design as required by the Authority.
- 6      A weight and balance report for the completed aircraft.
- 7      A record of missing items or defects which do not affect airworthiness these for example could be furnishing or BFE (Items may be recorded in a technical log or other

suitable arrangement such that the operator and Authority are formally aware).

- 8 Product support information required by other implementing rules and associated CS or GM, such as a Maintenance Manual, a Parts Catalogue, or MMEL all of which are to reflect the actual build standard of the particular aircraft. Also an Electrical load analysis and a wiring diagram.
- 9 Records which demonstrate completion of maintenance tasks appropriate to the test flight flying hours recorded by the aircraft. These records should show the relationship of the maintenance status of the particular aircraft to the manufacturers recommended maintenance task list and the MRB document/report.
- 10 Details of the serviceability state of the aircraft in respect of a) the fuel and oil contents, b) provision of operationally required emergency equipment such as life rafts, etc.
- 11 Details of the approved interior configuration if different from that approved as part of the type design.
- 12 An approved Flight Manual which conforms to the build standard and modification state of the particular aircraft shall be available.
- 13 Show that inspections for foreign objects at all appropriate stages of manufacture have been satisfactorily performed.
- 14 The registration has been marked on the exterior of the aircraft as required by national legislation. Where required by national legislation fix a fireproof owners nameplate.
- 15 Where applicable there should be a certificate for noise and for the aircraft radio station.
- 16 The installed compass and or compass systems have been adjusted and compensated and a deviation card displayed in the aircraft.
- 17 Software criticality list.
- 18 A record of rigging and control surface movement measurements.
- 19 Details of installations which will be removed before starting commercial air transport operations (e.g., ferry kits for fuel, radio or navigation).
- 20 Where maintenance work has been performed under the privilege of CAR 21.163(d) issue a release to service that includes a statement that the aircraft is in a condition for safe operation.
- 21 List of all applicable Service Bulletins and airworthiness directives that have been implemented.

**GM No. 4 to CAR 21.165(c) - Airworthiness release or conformity certificate**

The AW Form 1, when used as a release certificate as addressed in CAR 21.165(c)(2) and (3), may be issued in two ways:

- As an airworthiness release, only when by virtue of the arrangement described in CAR 21.133(b) and (c), it can be determined that the part conforms to the approved design data and is in a condition for safe operation.
- As a conformity Certificate, only when by virtue of the arrangement described in CAR 21.133(b) and (c), it can be determined that the part conforms to applicable design data which is not (yet) approved, for a reason that is indicated in Block 12. Parts released with an AW Form 1 as a conformity Certificate are not eligible for installation in a type-certificated aircraft.

The AW Form 1 should only be used for Conformity release purposes when it is possible to indicate the reason that prevents its issue as for airworthiness release purposes.

**GM 21.165(d) and (h) - Obligations of the holder – Recording and archiving system**

Records within a production environment satisfy two purposes. Firstly, they are required, during the production process to ensure that products, parts, or appliances are in conformity with the controlling data throughout the manufacturing cycle. Secondly, certain records of milestone events are needed to subsequently provide objective evidence that all prescribed stages of the production process have been satisfactorily completed and that compliance with the applicable design data has been achieved.

Therefore, the approved production organisation should implement a system for the compilation and retention of records during all stages of manufacture, covering short-term and long-term records appropriate to the nature of the product and its production processes.

The management of such information should be subject to appropriate procedures in the Quality System required by CAR 21.139.

All forms of recording media are acceptable (paper, film, magnetic, ...) provided they can meet the required duration for archiving under the conditions provided.

The related organisation procedures should:

- Identify records to be kept.
- Describe the organisation of and responsibility for the archiving system (location, compilation, format) and conditions for access to the information (e.g., by product, subject).
- Control access and provide effective protection from deterioration or accidental damage.

- Ensure continued readability of the records.
- Demonstrate to the Authority proper functioning of the records system.
- Clearly identify the persons involved in conformity determination.
- Define an archiving period for each type of data taking into account importance in relation to conformity determination subject to the following:
  - a Data which supports conformity of a product, part, or appliance should be kept for not less than three years from the issue date of the related Statement of Conformity or Authorised Release Certificate.
  - b Data considered essential for continuing airworthiness should be kept throughout the operational life of the product, part or appliance.
- Ensure that the recording and record-keeping system used by the partners, supplier and sub-contractors meet the objective of conformity of the product, part or appliance with the same level of confidence as for their own manufacture. They should define in each case who is to retain the record data (organisation or partner, supplier or subcontractor). They should also define method for surveillance of the recording/record keeping system of the partners, suppliers or sub-contractors.

#### **SUBPART H - AIRWORTHINESS CERTIFICATES**

There are no AMC or GM items associated with this Subpart.

#### **SUBPART I - NOISE CERTIFICATES**

There are no AMC or GM items associated with this Subpart.

**SUBPART J - DESIGN ORGANISATION APPROVAL****GM No. 1 to 21.239(a) - Design assurance system****1      *Purpose***

This GM outlines some basic principles and objectives of CAR 21.239(a).

**2      *Definitions***

2.1    The design assurance system is the organisational structure, responsibilities, procedures and resources to ensure the proper functioning of the design organisation.

2.2    The design assurance means all those planned and systematic actions necessary to provide adequate confidence that the organisation has the capability

- to design products or parts in accordance with the applicable CS and environmental protection requirements,
- to show and verify the compliance with these CS and environmental protection requirements, and
- to demonstrate to the Authority this compliance.

2.3    The “Type Investigation” means the tasks of the organisation in support of the type-certificate, supplemental type-certificate or other design approval processes necessary to show and verify and to maintain compliance with the applicable CS and environmental protection requirements or any other applicable airworthiness requirements.

**3      *Design Assurance***

The complete process, starting with the CS and environmental protection requirements or any other applicable airworthiness requirements and product specifications and culminating with the issuing of a type-certificate, is shown in the diagram on Figure

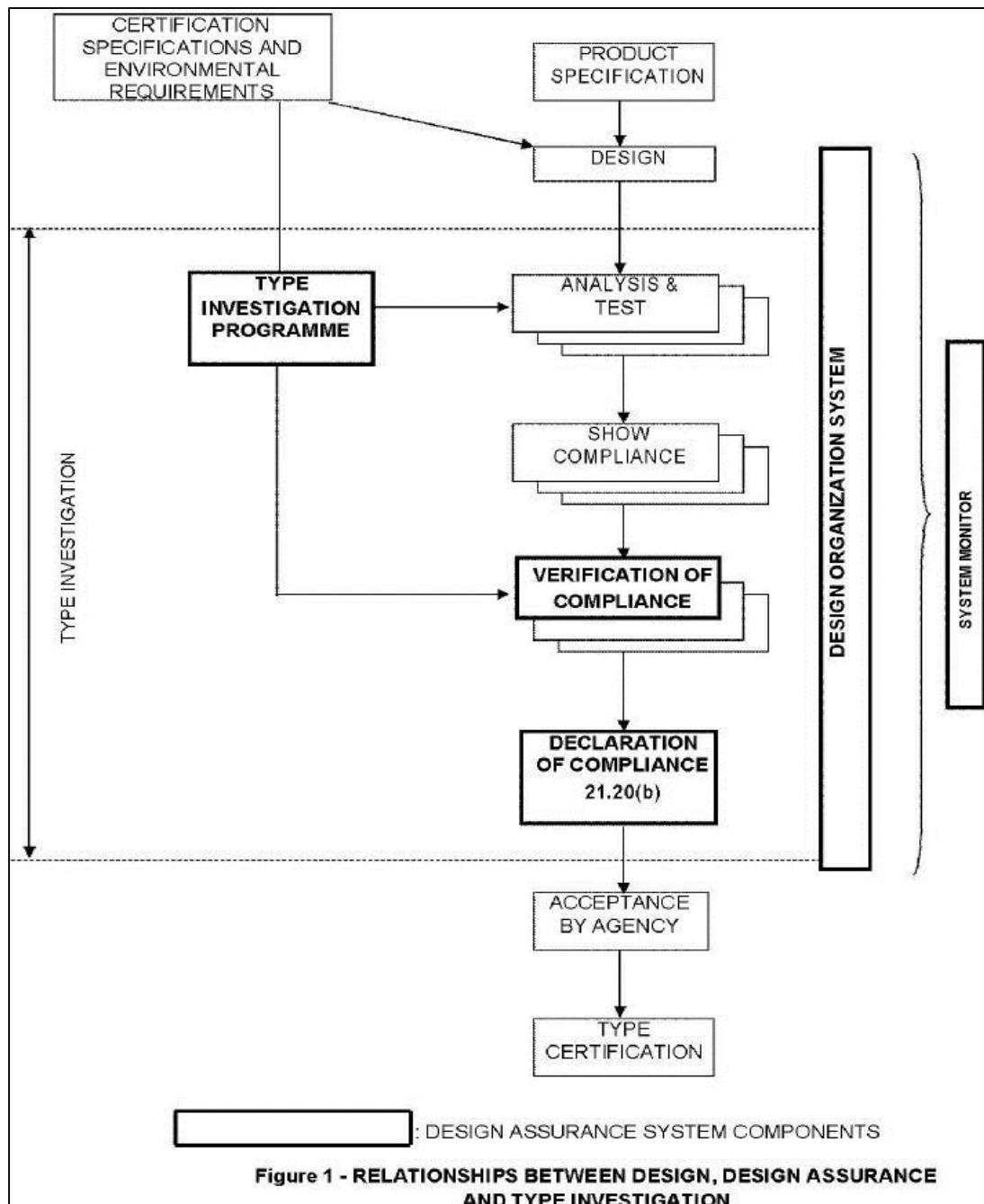
1.    This identifies the relationship between the design, the Type Investigation and design assurance processes.

Effective Design Assurance demands a continuing evaluation of factors that affect the adequacy of the design for intended applications, in particular that the product, or part, complies with applicable CS and environmental protection requirements or applicable airworthiness requirements and will continue to comply after any change.

Two main aspects should therefore be considered:

1 How the planned and systematic actions are defined and implemented, from the very beginning of design activities up to continued airworthiness activities;

3 How these actions are regularly evaluated and corrective actions implemented as necessary.



### 3.1 *Planned and Systematic Actions*

For design organisations carrying out Type Investigation of products, the planned and systematic actions should cover the following tasks and procedures should be defined accordingly:

#### 3.1.1 *General*

- a. To issue or, where applicable, supplement or amend the handbook in accordance with CAR 21.243, in particular to indicate the initiation of design activities on a product.
- b. To assure that all instructions of the Handbook are adhered to.
- c. To conduct Type Investigation.
- d. To nominate staff as “compliance verification engineers” responsible to approve compliance documents as defined in paragraph 3.1.3.
- e. To nominate personnel belonging to the Office of Airworthiness responsible as defined in paragraph 3.1.4.
- f. In the case of an applicant for a supplemental type-certificate, to obtain the agreement of the type-certificate holder for the proposed supplemental type-certificate to the extent defined in CAR 21.115.
- g. To ensure full and complete liaison between the type design organisation and related organisations having responsibility for products manufactured to the type-certificate.
- h. To provide the assurance to the Authority that prototype models and test specimens adequately conform to the type design (see CAR 21.33(b)(1)).

#### 3.1.2 *Chief Executive and Head of design organisation (or his or her Deputy)*

- a. The Chief Executive should provide the necessary resources for the proper functioning of the design organisation.
- b. The Head of the design organisation, or an authorised representative, should sign a declaration of compliance (see CAR 21.20(b) and CAR 21.97(a)(3)) with the applicable CS and environmental protection requirements after verification of satisfactory completion of the Type Investigation. In accordance with CAR 21.20(c) and CAR 21.97(a)(4), his or her signature on the declaration of compliance confirms that the procedures as specified in the handbook have been followed (see also GM 21.265(b)).
- c. The functions of Chief Executive and Head of the design organisation may be performed by the same person.

### 3.1.3 *Compliance Verification*

- a. Approval by signing of all compliance documents, including test programs and data, necessary for the verification of compliance with the applicable CS and environmental protection requirements as defined in Type Investigation program.
- b. Approval of the technical content (completeness, technical accuracy...), including any subsequent revisions, of the manuals approved by the Authority (Aircraft Flight Manual, the Airworthiness Limitations section of the Instructions for Continued Airworthiness and the Certification Maintenance Requirements (CMR) document, where applicable).

### 3.1.4 *Office of Airworthiness*

- a. Liaison between the design organisation and the Authority with respect to all aspects of Type Investigation.
- b. Ensuring that a handbook is prepared and updated as required in CAR 21.243.
- c. Co-operation with the Authority in developing procedures to be used for the type certification process.
- d. Issuing of guidelines for documenting compliance.
- e. Co-operation in issuing guidelines for the preparation of the manuals required by the applicable implementing rules, Service Bulletins, drawings, specifications, and standards.
- f. Ensuring procurement and distribution of applicable CS and environmental protection requirements and other specifications.
- g. Co-operating with the Authority in proposing the type-certification basis
- h. Interpretation of CS and environmental protection requirements and requesting decisions of the Authority in case of doubt.
- i. Advising of all departments of the design organisation in all questions regarding airworthiness, environmental protection approvals and certification.
- j. Preparation of the Type Investigation program and co-ordination of all tasks related to Type Investigation in concurrence with the Authority.
- k. Regular reporting to the Authority about Type Investigation progress and announcement of scheduled tests in due time.
- l. Ensuring co-operation in preparing test programs needed for demonstration of compliance.
- m. Establishing the compliance checklist and updating for changes.

