

CHANGE

U.S. DEPARTMENT OF  
TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
National Policy

8110.4C CHG 1

Effective Date:  
03/28/07

**SUBJ: Type Certification**

---

**1. Purpose.** This change transmits revised pages to Order 8110.4C, *Type Certification*. This change is issued to –

**a.** Revise parts of the order related to the equivalent level of safety (ELOS) coordination memorandum between the project ACO and the accountable directorate and introduce appendix 15 which contains the ELOS memorandum template.

**b.** Revise parts of the order related to the Certification Project Notification Form, continued airworthiness, major and minor changes in type design, concurrent testing, ACO to ACO coordination, restricted category, and other items.

**c.** Update references to FAA Order 1270.1, Freedom of Information Act Program and the National Environmental Policy Act (NEPA).

**2. Who this change affects.** Branch levels of the regional aircraft certification directorates and all aircraft certification field offices.

**3. Effective Date.** The provisions of this change for this directive become effective 6 months from the date of signature.

**4. Disposition of Transmittal.** Retain this transmittal sheet until the directive is canceled by a new directive.

**PAGE CHANGE CONTROL CHART**

Remove Pages	Dated	Insert Pages	Dated
iii	10/26/05	iii	03/28/07
iv	10/26/05	iv	10/26/05
v	10/26/05	v	03/28/07
vi	10/26/05	vi	10/26/05
vii (and viii)	10/26/05	vii (and viii)	03/28/07
5	10/26/05	5	10/26/05

**Distribution:** A-W(IR/FS/EE)-3; A-X (CD/FS)-3; A-FFS-5,7(LTD), A-FFS-10;  
A-FAC-0(LTD); A-FFS-10(LTD) ; AMA-220 (50 copies); AMA-250 (20 copies)  
AFS-600 (10 copies); AEU-100 (5 copies)

**Initiated by:** AIR-110

**PAGE CHANGE CONTROL CHART (Continued)**

<b>Remove Pages</b>	<b>Dated</b>	<b>Insert Pages</b>	<b>Dated</b>
6	10/26/05	6	03/28/07
8	10/26/05	8	03/28/07
13	10/26/05	13	10/26/05
14	10/26/05	14	03/28/07
15	10/26/05	15	03/28/07
16	10/26/05	16	10/26/05
17	10/26/05	17	03/28/07
18	10/26/05	18	10/26/05
29	10/26/05	29	03/28/07
30	10/26/05	30	10/26/05
35	10/26/05	35	03/28/07
36	10/26/05	36	03/28/07
37	10/26/05	37	03/28/07
38	10/26/05	38	03/28/07
39	10/26/05	39	03/28/07
40	10/26/05	40	10/26/05
41	10/26/05	41	10/26/05
42	10/26/05	42	03/28/07
43	10/26/05	43	10/26/05
44	10/26/05	44	03/28/07
45	10/26/05	45	03/28/07
46	10/26/05	46	10/26/05
47	10/26/05	47	03/28/07
48	10/26/05	48	03/28/07
51	10/26/05	51	10/26/05
52	10/26/05	52	03/28/07
61	10/26/05	61	03/28/07
62	10/26/05	62	10/26/05
71	10/26/05	71	03/28/07
72	10/26/05	72	10/26/05
73	10/26/05	73	10/26/05
74	10/26/05	74	03/28/07
75	10/26/05	75	03/28/07
76	10/26/05	76	10/26/05
87	10/26/05	87	03/28/07
88	10/26/05	88	03/28/07
89	10/26/05	89	03/28/07
90	10/26/05	90	03/28/07

**PAGE CHANGE CONTROL CHART (Continued)**

<b>Remove Pages</b>	<b>Dated</b>	<b>Insert Pages</b>	<b>Dated</b>
91	10/26/05	91	03/28/07
92	10/26/05	92	10/26/05
95	10/26/05	95	03/28/07
96	10/26/05	96	03/28/07
97	10/26/05	97	03/28/07
98	10/26/05	98	10/26/05
99	10/26/05	99	10/26/05
100	10/26/05	100	03/28/07
101	10/26/05	101	03/28/07
102	10/26/05	102	10/26/05
107	10/26/05	107	03/28/07
108	10/26/05	108	10/26/05
115	10/26/05	115	10/26/05
116	10/26/05	116	03/28/07
121	10/26/05	121	03/28/07
122	10/26/05	122	03/28/07
127	10/26/05	127	03/28/07
128	10/26/05	128	03/28/07
129 thru 130	10/26/05	129	03/28/07
N/A	10/26/05	130	03/28/07
133	10/26/05	133	03/28/07
134	10/26/05	134	03/28/07
135	10/26/05	135	03/28/07
136	10/26/05	136	03/28/07
137	10/26/05	137	03/28/07
138	10/26/05	138	03/28/07
139	10/26/05	139	03/28/07
140	10/26/05	140	03/28/07
141 (and 142)	10/26/05	141 (and 142)	03/28/07
143	10/26/05	143	10/26/05
144	10/26/05	144	03/28/07
149	10/26/05	149	10/26/05
150	10/26/05	150	03/28/07
151	10/26/05	151	03/28/07
152	10/26/05	152	03/28/07
153	10/26/05	153	03/28/07
154	10/26/05	154	03/28/07

# **PAGE CHANGE CONTROL CHART (Continued)**

<b>Remove Pages</b>	<b>Dated</b>	<b>Insert Pages</b>	<b>Dated</b>
A1-3	10/26/05	A1-3	10/26/05
A1-4	10/26/05	A1-4	03/28/07
A1-5	10/26/05	A1-5	03/28/07
A1-6	10/26/05	A1-6	03/28/07
A1-7	10/26/05	A1-7	03/28/07
A1-8	10/26/05	A1-8	03/28/07
A1-9	10/26/05	A1-9	03/28/07
A1-10	10/26/05	A1-10	03/28/07
N/A	N/A	A1-11	03/28/07
A1-11	10/26/05	A1-12	03/28/07
A1-12	10/26/05	A1-13	03/28/07
A1-13	10/26/05	A1-14	03/28/07
A1-14	10/26/05	A1-15 (and A1-16)	03/28/07
A2-5	10/26/05	A2-5	10/26/05
A2-6	10/26/05	A2-6	03/28/07
A2-7	10/26/05	A2-7	03/28/07
A2-8	10/26/05	A2-8	10/26/05
A7-1 (and A7-2)	10/26/05	A7-1 (and A7-2)	03/28/07
A12-5	10/26/05	A12-5	03/28/07
A12-6	10/26/05	A12-6	03/28/07
A12-7	10/26/05	A12-7	03/28/07
A12-8	10/26/05	A12-8	03/28/07
A12-9 (and A12-10)	10/26/05	A12-9 (and A12-10)	03/28/07
N/A	10/26/05	A15-1 and A15-2	03/28/07

/s/

David W. Hempe  
Manager, Aircraft Engineering  
Division, AIR-100

## TABLE OF CONTENTS

### CHAPTER 1. GENERAL

<i>Paragraph</i>	<i>Page</i>
1-1. Purpose .....	<u>1</u>
1-2. General .....	<u>1</u>
1-3. Cancellation .....	<u>1</u>
1-4. Deviations .....	<u>1</u>
1-5. Explanation of Changes .....	<u>1</u>
1-6. Definitions .....	<u>5</u>
1-7. Background and Discussion .....	<u>8</u>
Figure 1-1. Aircraft Certification Service Responsibilities .....	<u>10</u>
1-8. Scope .....	<u>13</u>
1-9. Related Publications .....	<u>13</u>
1-10. Records Management .....	<u>16</u>

### CHAPTER 2. TYPE CERTIFICATION PROCESS

2-1. General .....	<u>17</u>
2-2. A Model of the Type Certification Process .....	<u>17</u>
Figure 2-1. Typical Type Certification Process .....	<u>18</u>
Figure 2-2. Events in a Typical Type Certification Process .....	<u>19</u>
2-3. Conceptual Design .....	<u>20</u>
Figure 2-3. Typical Type Certification Process .....	<u>20</u>
2-4. Requirements Definition .....	<u>22</u>
Figure 2-4. Tasks During the Requirements Definition Phase .....	<u>22</u>
Figure 2-5. Special Class Aircraft Guidance .....	<u>31</u>
Figure 2-6. Special Condition Process .....	<u>34</u>
2-5. Compliance Planning .....	<u>36</u>
Figure 2-7. Tasks During the Compliance Planning Phase .....	<u>37</u>
2-6. Implementation .....	<u>41</u>
Figure 2-8. Tasks During the Implementation Phase .....	<u>41</u>
Figure 2-9. Typical Type Certification Process, Implementation Phase .....	<u>42</u>
Figure 2-10. Implementation Phase – Compliance Data Generation Activities .....	<u>43</u>
Figure 2-11. Implementation Phase – Compliance Substantiation Activities .....	<u>47</u>
Figure 2-12. Implementation Phase – Compliance Finding Activities .....	<u>50</u>
2-7. Post Certification Activities .....	<u>57</u>
Figure 2-13. Tasks During the Post-Certification Activities Phase .....	<u>57</u>

### CHAPTER 3. TYPE CERTIFICATES

3-1. General .....	<u>65</u>
3-2. Type Certificate .....	<u>65</u>
3-3. Type Certificate Data Sheet (TCDS) .....	<u>70</u>
3-4. Preparation of TCDS and Specifications for Printing .....	<u>84</u>
3-5. Changing a specification Document to a TCDS .....	<u>84</u>

**CHAPTER 4. CHANGES IN TYPE DESIGN**

<i>Paragraph</i>	<i>Page</i>
4-1. General .....	87
4-2. Major and Minor Design Changes .....	87
4-3. Certification Basis for Changed Aviation Products .....	87
4-4. Field Approvals.....	88
4-5. Compliance Inspection .....	89
4-6. Experimental Certificate .....	89
4-7. Revisions to Performance Data .....	90
4-8. Supplemental Type Inspection Report (STIR) .....	90
4-9. When Does the FAA Issue STCs? .....	90
4-10. When Won't the FAA Issue an STC? .....	91
4-11. Technical Requirements for an STC.....	91
4-12. Compatibility Examination .....	92
4-13. Approved Model List (AML) STCs .....	92
4-14. Non-Interference STCs .....	93
4-15. STC Projects Involving Foreign-Registered Aircraft and Import Products .....	94
4-16. STC and Amended STC Applications .....	95
4-17. Establishing an STC Project .....	96
4-18. Establishing ACO to ACO Coordination .....	96
4-19. Preparing FAA Form 8110-2, Supplemental Type Certificates .....	97
4-20. ACO Report of STC .....	100
4-21. Other Foreign Supplemental Type Certificates .....	100
4-22. FAA Validation of a CAA STC under Bilateral Agreements .....	100
4-23. Obtaining a Canadian STC by Validation of a U.S. STC .....	101

**CHAPTER 5. MANUFACTURING AND ENGINEERING RESPONSIBILITIES  
AND FUNCTIONS RELATIVE TO INSPECTION, TEST, AND FLIGHT TEST**

5-1. General .....	103
5-2. FAA Aviation Safety Inspectors (Manufacturing Inspectors) .....	103
5-3. Request for Conformity and Type Inspection Authorization .....	103
5-4. Inspections Conducted Outside the District Office.....	108
5-5. Streamlined Conformity Inspection Notification Process .....	108
5-6. Process Specification Review .....	113
5-7. Requests for Conformity Inspection from Foreign CAAs .....	116
5-8. Conformity Inspection Record Reporting .....	116
5-9. Test Articles - General .....	117
5-10. Witnessing Official Test .....	117
5-11. Structural Test Articles - Aircraft .....	117
5-12. Prototype Flight Test Articles - Aircraft .....	118
5-13. Endurance Test Articles – Engines and Propellers .....	118
5-14. Teardown Inspection .....	119
5-15. Ground Inspection - Aircraft .....	120
5-16. Using Engineering Data .....	122
5-17. Airworthiness Certification of Prototype Products .....	123
5-18. Accounting for Engineering Changes .....	124
5-19. Flight Test .....	124
5-20. Function and Reliability Testing .....	129