- n. Checking that all compliance documents are prepared as necessary to show compliance with all CS and environmental protection requirements, as well as for completeness, and signing for release of the documents.
- o. Checking the required type design definition documents described in CAR 21.31 and ensuring that they are provided to the Authority for approval when required.
- p. Preparation, if necessary, of a draft for a type-certificate data sheet and/or type-certificate data sheet modification.
- q. Providing verification to the head of the design organisation that all activities required for Type Investigation have been properly completed.
- r. Approving the classification of changes in accordance with CAR 21.91 and granting the approval for minor changes in accordance with CAR 21.95(b).
- s. Monitoring of significant events on other aeronautical products as far as relevant to determine their effect on airworthiness of products being designed by the design organisation.
- t. Ensuring co-operation in preparing Service Bulletins and the Structural Repair Manual, and subsequent revisions, with special attention being given to the manner in which the contents affect airworthiness and environmental protection and granting the approval on behalf of the Authority.
- u. Ensuring the initiation of activities as a response to failure (accident/incident/in-service experience) evaluation and complaints from the operation and providing of information to the Authority in case of airworthiness impairment (continuing airworthiness).
- v. Advising the Authority with regard to the issue of airworthiness directives in general based on Service Bulletins.
- w. Ensuring that the manuals approved by the Authority, including any subsequent revisions (the Aircraft Flight Manual, MMEL, the Airworthiness Limitations section of the Instructions for Continued Airworthiness and the Certification Maintenance Requirements (CMR) document, where applicable) are checked to determine that they meet the respective requirements, and that they are provided to the Authority for approval.

### 3.1.5 Maintenance and Operating Instructions

- a. Ensuring the preparation and updating of all maintenance and operating instructions (including Services Bulletins) needed to maintain airworthiness (continuing airworthiness) in accordance with relevant CS. For that purpose, the applicant should:

- establish the list of all documents it is producing to comply with the Appendix referred to in CS 23.1529, CS 25.1529, CS 27.1529, CS 29.1529, CS-E 25 or CS-P 40 or applicable airworthiness requirements.;
- define procedures and organisation to produce and issue these documents, using where applicable and so elected 21.263(c)(3) privilege.

b. In accordance with CAR 21.57, CAR 21.61, CAR 21.107, CAR 21.119, CAR 21.120 and CAR 21.449, ensuring that these documents are provided to all affected operators and all involved authorities.

3.2 Continued Effectiveness of the design assurance system. The organisation should establish the means by which the continuing evaluation (system monitoring) of the design assurance system will be performed in order to ensure that it remains effective.

**GM No. 2 to CAR 21.239(a) - Design assurance system for minor changes to type design or minor repairs to products**

**1. Purpose**

This GM outlines some basic principles and objectives in order to comply with CAR 21.239(a) for organisations designing only minor changes to type design or minor repairs to products.

**2. Design assurance system**

The design assurance system should include the following:

- an organisational structure to:
  - control the design
  - show compliance with applicable CS and environmental protection requirements
  - independently check showings of compliance
  - liaise with the Authority
  - continuously evaluate the design organisation
  - control sub-contractors

- procedures and responsibilities associated with the functions listed above, taking due account of CAR 21 requirements applicable to design and approval of minor changes to type design or minor repairs to products.

#### **AMC 21.239(a)(3) - Design assurance system - Independent system monitoring**

The system monitoring function required by CAR 21.239(a)(3) may be undertaken by the existing quality assurance organisation when the design organisation is part of a larger organisation.

#### **AMC 21.239(b) - Design assurance system - Independent checking function of the showing of compliance**

- 1 The independent checking function of the showing of compliance should consist of the verification by a person not creating the compliance data. Such person may work in conjunction with the individuals who prepare compliance data.
- 2 The verification should be shown by signing compliance documents, including test programs and data.
- 3 For a product, there is normally only one compliance verification engineer nominated for each relevant subject.
- 4 A procedure should cover the non-availability of nominated persons and their replacement when necessary.
- For STC cases, when compliance statement and associated documentation are produced by the TC holder, and when these data are approved under the system of the authority of TC holder, then the STC applicant does not need to provide, within its own DOA, the independent checking function required in CAR 21.239(b) for these data.

#### **GM 21.239(c) - Design assurance system**

In meeting the requirements of CAR 21.239(c) the applicant for a design organisation approval under Subpart J may adopt the following policy:

- 1 The satisfactory integration of the Partner/Sub-contractor and applicant's design assurance systems should be demonstrated for the activities covered under the applicant's terms of approval.
- 2 In the event that a Partner/Sub-contractor holds a design organisation approval (DOA.), then in accordance with CAR 21.239(c), the applicant may take this into account in demonstrating the effectiveness of this integrated system.

3 When any Partner/Sub-contractor does not hold a DOA then the applicant will need to establish to its own satisfaction and the satisfaction of the Authority, the adequacy of that partner's/sub-contractor's design assurance system in accordance with CAR 21.243(b).

**AMC No. 1 to CAR 21.243(a) - Data requirements**

The handbook should provide the following information for each product covered by the design organisation approval.

1 A description of the tasks which can be performed under the approval, according to the following classification:

- a. General areas, like subsonic turbojet airplanes, turbo propeller airplanes, small airplanes, rotorcraft.
- b. Technologies handled by the organisation (composite, wood or metallic construction, electronic systems, etc.)
- c. A list of types and models for which the design approval has been granted and for which privileges may be exercised, supported by a brief description for each product.
- d. For repair design, classification and (if appropriate) approval activities it is necessary to specify the scope of activity in terms of structures, systems, engines, etc.

2 A general description of the organisation, its main departments, their functions and the names of those in charge; a description of the line management and of functional relationships between the various departments.

3 A description of assigned responsibilities and delegated authority of all parts of the organisation which, taken together, constitute the organisation's design assurance system together with a chart indicating the functional and hierarchical relationship of the design assurance system to Management and to other parts of the organisation; also the chains of responsibilities within the design assurance system, and the control of the work of all partners and sub-contractors.

4 A general description of the way in which the organisation performs all the design functions in relation to airworthiness and environmental protection approvals including:

- a. The procedures followed and forms used in the Type Investigation process to ensure that the design of, or the change to the design of, the product as applicable is identified and documented, and complies with the applicable CS and environmental protection requirements or applicable airworthiness requirements, including specific requirements for import by importing authorities

- b. The procedures for classifying design changes as "major" or "minor" and for the approval of minor changes.
- c. The procedures for classifying and approving unintentional deviations from the approved design data occurring in production (concessions or non-conformance's).
- d. The procedure for classifying and obtaining approval for repairs.

5 A general description of the way in which the organisation performs its functions in relation to the continuing airworthiness of the product it designs, including cooperation with the production organisation when dealing with any continuing airworthiness actions that are related to production of the product, part or appliance, as applicable.

6 A description of the human resources, facilities and equipment, which constitutes the means for design, and where appropriate, for ground and flight testing.

7 An outline of a system for controlling and informing the Staff of the organisation of current changes in engineering drawings, specifications and design assurance procedures.

8 A description of the recording system for:

- a. The type design, including relevant design information, drawings and test reports, including inspection records of test specimens.
- b. The means of compliance.
- c. The compliance documentation (compliance check list, reports...).

9 A description of the record keeping system to comply with CAR 21.55 and CAR 21.105.

10 A description of the means by which the organisation monitors and responds to problems affecting the airworthiness of its product during design, production and in service in particular to comply with CAR 21.3 (see also GM No. 1 to CAR 21.239, paragraphs 3.1.4(s) and (u)).

11 The names of the design organisation authorised signatories. Nominated persons with specific responsibilities such as mentioned in CAR 21.33 and CAR 21.35 should be listed.

12 (Reserved).

13 A clear definition of the tasks, competence and areas of responsibility of the Office of Airworthiness.

14 A description of the procedures for the establishment and the control of the maintenance and operating instructions (see CAR 21.57, CAR 21.61, CAR 21.107, CAR 21.119, CAR 21.120 and CAR 21.449).

15 A description of the means by which the continuing evaluation (system monitoring) of the design assurance system will be performed in order to ensure that it remains effective.

**AMC No. 2 to 21.243(a) - Data requirements - Model content of handbook for organisations designing minor changes to type design or minor repairs to products**

**Part 1. Organisation**

- 1.1 Objective of handbook and binding statement
- 1.2 Responsible person for administration of handbook
- 1.3 Amendment procedure
- 1.4 List of effective pages
- 1.5 Distribution list
- 1.6 Presentation of design organisation (including locations)
- 1.7 Scope of work (with identification of type and models of products)
- 1.8 Organisation charts
- 1.9 Human resources
- 1.10 Management staff
- 1.11 Certifying personnel (see GM No. 2 to CAR 21.243(d), paragraph 2)
- 1.12 Independent system monitoring

**Part 2. Procedures**

- 2.1 Management of changes to type design and design of repairs
  - configuration control
  - classification
  - approval of minor changes to type design and minor repairs
- 2.2 Control of design subcontractors
- 2.3 Collecting/Investigating of failures, malfunctions and defects

- 2.4 Co-ordination with production
- 2.5 Documentation control
  - in relations with the changes and repairs
  - in relation with failures/malfunctions and defects (i.e. Services - Bulletins)
- 2.6 Record keeping

### **GM No. 1 to 21.243(d) - Statement of qualifications and experience**

#### **1 Purpose**

This GM provides guidelines on the following points:

- Who are the persons covered by CAR 21.243(d)?
- What is requested from the applicant for these persons?

#### **2 Who are the persons?**

Three different types of functions are named or implicitly identified in the requirements of CAR 21 Subpart J or in associated AMC and GM, using qualified and experienced personnel:

- the Chief Executive [see GM No. 1 to CAR 21.239(a), Para. 3.1.2, GM 21.249, GM 21.265(b)]
- the other management staff:
  - The Head of the design organisation [see GM No. 1 to CAR 21.239(a), Para 3.1.2, GM No. 1 21.245, para.4.1, GM 21.265(b)]
  - The Chief of the Office of Airworthiness, or [see GM No. 1 to CAR 21.245, Para. 4.2]
  - The Chief of the independent monitoring function of the design assurance system [see CAR 21.239(a)(3) and AMC No. 1 to 21.243(a), para.2]
- the personnel making decisions affecting airworthiness and environmental protection:
  - Compliance verification engineers [see GM No. 1 to 21.239(a), para.3.1.3; AMC 21.239(b)]
  - Personnel of the Office of Airworthiness making decisions affecting airworthiness and environmental protection, especially those linked with the CAR 21.263 privileges (signing documents for release, approving classification of changes and repairs, and granting the

approval of minor changes and minor repairs, granting the approval of SBs, and documentary changes to the aircraft flight manual) [see GM No. 1 to CAR 21.239(a), Para. 3.1.4]

### **3      Kind of statement**

#### **3.1    Chief Executive**

The Chief Executive should provide the necessary resources for the proper functioning of the design organisation.

A statement of the qualification and experience of the Chief Executive is normally not required.

#### **3.2    Other management staff**

The person or persons nominated should represent the management structure of the organisation and be responsible through the Head of design organisation to the Chief Executive for the execution of all functions as specified in CAR 21, Subpart J. Depending on the size of the organisation, the functions may be subdivided under individual managers.

The nominated managers should be identified and their credentials furnished to the Authority.

Authority on GCAA Form AWF-POS-4 in order that they may be seen to be appropriate in terms of relevant knowledge and satisfactory experience related to the nature of the design activities as performed by the organisation.

The responsibilities and the tasks of each individual manager should be clearly defined, in order to prevent uncertainties about the relations, within the organisation. Responsibilities of the managers should be defined in a way that all responsibilities are covered.

#### **3.3    Personnel making decisions affecting airworthiness and environmental protection**

For these personnel, no individual statement is required. The applicant should show to the Authority that there is a system to select, train, maintain and identify them for all tasks where they are necessary.

The following guidelines for such a system are proposed:

- These personnel should be identified in the handbook, or in a document linked to the handbook. This, and the corresponding procedures, should enable them to carry out the assigned tasks and to properly discharge associated responsibilities.
- The needs, in terms of quantity of these personnel to sustain the design activities, should be identified by the organisation.
- These personnel should be chosen on the basis of their knowledge, background and experience.
- When necessary, complementary training should be established, to ensure sufficient

- background and knowledge in the scope of their authorisation. The minimum standards for new personnel to qualify in the functions should be established. The training should lead to a satisfactory level of knowledge of the procedures relevant for the particular role.
- Training policy forms part of the design assurance system and its appropriateness forms part of investigation by the Authority within the organisation approval process and subsequent surveillance of persons proposed by the organisation.
- This training should be adapted in response to experience gained within the organisation
- The organisation should maintain a record of these personnel which includes details of the scope of their authorisation. The personnel concerned should be provided with evidence of the scope of their authorisation.
- The following minimum information should be kept on record:
  - a) Name
  - b) Date of birth
  - c) Experience and training
  - d) Position in organisation
  - e) Scope of the authorisation
  - f) Date of first issue of the authorisation
  - g) If appropriate, date of expiry of the authorisation
  - h) Identification number of the authorisation.

The record may be kept in any format and should be controlled.

- Persons authorised to access the system should be maintained at a minimum to ensure that records cannot be altered in an unauthorised manner or that such confidential records do not become accessible to unauthorised persons.
- Personnel should be given access to their own record.
- Under the provision of CAR 21.257 the Authority has a right of access to the data held in such a system.

- The organisation should keep the record for at least two years after a person has ceased employment with the organisation or withdrawal of the authorisation, whichever is the sooner.

**GM No. 2 to 21.243(d) - Data requirements - Statement of the qualification and experience - Organisations designing minor changes to type design or minor repairs to products**

For organisations designing minor changes to type design or minor repairs to products, the statement of the qualifications and experience required by CAR 21.243(d) should be addressed as follows :

1. The nominated managers should be identified and their credentials submitted to the Authority on GCAA Form AWF-POS-4 in order that they may be seen to be appropriate in terms of relevant knowledge and satisfactory experience related to the nature of the design activities as performed by the organisation.
2. The persons responsible to:
  - classify changes to type design or repairs
  - verify compliance [CAR 21.239(b)]
  - approve minor changes to type design and minor repairs [CAR 21.263(c)(2)]
  - issue information or instructions [CAR 21.263(c)(3)] should be selected by the organisation in accordance with a procedure and criteria agreed with the Authority.

**GM No. 1 to 21.245 - Requirements for approval See CAR 21.245**

- 1 *General.* The data submitted in accordance with CAR 21.243 should show that sufficient skilled personnel are available and suitable technical and organisational provisions have been made for carrying out the Type Investigation defined by GM No. 1 to 21.239(a), paragraph 2.3.
- 2 *Personnel.* The applicant should show that the personnel available to comply with CAR 21.245(a) are, due to their special qualifications and number, able to provide assurance of the design or modification of a product, as well as the compilation and verification of all data needed to meet the applicable CS and environmental protection requirements while taking into account the present state of the art and new experience.
- 3 *Technical.* The applicant should have access to:
  - a. Workshops and production facilities which are suitable for manufacturing prototype models and test specimens.

b. Accommodation and test facilities which are suitable for carrying out tests and measurements needed to demonstrate compliance with the CS and environmental protection requirements. The test facilities may be subjected to additional technical conditions related to the nature of tests performed.

4 *Organisation.* The data submitted in accordance with CAR 21.243 should show that:

- 4.1 The Head of the design organisation for which an application for approval has been made, has the direct or functional responsibility for all departments of the organisation which are responsible for the design of the product. If the departments responsible for design are functionally linked, the Head of the design organisation still carries the ultimate responsibility for compliance of the organisation with CAR 21 Subpart J.
- 4.2 An Office of Airworthiness, or equivalent function, has been established and staffed on a permanent basis to act as the focal point for coordinating airworthiness and environmental protection matters (see GM No. 1 to CAR 21.239 (a) paragraph 3.1.4); it reports directly to the Head of the design organisation or is integrated into an independent quality assurance organisation reporting to the Head of the design organisation.
- 4.3 [Reserved]
- 4.4 Responsibilities for all tasks related to Type Investigations are assigned in such a way that gaps in authority are excluded.
- 4.5 The responsibility for a number of tasks as in paragraph 4.4 may be assigned to one person especially in the case of simple projects.
- 4.6 Co-ordination between technical departments and the persons in charge of the system monitoring required by CAR 21.239(a)(3) has been established :
  - to ensure quick and efficient reporting and resolution of difficulties encountered using the handbook and associated procedures
  - to maintain the design assurance system □ to optimise auditing activities.

**GM No. 2 to 21.245 - Requirements for approval - Organisations designing minor changes to type design or minor repairs to products**

The data submitted in accordance with CAR 21.243 should show that:

- 1 The manager responsible for design has the direct or functional responsibility for all departments of the organisation which are involved in the design of minor changes to type design or minor repairs to products.

- 2 Person(s) have been nominated to liaise with the Authority and to co-ordinate airworthiness and environmental protection matters. Their position in the organisation should allow direct report to the manager responsible for design.
- 3 Responsibilities for all tasks related to the design and approval of minor changes to type design or minor repairs to products are assigned to ensure that all areas are covered
- 4 The responsibility for a number of tasks as in paragraph 3 may be assigned to one person especially in the case of simple projects.

#### **GM 21.247- Significant changes in the design assurance system**

In addition to a change in ownership (see CAR 21.249), the following changes to the design assurance system should be considered as “significant” to the showing of compliance or to the airworthiness or environmental protection of the products:

#### **1 Organisation**

- Relocation to new premises (see also GM 21.249)
- Change in the industrial organisation (partnership, suppliers, design work sharing) unless it can be shown that the independent checking function of the showing of compliance is not affected
- Change in the parts of the organisation that contribute directly to the airworthiness or environmental protection (independent checking function, office of airworthiness [or equivalent])
- Change to the independent monitoring principles (see CAR 21.239(a)(3))

#### **2 Responsibilities**

- Change of the management staff
  - the Head of the design organisation [GM No. 1 to CAR 21.239(a), Para 3.1.2, GM No. 1 to CAR 21.245, Para 4.1, GM 21.265(b)]
  - the Chief of the Office of Airworthiness [GM No. 1 to CAR 21.245, Para. 4.2]
  - the Chief of the independent monitoring function of the design assurance system [CAR 21.239(a)(3) and AMC No. 1 to CAR 21.243(a), para.2]
- New distribution of responsibilities affecting airworthiness or environmental protection.

☒ For organisations designing minor changes to type design or minor repairs to products, change of the persons identified in GM No. 2 to CAR 21.243(d).

### 3 Procedures

Change to the principles of procedures related to :

- The type certification
- The classification of changes and repairs as " major " or " minor " [CAR 21.263(c)(1)]
- The treatment of major changes and major repairs
- The approval of the design of minor changes and minor repairs [CAR 21.263(c)(2)]
- The issue of information and instructions under the privilege of CAR 21.263(c)(3)
- The approval of documentary changes to the Aircraft Flight Manual [CAR 21.263(c)(4)]
- The approval of the design of major repairs [CAR 21.437 or CAR 21.263(c)(5)] - Continued airworthiness (see CAR 21.3)
- The configuration control, when airworthiness or environmental protection is affected
- The acceptability of design tasks undertaken by partners or subcontractors [CAR 21.239(c)]

### 4 Resources

- \* Substantial reduction in number and/or experience of staff (see CAR 21.245(a)).

### GM 21.249 Transferability

1. Transfer of the approval would normally only be agreed in cases where the organisation itself remains substantially unchanged.
2. An acceptable transfer situation could be for example a change of company name (supported by the appropriate certificate from the National Companies Registration Office or equivalent) but with no changes to site address or Chief Executive. However, if the same legal entity were to relocate to new premises with a new Chief Executive and/or new departmental heads, then a substantial investigation by the Authority would be necessary such that the change would be classified as a re-approval.
3. In the event of receivership there may be good technical justification for continuation of the approval provided that the company continues to function in a satisfactory manner. It is likely that at a later stage the approval might be surrendered by the receiver or transferred to another legal entity in which case the former paragraphs apply.

**GM No. 1 to 21.251 - Terms of approval**

- 1 The terms of approval are stated on the certificate of approval issued by the Authority. The certificate states the scope of work and the products , changes or repairs thereof, with the appropriate limitations for which the approval has been granted. For design organisation approval covering type certification or UAE TSO authorisation for APU, the list of product types covered by the design assurance system should be included.
- 2 Approval of a change in the terms of approval in accordance with CAR 21.253 will be confirmed by an appropriate amendment of the certificate of approval.
- 3 The certificate references the handbook of the approved design organisation, provided in accordance with CAR 21.243. This handbook defines the tasks which may be performed under the approval.
- 4 Scopes of work are, for example, “subsonic turbojet airplanes”, “turbo propeller airplanes”, “small airplanes”, “rotorcraft”... Technologies are quoted in the scope of work when it is considered by the Authority as a limitation for the design organisation approval.
- 5 For repair design activities, the certificate states the scope of work with the appropriate limitations for which the approval has been granted.

**GM No. 2 to 21.251 - Terms of approval - Organisations designing minor changes to type design or minor repairs to products**

Terms of approval issued for organisations designing minor changes to type design or minor repairs to products should contain:

**1. Scope of work**

This design organisation approval has been granted for:

- designing minor changes to type design or minor repairs to [aircraft, engine, propeller] in accordance with the applicable CS and environmental protection requirements,
- showing and verifying the compliance with these CS and environmental protection requirements.

**2. Category of products**

Any other indication if the Authority has found a limitation related to aircraft systems or technologies and reducing the scope as defined in paragraph 1.

### 3. Privileges

The holder of this approval is entitled to:

List of the privileges granted with the approval, pursuant to CAR 21.263(c)(1), (2) and (3).

#### **GM 21.257(a) - Investigations**

Arrangements that allow the Authority to make investigations include the complete design organisation including partners, sub-contractors and suppliers, whether they are in the State of the applicant or not, assisting and co-operating with the Authority in performing inspections and audits conducted during initial assessment and subsequent surveillance.

Assistance to the Authority includes all appropriate means associated with the facilities of the design organisation to allow the Authority to perform these inspections and audits, such as a meeting room and office support.

#### **GM 21.263(b) - DOA privilege related to compliance documents**

A compliance document is the end result of a certification process, where the showing of compliance is recorded. For each specific certification process, the Authority is involved in the process itself at an early stage, especially through the establishment of the certification programme. The inspections or tests under CAR 21.257(b) may be performed at various stages of the whole certification process, not necessarily when the compliance document is presented.

Therefore, according to the scheduled level of involvement, the Authority should agree with the DOA holder documents to be accepted without further Authority verification under the DOA privilege of CAR 21.263(b).

#### **AMC 21.263(b)(1) - Compliance documents with conditions related to engine or propeller without a type-certificate or with unapproved changes and fitted on aircraft for which a permit to fly is requested**

The establishment of flight conditions may include conditions related to engines/propellers without a type-certificate or with unapproved changes and fitted on the aircraft for which a permit to fly is requested. These conditions (i.e. installation, operating, maintenance conditions or limitations) are defined by the organisation responsible for the design of the engine/propeller and provided to the organisation responsible for the design of the aircraft.

When the organisation responsible for the design of the engine/propeller has a DOA, the establishment and substantiation of these conditions shall be done under the relevant DOA procedures. For that purpose, the associated documentation shall be processed like any other compliance document. It shall be provided to the organisation responsible for the design of the aircraft that will use it for the establishment of the aircraft flight conditions.

**AMC No. 1 to CAR 21.263(c)(1) - Procedure for the classification of changes to type design and repairs as minor and major**

**1 Intent**

This acceptable means of compliance provides means to develop a procedure for the classification of changes to type design and repairs.

Each DOA **applicant** shall develop its **own** internal **classification** procedure **following** this AMC, **in order to** obtain the **associated** CAR 21.263(c)(1) privilege.

**2 Procedure for the classification of changes to type design and repairs**

**2.1 Content**

The procedure shall address the following points:

- the identification of changes to type design or repairs
- classification
- justification of the classification
- authorised signatories
- supervision of changes to type design or repairs initiated by subcontractors

For changes to type design, criteria used for classification shall be in **compliance** with CAR 21.91 and GM 21.91.

For repairs, criteria used for classification shall be in compliance with CAR 21.435 and GM 21.435.

**2.2 Identification of changes to type design or repairs**

The procedure shall indicate how the following are identified: - major changes to type design or major repairs

- those minor changes to type design or minor repairs where additional work is necessary to show compliance with the CS and environmental protection requirements
- other minor changes to type design or minor repairs requiring no further showing of compliance.

**2.3 Classification**

The procedure shall show how the effects on airworthiness and environmental protection are analyzed, from the very beginning, by reference to the applicable requirements.

If no specific airworthiness or environmental protection requirements are applicable to the change or repairs, the above review shall be carried out at the level of the part or system where the change or repair is integrated and where specific airworthiness or environmental protection requirements are applicable.

#### **2.4 Justification of the classification**

All decisions of classification of changes to type design or repairs as "major" or "minor" shall be recorded and, for those which are not straightforward, also documented. These records shall be easily accessible to the Authority for sample check.

#### **2.5 Authorised signatories**

All classifications of changes to type design or repairs shall be accepted by an appropriate authorised signatory.

The procedure shall indicate the authorised signatories for the various products listed in the terms of approval.

For those changes or repairs that are handled by subcontractors, as described under paragraph 2.6, it shall be described how the DOA holder manages its classification responsibility.

#### **2.6 Supervision of changes to type design or repairs initiated by subcontractors**

The procedure shall indicate, directly or by cross-reference to written procedures, how changes to type design or repairs may be initiated and classified by subcontractors and are controlled and supervised by the DOA holder.

**AMC No. 2 to CAR 21.263(c)(1) - Privileges - Organisations designing minor changes to type design or minor repairs to products : classification procedure**

**1. Content**

The procedure shall address the following points:

- configuration control rules, especially the identification of changes to type design or repairs
- classification, in compliance with CAR 21.91 and GM 21.91 for changes and GM 21.435 for repairs
- justification of the classification - authorised signatories

**2. Identification of changes to type design or repairs**

The procedure shall indicate how the following minor changes to type design or minor repairs are identified:

- those minor design changes to type design or minor repairs where additional substantiation data is necessary to show compliance with the airworthiness or environmental protection requirements
- other minor design changes to type design or minor repairs requiring no further showing of compliance.

**3. Classification**

The procedure shall show how the effects on airworthiness and environmental protection are analyzed, from the very beginning, by reference to the applicable requirements.

If no specific requirements are applicable to the change or the repair, the above review shall be done at the level of the part or system where the change or repair is integrated and where specific CS or environmental protection requirements are applicable. For repair, see also GM 21.435.

**4. Justification of the classification**

All decisions of classification of changes to type design or repairs as "minor" shall be recorded and, for those which are not straightforward, also documented. These records shall be easily accessible to the Authority for sample check.

It may be in the format of meeting notes or register.

**5. Authorised signatories**

All classifications of changes to type design or repairs shall be accepted by an appropriate authorised signatory.

The procedure shall indicate the authorised signatories for the various products listed in the terms of approval.

**AMC No. 1 to CAR 21.263(c)(2) - Procedure for the approval of minor changes to type design or minor repairs**

**1 Intent**

This acceptable means of compliance provides means to develop a procedure for the approval of minor changes to type design or minor repairs.