## CHAPTER 6. ADDITIONAL INFORMATION ON SELECTED TOPICS

<i>Paragraph</i>	<i>Page</i>
6-1. Provisional Type Certificates .....	<u>131</u>
6-2. Type Certification at Restricted Category, 14 CFR § 21.25 .....	<u>133</u>
6-3. Type Certification of Civil-Derived Aircraft (Restricted Category), 14 CFR § 21.25(a)(2).....	<u>134</u>
6-4. Type Certification of Military Derived Aircraft (Restricted Category), 14 CFR § 21.25(a)(2) .....	<u>134</u>
6-5. Establishing New Restricted Category Special Purposes, 14 CFR § 21.25(b)(7) .....	<u>134</u>
6-6. Type Certification of Surplus Military Aircraft, 14 CFR § 21.27 .....	<u>134</u>
6-7. Multiple Airworthiness Certification, 14 CFR § 21.187 .....	<u>135</u>
6-8. Aerial Dispensing of Liquids .....	<u>135</u>

## CHAPTER 7. NOISE CERTIFICATION

7-1. Overview of Noise Certification Rules .....	<u>143</u>
7-2. Noise Certification Basis .....	<u>143</u>
7-3. Noise Control Act Finding .....	<u>143</u>
7-4. National Environmental Policy Act (NEPA) .....	<u>144</u>
7-5. Acceptable Means of Compliance .....	<u>144</u>
7-6. Witnessing Tests .....	<u>145</u>
7-7. Correction Procedures Evaluation .....	<u>146</u>
7-8. Noise-Related Type Certification Requirements .....	<u>147</u>
7-9. Changes to the Type Design of an Aircraft .....	<u>147</u>
7-10. Supplemental Type Certificates .....	<u>148</u>
7-11. Standard Airworthiness Certificates .....	<u>148</u>
7-12. Airworthiness Certificates for Restricted Category Aircraft .....	<u>149</u>
7-13. Designated Alteration Station (DAS) Limits .....	<u>149</u>
Figure 7-1. Type of FAA Approval Certain Aircraft Need to Meet 14 CFR part 36 Noise Standards .....	<u>150</u>
Figure 7-2. Criteria for Ensuring Design Changes to Stage 1, 2, and 3 Subsonic Transport Category Large or Turbojet-Powered Airplanes Meet 14 CFR § 36.7 Noise Standards ...	<u>151</u>
Figure 7-3. Criteria for Ensuring Design Changes to Commuter Category and Propeller-Driven small airplanes Meet 14 CFR § 36.9 Noise Standards .....	<u>153</u>
Figure 7-4. Criteria for Ensuring Design Changes to Helicopters Meet 14 CFR part 36 Noise Standards .....	<u>154</u>

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (14 pages)

Figure 1. Instructions for Completion of FAA Form 8110-12, Application for TC, PC, or STC .....	<u>A1-1</u>
Figure 2. Sample FAA Form 8110-12 .....	<u>A1-2</u>
Figure 3. Standardized Certification Project Notification Procedures .....	<u>A1-4</u>
Figure 4. Standardized Certification Project Notification Form .....	<u>A1-9</u>
Figure 5. ACOS Project, TC, and STC Numbering System .....	<u>A1-11</u>
Figure 6. Project Significance for ACO to ACO Coordination .....	<u>A1-13</u>
Figure 7. Sample Type Certification Project Plan .....	<u>A1-14</u>

**APPENDIX 2. ISSUANCE OF CERTIFICATES (12 pages)**

<i>Paragraph</i>	<i>Page</i>
Figure 1. Instructions for Preparation of Form 8110-9, TC .....	A2- 1
Figure 2. Sample Type Certificate, FAA Form 8110-9 .....	A2- 2
Figure 3. Sample Supplemental Type Certificate, FAA Form 8110-2.....	A2- 4
Figure 4. Sample Documenting a Certification Basis .....	A2- 6
Figure 5. Sample Written Permission Statements for an STC .....	A2- 9
Figure 6. Sample Type Certificate Data Sheet First Page with TC Holder Record Paragraph .....	A2-10
Figure 7. Sample Type Certification Data Sheet First Page with Products Codes (Designations) .....	A2-11

**APPENDIX 3. LIST OF FAA FORMS (1 page)****APPENDIX 4. CONFORMITY (12 pages)**

Figure 1. Completion of FAA Form 8120-10, Request for Conformity .....	A4- 1
Figure 2. Request for Conformity, FAA Form 8120-10 .....	A4- 3
Figure 3. Completion of FAA Form 8100-1, Conformity Inspection Record.....	A4- 5
Figure 4. Statement of Conformity, FAA Form 8130-9 from Applicant .....	A4- 7
Figure 5. Statement of Conformity, FAA Form 8130-9 from Agent for Applicant.....	A4- 9
Figure 6. Type Inspection Authorization, FAA Form 8110-1 .....	A4-11

**APPENDIX 5. CANADIAN STCs (3 pages)**

Figure 1. Formal Canadian STC Application Request.....	A5- 1
Figure 2. Transport Canada Regional Managers, Aircraft Certification .....	A5- 2
Figure 3. Sample Letter of Request.....	A5- 3

**APPENDIX 6. LIST OF ACRONYMS (3 pages)****APPENDIX 7. AIRCRAFT CERTIFICATION OFFICES (1 page)****APPENDIX 8. AIRCRAFT EVALUATION GROUP (1 page)****APPENDIX 9. AIRCRAFT CERTIFICATION SERVICE (1 page)****APPENDIX 10. DATA RETENTION (3 pages)**

Figure 1. Project Records .....	A10- 1
Figure 2. Type Design and Substantiating Data.....	A10- 2
Figure 3. Working Papers .....	A10- 3

**APPENDIX 11. HISTORICAL BACKGROUND OF AIRCRAFT AIRWORTHINESS REGULATIONS (1 page)****APPENDIX 12. ISSUE PAPERS (9 pages)**

**APPENDIX 13. ISSUE PAPER FORMAT/TEMPLATE (10 pages)***Paragraph**Page*

Figure 1. Issue Paper Coordination Grid.....	A13- 7
Figure 2. Issue Paper Format .....	A13- 9

**APPENDIX 14. SAMPLE ISSUE PAPER (3 pages)****APPENDIX 15. ELOS MEMORANDUM TEMPLATE (2 pages)**



(53) Paragraph 5-17 was paragraph 5-12.

(54) Paragraph 5-18 was paragraph 5-13.

(55) Paragraph 5-19 was paragraph 6-4, but has been revised due to issuance of revised FAA Order 8110.41, Aircraft Certification Service FAA Flight Test Responsibilities, Procedures, and Training.

(56) Paragraph 5-20 was paragraph 5-14.

(57) Paragraph 6-1 addresses provisional TCs.

(58) Paragraphs 6-2 through 6-6 were paragraphs 6-1 and 6-2.

(59) Paragraph 6-7 addresses multiple airworthiness certification, 14 CFR § 21.187.

(60) Paragraph 6-8 addresses procedures for approving aerial dispensing of liquids.

(61) Chapter 7 was created to capture all 14 CFR part 36 (noise) requirements. These requirements were paragraph 6-3.

(62) Appendix 1 incorporates numerous revised forms and guidance for establishing certification projects.

(63) Appendix 2, figure 7 incorporates products codes (designations) used on TCDSs for small airplanes, rotorcraft, and engines.

(64) Appendix 5, figure 2 lists current Transport Canada Aircraft Certification Divisions' addresses.

(65) Appendix 12 describes issue papers procedures.

(66) Appendix 13 gives a format and template for issue papers.

(67) Appendix 14 gives a sample issue paper.

## **1-6. DEFINITIONS.**

**a. Amended TC** – an approval for a change to a TC, made by the TC holder. Only the holder of the TC may apply for an amended TC.

**b. Certificate Management ACO (CMACO)** – the ACO managing the product's TC. The CMACO also manages the continued airworthiness for all products it approves for as long as the products are in service.

**c. Certification Plan** – the applicant's intended means for showing that a product complies with the applicable regulations.

**d. Certification Process Improvement (CPI)** – an initiative to improve safety by fostering better communications, project management, and accountability between design approval applicants and the FAA, set forth by a job aid titled *The FAA and Industry Guide to Product Certification*.

**e. Certification Project Notification (CPN)** – a form (see appendix 1, figure 4 of this order) used by the project manager to notify the accountable directorate of a new project. The accountable directorate also uses a CPN to classify the project significant or not significant.

**f. Certification Project Plan (CPP)** – a living document (see appendix 1, figure 7 of this order) used to coordinate schedules, responsibilities, and personnel resources between the accountable directorate and project ACO.

**g. Designees** – a non-FAA person appointed by the FAA in accordance with 14 CFR part 183, Subpart A. This person has been delegated the responsibilities of a FAA manufacturing inspector, engineer, or test pilot. Designees may be authorized to perform the functions listed in 14 CFR part 183, Subpart C.

**h. Field Approval** – a method by which FAA approves technical data used to accomplish a major repair or a major alteration on a single aircraft, provided the repair or alteration is not classified as a major change in type design. An FAA inspector's signature in Block 3 of an FAA Form 337, Major Repair and Alteration, approves the data referenced on the form.

**i. Flight Test** – for the purpose of this order, any ground or flight test performed on the product test article that is controlled or evaluated by FAA flight test personnel (or their designees), in support of appropriately authorized official testing.

**j. Partnership for Safety Plan (PSP)** – an agreement between a design approval applicant and the FAA describing how they will work together to certify and maintain integrity of the design approvals.

**k. Parts Manufacturer Approval (PMA)** – an FAA design and production approval to manufacture replacement and modification parts that comply with the regulations. See Order 8110.42, Parts Manufacturer Approval Procedures.

**l. Product** – for type certification, an aircraft, an aircraft engine, or a propeller. The word product has other meanings in different contexts, such as export airworthiness approvals (see 14 CFR § 21.1(b)).

**m. Production Certificate (PC)** – an approval by the FAA to manufacture or alter a product after having shown compliance with an approved type design. The FAA issues a PC to a TC holder (this includes STC holders) or a licensee of a TC holder, who meets the requirements of 14 CFR §§ 21.135, 21.139, and 21.143.

**n. Project ACO (PACO)** – the ACO working a certification project. The PACO may need to coordinate with the CMACO, if the project is a follow-up certification activity, such as an STC or PMA.

**o. Project Specific Certification Plan (PSCP)** – an integrated planning and project management tool combining the information from the applicant’s certification plan, the FAA’s CPP, and other information recommended in *The FAA and Industry Guide to Product Certification*.

**p. Provisional Type Certificate** – a time and operationally limited design approval that the FAA issues, upon request. Even though the FAA has not completed its findings of compliance to issue a TC, the FAA issues a provisional type certificate after the applicant has completed the necessary tests, analyses, and computations to show that the product complies with the applicable regulations. See 14 CFR part 21 Subpart C.

**q. Significant Change** – as defined in Order 8110.48, How to Establish the Certification Basis for Changed Aeronautical Products, a change to the TC is significant to the extent it changes one or more of the following: general configuration, principles of construction, or the assumptions used for certification. The change is not extensive enough to be considered a substantial change. See Order 8110.48 for more information.

**r. Significant Project** – a type certification project for a new TC or for a change to a TC. This type of project meets the criteria listed in paragraph 2-4c(1) below.

**s. Supplemental Type Certificate (STC)** – a TC that the FAA issues to an applicant who alters a product by introducing a major change in type design (as defined by 14 CFR § 21.93(a)). The STC process is essentially the same as the TC process; differences are discussed in chapter 4 below.

**(1) One-Only STC** – a special case of limiting the change to a specific serial numbered aircraft, the FAA does not require the STC data to be sufficient for accurate reproducibility.