Each DOA applicant shall develop its own internal procedures following this AMC, in order to obtain the associated privilege under CAR 21.263(c)(2).

**2 Procedure for the approval of minor changes to type design or minor repairs**

**2.1 Content**

The procedure shall address the following points:

- compliance documentation
- approval under the DOA privilege
- authorised signatories
- supervision of minor changes to type design or minor repairs handled by subcontractors.

**2.2 Compliance documentation**

For those minor changes to type design or minor repairs where additional work to show compliance with the applicable CS and environmental protection requirements is necessary, compliance documentation shall be established and independently checked as required by CAR 21.239(b).

The procedure shall describe how the compliance documentation is produced and checked.

**2.3 Approval under the DOA privilege**

2.3.1 For those minor changes to type design or minor repairs where additional work to show compliance with the applicable CS and environmental protection requirements is necessary, the procedure shall define a document to formalise the approval under the DOA privilege. This document shall include at least :

- identification and brief description of the change or repair and reasons for change or repair
- applicable CS or environmental protection requirements and methods of compliance
- reference to the compliance documents
- effects, if any, on limitations and on the approved documentation
  - evidence of the independent checking function of the showing of compliance
  - evidence of the approval under the privilege of CAR 21.263(c)(2) by an authorised signatory
  - date of the approval

For repairs, see AMC 21.433(a).

2.3.2 For the other minor changes to type design or minor repairs, the procedure shall define a means to identify the change or repair and reasons for the change or repair, and to formalise its approval by the appropriate engineering authority under an authorised signatory. This function may be delegated by the Office of Airworthiness but shall be controlled by the Office of Airworthiness, either directly or through appropriate procedures of the DOA holder's design assurance system.

#### **2.4 Authorised signatories**

The persons authorised to sign for the approval under the privilege of CAR 21.263(c)(2) shall be identified (name, signature and scope of authority) in appropriate documents that maybe linked to the handbook.

#### **2.5 Supervision of minor changes to type design or minor repairs handled by subcontractors**

For the minor changes to type design or minor repairs described in 2.3.2, that are handled by subcontractors, the procedure shall indicate, directly or by cross-reference to written procedures how these minor changes to type design or minor repairs are approved at the subcontractor level and the arrangements made for supervision by the DOA holder.

#### **AMC No. 2 to CAR 21.263(c)(2) - Privileges - Organisations designing minor changes to type design or minor repairs to products : procedure for the approval of minor changes to type design or minor repairs**

##### **1. Content**

The procedure shall address the following points : - compliance documentation - approval under the DOA privilege - authorised signatories

##### **2. Compliance documentation**

For those minor changes to type design or minor repairs where additional work to show compliance with the applicable CS and environmental protection requirements is necessary, compliance documentation shall be established and independently checked as required by CAR 21.239(b).

The procedure shall describe how the compliance documentation is produced and checked.

### **3. Approval under the DOA privilege**

**3.1.** For those minor changes to type design or minor repairs where additional work to show compliance with the applicable CS or environmental protection requirements is necessary, the procedure shall define a document to formalise the approval under the DOA privilege.

This document shall include at least :

- identification and brief description of the change or the repair and reason for change or repair
- applicable CS or environmental protection requirements and methods of compliance
- reference to the compliance documents
- effects, if any, on limitations and on the approved documentation
- evidence of the independent checking function of the showing of compliance
- evidence of the approval under the privilege of CAR 21.263(c)(2) by an authorised signatory
- date of the approval

For repairs, see also AMC 21.433(a).

**3.2.** For the other minor changes to type design or minor repairs, the procedure shall define a means to identify the change or repair and reasons for the change or repair, and to formalise its approval by the appropriate engineering authority under an authorised signatory. This function shall be controlled through appropriate procedures of the DOA holder's design assurance system.

### **4. Authorised signatories**

The persons authorised to sign for the approval under the privilege of CAR 21.263(c)(2) shall be identified (name, signature and scope of authority) in appropriate documents that may be linked to the handbook.

### **GM 21.263(c)(3) - Issue of information or instructions**

#### **1 Intent**

This GM provides guidelines to address the various aspects the DOA should cover in order to have a comprehensive procedure for the issue of information or instructions.

## 2 Scope

The information or instructions referred to in CAR 21.263(c)(3) are issued by a DOA holder to make available to the owners or operators of a product with all necessary data to implement a change on the product or a repair, or to inspect it. Some are also issued to provide maintenance organisations and other interested persons with all necessary maintenance data for the performance of maintenance, including implementation of a change on the product or a repair, or inspection, in accordance with CAR 21.61, CAR 21.107, CAR 21.120 or CAR 21.449 (Instructions for Continued Airworthiness).

This information or instructions may be issued in a format of a Service Bulletin as defined in ATA 100 system, or in Structural Repair Manuals, Maintenance Manuals, Engine and Propeller Manuals etc. The preparation of this data involves design, production and inspection. As the overall responsibility, through the privilege, is allocated to the DOA holder, the three aspects should be properly handled under the DOA to obtain the privilege "to issue information or instructions containing a statement that the technical content is approved", and a procedure should exist.

## 3 Procedure

For the information and instructions issued under CAR 21.263(c)(3), the DOA holder should establish a procedure addressing the following points :

- preparation
- verification of technical consistency with corresponding approved change(s) , repair(s) or approved data, including affectivity, description, effects on airworthiness and environmental protection, especially when limitations are changed
- verification of the feasibility in practical applications - authorised signatories.

The procedure should include the information or instructions prepared by subcontractors or vendors, and declared applicable to its products by the DOA holder.

## 4 Statement

The statement provided in the information or instructions should also cover the information or instructions prepared by subcontractors or vendors and declared applicable to its products by the DOA holder.

The technical content is related to the design data and accomplishment instructions, and its approval means that:

- the design data has been appropriately approved ; and

- the instructions provide for practical and well defined installation/inspection methods, and, when accomplished, the product is in conformity with the approved design data.

Note : Information and instructions related to required actions under CAR 21.3B(b) (airworthiness directives) are submitted to the Authority to ensure compatibility with Airworthiness directive content (see CAR 21.265(e)), and contain a statement that they are, or will be, subject to an airworthiness directive issued by the Authority.

## **GM 21.263(c)(4) - Procedure for the approval of documentary changes to the Aircraft Flight Manual**

### **1 Intent**

This GM provides guidelines to develop a procedure for the approval of documentary changes to the Aircraft Flight Manual (AFM).

Each DOA applicant should develop its own internal procedure, based on these guidelines, in order to obtain the associated privilege under CAR 21.263(c)(4).

### **2 Definition of documentary changes to the AFM**

Examples of documentary changes to the AFM that may be approved under the DOA privilege:

**A - FOR AFM ISSUED BY THE TYPE-CERTIFICATE HOLDER** Editorial changes or corrections to the AFM.

Changes to weight limitations that are within all previously approved limitations (e.g., structural, noise, etc.)

The addition of compatible and previously approved AFM Temporary changes, appendices or Supplements.

Conversions of previously approved combinations of units of measurement added to the AFM in a previously approved manner.

The addition of aircraft serial numbers to an existing AFM where the aircraft configuration, as related to the AFM, is identical to aircraft already in that AFM.

The removal of reference to aircraft serial numbers no longer applicable to that AFM.

**B - FOR AFM SUPPLEMENTS ISSUED BY STC HOLDERS**

Editorial changes or corrections to the AFM Supplement. Changes to weight limitations that are within all previously approved limitations (e.g., structural, noise, etc.)

Conversions of previously approved combinations of units of measurement added to the AFM Supplement in a previously approved manner.

The addition of aircraft serial numbers to an existing AFM Supplement where the aircraft configuration, as related to the AFM Supplement, is identical to aircraft already in that AFM Supplement.

The removal of reference to aircraft serial numbers no longer applicable to that AFM Supplement.

### **3 Procedure for the approval of documentary changes**

#### **3.1 Content**

The procedure should address the following points:

- preparation of all AFM changes,
- classification as documentary AFM change,
- verification by the airworthiness function, especially regarding the classification of the AFM change,
- approval of AFM changes,
- approval statement and authorised signatories,
- distribution.

#### **3.2 Preparation**

The procedure should indicate how AFM changes are prepared and how the co-ordination with people in charge of design changes is performed.

#### **3.3 Classification**

The procedure should indicate how AFM changes are classified as documentary changes, in accordance with the criteria of paragraph 2.

Changes to the AFM of an editorial nature should be non-technical and should normally only affect existing approved data.

#### **3.4 Verification by Office of airworthiness function**

The procedure should indicate how people in charge of Office of airworthiness function will : - verify the classification as documentary changes

- review the content of the AFM changes.

#### **3.5 Approval**

Any change to the AFM should be approved, either by the Authority, or under the privilege of CAR 21.263(c)(4) for documentary AFM changes.

For documentary AFM changes, the procedure should indicate how the approval under the privilege will be formalised.

### **3.6 Approval statement and authorised signatories**

Revisions of the AFM containing only documentary changes should be issued with the approval statement defined in CAR 21.263(c)(4).

When approval status is shown on each page, a simplified statement such as "Approved under the authority of DOA nr.[UAE].J.[xyz]" may be used.

The authorised signatories should be identified (name, signature), together with the scope of authorisation, in a document that can be linked to the DOA handbook.

### **3.7 Maintaining, updating and distribution**

The procedure should indicate how the master copy of the AFM is maintained and updated, and how approved revisions are distributed, taking account of CAR 21.57 or CAR 21.119.

## **AMC 21.263(c)(6) - Procedure for the approval of the conditions for issue of a permit to fly**

### **1 Intent**

This AMC provides means to develop a procedure to determine that an aircraft can fly, under the appropriate restrictions compensating for non compliance with the certification specifications applicable to the aircraft category.

Each DOA applicant or holder shall develop its own internal procedure following this AMC, in order to obtain the privilege to make this determination and approve associated conditions without Authority involvement, under CAR 21.263(c)(6). When the privilege does not apply, the DOA holder will prepare all necessary data required for the determination in accordance with the same procedure required for the privilege, and will apply for Authority approval.

### **2 Procedure for the approval of the conditions for issue of a permit to fly**

#### **2.1 Content**

The procedure shall address the following points:

- decision to use the privilege;
- management of the aircraft configuration;

- determination of the conditions that shall be complied with to perform safely a flight;
- documentation of flight conditions substantiations;
- approval under the DOA privilege, when applicable;
- authorised signatories.

## **2.2 Decision to use the privilege of CAR 21.263(c)(6)**

The procedure shall include a decision to determine:

- flights for which the privilege of CAR 21.263(c)(6) will be exercised; and
- flights for which the approval of flight conditions by the Authority will be required according to the criteria of CAR 21.263(c)(6).

**2.3 Management of the aircraft configuration** The procedure shall indicate:

- how the aircraft, for which an application for permit to fly is made, is identified;
- how changes to the aircraft will be managed.

## **2.4 Determination of the conditions that shall be complied with to perform safely a flight**

The procedure shall describe the process used by the DOA holder to justify that an aircraft can perform the intended flight(s) safely. This process should include:

- identification of deviations from applicable certification specifications or non compliance with CAR 21 conditions for the issue of a certificate of airworthiness;
- analysis, calculations, tests or other means used to determine under which conditions or restrictions the aircraft can perform safely a flight;
- the establishment of specific maintenance instructions and conditions to perform these instructions;
- independent technical verification of the analysis, calculations, tests or other means used to determine under which conditions or restrictions the aircraft can perform the intended flight(s) safely;
- statement by the office of airworthiness (or equivalent), that the determination has been made in accordance with the procedure and that the aircraft has no features and characteristics making it unsafe for the intended operation under the identified conditions and restrictions;
- approval by an authorised signatory.

## **2.5 Documentation of flight conditions substantiations**

1. The analysis, calculations, tests, or other means used to determine under which conditions or restrictions the aircraft can perform safely a flight, shall be compiled in compliance documents. These documents shall be signed by the author and by the person performing the independent technical verification.
2. Each compliance document shall have a number and issue date. The various issues of a document shall be controlled.
3. The data submitted and approved by the type-certificate holder can be used as substantiations. In that case, the independent technical verification referred to in 2.4 is not required.

**2.6 Approval under the DOA privilege 2.6.1 Initial approval**  
The procedure shall include the following GCAA Form AWF-Ptf-18A to support the approval under the DOA privilege:

FLIGHT CONDITIONS FOR A PERMIT TO FLY – APPROVAL FORM	
<b>1. Applicant approval nr.</b> <i>[Name and organisation approval number of organisation providing the flight conditions and associated substantiations]</i>	<b>2. Approval form nr.</b> <b>Issue:</b> <i>[number and issue, for traceability purpose]</i>
<b>3. Aircraft manufacturer/type</b>	<b>4. Serial number(s)</b>
<b>5. Purpose</b>	
<b>6. Aircraft configuration</b> The above aircraft for which a permit to fly is requested is defined in <i>[add reference to the document(s) identifying the detailed configuration of the aircraft]</i> <i>[For change(s) affecting the initial approval form: description of change(s). This form shall be re-issued]</i>	
<b>7. Substantiations</b> <i>[References to the document(s) justifying that the aircraft (as described in 5.) can perform the intended flight(s) safely under the defined conditions or restrictions.]</i> <i>[For change(s) affecting the initial approval form: reference(s) to additional substantiation(s). This form shall be re-issued]</i>	
<b>8. Conditions/Restrictions</b> The above aircraft shall be used with the following conditions or restrictions: <i>[Details of these conditions/restrictions, or reference to relevant document, including specific maintenance instructions and conditions to perform these instructions]</i>	
<b>9. Statement</b> The determination of the flight conditions has been made in accordance with the relevant DOA procedure agreed by the Authority. The aircraft has no features and characteristics making it unsafe for the intended operation under the identified conditions and restrictions.  <i>[strikethrough what is not applicable]</i>	
<b>10a</b> Approved under the authority of DOA UAE.21J.xyz <i>[when privilege of CAR 21.263(c)(6) applies]</i> <b>10b</b> Submitted under the authority of DOA UAE.21J. xyz <i>[when privilege of CAR 21.263(c)(6) does not apply]</i>	
<b>11. Date of issue</b>	<b>12. Name and signature</b> <i>[Authorised signatory]</i>
<b>12. GCAA approval and date</b> <i>[when privilege of CAR 21.263(c)(6) does not apply]</i>	

When the privilege of CAR 21.263(c)(6) is not applicable, the signed form should be presented by the office of airworthiness (or equivalent) to the Authority.

### **2.6.2 Approval of changes**

Except for changes that do not affect the conditions approved for the issue of the permit to fly, the procedure shall specify how changes will be approved by the DOA Holder. The form of paragraph 2.6.1 shall be updated.

### **2.7 Authorised signatories**

The person(s) authorised to sign the approval form shall be identified (name, signature and scope of authority) in the procedure, or in an appropriate document linked to the DOA handbook.

## **AMC 21.263(c)(7) - Procedure for the issue of a permit to fly**

### **1 Intent**

This acceptable means of compliance provides means to develop a procedure for the issue of a permit to fly.

Each DOA applicant or holder shall develop its own internal procedure following this AMC, in order to obtain the privilege of CAR 21.263(c)(7) to issue permits to fly for aircraft it has designed or modified, when the design organisation itself is controlling under its DOA the configuration of the aircraft and is attesting conformity with the design conditions approved for the flight.

### **2 Procedure for the issue of a permit to fly**

#### **2.1 Content**

The procedure shall address the following points:

- conformity with approved conditions;
- issue of the permit to fly under the DOA privilege;
- authorised signatories;
- interface with the local authority for the flight.

#### **2.2 Conformity with approved conditions**

The procedure shall indicate how conformity with approved conditions is made, documented and attested by an authorised person.

### **2.3 Issue of the permit to fly under the DOA privilege**

The procedure shall describe the process to prepare the GCAA Form AWF-PtF-20b and how compliance with CAR 21.711(b) and (e) is established before signature of the permit to fly.

### **2.4 Authorised signatories**

The person(s) authorised to sign the permit to fly under the privilege of CAR 21.263(c)(7) shall be identified (name, signature and scope of authority) in the procedure, or in an appropriate document linked to the DOA handbook.

### **2.5 Interface with the local authority for the flight**

The procedure shall include provisions describing the communication with the local authority for compliance with the local requirements which are outside the scope of the conditions of CAR 21.708(b) (see CAR 21.711(e)).

### **AMC 21.265(a) - Administration of the handbook**

- 1 The handbook of the applicant shall be in the language which will permit the best use of it by all personnel charged with the tasks performed for the purpose of the design organisation. The applicant may be requested to provide an English translation of the handbook and other supporting documents as necessary for the investigation.
- 2 The handbook shall be produced in a concise form with sufficient information to meet CAR 21.243 relevant to the scope of approval sought by the applicant. The handbook shall include the following:
  - a. Organisation name, address, telephone, telex and facsimile numbers.
  - b. Document title, and company document reference No (if any).
  - c. Amendment or revision standard identification for the document.
  - d. Amendment or revision record sheet.
  - e. List of effective pages with revision/date/amendment identification for each page.
  - f. Contents list or index.

- g. A distribution list for the Handbook.
- h. An introduction, or foreword, explaining the purpose of the document for the guidance of the organisation's own personnel. Brief general information concerning the history and development of the organisation and, if appropriate, relationships with other organisations which may form part of a group or consortium, shall be included to provide background information for the Authority.
- i. The certificate of approval shall be reproduced in the document.
- j. Identification of the department responsible for administration of the Handbook.

Note: In the case of an initial or revised approval it is recognised that certificate will be issued after Authority agreement to the handbook content in draft form. Arrangements for formal publication in a timely manner shall be agreed before the certificate of approval is issued.

- 3 An updating system shall be clearly laid down for carrying out required amendments and modifications to the handbook.
- 4 The handbook may be completely or partially integrated into the company organisation manual. In this case, identification of the information required by CAR 21.243 shall be provided by giving appropriate cross references, and these documents shall be made available, on request, to the Authority.

#### **GM 21.265(b) - Use of the handbook**

- 1 The handbook should be signed by the Chief Executive and the Head of the design organisation and declared as a binding instruction for all personnel charged with the development and type investigation of products.
- 2 All procedures referenced in the handbook are considered as parts of the handbook and therefore as basic working documents.

## Appendix to Subpart J - Guidance Material on Design organisation approval application

### Eligibility:

1. The GM contained in this appendix provides an overview of the approval process and requirements, and on how a design organisation would apply to the GCAA for a UAE design organisation approval (DOA).
2. This procedure shall be read in conjunction with UAE CAR 21 Acceptable Means of Compliance and Guidance Material (AMC & GM) and provides supplemental information only.
3. In order to design or approve a change or a repair for incorporation on an aircraft registered in the UAE, an organisation is required to have a UAE DOA.

### Application:

1. An application for a UAE DOA shall be made on the form AWF-DOA-001, and in a manner established by the GCAA.
2. On receipt of the application, the GCAA will establish contact with the applicant and intimate additional requirements, if any, and on how to proceed.
3. The GCAA will send an invoice to the applicant reflecting the applicable fees and charges current at that time (IB 14/2006 or later applicable GCAA policy for fees). The fees shall be paid to the GCAA.
4. All enquiries related to the design organisation approvals should be addressed to:

*Manager Engineering Safety,  
 General Civil Aviation Authority  
 PO Box: 30500,  
 Marrakesh Street (Behind RTA building)  
 Um Ramool Area,  
 Dubai, United Arab Emirates.  
 Phone: +971 4 2111606 & +971 50 8127849  
 Fax: +971 4 282 0847  
 Email: [airworthiness@gcaa.gov.ae](mailto:airworthiness@gcaa.gov.ae)*

5. The GCAA has categorised UAE DOA depending on the investigation required for issuing the approval:
  - a) Design Organisations with existing EASA DOA or equivalent
  - b) Design Organisations without existing EASA DOA or equivalent

In both the cases above, the GCAA will assign a design organisation team leader, responsible for the assessment of the application package.

### 1. Design organisations with existing EASA DOA or equivalent:

#### 1.1 Requirements:

The UAE DOA is issued for one year and renewed on yearly basis. The UAE Operator is required to send a letter of intent to the GCAA to support their need for UAE DOA.

If the applicant design organisation already holds a DOA from EASA or equivalent, then the following documents should be submitted to the GCAA:

- a) The application form AWF-DOA-001 duly filled and signed,
- b) Design organisation approval certificate with privileges, scope, products, parts and appliances covered,
- c) Design organisation handbook (DOH) or equivalent,
- d) Procedures manual(s),
- e) The organisation shall complete the UAE design organisation supplement and shall acquire its approval from the GCAA through Q-Pulse system. The GCAA will provide a copy of the template for the supplement at the beginning of the approval process,
- f) Copy of the last internal audit with findings closure actions,
- g) Copy of the last audit by parent DOA issuing national aviation authority with findings and closure actions,
- h) Evidence of payment of UAE DOA fee.

### **1.2 Investigations:**

The GCAA may audit an applicant design organisation prior to the issue of UAE DOA. The audit shall be decided on the scope and privileges being requested from the GCAA and the complexity of the project in hand for UAE registered aircraft. The UAE DOA team leader will make a decision to audit the applicant design organisation after due consultation however his decision is considered final.

The expenses for the audit are not part of the UAE DOA fees. A separate invoice will be raised for the audit expenses and the applicant design organisation is expected to ensure that the payment is received by the GCAA at least a week prior to the travel date of the auditing inspector(s). The GCAA inspector needs to paid per diem and business class ticket as per the GCAA policy at the time of travel, such policy is available at [www.gcaa.gov.ae](http://www.gcaa.gov.ae)

The GCAA manages audits through Q-Pulse system and satisfactory closure of the audit findings is required for the issue of UAE DOA.

The ongoing audits are conducted at a frequency of three years, however the GCAA may plan an audit prior to completion of the three year cycle based on risk assessment and project(s) undertaken by the organisation.

### **1.3 Reports and returns:**

The details of reports and returns are provided in the UAE DOA supplement.

## **2. Design organisation without existing EASA DOA or equivalent:**

Such organisations require detailed assessment and investigation as per CAR 21 Subpart J and associated AMC & GM.

### **Terms of Approval:**

On satisfactory completion of the assessment and payment of the applicable fees and charges, the GCAA will issue UAE DOA Certificate.

The GCAA may issue DOA with the same or less privilege as issued by the parent national aviation authority, depending on the outcome of the assessment.

**Changes to the UAE approved design organisation:**

CAR 21 subpart J defines significant changes which need prior approval from the GCAA.

The GCAA requires the design organisations to intimate the GCAA in parallel with its parent national aviation authority of the significant changes as required by CAR 21.247 & CAR 21.253.

**SUBPART K - PARTS AND APPLIANCES**

**AMC CAR 21.303(c) Standard parts**

1. In this context a part is considered as a “standard part” where it is designated as such by the design approval holder responsible for the product, part or appliance, in which the part is intended to be used. In order to be considered a “standard part”, all design, manufacturing, inspection data and marking requirements necessary to demonstrate conformity of that part should be in the public domain and published or established as part of officially recognised Standards, or
2. For sailplanes and powered sailplanes, where it is a non-required instrument and/or equipment certified under the provision of CS 22.1301(b) or equivalent airworthiness standards, if that instrument or equipment, when installed, functioning, functioning improperly or not functioning at all, does not in itself, or by its effect upon the sailplane and its operation, constitute a safety hazard.

“Required” in the term “non-required” as used above means required by the applicable airworthiness code (CS 22.1303, 22.1305 and 22.1307 or equivalent airworthiness standards) or required by the relevant operating regulations and the applicable Rules of the Air or as required by Air Traffic Management (e.g. a transponder in certain controlled airspace).

Examples of equipment which can be considered standard parts are electrical variometers, bank/slip indicators ball type, total energy probes, capacity bottles (for variometers), final glide calculators, navigation computers, data logger / barograph / turnpoint camera, bug-wipers and anti-collision systems.

Equipment which shall be approved in accordance to the airworthiness code shall comply with the applicable UAE TSO or equivalent and is not considered a standard part (e.g. oxygen equipment)."

**GM to 21.303(c) - Officially recognised standards**

In this context “officially recognised Standards” means:

1. Those standards established or published by an official body whether having legal personality or not, which are widely recognised by the air transport sector as constituting good practice; or

2. The standard used by the manufacturer of the equipment as mentioned in paragraph 2 of AMC 21.303(c)."

## **SUBPART M - REPAIRS**

### **GM 21.431(a)**

#### **Scope**

Manuals and other instructions for continued airworthiness (such as the Manufacturers Structural Repair Manual, Maintenance Manuals and Engine Manuals provided by the holder of the type certificate, supplemental type-certificate, design approval or UAE TSO authorisation as applicable) for operators, contain useful information for the development and approval of repairs.

When these data are explicitly identified as approved, they may be used by operators without further approval to cope with anticipated in-service problems arising from normal usage provided that they are used strictly for the purpose for which they have been developed.

Approved data is data which is approved either by the Authority, or by an appropriately approved design organisation.

Flow Chart 2 addresses procedures that should be followed for products where the State of design..

When specific repair data that is has overseas approval is accepted based on either bilateral agreement or specific provisions in the rules for the acceptance.

### **GM 21.431(d) Repairs to articles**

A repair to an article under CAR 21.611 has to be seen in the context of an UAE TSO authorisation, i.e., when an article as such is specifically approved under Subpart O, with dedicated rules that give specific rights and obligations to the designer of the article, irrespective of any product type design or change to the type design. For a repair to such an article, irrespective of installation on any aircraft, Subpart O, and CAR 21.611 in particular, should be followed.

When an airline or a maintenance organisation is designing a new repair (based on data not published in the TC holder or Original Equipment Manufacturer documentation) on an article installed on an aircraft, such a repair can be considered as a repair to the product in which the article is installed, not to the article taken in isolation. Therefore Subpart M can be used for the approval of this repair, that will be identified as "repair to product x affecting article y", but not "repair to article y".

**AMC 21.433 (a) and 21.447 - Repair design and record keeping**

1. Relevant substantiation data associated with a new major repair design and record keeping should include:
  - a. damage identification and reporting source,
  - b. major repair design approval sheet identifying applicable requirements and references of justifications,
  - c. repair drawing and/or instructions and scheme identifier,
  - d. correspondence with the TC, STC, design approval or UAE TSOA holder, if its advice on the design has been sought,
  - e. structural justification (static strength, fatigue, damage tolerance, flutter etc ) or references to this data,
  - f. effect on the aircraft, engines and/or systems, (performance, flight handling, etc as appropriate)
  - g. effect on maintenance program,
  - h. effect on Airworthiness limitations, the Flight Manual and the Operating Manual,
  - i. weight and moment change,
  - j. special test requirements.
2. Relevant minor repair documentation includes paragraphs 1(a) and (c). Other points of paragraph 1 may be included where necessary. If the repair is outside the approved data, justification for classification is required.
3. Special consideration should be given to repairs that impose subsequent limitations on the part, product or appliance, (e.g., engine turbine segments that may only be repaired a finite number of times, number of repaired turbine blades per set, over sizing of fastener holes, etc.).
4. Special consideration should also be given to Life Limited parts and Critical Parts, notably with the involvement of the type-certificate or STC holder, when deemed necessary under CAR 21.433 (b).
5. Repairs to engine critical parts would normally only be accepted with the involvement of the TC holder.