**(2) Multiple STC** – any STC that is not “One-Only.”

**(3) Approved Model List (AML) STC** – a special case of multiple STC using an AML to control installation eligibility, such that adding new make and model products does not require amendment of the STC.

**(4) Non-Interference STC** – a special case of STC approving a product modification that provides a convenience or function that is not required by the applicable operating rules or airworthiness standards applicable to the aircraft’s intended operations.

**t. Type Certificate (TC)** – a design approval issued by the FAA when the applicant demonstrates that a product complies with the applicable regulations. As defined by 14 CFR § 21.41, the TC includes the type design, the operating limitations, the TCDS, the applicable regulations, and other conditions or limitations prescribed by the Administrator. The TC is the foundation for other FAA approvals, including production and airworthiness approvals.

**u. Type Certification Board (TCB)** – an FAA management team responsible for acquainting the applicant with the certification process, resolving significant problems, and establishing a schedule for the overall accomplishment of the type certification project.

**v. Type Certification Board Meeting (TCBM)** – any formal meeting between the TCB and the applicant to coordinate the move to the next project phase or resolve issues preventing progress to the next phase. Examples include preliminary, interim, pre-flight, and final TCBMs.

**w. Type Design** – the engineering definition of a particular product. The type design consists of the following (see 14 CFR § 21.31):

- (1) Drawings and specifications,
- (2) Dimensions, materials, and processes,
- (3) Airworthiness limitations,
- (4) (for primary category aircraft, if desired) A special inspection and preventive maintenance program designed to be accomplished by an appropriately rated and trained pilot-owner, and
- (5) Other data to describe the product design, and to determine the airworthiness, noise characteristics, fuel venting, and exhaust emissions (where applicable).

**x. Validation** – as defined in Order 8110.52, Type Validation and Post-Type Validation Procedures, a special form of certification used to establish the compliance of an imported product to the importing state's applicable airworthiness standards. See Order 8110.52 for additional information.

## **1-7. BACKGROUND AND DISCUSSION.**

**a. Order 8110.4, Type Certification**, is primarily written for internal use by the FAA, its designees, and delegated organizations. The order provides procedures and policy for the type certification of products. The office of primary responsibility for this order is the Aircraft Certification Service's (AIR), Aircraft Engineering Division's (AIR-100), Certification Procedures Branch (AIR-110). Unless stated otherwise, the type certification process in this order applies to all U.S. TCs, including amended TCs and STCs.

**b. Title 49 of the United States Code (49 USC) section 40101 and Subsequent.**

(1) 49 U.S.C. § 40101 and subsequent re-codifies the Federal Aviation Act of 1958. Title 49 U.S.C. § 44701 directs the FAA to promote safety of flight of civil aircraft in air commerce by prescribing and revising minimum standards. These standards set requirements for the design, materials, workmanship, construction, operation, and performance of aircraft, aircraft engines, and propellers. The Aircraft Certification Regulatory Program (ACRP) was developed to accomplish this mission. Appendix 11 of this order gives the history of aircraft airworthiness regulations.

## 1-8. SCOPE.

a. Type certification, the subject of this order, is one way the FAA promotes safety of flight. Although the FAA is organized to focus on the various aspects of safety through separate internal organizations, these aspects are not independent. For example, before manufacturing a product, an applicant must have a design approval (that is, TC, STC, amended TC, amended STC) and a PC or other FAA production approval. Similarly, before manufacturing a component or spare part (for sale) the applicant must have a PMA or a TSO authorization. These approvals require concurrent work between the ACO and the MIDO. This order focuses on the design approval process conducted by ACOs. It also addresses other aspects of safety, such as airworthiness (airworthiness certificates), manufacturing (production approval), maintenance, and operations (continued airworthiness) as they relate to design approval (type certification). For a more complete understanding of aircraft certification, see the related material listed on the FAA web page and particularly the FAA orders listed in paragraph 1-9, Related Publications, below.

b. The experienced applicant recognizes value in addressing various safety aspects in a unified, coordinated approach. The FAA encourages applicants to develop a plan for working with their geographic ACO that considers all safety aspects. Find guidance on developing such a plan, known as the Partnership for Safety Plan (PSP), in *The FAA and Industry Guide to Product Certification* ([www.faa.gov/aircraft/air\\_cert/design\\_approvals/media/CPI\\_guide\\_II.pdf](http://www.faa.gov/aircraft/air_cert/design_approvals/media/CPI_guide_II.pdf)). This plan:

- (1) Is a tool that helps determine how much attention the various safety aspects warrant and helps the FAA establish priorities that best promote safety,
- (2) Addresses the unique characteristics of the applicant's affiliation with the FAA,
- (3) Remains independent of specific projects,
- (4) Identifies expectations and develops specific interface procedures between the applicant and the FAA, within the limits of FAA regulations and policy, and
- (5) Helps the FAA build a constructive relationship with the applicant, including how the FAA and the applicant hold each other accountable.

c. Although *The FAA and Industry Guide to Product Certification* is broader in scope than this order, we mention it because its principles and tools are intended to improve the efficiency of the type certification process described here.

## 1-9. RELATED PUBLICATIONS.

a. **FAA Manual** IR-04-01, Records Management Requirement Manual

b. **FAA Orders.**

- (1) FAA Order 1050.1, Policies and Procedures for Considering Environmental

Impacts

- (2) FAA Order 1270.1, Freedom of Information Act Program
- (3) FAA Order 1350.14, Records Management
- (4) FAA Order 1370.81, Electronic Mail
- (5) FAA Order 4040.26, Aircraft Certification Service Flight Safety Program
- (6) FAA Order 7110.65, Air Traffic Control
- (7) FAA Order 8000.79, Use of Electronic Technology and Storage of Data
- (8) FAA Order 8100.5, Aircraft Certification Service Mission, Responsibilities, Relationships, and Programs.
- (9) FAA Order 8100.8, Designee Management Handbook
- (10) FAA Order 8100.9, DDS Order
- (11) FAA Order 8100.11, Developing Undue Burden and No Undue Burden Decision Papers Under 14 CFR part 21
- (12) FAA Order 8110.37, DER Guidance Handbook
- (13) FAA Order 8110.41, Aircraft Certification Service Flight Test Pilot Training, Responsibilities, Procedures, and Training
- (14) FAA Order 8110.42, Parts Manufacturer Approval Procedures
- (15) FAA Order 8110.44, Conformity Inspection Notification Process
- (16) FAA Order 8110.48, How to Establish the Certification Basis for Changed Aeronautical Products
- (17) FAA Order 8110.49, Software Approval Guidelines
- (18) FAA Order 8110.52, Type Validation and Post-Type Validation Procedures
- (19) FAA Order 8110.54, Instructions for Continued Airworthiness – Responsibilities, Requirements, and Contents.
- (20) FAA Order 8110.56, Restricted Category Type Certification
- (21) FAA Order 8120.2, Production Approval and Certificate Management Procedures
- (22) FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products
- (23) FAA Order 8130.29, Issuance of a Special Airworthiness Certificate for Show Compliance Flight Testing

- (24) FAA Order 8150-1, Technical Standard Order Procedures
- (25) FAA Order 8300.10, Airworthiness Inspector's Handbook
- (26) FAA Order 8400.10, Air Transportation Operations Inspector's Handbook (particularly Volume 8, Chapter 3)
- (27) FAA Order 8700.1, General Aviation Operations Inspector's Handbook

**c. FAA Advisory Circulars (AC).**

- (1) AC 20-135, Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards and Criteria
- (2) AC 21.17-1, Type Certification – Airships
- (3) AC 21.17-2, Type Certification – Fixed Wing Gliders
- (4) AC 21.17-3, Type Certification of Very Light Airplanes
- (5) AC 21-23, Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products Imported into the United States
- (6) AC 21-24, Extending a Production Certificate to a Facility Located in a Bilateral Airworthiness Agreement Country
- (7) AC 21-40, Application Guide for Obtaining a Supplemental Type Certificate
- (8) AC 23-8, Flight Test Guide for Certification of Part 23 Airplanes
- (9) AC 25-7, Flight Test Guide for Certification of Transport Category Airplanes
- (10) AC 25-19, Certification Maintenance Requirements
- (11) AC 25.571-1, Damage Tolerance and Fatigue Evaluation of Structure
- (12) AC 27-1, Certification of Normal Category Rotorcraft
- (13) AC 29-2, Certification of Transport Category Rotorcraft
- (14) AC 33-2, Aircraft Engine Type Certification Handbook
- (15) AC 36-4, Noise Certification Handbook
- (16) AC 121-22, Maintenance Review Board

**d. National Aeronautics and Space Administration (NASA) documents.**

(1) Burk, Sanger M. Jr., Summary of Design Considerations for Airplane Spin-Recovery Parachute Systems; NASA TN D-6866, August 1972.

(2) Bradshaw, Charles F., A Spin-Recovery System for Light General Aviation Airplanes; NASA CP-2127, 14th Aerospace Mechanics Symposium, May 1980.

(3) Stough, Paul H. III, A Summary of Spin-Recovery Parachute Experience on Light Airplanes; AIAA Paper Number 90-1317, AIAA/SFTE/DGLR/SETP Fifth Biannual Flight Test Conference, May 1990.

**1-10.RECORDS MANAGEMENT.** Refer to Orders 0000.1, FAA Standard Subject Classification System; 1350.14, Records Management; and 1350.15, Records, Organization, Transfer, and Destruction Standards; or your office Records Management Officer or Directives Management Officer for guidance regarding retention or disposition of records.

## CHAPTER 2. TYPE CERTIFICATION PROCESS

**2-1. GENERAL.** This chapter describes the process for U.S. applicants to obtain a U.S. TC for their product under 14 CFR § 21.21. Follow Order 8110.52 when U.S. applicants seek foreign TCs and when non-U.S. applicants seek U.S. TCs. The process given in this chapter applies to the four kinds of TCs: TC, amended TC, STC, and amended STC. Some of the steps or procedures in this chapter may not apply to all certification projects because some of the steps or procedures may not be needed due to the design features of the proposed product or the design features of the proposed change to the product. However, if an official flight test was required, then all steps and procedures related to issuance and closure of a TIA are necessary and cannot be omitted. This chapter models the standard type certification process, describes responsibilities of the parties, and presents the administrative methods and tools FAA personnel use in conducting a type certification project. Processes unique to STCs are discussed in chapter 4.

### **2-2. A MODEL OF THE TYPE CERTIFICATION PROCESS.**

**a. Description.** The model presented in the following sections is a high-level flow diagram of the certification events that typically make up the life cycle of an aircraft. It is meant to explain the type certification process, not to dictate precisely how the project should flow. Certain assumptions and simplifications were made so that the model clearly shows the relationship of the various events and milestones. Although the model shows the proper sequence of events for certifying a product, the various aspects of the project generally progress through the process at different times and at different rates. It is useful to think of a project as multiple certification items worked to this model on individual but inter-related schedules.

**b. Applying the Model.** Below are factors for the FAA and the applicant to consider while using this model to plan and manage the project.

(1) At times, the model implies a transport category airplane intended for 14 CFR part 121 air carrier operations. However, the basic certification principles of the model apply to any FAA design approval project.

(2) The scope, magnitude, and complexity of the project influence the relative importance of the events specified in the model. On less-demanding projects, events may be combined, conducted informally, or skipped all together.