**GM 21.435(a) - Classification of repairs**

## 1. Clarification of the terms Major/Minor

In line with the definitions given in CAR 21.91, a new repair is classified as 'major' if the result on the approved type design has an appreciable effect on structural performance, weight, balance, systems, operational characteristics or other characteristics affecting the airworthiness of the product, part or appliance. In particular, a repair is classified as major if it needs extensive static, fatigue and damage tolerance strength justification and/or testing in its own right, or if it needs methods, techniques or practices that are unusual (i.e., unusual material selection, heat treatment, material processes, jigging diagrams, etc.) Repairs that require a re-assessment and re-evaluation of the original certification substantiation data to ensure that the aircraft still complies with all the relevant requirements, are to be considered as major repairs.

Repairs whose effects are considered minor and require minimal or no assessment of the original certification substantiation data to ensure that the aircraft still complies with all the relevant requirements, are to be considered "minor".

It is understood that not all the certification substantiation data will be available to those persons/organisations classifying repairs. A qualitative judgment of the effects of the repair will therefore be acceptable for the initial classification. The subsequent review of the design of the repair may lead to it being re-classified, owing to early judgments being no longer valid.

## 2. Airworthiness concerns for Major/Minor classification

The following should be considered for the significance of their effect when classifying repairs. Should the effect be considered to be significant then the repair should be classified 'Major'. The repair may be classified as 'Minor' where the effect is known to be without appreciable consequence.

## i) Structural performance

Structural performance of the product includes static strength, fatigue, damage tolerance, flutter and stiffness characteristics. Repairs to any element of the structure should be assessed for their effect upon the structural performance.

## ii) Weight and balance

The weight of the repair may have a greater effect upon smaller aircraft as opposed to larger aircraft. The effects to be considered are related to overall aircraft centre of gravity and aircraft load distribution. Control surfaces are particularly sensitive to the changes due to the effect upon the stiffness, mass distribution and surface profile which may have an affect upon flutter characteristics and controllability.

## iii) Systems

Repairs to any elements of a system should be assessed for the effect intended on the operation of the complete system and for the effect on system redundancy. The consequence of a structural repair on an adjacent or remote system should also be considered as above, (for example: airframe repair in area of a static port).

iv) Operational characteristics

Changes may include:

- stall characteristics
- handling
- performance and drag
- vibration

v) Other characteristics

- changes to load path and load sharing - change to noise and emissions
- fire protection / resistance

Note: Considerations for classifying repairs 'Major/Minor' should not be limited to those listed above.

3. Examples of 'Major' repairs

- i) A repair that requires a permanent additional inspection to the approved maintenance program, necessary to ensure the continued airworthiness of the product. Temporary repairs for which specific inspections are required prior to installation of a permanent repair do not necessarily need to be classified as 'Major'. Also, inspections and changes to inspection frequencies not required as part of the approval to ensure continued airworthiness do not cause classification as 'Major' of the associated repair.
- ii) A repair to life limited or critical parts.
- iii) A repair that introduces a change to the Aircraft Flight Manual.

**GM 21.437 - Issue of repair design approval**

1) Approval by DOA holder

Approval of repairs through the use of procedures agreed with the Authority, means an approval issued by the DOA holder without requiring Authority involvement. The Authority will monitor application of this procedure within the surveillance plan for the relevant organisation. When the organisation exercises this

privilege, the repair release documentation should clearly show that the approval is under their DOA privilege.

2) Previously approved data for other applications

When it is intended to use previously approved data for other applications, it is expected that applicability and effectiveness would be checked with an appropriately approved design organisation. After damage identification, if a repair solution exists in the available approved data, and if the application of this solution to the identified damage remains justified by the previous approved repair design, (structural justifications still valid, possible airworthiness limitations unchanged), the solution can be considered approved and can be used again.

3) Temporary repairs.

These are repairs that are life limited, to be removed and replaced by a permanent repair after a limited service period. These repairs should be classified under CAR 21.435 and the service period defined at the approval of the repair.

4) Fatigue and damage tolerance.

When the repaired product is released into service before the fatigue and damage tolerance evaluation has been completed, the release should be for a limited service period, defined at the issue of the repair.

**GM 21.437(a) - Issue of repair design approval**

1) Products first type-certified by the Authority or first type-certified by a Member State (covering products type-certified through JAA procedures or under national regulations and products certificated nationally without a type-certificate).

i) Authority approval is required in cases of major repairs proposed by design organisation approval holders, not being the TC or STC holder, and in cases of minor repairs proposed by persons not holding a design organisation approval.

ii) Authority approval may be required in cases of major repairs proposed by design organisation approval holders, being the TC or STC holder, if the major repair is:

- related to new interpretation of the airworthiness requirement as used for type certification.

- related to different means of compliance from that used for type certification.

- related to the application of airworthiness requirements different from that used for type certification.

**Note:** This should be established at the time of DOA approval.

2) Products first type-certified by the Authority of a third country.

Authority approval is always required for major repairs on products first type-certified by the Authority of a third country. Approval privileges extended to TC holders (noted in CAR 21.437(b) are not extended to TC holders of products first type-certified by the competent authority of a third country. Type-certificate holders of those types may need to be involved when an arrangement with the TC holder has been determined necessary under CAR 21.433(b).

For repairs approved outside of the GCAA conditions for acceptance may be defined in the bilateral arrangement between the GCAA and the Authority of a third country. In the absence of such arrangement, the repair data shall follow the approval route as if it was designed and approved within the UAE.

#### **AMC 21.437(b) - Issue of repair design approval**

In order for the approved design organisation that is also the type-certificate holder to approve 'Major' repair design the following should be considered applicable:

- i) The type-certificate holder being approved under CAR 21 Subpart J.
- ii) Procedures having been established that comply with CAR 21 Subpart M as agreed with the Authority.
- iii) The type-certification basis for the product, part or appliance to be repaired having been identified together with all other relevant requirements.
- iv) All records and substantiation data including documents showing compliance with all relevant airworthiness requirements being held for reviews by the Authority.
- v) A summary list of all major repair approvals being provided to the Authority on a regular basis as agreed with the Authority.
- vi) Whether the repair design is affected by the presence of any supplemental type certificate.

#### **GM 21.439 - Production of repair parts**

A maintenance body, (organisation or person), may manufacture parts for repair purposes when in accordance with Subpart F or when approved under CAR 21 Subpart G. In addition, a maintenance organisation may manufacture parts for its own repair purposes when expressly authorised by the Authority of the Member State in accordance with the applicable implementing rules.

**GM 21.441 - Repair embodiment**

Repairs should be accomplished by an organisation or person in accordance with the relevant implementing rules.

The holder of a production organisation approval under Subpart G of CAR 21 may accomplish repairs to new aircraft, within its terms of approval, under the privilege of CAR 21.163(d).

**GM 21.443 - Limitations**

Instructions and limitations associated with repairs should be specified and controlled by those procedures required by the applicable operations rules.

**GM 21.445 - Unrepaired damage**

This is not intended to supersede the normal maintenance practices defined by the type certificate holder, (e.g., blending out corrosion and re-protection, stop drilling cracks, etc.), but addresses specific cases not covered in the manufacturer's documentation.

## SUBPART O - UAE TECHNICAL STANDARD ORDER AUTHORISATIONS

### **AMC 21.602B(b)(2) - Procedures for UAE TSO authorisations**

#### **1 Scope**

- 1.1 A manual of procedures shall set out specific design practices, resources and sequence of activities relevant for the specific projects, taking account of CAR 21 requirements.
- 1.2 These procedures shall be concise and limited to the information needed for quality and proper control of activities by the applicant/holder, and by the Authority.

#### **2 Management of the UAE TSO authorisation process**

- 2.1 For UAE TSO authorisation, a procedure following the principles of AMC 21.14(b), paragraph 2.1, 2.2 and 2.3, with the necessary adaptation related to CAR 21 Subpart O context, shall be established.

#### **3 Management of design changes**

- 3.1 A procedure following the principles of AMC 21.14(b), paragraphs 3.2 and 3.3, with the necessary adaptation to take into account CAR 21.611, shall be established for the classification and approval of design changes on articles under UAE TSO authorisation
- 3.2 Repairs and production deviations from the approved design data A procedure following the principles of paragraph 3.1 shall be established for the classification and approval of repairs and unintentional deviations from the approved design data occurring in production (concessions or non-conformance's). For repairs, the procedure shall be established in accordance with CAR 21 Subpart M and associated AMC or GM. For deviations, the procedure shall be established in accordance with CAR 21.610.

#### **4 Obligations addressed in CAR 21.609**

The applicant should establish the necessary procedures to show to the Authority how it will fulfil the obligations under CAR 21.609.

For issue of information and instructions, a procedure following the principles of AMC 21.14(b), paragraph 4 shall be established.

#### **5 Control of design subcontractors**

The applicant shall establish the necessary procedures to show to the Authority how it will control design subcontractors.

**AMC 21.608 - Declaration of Design and Performance****STANDARD FORM**

DDP No. ....

ISSUE No. ....

- 1 Name and address of manufacturer.
- 2 Description and identification of article including:  
Type No .....  
Modification Standard Master drawing record Weight and overall dimensions
- 3 Specification reference, i.e., UAE TSO No. and Manufacturer's design specification.
- 4 The rated performance of the article directly or by reference to other documents.
- 5 Particulars of approvals held for the equipment.
- 6 Reference to qualification test report.
- 7 Service and Instruction Manual reference number.
- 8 Statement of compliance with the appropriate UAE TSO and any deviations there from.
- 9 A statement of the level of compliance with the UAE TSO in respect of the ability of the article to withstand various ambient conditions or to exhibit various properties.

The following are examples of information to be given under this heading depending on the nature of the article and the requirements of the UAE TSO.

- a. Environmental Qualification
  - i. Temperature and Altitude
  - ii. Temperature Variation
  - iii. Humidity
  - iv. Operational Shocks and Crash Safety

- v. Vibration
- vi. Explosion Proofness
- vii. Water proofness

**Fluids Susceptibility**

- viii. Sand and Dust
- ix. Fungus Resistance
- x. Salt Spray
- xi. Magnetic Effect
- xii. Power Input
- xiii. Voltage Spike
- xiv. Audio Frequency Conducted Susceptibility - Power Inputs
- xv. Induced Signal Susceptibility

**Radio Frequency Susceptibility (Radiated and Conducted)**

- xvi. Emission of Radio Frequency Energy
- xvii. Lightning Induced Transient Susceptibility
- xviii. Lightning Direct Effects

- xix. Icing

**Electrostatic Discharge**

- xx. Fire, Flammability

(NOTE: The manufacturer should list environmental categories for each of the sections of the issue of EUROCAE ED-14/RTCA DO-160 that was used to qualify the article.)

- (a) For radio transmitters the transmitting frequency band, maximum transmitting power, and emission designator.
- (b) Working and ultimate pressure or loads.
- (c) Time rating (e.g., continuous, intermittent) or duty cycle.

(d) Limits of accuracy of measuring instruments.

(e) Any other known limitations which may limit the application in the aircraft e.g., restrictions in mounting attitude.

**10 A statement of criticality of software levels used or “None” if not applicable.**

**(Note:** Software levels are those defined in the current issue of EUROCAE ED-12B/RTCA document DO-178B.)

11 A statement of design assurance level for complex hardware or a statement indicating whether complex hardware is embedded or not in the product.

(NOTE: Complex hardware design assurance levels are those defined in the applicable issue of EUROCAE ED- 80/RTCA DO-254.)

12 The declaration in this document is made under the authority of [name of manufacturer].

[name of manufacturer] cannot accept responsibility for equipment used outside the limiting conditions stated above without their agreement.

Date: ..... Signed ..... (Manufacturer's authorised representative)

**GM to 21.611 - Design changes**

A change to an UAE TSO article can either be seen:

under this CAR 21.611 in the context of an UAE TSO authorisation, i.e., when an article as such is specifically approved under Subpart O, with dedicated rules that give specific rights and obligations to the designer of the article, irrespective of any product type design or change to the type design. For a change to such an article, irrespective of installation on any aircraft, Subpart O, and this CAR 21.611 in particular, should be followed.