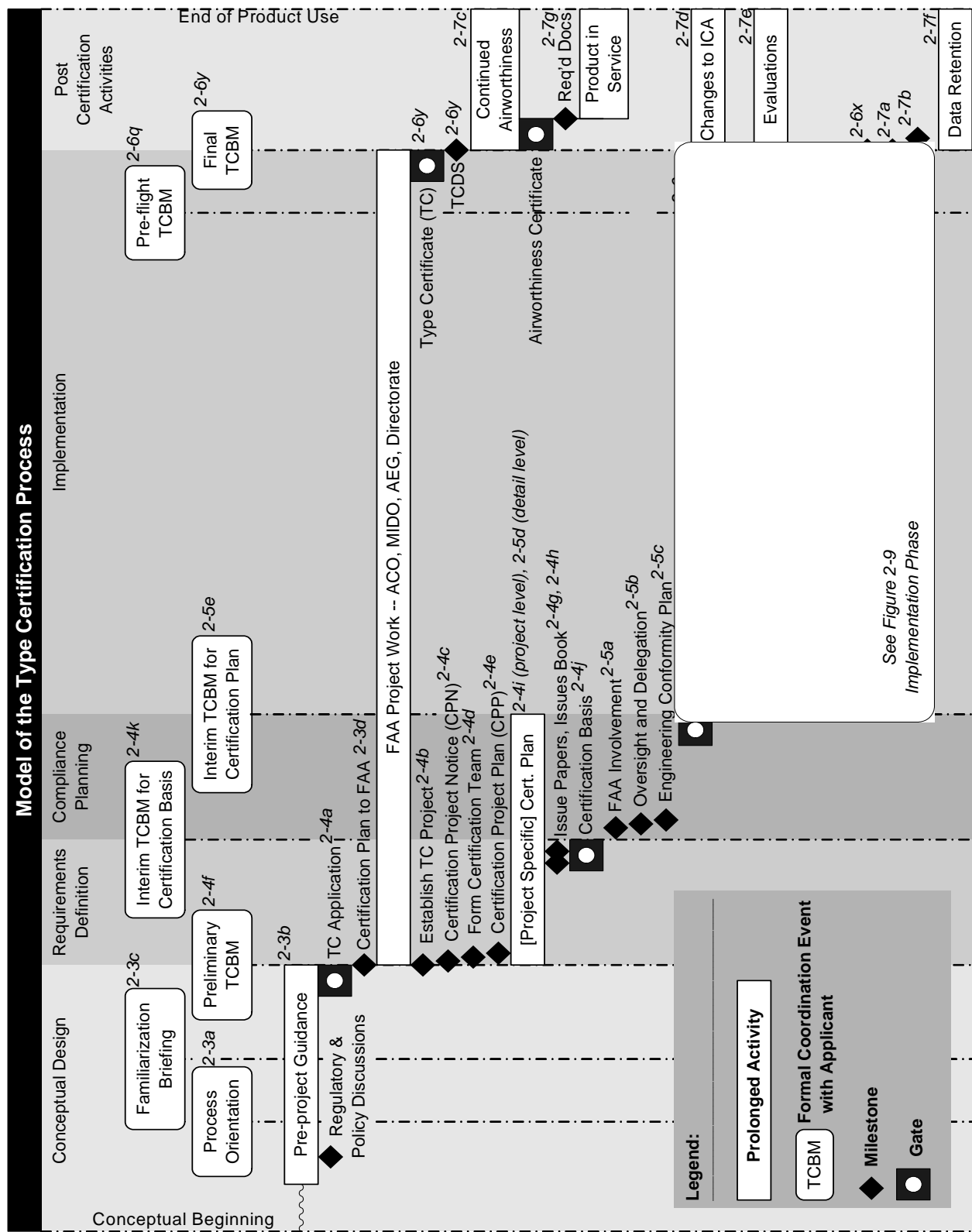
(3) Engineering design is an iterative process. Few projects will traverse the timeline directly from left to right.

(4) Planners work with limited information. As the project progresses, keep plans flexible and revise as necessary.

(5) Allocate lead-time for meeting the milestone. None are shown in the figure.

**c. Overview of a Typical Type Certification Process.** The model divides the product's type certification life cycle into phases based on *The FAA and Industry Guide to Product Certification*. Figure 2-1, Typical Type Certification Process, diagrams the flow of events through these phases. The numbers next to each event correspond to descriptive paragraphs for the event.

FIGURE 2-1. TYPICAL TYPE CERTIFICATION PROCESS



Individuals participating in discussions should be identified by titles only.

**e. Develop Certification Project Plan (CPP).** The CPP defines the working relationship between the accountable directorate and PACO for a specific type certification project. The CPP is the principal project coordination tool that the project manager updates throughout the project. The CPP sets the proposed project schedule as well as the resources and responsibilities to be allocated from both the accountable directorate and PACO in order to support the applicant's schedule. Early commitment of FAA resources combined with a realistic project schedule will enable the accountable directorate and PACO to plan and direct their resources more effectively. The CPP represents our plan to support the applicant's schedule. The project manager and project officer should follow the CPP in draft form until the project develops sufficiently for preparation of a final CPP. The project manager submits the CPP final plan through the ACO manager to the accountable directorate manager for approval. The applicant's certification plan may take the place of the CPP when it includes all of the information that should be in the CPP and is coordinated with the project officer. See appendix 1, figure 7, of this order for a sample type CPP.

**NOTE:** The applicant's certification plan and the CPP are combined to form the basis of the PSCP for those projects using the techniques and guidance from *The FAA and Industry Guide to Product Certification*.

**f. The Preliminary TCB Meeting** is the initial formal meeting that establishes the basis for all integrated certification planning combining the interests of engineering, flight test, manufacturing, and maintenance and operations. Use this meeting to determine if the TCB and the applicant are adequately familiar with the various aspects of the project and to determine whether the project is mature enough to begin defining the requirements. Obtain mutual commitment to the issues and acceptance of the risks before proceeding into the requirements definition phase. This meeting should:

- (1) Update and further acquaint FAA personnel with the project,
- (2) Work toward establishing the certification basis,
- (3) Open discussion of design details and possible problem areas with specialists,
- (4) Identify areas needing the formation of special compliance teams to attain the earliest possible resolution of potential problems,
- (5) Identify novel or unique design features, materials, or processes, and
- (6) Establish a schedule for the certification project.

**NOTE:** Developing the certification basis may require follow-up meetings between the ACO and the applicant. If the certification basis can't be established quickly and easily, consider re-assembling the certification team by scheduling an interim TCB meeting for finalizing the certification basis.

**g. Issue Paper.** An issue paper provides a means for identifying and resolving significant technical, regulatory, and administrative issues occurring during the certification

process. Issue papers are primarily intended to provide an overview of significant issues, a means of determining the status of issues, and a basis for a post-certification summary statement on how issues were resolved. See appendices 12 through 14 of this order for detailed information regarding issue paper procedures, issue paper forms and templates, and a sample issue paper.

**h. Issues Book.** The project manager assembles issue papers and publishes them in the form of an issues book for distribution to the TCB members, project team members, applicant, and the accountable directorate. The issues book may be revised to add new issue papers or update existing papers without holding a formal TCB meeting, provided that the new or updated issue paper can be coordinated through the applicant and TCB.

**i. The Project Specific Certification Plan (PSCP)** is the primary project management tool for coordinating activities between the FAA and applicants choosing to implement the techniques and guidance described in *The FAA and Industry Guide to Product Certification*. The PSCP combines information from the applicant's certification plan and the FAA's CPP with additional project details to support an effective certification project. It is also the depository for milestones, performance measures, and information unique to the certification project. The FAA and the applicant's certification teams begin developing the PSCP when they have collected the information needed in the applicant's certification plan (discussed in paragraph 2-3d of this order) and the CPP (discussed in paragraph 2-4e of this order). This combined certification team adds additional planning information to meet the objectives outlined in *The FAA and Industry Guide to Product Certification*. Although the PSCP is a plan subject to change, the commitments made by each party are the expectations of the signatories. When developing a PSCP, ensure commitments:

- (1) Remain within the authority of the signatories,
- (2) Are consistent with FAA regulations or policy,
- (3) Do not redefine certificate eligibility (for example, agreeing to a fixed certification date),
- (4) Can be met even in circumstances less than ideal, and
- (5) Consider obligations made to other projects and applicants.

**j. Certification Basis.** Early in a TC project, the FAA establishes the certification basis, defining the applicable requirements of 14 CFR for the issuance of the TC. The certification basis identifies the specific 14 CFR parts and amendment levels with which the applicant must show compliance before the issuance of the TC. The certification basis includes the applicable airworthiness standards for the category of the TC to be issued. It also includes the applicable aircraft noise, fuel venting, and exhaust emission requirements contained in 14 CFR. The FAA makes every effort to ensure the certification basis is correct at the beginning of the project and the applicant is advised of all regulatory aspects including operational requirements contained in other subchapters in 14 CFR. The certification basis is established by the FAA and agreed to by the applicant, based on a mutual understanding of the design features of the product to be certificated. Upon agreement of the certification basis, new policy will not be imposed unless

**(4) Equivalent Level of Safety (ELOS) Finding.** ELOS findings are made by the accountable directorate when literal compliance with a certification regulation cannot be shown and compensating factors in the design can be shown to provide a level of safety equivalent to that established by the airworthiness standards. An ELOS finding may document a method of compliance that is different from what is stated in the rule, but is judged as acceptable by the FAA.

**(a) Use Issue Paper to Develop the ELOS Finding.** The FAA and the applicant work together using the issue paper process to develop the proposed ELOS finding for submittal to the directorate. See appendix 12, paragraphs 2f and 3 of this order for the procedures to follow. All ELOS findings must be listed on the TCDS or the STC. The TCDS or STC identifies an ELOS memorandum, explaining the basis for the FAA's acceptance of the applicant's proposal that the compensating features provide an ELOS to the literal airworthiness standard.

**(b) Develop ELOS Memorandum.** Unlike special conditions or exemptions, the ELOS finding is not developed through a public comment process. The ELOS memorandum is a publicly releasable document that is a part of the certification basis. Title 14 CFR § 21.41 identifies among other items, the certification basis of an aircraft as part of the TC. A certification basis is releasable to the public, in contrast to an issue paper that may contain proprietary information. The issue paper originator or the project manager constructs the ELOS memorandum from the issue paper, ensuring that the memorandum contains the information called for in appendix 12, paragraphs 2f (1) through (6). Use the issue paper conclusion to the maximum extent practical and assure that the language in the public document accurately reflects the issue paper conclusion.

**NOTE:** Ensure all sensitive or proprietary information is kept out of the ELOS memorandum. Refer to paragraph 2.6 k.(1) of this order.

**(c)** The accountable directorate, in turn, will inform the certification office of their evaluation and concurrence of the ELOS. See appendix 15 for the standardized ELOS Memorandum template. Also, refer to the RGL ELOS section for examples of ELOS memorandum request and acceptance documents.

**(d)** The accountable directorate staff will assign a reference number to the ELOS memorandum to allow its access from the FAA's Regulatory and Guidance Library (RGL) electronic database. This ELOS memorandum number should be listed in the TCDS under the Certification Basis section (TCs and ATCs) or in the Limitations and Conditions section of the STC Certificate.

**(5) Exemptions.** An exemption is a grant of relief to an applicant from the requirement of a specified airworthiness standard. A petition for exemption follows the procedures for public comment on rulemaking that are described in 14 CFR part 11. The applicant should submit a petition for exemption to the FAA accountable directorate through the ACO. This permits the directorate to monitor the progress of the development of the certification basis.

Title 14 CFR § 11.81 states the information that the applicant must provide in a petition for exemption. The FAA considers the following before granting an exemption: the requested exemption must benefit the public as a whole; and, granting the exemption would either not adversely affect safety or the exemption would provide a level of safety at least equal to that provided by the rule from which relief is sought.

**NOTE:** If the applicant submits the petition for exemption according to the instructions in 14 CFR § 11.63(b), also request that a copy be provided to the ACO for coordination with the accountable directorate.

**(a) Use ELOS Finding Instead of an Exemption, if Possible.** If the applicant's petition for exemption makes a case that the proposal would provide a level of safety at least equal to that provided by the rule from which relief is sought, the FAA may agree to make an ELOS finding rather than go through the rulemaking process of an exemption. ELOS findings can generally be made more quickly than exemptions. Coordinating the petition for exemption with the accountable directorate will allow this determination to be made.

**(b) Granting the Exemption Would Be in the Public Interest.** The FAA may determine that the public interest would be served by granting an exemption. For example, the FAA may grant a time-limited exemption to allow the applicant time to resolve unanticipated inconsistencies between an optional equipment variant and the original type-certificated equipment. Also, the FAA may permit a time-limited exemption in situations where new guidance for standardized methods of compliance needs to be developed, such as for dynamic testing of side-facing.

**j. Interim TCB Meeting for Certification Basis** is the formal meeting to finalize the amendment level of applicable seats airworthiness, noise, and emissions regulations; special conditions; exemptions; and ELOS findings for the project. Although not always necessary, consider holding this TCB meeting to expedite the resolution of certification basis issues.

**(1)** If the meeting does not result in an established certification basis, it should establish a clear understanding of the actions needed to resolve the issues and assignment of those actions to the responsible people. Record duty assignments and due dates in the TCBM minutes.

**(2)** Use this meeting to clarify the certification risks of proceeding without a complete definition of the certification requirements. The applicant has risks that include the project schedule, redesign, and retesting. The FAA risks not being able to assign resources at critical times to complete the project. Before proceeding into the next phase, obtain mutual commitment to resolving the issues and an acceptance of the risks. If the project is not ready to proceed, schedule a follow-up interim TCB meeting for certification basis.

## **2-5. COMPLIANCE PLANNING.**

**FIGURE 2-7. TASKS DURING THE COMPLIANCE PLANNING PHASE**

FAA Involvement.....	2-5a
Oversight and Delegation.....	2-5b
Conformity for Engineering Purposes.....	2-5c
Completed [Project Specific] Certification Plan.....	2-5d
Interim TCB Meeting for [Project Specific] Certification Plan Agreement .....	2-5e

**a. FAA Involvement.** For planning purposes, the FAA's and the applicant's certification teams need to know in which aspects of the project the FAA intends involvement and at what level. The heavy workloads for FAA personnel limit involvement in certification activities to a small fraction of the whole. FAA type certification team members must review the applicant's design descriptions and project plans, determine where their attention will derive the most benefit, and coordinate their intentions with the applicant.

(1) When a particular decision or event is critical to the safety of the product or to the determination of compliance, the FAA must be directly involved (as opposed to indirect FAA involvement by, for example, DERs). Project team members must build on their experience to identify critical issues. Some key issues that will always require direct FAA involvement include rulemaking (such as for special conditions), ELOS determinations, development of issue papers, and compliance findings considered unusual or typically reserved for the FAA. While these items establish the minimum direct FAA involvement, additional critical safety findings must also be identified based on the safety impact or the complexity of the requirement or the method of compliance. Additional factors to consider in determining the areas of direct FAA involvement include the FAA's confidence in the applicant, the applicant's experience, the applicant's internal processes, and confidence in the designees.

(2) Focusing FAA resources on the most critical areas maximizes the use of the delegation system while allowing for oversight and best use of the ACO's limited resources. FAA confidence in designees allows for full delegation for other than inherently governmental areas or new standards that are developing an experience base. Furthermore, confidence that the important safety areas are covered promotes greater delegation.

**b. Oversight and Delegation.**

(1) Once the project team has determined the findings requiring FAA involvement, all other compliance requirements should be considered acceptable for delegation. Once a finding is delegated, any increase in direct FAA involvement should be determined based on the value of the direct FAA involvement. Keep in mind, the value of involvement decreases when appropriate trust and designee capability exists to make the finding. However, when confidence in the designee is lacking or the designee is inexperienced, the value of direct FAA involvement increases. There will also be less tangible reasons for direct FAA involvement in a delegated finding, including involvement that is the result of project oversight or DER oversight, or to develop FAA team-member knowledge of the product. This type of direct FAA involvement should be planned so that it does not adversely impact the project schedule.

(2) Team members should establish levels of individual designee oversight they will perform based on the value of the FAA review and the risk of not reviewing the delegated

finding. For the purpose of estimating the amount of direct FAA involvement in making compliance findings, the DER managers should classify findings into the following three categories:

(a) Findings that will need no further ACO review – The FAA accepts that the designees are solely responsible for scheduling and making the finding. The FAA will accept the finding without additional involvement or impact to the project schedule. Findings in this category require no direct FAA involvement.

(b) Findings that will benefit from ACO review – Although the designees will be delegated to make these findings, the FAA may review the findings for the purpose of project oversight or DER oversight. The FAA will have discretion to identify what to review and the amount of review necessary. FAA review can vary from a cursory review of the DER's submittal to complete evaluation of the DER's methods. Deficiencies identified during review should be addressed with the DER or applicant as appropriate. Findings in this category require judicious use of the available FAA resources to manage the project and DERs effectively.

(c) Findings requiring ACO involvement – Although the designees may be involved by recommending approval of data, the FAA is responsible for making these findings. These findings should be related to key areas reserved for the FAA, derive significant value from direct FAA involvement, or result in unacceptable risk if the ACO is not involved. Findings in this category result in a commitment of ACO resources to support the agreed-to project schedule.

**NOTE:** Although the applicant needs to be informed of which findings are reserved for the FAA, the review or non-review of delegated findings is a matter of internal ACO resource planning, and should not be communicated to the applicant or designees. Items planned to be accepted without review may change status and require review due to applicant and designee performance during the project (for example, when deficiencies are identified in other findings).

**c. Conformity for Engineering Purposes.** The FAA uses conformity inspections for both quality assurance and engineering purposes. FAA conformity is a validation of the applicant's conformity. As part of the type certification process, the ACO must identify the minimum level of conformity inspections needed for certification. During the inspection, FAA manufacturing inspectors base the depth of their assessment on factors such as quality of the applicant's conformity paperwork, comparison of inspection results, and magnitude and complexity of the inspection.

(1) The applicant is responsible for identifying the test articles that will be used to generate compliance data, and for conducting 100 percent applicant conformity of those test articles as required by 14 CFR § 21.33(b). The ACO is responsible for identifying features, attributes, and components critical to the test results and for requesting FAA conformity on these test articles with special instructions as necessary. The MIDO is responsible for determining what conformity inspections will be necessary for processing production approvals. Because both offices need FAA conformity inspections for different purposes, the ACO and MIDO should finalize a comprehensive conformity plan (also known as conformity verification plan) together. Base this conformity plan on the test article and schedule data in the applicant's certification plan.

(2) To expedite agreement of a completed PSCP, applicants should develop their test article and schedule data into a conformity plan that the ACO and MIDO can accept with

minimal further development (see paragraph 5-5 of this order). Applicants should consider the conformity requirements elsewhere in this and other orders and present a plan that supports their showing of compliance for a TC and the FAA's finding of compliance for the TC and PC. While applicant involvement in the conformity plan is strongly encouraged (only the supporting data listed in paragraph 2-3d of this order are required), the FAA must retain the discretion to make the inspections necessary to determine compliance with the applicable 14 CFR requirements. Therefore, the FAA is responsible for the final content of the plan.

**(3) Using Parts Produced by Technical Standard Order (TSO) Authorization or PMA in Certification Testing.**

(a) Either of these approvals indicates that the production system has determined that the part produced conforms to a specifically defined FAA-approved design, and that any deviations from that approved design have been dispositioned and found to have no effect on form, fit, or function of the article. In accordance with 14 CFR § 21.601(b)(4), an article manufactured under a TSO authorization is an FAA-approved article. For parts produced under a PMA, the corresponding regulatory definition for the quality control system is 14 CFR § 21.303(h). Marking of the part in accordance with 14 CFR § 45.15 conveys the same indication that a part meets the FAA-approved design.

(b) Because of a part's approval by TSO or PMA, a part conformity may not be necessary for its use in a certification project. ACO engineering should consider whether the testing to be accomplished requires a test article definition more specific than the "form, fit, or function" of the part provided by the TSO or PMA. For example, the engineer may be concerned about a test article having features biased to one or the other end of a tolerance. If ACO engineering wants to ensure the part does not have a bias that may affect the outcome of the test, the engineer may ask the inspector to review any MRB action for deviations to the test article referencing the characteristic the engineer identifies. Indicate this in the "Special Instructions" section of the Request for Conformity Inspection. For the purpose of this order, a deviation is a non-conformance that is found and accepted by means of ACO engineering evaluation or MRB action.

(c) ACO engineering may determine that an installation inspection is adequate for its needs. The installation conformity inspection, which follows the ACO review of the substantiating data, is performed to verify the installation was accomplished in accordance with the approved data, with all or any discrepancies noted, before official FAA testing. It is during the installation conformity inspection that the article's TSO number, part number, serial number, software part number or version, and so forth, as referenced in the installation data, are verified and recorded.

**d. Completed [Project Specific] Certification Plan.** By this point in the project, the details of the applicant's plan for showing compliance, including the remaining elements outlined in paragraph 2-3d above should be captured in the certification plan or PSCP. From this information, the certification team should be able to determine that, if the plan was successfully executed, its results would show compliance. The amount of detail necessary to avoid ambiguity will vary from finding to finding, but, in general, it decreases when the applicant chooses common means of compliance such as those described in ACs. The certification team should find the plan agreeable before processing conformity requests, approving test plans, witnessing or observing certification tests, or performing any other certification project activities, to ensure the certification team and the applicant are working with the same fundamental understanding of the certification data.

**e. Interim TCB Meeting for [Project Specific] Certification Plan Agreement.** This is the formal meeting to establish consensus on all integrated certification planning. During this meeting, use the PSCP (or the certification plan and CPP) to assess the certification risks of proceeding into the actions of showing and finding compliance. Obtain mutual agreement to the adequacy of the plan and acceptance of the risks before proceeding with implementation. The certification team may hold one main Interim TCB Meeting to reach agreement on how the project will be conducted, followed by splinter meetings to address the certification activities required for the various systems, disciplines, or components of the aircraft design. When dividing the TCBM this way, the project-level agreement of the certification plan must include a realistic schedule for splinter meetings. The TCB meeting for certification plan agreement concludes with the completion of its splinter meetings. Use an Interim TCBM to establish agreement with the certification plan when the following happens:

- (1) The project requires significant coordination of resources,
- (2) A face-to-face meeting would better help all involved parties understand how compliance will be shown,
- (3) The applicant requests one,
- (4) Issues with the certification plan need management visibility,
- (5) The project manager wishes to encourage teamwork within the FAA and with the applicant,
- (6) Numerous comments and questions could be more efficiently addressed in person, and
- (7) Ambiguities in the plan need to be resolved.

**NOTE:** The expected level of detail in a PSCP allows the project manager/engineer to identify the applicant's deliverables and hold the appropriate parties responsible for fulfilling their commitments and vice versa.