Or

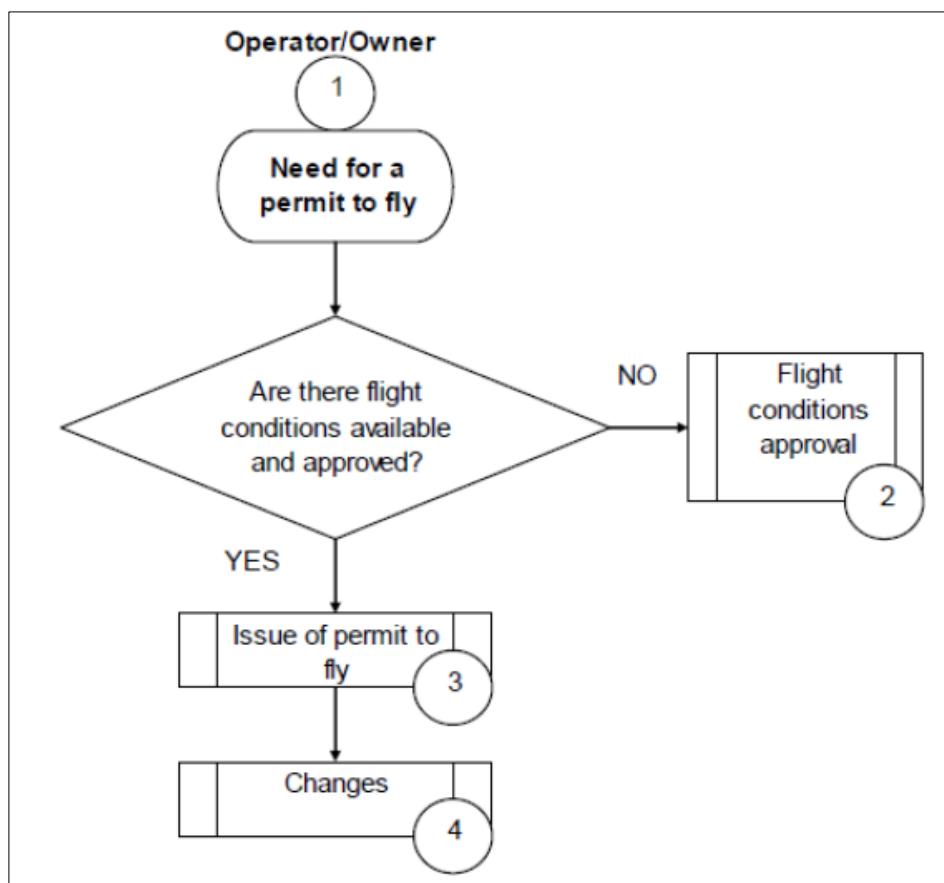
When an airline or a maintenance organisation is designing a change (based on data not published in the TC holder or Original Equipment Manufacturer documentation) on an article installed on an aircraft, such a change can be considered as a change to the product in which the article is installed, not to the article taken in isolation. Therefore Subpart D can be used for the approval of this change that will be identified as "change to product x affecting article y", but not "change to article y".

## SUBPART P - PERMIT TO FLY

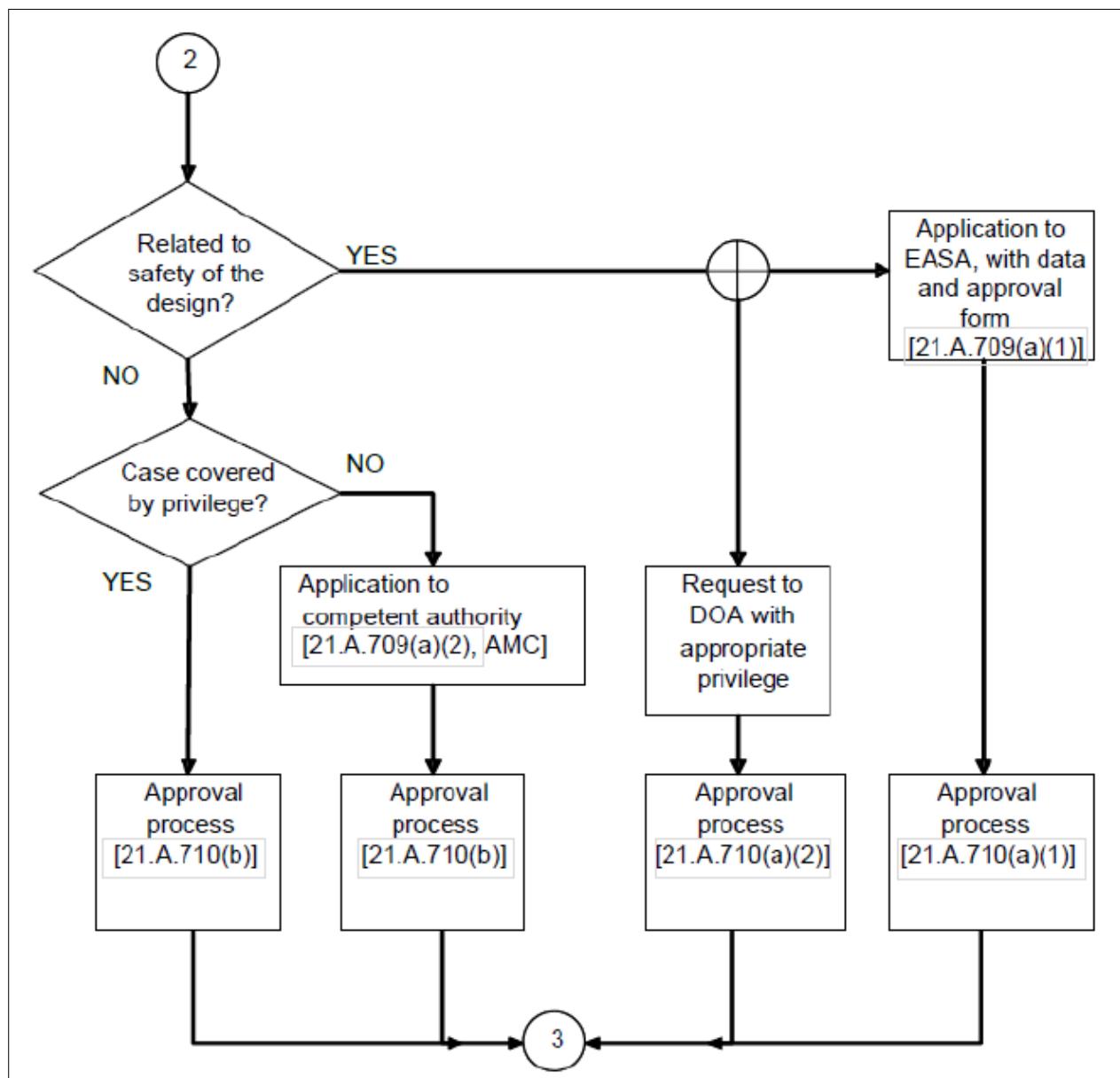
The process allowing a flight under a permit to fly can be described as follows:

1. Flow-chart 1: overview
2. Flow-chart 2: approval of flight conditions
3. Flow-chart 3: issue of permit to fly
4. Flow-chart 4: changes after first issue of permit to fly

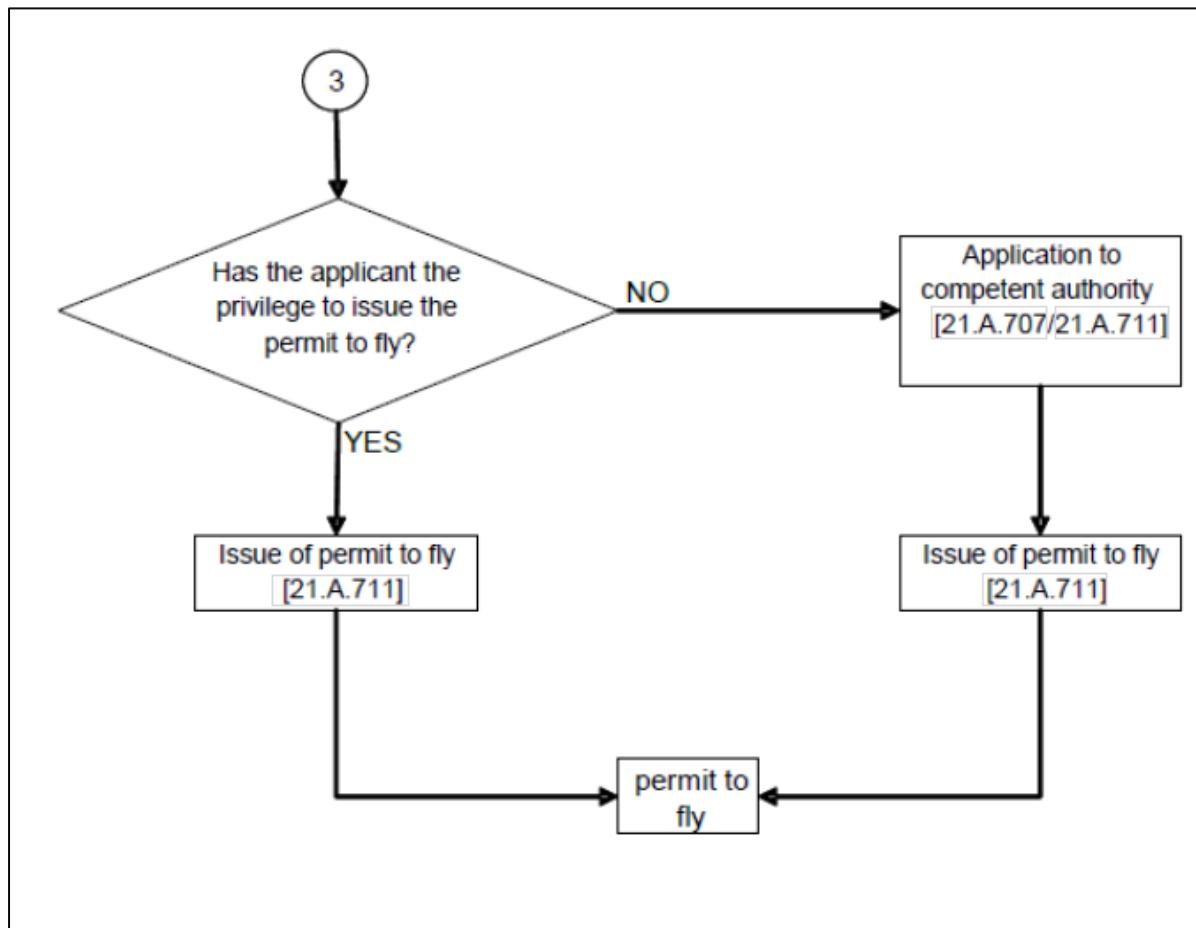
### Flow-Chart 1 - Overview



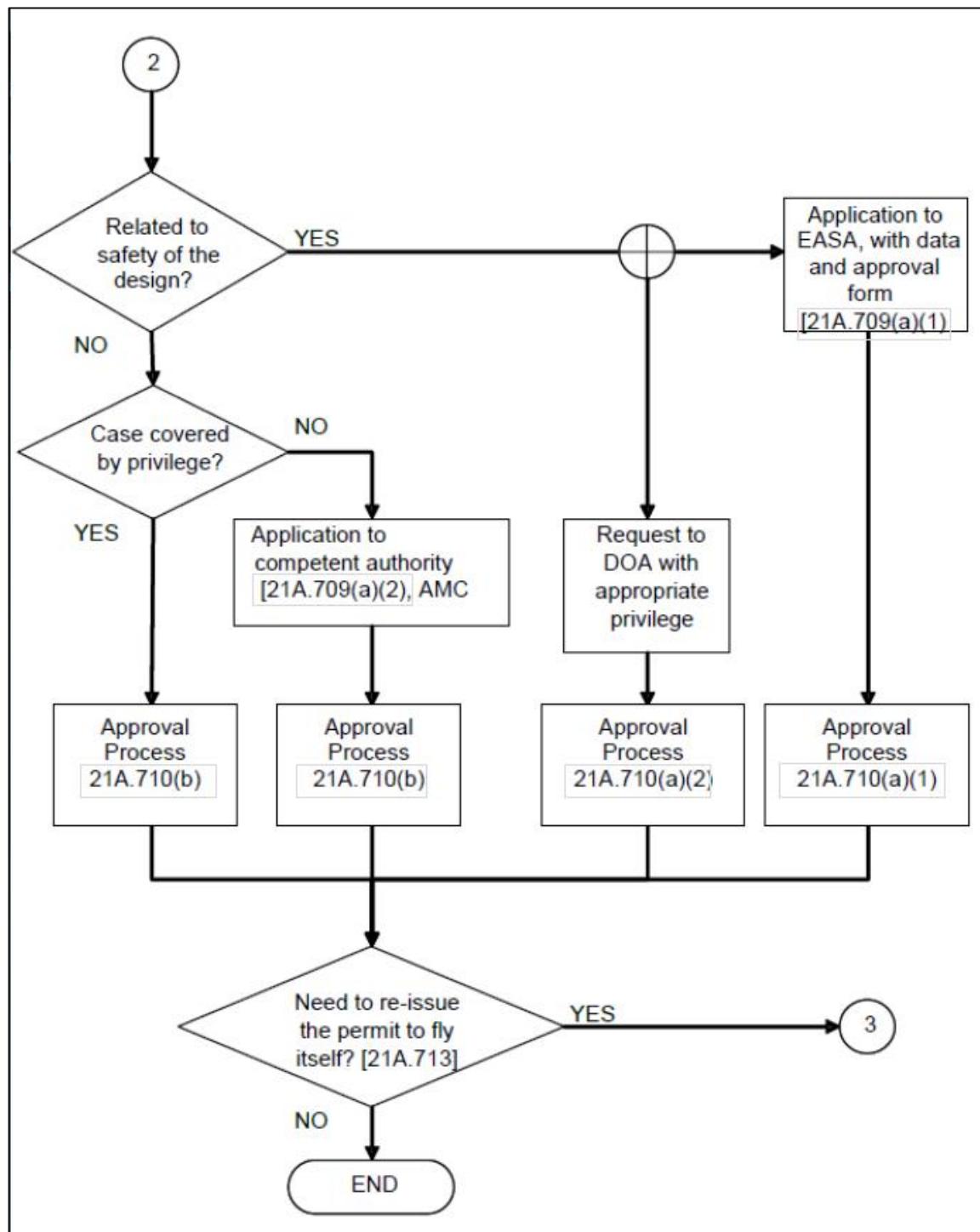
## Flow-Chart 2 - Approval of Flight Conditions



Flow-Chart 3 - Issue of Permit to Fly



Flow-Chart 4 - Changes after first issue of Permit



**GM 21.701(a) - Permit to fly when certificate of airworthiness or restricted certificate of airworthiness is not appropriate**

A certificate of airworthiness or restricted category certificate of airworthiness may not be appropriate for an individual aircraft or aircraft type when it is not practicable to comply with the normal continued airworthiness requirements and the aircraft is to a design standard that is demonstrated to be capable of safe flight under defined conditions. Paragraph CAR 21.701 identifies cases where the issuance of a (Restricted) Certificate of Airworthiness may not be possible or appropriate and this paragraph provides further information and typical examples for clarification where appropriate:

Note: This list of examples is not exhaustive

(1) Development:

- testing of new aircraft or modifications
- testing of new concepts of airframe, engine propeller and equipment;
- testing of new operating techniques;

(2) Showing compliance with regulations or certification specifications:

- certification flight testing for type certification, supplemental type certificates, changes to type certificates or UAE Technical Standard Order authorisation;

(3) Design organisations or production organisations crew training:

- Flights for training of crew that will perform design or production flight testing before the design approval and Certificate of Airworthiness (C of A) can be issued.