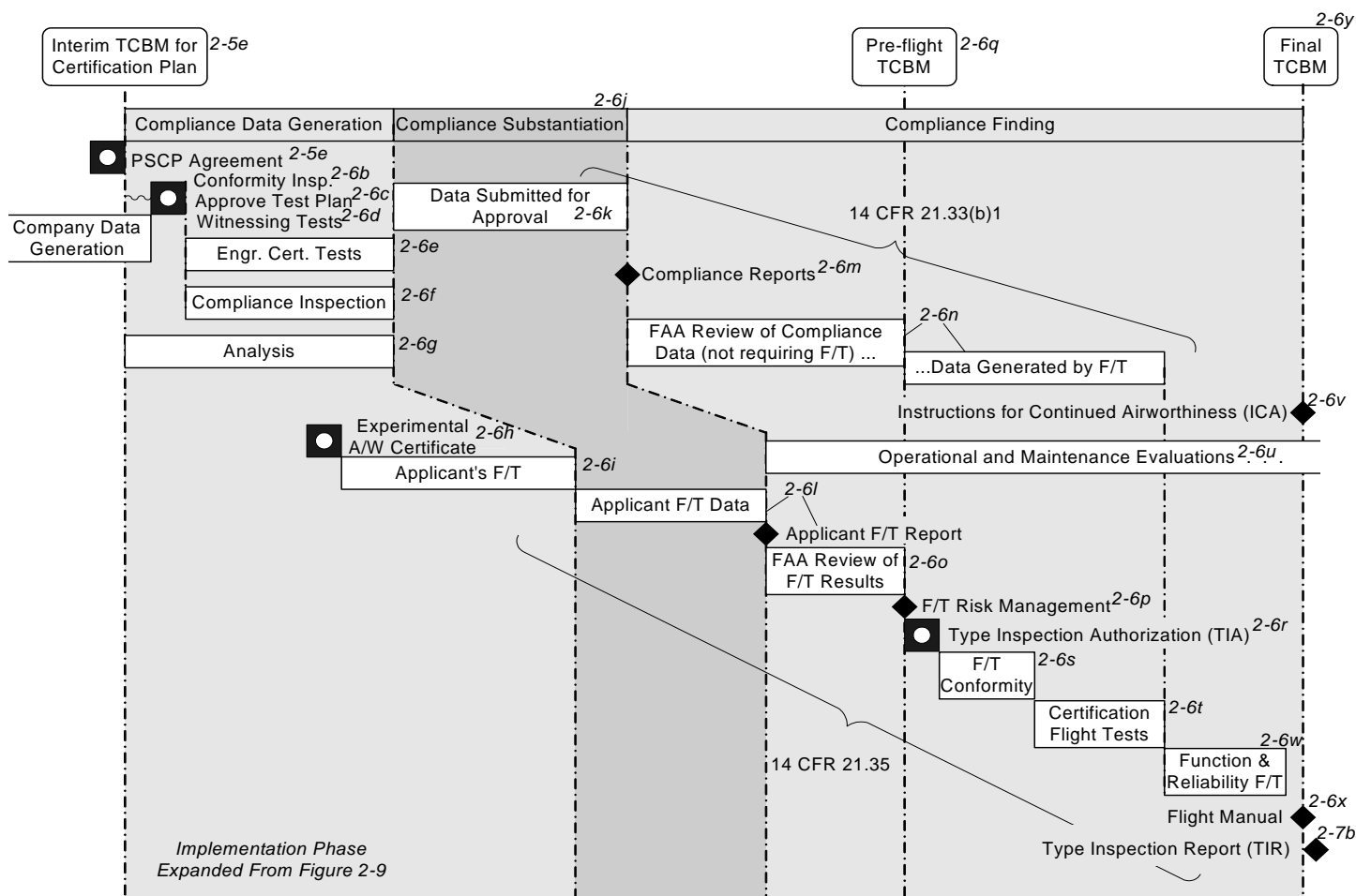
## 2-6. IMPLEMENTATION.

**FIGURE 2-8. TASKS DURING THE IMPLEMENTATION PHASE**

<b>Compliance Data Generation Activities</b>	
Conformity Inspections.....	2-6b
Applicant Test Plan and FAA Approval.....	2-6c
Before Witnessing Engineering and Flight Tests .....	2-6d
Engineering Certification Tests .....	2-6e
Engineering Compliance by Inspection.....	2-6f
Analysis.....	2-6g
Experimental Airworthiness Certificate .....	2-6h
Applicant's Flight Tests.....	2-6i
<b>Compliance Substantiation Activities</b>	
Compliance Substantiation – General.....	2-6j
Data Submitted for Approval.....	2-6k
Applicant Flight Test Data and Report.....	2-6l
Compliance Reports.....	2-6m
<b>Compliance Finding Activities</b>	
FAA Review of Compliance Data .....	2-6n
Review of Applicant's Flight Test Results .....	2-6o
Flight Test Risk Management Process.....	2-6p
Pre-Flight TCB Meeting .....	2-6q
Type Inspection Authorization (TIA).....	2-6r
Flight Test Conformity Inspection.....	2-6s
Certification Flight Tests .....	2-6t
Operational and Maintenance Evaluations .....	2-6u
Instructions for Continued Airworthiness (ICA) .....	2-6v
Function and Reliability (F&R) Flight Testing .....	2-6w
Aircraft Flight Manual .....	2-6x
Final TCB Meeting, Issuance of Type Certificate & Data Sheet .....	2-6y

**a. Considerations for the Implementation Phase.** In this phase, the FAA and applicant conduct the certification project by implementing the certification plan. The activities and events in this phase are not always chronological. However, these events do organize neatly in other ways. In figure 2-9 of this order, you will see the implementation phase divided into: Compliance Data Generation, Compliance Substantiation, and Compliance Finding. Furthermore, the certification process for engineering and flight tests are similar but not exactly the same. Two rules establish the differences indicated on the figure. This paragraph, 2-6, is organized to maximize the similarities while showing the differences between the certification process for engineering and flight test as each process progresses through the three categories of activities in this phase.

**FIGURE 2-9. TYPICAL TYPE CERTIFICATION PROCESS,  
IMPLEMENTATION PHASE**



**(1) Engineering and Flight Test Certification Processes.** Title 14 CFR §§ 21.33 and 35 establish two processes for tests and inspections. For flight tests, the applicant performs the necessary tests and inspections and submits the results to the FAA for review. For certain flight tests the FAA may choose to conduct certification flight testing concurrently with the applicant (see paragraph 5-19c of this order). The FAA determines which results will be repeated in FAA flight testing to validate the applicant's entire flight test data package. Engineering tests and inspections (see paragraph 2-6. e. in this order) do not need to be performed by the applicant before the FAA witnesses the demonstration.

**(2) Generating Data for Substantiating and Finding Compliance.** The activities and events in the implementation phase are categorized by whether they involve the development of certification data, showing compliance with that data, or finding compliance. The Generation of Compliance Data category is distinct from the Showing Compliance category and includes activities such as running tests, making compliance inspections, and performing analyses. To illustrate the distinction, consider a part used in the type design of a certificated helicopter. The helicopter's TC holder may wish to include the part in a new helicopter design. The data

generated for the first TC is still valid FAA data. However, the use of the part in a new application requires a new showing of compliance. The previously generated data may or may not be adequate to make the new showing of compliance. The Showing Compliance category includes activities – like writing compliance and flight test reports – in which the applicant presents the various data in a logical order with explanations of how the data prove compliance. The Finding Compliance category includes FAA activities based on 14 CFR § 21.21. These FAA activities include: determination that the applicant’s substantiating data shows compliance to the certification basis; identification and examination of the type design; and (if the product is an aircraft) determination that no feature or characteristic makes the aircraft unsafe for the category for which the type certificate is to be issued.

#### **FIGURE 2-10. IMPLEMENTATION PHASE – COMPLIANCE DATA GENERATION ACTIVITIES**

Conformity Inspections.....	2-6b
Applicant Test Plan and FAA Approval.....	2-6c
Before Witnessing Engineering and Flight Tests .....	2-6d
Engineering Certification Tests .....	2-6e
Engineering Compliance by Inspection .....	2-6f
Analysis.....	2-6g
Experimental Airworthiness Certificate .....	2-6h
Applicant’s Flight Tests.....	2-6i

**b. Conformity Inspections.** Conformity inspections verify and provide objective documentation that the test articles, parts, assemblies, installations, functions, and test setups conform to the design data. Title 14 CFR § 21.33(a) requires the applicant to allow the FAA to conduct any conformity inspections it chooses during the type certification process. It is the responsibility of FAA engineering personnel to determine the need to conduct conformity inspections and then request that the project MIDO performs the required conformity inspections. Because of the complex nature of the conformity process and the necessity for parts conformity inspections early in the certification project, the project MIDO should be consulted early in the project. This ensures the necessary inspections are scheduled at appropriate times. The FAA manufacturing inspector verifies the product conforms to the drawings, specifications, and special processes. An FAA conformity inspection must be successfully accomplished before any certification ground or flight tests are conducted. Conformity inspections are requested by FAA engineering using FAA Form 8120-10, Request for Conformity, or FAA Form 8110-1, Type Inspection Authorization. Additional information on the responsibilities and functions of manufacturing and engineering is located in chapter 5 of this order.

(1) In accordance with 14 CFR § 21.33(b): “Each applicant must make all inspections and tests necessary to determine:

(a) Compliance with the applicable airworthiness, aircraft noise, fuel venting, and exhaust emission requirements,

- (b) Materials and products conform to the specifications in the type design,
- (c) Parts of the products conform to the drawings in the type design, and
- (d) The manufacturing processes, construction, and assembly conform to those specified in the type design.”

(2) The applicant must submit FAA Form 8130-9, Statement of Conformity, attesting that the articles are in conformity with the proposed design. The FAA should receive these forms from the applicant before conducting any FAA conformity inspections. Only in this manner can the FAA ascertain that the test articles are true representations of the proposed test article (see 14 CFR § 21.53(b)).

**c. Applicant Test Plan and FAA Approval.** The applicant must prepare a test plan when testing is necessary to show compliance to the regulations. The applicant should also submit the test plan early enough to allow the FAA time to review and approve the test plan before the start of the test. The test plan is used to ensure orderly and complete testing is accomplished. At a minimum, a description of the items to be tested and a list of all equipment necessary to conduct the test should be in the test plan. It is also important to include a description of how the equipment is to be calibrated (when calibration is required) and approved before the test, required conformities of the test article and test setup, a list of the specific airworthiness standards, a description of how compliance is expected to be shown, and a test procedure written in a step-by-step format with defined pass/fail criteria. After the ACO engineer or FAA pilot approves the test plan, they request an FAA conformity inspection of the test article and test setup to ensure conformance to the engineering drawings and test plan.

**d. Before Witnessing Engineering and Flight Tests.** When witnessing official tests, the FAA-authorized witness will verify that the test procedures described in the applicant’s FAA-approved test plan are followed and that any data captured by test instrumentation appears to be valid data for the test in question. If the test is lengthy, witness at least the most appropriate or critical portions of the tests and conduct a post-test examination. If the ACO engineer or pilot will not be able to witness the test, they will authorize another qualified ACO engineer, FAA pilot, or DER; or request help from a manufacturing inspector to witness the test. See chapter 5, paragraph 5-10 of this order for a discussion of MIDO inspectors witnessing tests.

(1) The minimum participants for witnessing the test are the FAA-authorized witness and the applicant’s knowledgeable representative who is capable of performing the test. But there are some cases such as flight tests of certain single-seat aircraft, agricultural airplanes and gliders, where the minimum number of participants can only be one person, the FAA flight test pilot or his designated DER flight test pilot. After the test, the FAA-authorized witness must sign a record showing the results were obtained by properly following the approved test plan. This record should identify the test and include the results obtained, the decisions reached, and any recommendations made to the applicant. Add a copy of this record to the test report. This record is not a substitute for the applicant’s test report showing completion of the test plan.

(2) **If a MIDO inspector or DER is to be the witness,** the ACO engineer or pilot will provide them with the appropriate instructions and a reference to the applicant’s test plan. The FAA-authorized witness should not witness any tests without prior coordination with the ACO engineer or pilot.

**e. Engineering Certification Tests** are used by applicants to demonstrate compliance with a requirement, or to collect quantifiable product or component data necessary for showing compliance. In contrast, certification flight tests rely on, or supplement quantifiable data with, the pilot's qualitative evaluation and are conducted on a test article of the product. Most certification tests are either quantifiable engineering certification tests or certification flight tests to accomplish a qualitative assessment. A certification flight test may provide both a compliance demonstration for the engineer, as well as a qualitative assessment for the pilot. A few examples of engineering certification tests include part qualification, system function, iron bird, fatigue, flammability, landing gear drop test, ground vibration, and electro-magnetic interference tests. Most of these tests are performed to satisfy the requirement of 14 CFR§ 21.35(a)(2). The FAA has established that a reliable way to determine the safety of an aircraft is to show its compliance with the minimum standards established by the applicable airworthiness requirements. Therefore, it is essential for the applicant to conduct adequate evaluation of the aircraft by performing engineering tests, analysis, and flight tests. Each applicant test must be accomplished successfully before conducting any FAA certification flight test to validate an applicant's showing of compliance. For certain flight tests the FAA may choose to conduct certification flight testing concurrently with the applicant (see paragraph 5-19e of this order). To show compliance with a type certification requirement, the conformity of the test article, test setup, and test procedures used, and the validity of the test results must be established for each certification test conducted.