(4) Production flight testing of new production aircraft:

- For establishing conformity with the approved design, typically this would be the same program for a number of similar aircraft;

(5) Flying aircraft under production between production facilities: - green aircraft ferry for follow on final production.

(6) Flying the aircraft for customer acceptance: - Before the aircraft is sold and/or registered.

(7) Delivering or exporting the aircraft: - Before the aircraft is registered.

(8) Flying the aircraft for Authority acceptance:

- In the case of inspection flight test by the authority before the C of A is issued.

(9) Market survey, including customer's crew training:

- Flights for the purpose of conducting market survey, sales demonstrations and customer crew training with non type certificated aircraft or aircraft for which conformity has not yet been established or for non-registered a/c and before the Certificate of Airworthiness is issued

(10) Exhibition and air show:

- Flying the aircraft to an exhibition or show and participating to the exhibition or how before the design approval is issued or before conformity with the approved design has been shown.

(11) Flying the aircraft to a location where maintenance or airworthiness review are to be performed, or to a place of storage:

- Ferry flights in cases where maintenance is not performed in accordance with approved programs, where an AD has not been complied with where certain equipment outside the Master Minimum Equipment List (MMEL) is unserviceable or when the aircraft has sustained damage beyond the applicable limits.

(12) Flying an aircraft at a weight in excess of its maximum certificated takeoff weight for flight beyond the normal range over water, or over land areas where adequate landing facilities or appropriate fuel is not available:

- Oversees ferry flights with additional fuel capacity.

(13) Record breaking, air racing or similar competition: - Training flight and positioning flight for this purpose are included.

(14) Flying aircraft meeting the applicable airworthiness requirements before conformity to the environmental requirements has been found:

- Flying an aircraft which has been shown to comply with all applicable airworthiness requirements but not with environmental requirements.

(15) For non-commercial flying activity on individual non-complex aircraft or types for which a certificate of airworthiness or restricted certificate of airworthiness is not appropriate.

- For aircraft which cannot practically meet all applicable airworthiness requirements, such as certain aircraft without TC-holder ("generically termed orphan aircraft") or aircraft which have been under national systems of Permit to Fly and have not been shown to meet all applicable requirements. The option of a permit to fly for such an aircraft should only be used if a certificate of airworthiness or restricted certificate of airworthiness cannot be issued due to conditions which are outside the direct control of the aircraft owner, such as the absence of properly certified spare parts.

Note: The above listing is of cases when a permit to fly MAY be issued; it does not mean that in the described cases a permit to fly shall be issued. If other legal means are available to allow the intended flight(s) they can also be used.

**GM 21.703 - Applicant for a permit to fly**

1. The applicant for a permit to fly may be a person other than the registered owner of the aircraft. As the holder of this permit will be responsible for ensuring that all the conditions and limitations associated with the permit to fly are continuously satisfied, the applicant for the permit should be a person or organisation suitable for assuming these responsibilities. In particular, the organisations designing, modifying or maintaining the aircraft should normally be the holder of the associated permits to fly.
2. An appropriately approved design organisation can apply for the approval of the flight conditions when using its privilege in accordance with CAR 21.263(b)(1).

**GM 21.707(b) - Application**

GCAA approved form shall be used for permit to fly.

**GM 21.708(b)(6) - Continuing airworthiness**

In most cases a simple reference to existing maintenance requirements will suffice for aircraft that have a temporarily invalid C of A.

For other aircraft it will have to be proposed by the applicant as part of the flight conditions. For approved organisations they can be included in their procedures.

**GM No. 1 to 21.708(c) - Safe flight**

Safe flight normally means continued safe flight and landing but in some limited cases (e.g. higher risk flight testing) it can mean that the aircraft is able to fly in a manner that will primarily ensure the safety of over flown third parties, the flight crew and, if applicable other occupants.

This definition of "safe flight" should not be interpreted as allowing a test pilot, equipped with a parachute and operating over a sparsely populated area, to set out on a test flight in the full knowledge that there is a high probability of losing the aircraft. The applicant should take reasonable care to minimise safety risks and to be satisfied that there is a reasonable probability that the aircraft will carry out the flight without damage or injury to the aircraft and its occupants or to other property or persons whether in the air or on the ground.

**GM No. 2 to 21.708(c) - Substantiations**

The substantiations should include analysis, calculations, tests or other means used to determine under which conditions or restrictions the aircraft can perform safely a flight.

### **GM No. 3 to 21.708(c) - Operation of overweight aircraft**

This GM provides information and guidance with respect to permit to fly for operating an aircraft in excess of its maximum certificated takeoff weight, for flight beyond the normal range over water, or over land areas where adequate landing facilities or appropriate fuel is not available.

#### **1. GENERAL.**

The excess weight that may be authorised for overweight operations should be limited to additional fuel, fuel carrying facilities, and navigational equipment necessary for the flight.

It is recommended that the applicant discuss the proposed flight with the TC holder of the aircraft to determine the availability of technical data on the installation of additional fuel carrying facilities and/or navigational equipment.

#### **2. CRITERIA USED TO DETERMINE THE SAFETY OF ADDITIONAL FACILITIES.**

In evaluating the installation of additional facilities, the Authority or the design organisation shall find that the changed aircraft is safe for operation. To assist in arriving at such a determination, the following questions are normally considered:

- a. Does the technical data include installation drawings, structural substantiating reports, weight, balance, new centre of gravity limits computations, and aircraft performance limitations in sufficient detail to allow a conformity inspection of the aircraft to be made?
- b. In what ways does the aircraft not comply with the applicable airworthiness requirements?
- c. Are the fuel tanks vented to the outside? Are all areas in which tanks are located ventilated to reduce fire, explosion, and toxicity hazards?
- d. Are the tanks even when empty strong enough to withstand the differential pressure at maximum operating altitude for a pressurised aircraft?
- e. Have means been provided for determining the fuel quantity in each tank prior to flight?
- f. Are shutoff valves, accessible to the pilot, provided for each additional tank to disconnect these tanks from the main fuel system?
- g. Are the additional fuel tank filler connections designed to prevent spillage within the aircraft during servicing?
- h. Is the engine oil supply and cooling adequate for the extended weight and range?

#### **3. LIMITATIONS.**

The following types of limitations may be necessary for safe operation of the aircraft:

- a. Revised operational airspeeds for use in the overweight condition.
- b. Increased pilot skill requirements.
- c. A prescribed sequence for using fuel from various tanks as necessary to keep the aircraft within its centre of gravity range.
- d. Notification to the control tower of the overweight takeoff condition to permit use of a runway to minimise flight over congested areas.
- e. Avoidance of severe turbulence. If encountered, the aircraft should be inspected for damage as soon as possible.

EXAMPLE of operating limitations which may be prescribed as part of the permit to fly: Aircraft type: xxxxxx  
Model: yyyy

Limitations:

1. Maximum weight shall not exceed 8,150 pounds.
2. Maximum quantity of fuel carried in auxiliary tanks shall not exceed 106 gallons in fwd tank, 164 gallons in centre tank, and 45 gallons in aft tank.
3. Centre of gravity limits shall not exceed (fwd) +116.8 and (aft) +124.6.
4. Aerobatics are prohibited.
5. Use of autopilot while in overweight condition is prohibited.
6. Weather conditions with moderate to severe turbulence should be avoided.
7. When an overweight landing is made or the aircraft has been flown through moderate or severe turbulence while in an overweight condition, the aircraft shall be inspected for damage after landing. The inspections performed and the findings shall be entered in the aircraft log. The pilot shall determine, before the next takeoff, that the aircraft is airworthy.
8. When operated in the overweight condition, the cruising speed ( $V_c$ ) shall not exceed 185 m.p.h. and the maximum speed ( $V_{ne}$ ) shall not exceed 205 m.p.h.
9. Operation in the overweight condition shall be conducted to avoid areas having heavy air traffic, to avoid cities, towns, villages, and congested areas, or any other areas where such flights might create hazardous exposure to person or property on the ground.

**GM 21.708(d) - Control of aircraft configuration**

The applicant should establish a method for the control of any change or repair made to the aircraft, for changes and repairs that do not invalidate the conditions established for the permit to fly.

All other changes should be approved in accordance with CAR 21.713 and when necessary a new permit to fly should be issued in accordance with CAR 21.711.

**AMC 21.709(b) - Submission of documentation supporting the establishment of flight conditions**

Together with the application, the documentation required by CAR 21.709(b) shall be submitted with the approval form (GCAA Form AWF-PtF-18B) defined below, completed with all relevant information. If the complete set of data is not available at the time of application, the missing elements can be provided later. In such cases, the approval form shall be provided only when all data are available, to allow the applicant to make the statement required in box 8 of the form.

FLIGHT CONDITIONS FOR A PERMIT TO FLY – APPROVAL FORM	
<b>1. Applicant approval nr.</b> <i>[Name and organisation approval number of organisation providing the flight conditions and associated substantiations]</i>	<b>2. Approval form nr.</b> <b>Issue:</b> <i>[number and issue, for traceability purpose]</i>
<b>3. Aircraft manufacturer/type</b> <b>5. Purpose</b>	<b>4. Serial number(s)</b>
<b>6. Aircraft configuration</b> <i>The above aircraft for which a permit to fly is requested is defined in [add reference to the document(s) identifying the detailed configuration of the aircraft]</i> <i>[For change(s) affecting the initial approval form: description of change(s). This form shall be re-issued]</i>	
<b>7. Substantiations</b> <i>[References to the document(s) justifying that the aircraft (as described in 5.) can perform the intended flight(s) safely under the defined conditions or restrictions.]</i> <i>[For change(s) affecting the initial approval form: reference(s) to additional substantiation(s). This form shall be re-issued]</i>	
<b>8. Conditions/Restrictions</b> <i>The above aircraft shall be used with the following conditions or restrictions:</i> <i>[Details of these conditions/restrictions, or reference to relevant document, including specific maintenance instructions and conditions to perform these instructions]</i>	
<b>9. Statement</b> <i>The flight conditions have been established and justified in accordance with CAR 21.708.</i> <i>The aircraft as identified in block 6 above has no features and characteristics making it unsafe for the intended operation under the identified conditions and restrictions.</i>	
<i>[when approved under a privilege of an approved organisation]</i> <b>10. Approved under *ORGANISATION APPROVAL NUMBER+”</b>	
<b>11. Date of issue</b>	<b>12. Name and signature</b> <i>[Authorised signatory]</i>
<i>[when not approved under a privilege of an approved organisation]</i> <b>13. Approval and date</b> <i>the appropriate approval: GCAA</i>	

When the flight conditions are approved under a privilege, this form should be used by the approved organisation to document the approval.

### **GM 21.710 - Approval of flight conditions**

1. The approval of flight conditions is related to the safety of the design, when:
  - a. the aircraft does not conform to an approved design; or
  - b. an Airworthiness Limitation, a Certification Maintenance Requirement or an Airworthiness Directive has not been complied with; or
  - c. the intended flight(s) are outside the approved envelope;
  - d. the permit to fly is issued for the purpose of CAR 21.701(a)(15).
2. Examples when the approval of flight conditions is not related to the safety of the design are:
  - a. production flight testing for the purpose of conformity establishment;
  - b. delivery / export flight of a new aircraft the design of which is approved;
  - c. demonstrating continuing conformity with the standard previously accepted by the Authority for the aircraft or type of aircraft to qualify or re-qualify for a (restricted -) certificate of airworthiness.

### **GM 21.711(e) - Additional conditions and restrictions**

The conditions and restrictions prescribed by the Authority may include airspace restrictions to make the conditions approved under CAR 21.710 more concrete, or conditions outside the scope of the ones mentioned in CAR 21.708(b) such as a radio station license.

### **GM 21.713 Changes**

Changes to the conditions or associated substantiations that are approved but do not affect the text on the permit to fly do not require issuance of a new permit to fly. In case a new application is necessary, the substantiation for approval of the flight conditions only needs to address the change.

#### **Transfer of a permit to fly**

Except for permits to fly issued under CAR 21.701(a)(15), like aircraft without TC holder, a permit to fly is issued based upon the applicant's declaration of many aspects of the proposed flight or flights, some of which are specific to the applicant. Accordingly, the basis upon which a permit to fly has been issued necessarily is no longer fully in place when the holder of a permit to fly changes, ownership changes, and/or there is a change of register. Such changes necessitate a new application under CAR 21.707.

**SUBPART Q - IDENTIFICATION OF PRODUCTS, PARTS AND APPLIANCES****GM 21.804(a)(1)****Identification of parts and appliances**

It is not the intent of CAR 21.804(a)(1) to introduce an obligation for a production organisation (manufacturer) to mark new parts or appliances with information which is not identified by the design approval holder. Therefore, the physical marking of parts and appliances is only required when established by the design approval (TC, STC, UAE TSO, repair, minor change) holder.

For designs (TC, STC, UAE TSO, repair, change) approved after the date of entry into force CAR 21 the design approval holder is required to identify to the manufacturer how the marking in accordance with CAR 21.804(a)(1) should be done. This can be limited to identifying a marking field, possible depth and/or means etc., without prescribing the actual text or symbols to be used