**f. Engineering Compliance by Inspection.** An engineering compliance inspection should be done for any aspect of product design and installation where compliance with the certification requirements cannot be determined through the review of drawings or reports. Do not confuse this inspection with a conformity inspection done by manufacturing inspectors as described previously in paragraph 2-6b above.

(1) An engineering compliance inspection determines compliance to the regulations. An engineering compliance inspection provides an opportunity to review an installation and its relationship to other installations on a product. This inspection ensures systems and components are compatible with each other and meet the applicable requirements of the airworthiness and operational standards (see 14 CFR § 21.33).

(2) **Sample Inspections.** The product must conform to the type design before conducting the engineering compliance inspection. Document the findings for the applicant to include as part of the substantiating data. Engineering compliance inspections may be delegated to DERs. However, DERs should receive proper guidance in order to effectively make the findings on behalf of the FAA.

(a) **Interior Inspections.** Engineering compliance inspections for aircraft interiors are generally more complex than other compliance inspections. This is primarily due to the many varied regulations and paragraphs with which the applicant must comply such as emergency lighting, emergency exit arrangement, ordinance signs, aisle widths, cockpit controls, waste containers, placards, and occupant protection. As with all findings, in accomplishing an interior compliance inspection, the certification team makes many determinations and, therefore, should be very familiar with current regulations and policy.

**(b) Control System Inspections.** Control system compliance inspections are accomplished to determine ease of control operation, strength of components, detection of interference, or deflection of control system linkages.

**(c) Fire Protection Inspections.** Flammable fluid fire protection compliance requires inspection to ensure that proper separation and isolation of flammable fluid carrying lines from ignition sources is maintained.

**(d) System Routing Inspections.** Hydraulic and electrical systems routing requires inspection to ensure that proper support and separation is maintained.

**g. Analysis.** Engineering analysis is an integral part of showing compliance. It encompasses the full range of analytical techniques such as textbook formulas, computer algorithms, computer modeling/simulation, or structured assessments (for example, the processes in SAE International's Aerospace Recommended Practice (ARP) 4761, Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment, dated December 1, 1996. The FAA approves the data, not the analytical technique, so the FAA holds no list of acceptable analyses, approved computer codes, or standard formulas. Use of a well-established analysis technique is not enough to guarantee the validity of the result. The applicant must show the data are valid. Consequently, the ACO and its representatives are responsible for finding the data accurate, and applicable, and that the analysis does not violate the assumptions of the problem.

**h. Experimental Airworthiness Certificate.** With certain exceptions, the applicant must get a special airworthiness certificate in the experimental category before conducting research or developmental flight tests on test aircraft. Order 8130.2, Airworthiness Certification of Aircraft and Related Products, explains the issuance of experimental airworthiness certificates. Also, the applicant must get a special airworthiness certificate in the experimental category before conducting flight tests to show compliance. For more information, see Order 8130.29, Issuance of a Special Airworthiness Certificate for Show Compliance Flight Testing.

**(1)** Before flying the aircraft, applicants must notify air traffic so that they can make special accommodations for the aircraft with the normal terminal and enroute air traffic (see Order 7110.65, Air Traffic Control). The applicant must provide the following information to the Air Traffic Organization – Terminal Services, Terminal Safety and Operations Support (WAJT20000, 600 Independence Avenue, SW, Washington, D.C. 20591, or fax: (202) 493-4567):

- (a)** Aircraft type designation (B-777, A340, and so forth),
- (b)** Number and type of powerplant (Piston, Turboprop, Jet),
- (c)** Aircraft weight or weight classification (heavy, large, small),
- (d)** Average rate of climb (or descent if appropriate) (feet per minute), and
- (e)** Max cruising and landing speeds (MPH or KTS or MACH).

**i. Applicant's Flight Tests.** To comply with 14 CFR§ 21.35(a)(4), the applicant conducts flight tests and inspections before the TIA for research and development. The research and development flight test results are not part of the type certification process. The applicant's flight tests, conducted to satisfy 14 CFR § 21.35(a)(4), are not explicitly part of the FAA's flight test program, unless the FAA agrees to conduct concurrent testing with the applicant and issues a TIA for the test. Official FAA flight testing begins only after the FAA issues a TIA. However, the applicant conducts the tests and inspections to demonstrate that the test article to be submitted for FAA certification ground and flight tests meets the minimum requirements for quality, conforms to the design data, and is safe for the planned tests. The applicant will report the data generated in these tests to the FAA for review of its acceptability. Since the validity of flight test data generated with test articles that don't represent the type design is indeterminable, ensure the applicant understands the importance of controlling the configuration and recording the conformity of the test article for each flight.

#### **FIGURE 2-11. IMPLEMENTATION PHASE – COMPLIANCE SUBSTANTIATION ACTIVITIES**

Compliance Substantiation – General.....	2-6j
Data Submitted for Approval.....	2-6k
Applicant Flight Test Data and Report .....	2-6l
Compliance Reports.....	2-6m

#### **j. Compliance Substantiation – General.**

**(1) Applicant Flight Test Data and Report.** Paragraph 2-6l below discusses the certification process involving tests and inspections. This process needs to be successfully accomplished by the applicant before presentation to the FAA. Title 14 CFR §§ 21.33 and 21.35 provide criteria for making that determination. The compliance substantiation data generated during these tests are reported to the FAA in the applicant's flight test report. In the event the FAA agrees to conduct testing concurrently with the applicant, it is understood that the report will not contain compliance substantiation for those specific tests. All other tests are accomplished in the presence of the FAA, and applicants submit their data for approval as discussed in paragraph 2-6k, Data Submitted for Approval, and paragraph 2-6m, Compliance Reports. In either case, the applicant has the following responsibilities:

**(2) Applicant Responsibility.** Applicants are responsible for complying with the regulations that apply to the specific product or operation. They must:

**(a)** Submit the necessary type design and substantiating data to show the product being certificated meets the applicable airworthiness, aircraft noise, and emissions requirements of the regulations, and any special conditions prescribed by the FAA (see 14 CFR§ 21.21). The FAA does not give a specific format for submitting technical data (if it is an original paper copy). However, if data are submitted in any form other than an original paper copy, the form must be acceptable to the FAA (see Order 8000.79 and FAA Manual IR-04-01). This requires a memorandum of agreement (MOA) between the applicant and the FAA.

**(b)** Submit a statement of conformity to the FAA for each aircraft, engine, and propeller presented for type certification, and each aircraft or part presented for testing (see 14 CFR § 21.53).

(c) Allow the FAA to make any inspection and any flight or ground test necessary to determine compliance with the applicable requirements of the regulations (see 14 CFR§ 21.33).

(d) Accomplish the requirements of 14 CFR § 21.35(a) before making their flight tests and, upon showing compliance, complete all flight tests the FAA finds necessary. Applicants must provide a person holding an appropriate pilot certificate to perform the flight tests (see 14 CFR §§ 21.35 and 21.37).

**k. Data Submitted for Approval.** During this period of activity, the TC applicant is submitting to the FAA the necessary design data, test reports, and computations to show that the product to be certificated meets the applicable airworthiness, noise, and emission requirements of 14 CFR and any special conditions identified by the FAA. The applicant should submit the compliance data as soon as the data are complete and in a logical format for review, so the FAA's review can be accomplished during the normal course of a certification project. This activity culminates with submittal of compliance reports. The following are requirements for technical data and their use by the FAA:

(1) **Disclosure of Technical Data.** The policy for disclosure of FAA information is contained in Order 1270.1, Freedom of Information Act Program, and contains 9 exemptions for release of technical data. The FAA must not release proprietary information (descriptive, design, and substantiating data received from applicants) to any party who does not have written permission from the applicant (or the certificate holder). The certification basis information is not proprietary data, because it is a part of the TC.

(2) **FAA Use of Technical Data.** FAA personnel may use the applicant's or certificate holder's data for reference or evaluation of any subsequent applicant's submitted data if the information is used solely for that purpose. This FAA use of technical data does not permit designees who may be working for a subsequent applicant to request access to another applicant's data.

(3) **Applicant-Provided Data.** The FAA will not question the source or the method by which an applicant for a design approval obtains the data submitted by an applicant. An applicant showing compliance to the applicable requirements may obtain certification credit for previously approved data without showing further compliance if the applicant:

(a) Provides sufficient evidence that the presented data were, in fact, approved by the FAA. The applicant does not need to submit the data if they were obtained with the consent of the original approval holder.

(b) Establishes that the previously approved data are applicable to the applicant's design to the extent that any design deviations will have no effect on the design's airworthiness or on showing compliance with the applicable regulations.

(c) Provides sufficient substantiation and descriptive data of its own modification so that FAA can make a finding of compliance.

(d) Has sufficient engineering data necessary to provide continued airworthiness information should the modification be the subject of a service difficulty report or an AD.

- (1) Hazards are identified,
- (2) An assessment is made of the risks involved,
- (3) Mitigating procedures are established to reduce or eliminate the risks, and
- (4) A conscious decision is made at the appropriate level to accept residual risks.

**q. Pre-Flight TCB Meeting.** The pre-flight TCB meeting is held to discuss and clarify any questions the applicant may have about the required FAA flight testing of the aircraft. For engine and propeller certification projects, the pre-flight TCB meeting is referred to as the pre-type inspection authorization (pre-TIA) meeting. These meetings also identify any outstanding conformity inspection issues and engineering compliance determinations. Normally the TCB chairman, or their representative, issues the TIA after all issues are resolved. Either the TCB or the applicant may request this meeting. Include a MIDO representative for the coordination of conformity inspections required for compliance flight testing.

**r. Type Inspection Authorization (TIA).** The TIA is issued after the FAA reviews the applicant's test results package and determines its acceptability. The ACO prepares the TIA on FAA Form 8110-1 (see appendix 4, figure 6 of this order). It also authorizes official conformity, airworthiness inspections, and ground and flight tests necessary to fulfill TC certification requirements. In addition, if there are operational and airworthiness requirements to be addressed, include AEG operational evaluations in the TIA.

**(1) Preparing and Issuing the TIA.** The TIA is not prepared until coordination is accomplished with each appropriate engineering discipline and, when appropriate, the AEG, so that all required information for each disciplines' portion of the inspection or authorization is included. The TIA is issued when the examination of the technical data required for type certification is completed or has reached a point where it appears the aircraft or component being examined is expected to meet the applicable regulations.

**NOTE:** To assist the manufacturing inspector, the following information should be included in block 18, part 1, of Form 8110-1.

**Point of contact at conformity site:** \_\_\_\_\_

**Phone number of point of contact:** \_\_\_\_\_

**Location of aircraft/conformity site:** \_\_\_\_\_

**DAR requested by the applicant:** \_\_\_\_\_ (as applicable)

**(2) Coordination.** Coordinate the TIA with the PACO, the project MIDO, and when requested, the accountable directorate. Also, coordinate with the AEG when appropriate.

**(3) Notification.** Notify and provide the applicant with a copy of the TIA after it is issued.

**(4) Inspections.** FAA manufacturing inspection personnel do conformity inspections before ground and flight tests. All unsatisfactory items must be resolved before conducting the test.

**(5) Tests.** After the applicant complies with 14 CFR § 21.35(a), FAA personnel witness and conduct official certification tests. FAA designees may also witness or conduct the tests when authorized to do so.

**(6) Outside ACO Requests.** The project MIDO should request the geographically appropriate MIDO to perform the conformity inspection if the TIA conformity is done by FAA personnel outside the project MIDO's geographic area. If the TIA test is to be conducted by FAA personnel outside the geographic area of the PACO, the PACO may delegate the witnessing (at their discretion) to the geographically appropriate ACO.

**s. Flight Test Conformity Inspections.** The ground inspection physically verifies that the aircraft submitted for flight test meets the minimum requirements for quality, conforms with the technical data, and is safe for the intended ground and flight tests. The results are recorded together with any other data requested by FAA engineering and flight test personnel.

**(1) Normally a progressive ground inspection** is performed in three phases. This depends, however, on the complexity of the project. The three phases are: preliminary ground inspection, official ground inspection, and coordinated ground-flight inspection. See chapter 5, paragraph 5-15 of this order for detailed information on these three phases.

**(2) The manufacturing inspector** makes the initial acceptance of the test aircraft for FAA flight testing. The initial acceptance is based on the determination of the aircraft condition for safe operation and the testing to be conducted. The manufacturing inspector and the flight test personnel should establish a mutually agreeable system for informing the project manager of daily changes to the aircraft and any problems encountered during flight test.

**t. Certification Flight Tests** are used by the FAA to verify the flight test data reported by the applicant or to obtain compliance data for flight testing conducted concurrently with the applicant. These tests evaluate the aircraft's performance, flight characteristics, operational qualities, and equipment operation. They also determine operational limitations, procedures, and pilot information. Certification flight tests are conducted under the TIA and may include flight, ground, and functional and reliability testing. ACs 23-8, 25-7, 27-1, and 29-2 provide guidance for certification flight tests. Also, for type certification testing of prototypes, the applicant provides first-pilot-checkout flight time for the FAA flight test and AEG pilots assigned to the project before the FAA compliance flight tests. For more information, see chapter 5, paragraph 5-19 of this order.

**u. Operational and Maintenance Evaluations (AEG Responsibilities).** The AEGs were established to meet FAA's operations and maintenance responsibilities during the type certification process. The AEGs are comprised of operations and airworthiness inspectors who work directly with aircraft certification personnel to contribute an operational perspective to engineering activities. The AEGs advise manufacturers of applicable operational and maintenance requirements during the design and certification process and also make recommendations to Flight Standards about flight training, inspection programs, and flight crew

**c. Continued Airworthiness.** Continued airworthiness is the preservation of the product's level of safety as defined at the time of certification (or its approved altered condition) through the end of the product life cycle. It is applied to the product design/production and its operation, maintenance, modification, and repair.

(1) AIR is responsible for overseeing the design approval holder and production approval holder (PAH) to preserve the safety of the approved product, part, or appliance. AIR preserves safety by identifying and evaluating safety concerns, and developing and implementing corrective action.

(2) AIR is also responsible for interfacing with the operating environment through a proactive collaboration with AFS and others involved in the operations, maintenance, and alteration of in-service products.

(3) Data such as stress analysis, damage tolerance assessment, or process specifications used to substantiate a major repair to primary structure can only be approved by: an ACO, a DER with specific authorization for major repairs and/or alterations in the necessary engineering discipline, a designated alteration station (DAS) when accomplished by an STC; a repair station, air carrier, or commercial operator authorized under Special Federal Aviation Regulations 36 (major repair only); and holders of a delegation option authorization (DOA).

**d. Changes to Instructions for Continued Airworthiness (ICA).** Title 14 CFR § 21.50(b) requires ICA changes to be made available to any person who must comply with them. The design approval holder should provide these changes according to a plan that was accepted by both the ACO/ECO and AEG. The changes should be formatted to directly supplement the original ICA and should clearly say what's being changed.

**e. Post-Certification Evaluations.**

**(1) Special Certification Review (SCR).**

(a) An SCR is a way to evaluate the type certification project and potentially unsafe design features on previously approved products. The accountable directorate may initiate an SCR after the certification project or as service experience dictates (14 CFR § 13.19).

(b) Potential safety problem areas for which an SCR may be appropriate include:

- 1 Complex or unique design features,
- 2 Advanced state-of-the-art concepts in design and manufacturing,
- 3 Potentially unsafe features used on similar previous designs requiring further analysis and evaluation,
- 4 Compliance areas critical to safety and operational suitability that require evaluations,
- 5 Unsafe operational or maintainability characteristics,
- 6 ELOS determinations with potential major effects on safety, and
- 7 Complicated interrelationships of unusual features.

(c) Results of an SCR include a detailed review and evaluation of the product's applicable airworthiness and operational certification requirements, recommendations for

revisions, if appropriate, and improvement in achieving uniform application of the certification rules throughout the FAA.

(d) The accountable directorate establishes the SCR team. The team may be comprised of FAA personnel from the CMACO, the PACO, the accountable directorate, AEG personnel, MIDO personnel, or other FAA personnel, as appropriate. The team may use governmental agencies, outside consultant firms, and industry to get technical expertise to do a thorough evaluation. If an SCR is deemed necessary for an imported product, representatives of the original certifying CAA must also be invited.

(e) Evaluation procedures used during the SCR include examination of the applicant's or certificate holder's data, discussions with FAA personnel and the applicant's or certificate holder's personnel, inspection of the prototype or production articles, and any other way for the team to perform a complete and comprehensive evaluation consistent with the purpose of the review.

(f) Thoroughly explore every significant aspect and ramification of the potential safety problem in question. Consider the adequacy of the applicable regulations and policy material.

(g) The SCR chairperson prepares a report of the team's findings and recommendations. The accountable directorate may use the report to develop regulatory changes or guidance material.

(h) The certifying ACO is responsible for appropriate action on the SCR team's findings and recommendations.

## **(2) Fact-Finding Investigations.**

(a) Fact-finding investigations are authorized under 49 U.S.C. 46104 and conducted under 14 CFR part 13, subpart F. This is an investigation where the compulsory processes of the Federal Aviation Act of 1958, Section 1004, are used to assist the FAA in finding material facts to support the performance of FAA functions. This procedure is not used either as a substitute for a routine investigation or as an investigation of violations that constitute felonies under Federal law.

(b) Reports or allegations of certification basis noncompliance may be received after a TC is issued. Complainants should furnish full facts to support all allegations of noncompliance. Depending on the circumstances and the extent of factual substantiation of the allegations, it may be necessary to develop evidence through a fact-finding investigation. The objective of a fact-finding investigation is to get the information necessary to decide what FAA action, if any, should be taken. The FAA may determine that this type of investigation is necessary even without an external complaint.

## **f. Data Retention.**

(1) **Project.** The ACO maintains the project file for each type certification project. The project file must contain records associated with the project. Records are defined as

show all previous holders. Provide information in the following form: "ABC Corporation transferred TC 123 to XYZ Corporation on January 1, 1999." Add all known transfers to the Holder Record paragraph when a TCDS is revised for any reason. See an example of the first page of a TCDS with the Holder Record in appendix 2, figure 6 of this order.

(6) One or more sections follow the identification of the TC holder and holder record. Each section addresses an individual model of the general type covered by the TC.

(a) Start each model's section with a Roman numeral, followed by the model designation, copied from the application for TC.

**NOTE:** Do not include unofficial common, popular, or marketing nomenclature in the TCDS.

(b) Include the category or categories in which the aircraft is certificated, in parenthesis following the model designation. Next is the approval date, which is the date on the TC. Also, see appendix 2, figure 7 of this order for the product codes (designations) used for some small airplanes, rotorcraft, and engines.

(c) Immediately below the heading for the new model, show the differences between the new model added to the TCDS and a previously approved model. This information helps in determining the eligibility of a conversion from one model to another.

**e. Information Required for Each Model Aircraft TCDS.** The TCDS contains each item listed below, under the same headings shown. If several models are included under the same TC, a section covers each model and items are repeated under each section with the exception of the datum, mean aerodynamic chord, leveling means, control surface movements, and production basis. If these items are common to all models, list them under "Data Pertinent to All Models." Include a reference to detailed information for each item, if that information is in an approved FAA document and is readily available. For example, information in the aircraft flight manual could be referenced via the TCDS if copying that information into the TCDS would be voluminous. The following are instructions for completing the TCDS.

(1) **Engine.** Show the abbreviated name of the engine manufacturer, the number of engines installed, the engine TC number, and the complete model designation for all engines for which the manufacturer has obtained approval under this certificate.

(2) **Fuel.** Show the minimum fuel grade and approved alternate fuels for the basic engine and any optional engines approved for the aircraft.

(3) **Engine Limits.** Show the installed maximum continuous and takeoff limits of the engines, including power setting parameters (for example, manifold pressure, engine pressure ratio), revolutions per minute (rpm), and power or thrust output. The limits may be less than, but must never exceed, the rating for the engine shown on the applicable engine TCDS. Any reduction may be dictated by structural, vibration, performance, or other requirements. For altitude engines, that is, supercharged engines, the limits are shown for sea level and for the critical altitude or altitudes. Include a statement about variation between altitudes such as "straight line manifold pressure variation with altitude from sea level to 10,000 feet."

**(4) Propeller and Propeller Limits.** Show the name of the propeller manufacturer, the number of propellers installed, the propeller TC number, and the model designation for each propeller for which the manufacturer has obtained approval. Include the propeller limits and any operating restrictions peculiar to the propeller or propeller-engine combination.

(a) Show the static rpm limits and diameter limits for fixed-pitch propellers. For example, if the TIR shows that the static rpm limits are between 2,200 and 2,350, the TCDS would include a note as follows: “Static rpm at permissible throttle setting: Not over 2,350 rpm, not under 2,200 rpm. No additional tolerance permitted.” In the basic limits, give all tolerances that the FAA permits.

(b) Show the diameter limits and blade angle settings (feathering, high, low, and reverse, as applicable) for adjustable, two-position, controllable, and automatic propellers. Also, show the applicable static rpm limits (with tolerances), if considered desirable. The diameter limits should include both the maximum and minimum allowable limits for repairs and the following note: “No further tolerance permitted.”

(c) The FAA requires additional information in certain circumstances, such as:

**1** The model designation of both the hub and the blades if the propeller blades are not an integral part of the hub.

**2** If interchangeable blades are listed, include a note showing where to find the listing of any eligible blades.

**3** The reference blade station at which the angle is measured for propellers. This enables the blade angle setting to be varied.

**(5) Rotor Speed Limits.** Include helicopter rotor speed limitations, with power on and power off.

**(6) Transmission Torque Limits.** Include helicopter transmission torque limits.

**(7) Airspeed Limits.** Show all applicable airspeed limits in mph and/or knots, as appropriate, and indicate whether the airspeeds are calibrated or indicated. Use the airspeed found in the Civil Aviation Regulations or in the 14 CFR sections under which the aircraft is type certificated.

**(8) Center of Gravity (C.G.) Range.** The C.G. range approved for the extreme loading conditions of the aircraft are provided in distance from the datum. It is satisfactory for dimensions to be measured to the nearest tenth of an inch, or equivalent. If the landing gear is retractable, the limits should be given in terms of landing gear extended and a statement should be added to that effect. Include the moment change due to the retraction of the landing gear. No specific standard for presentation can be set in the case of aircraft where the C.G. limits vary with loaded weight.

**(9) Empty Weight C.G. Range.** An empty weight C.G. range may be established. If not, insert the word “none” after the heading. If provided, the forward and aft limits are in

distance from the datum. Include a full explanation if the C.G. range is affected by items of equipment. If an empty weight C.G. range is established, include the following statement, with the wording modified to suit the individual case:

“When the empty weight C.G. falls within the range given, complete computations of critical forward and aft C.G. positions are unnecessary. Range is not valid for nonstandard arrangements.”

**(10) Datum.** The datum, designated by the applicant, is a definite, unmistakable, and unchangeable point for the purpose of taking measurements to identify locations on the aircraft. The applicant defines it so that it may be readily identified.

**(11) Leveling Means.** Include the description of the means provided for leveling the aircraft, with information for location and accessibility of a leveling point. The leveling point is always a definite, unmistakable, and unchangeable point on the aircraft.

**(12) Maximum Weights.** Include all applicable maximum weights such as ramp, landing, takeoff, and zero fuel weights. Include engine-out ferrying operation weight, if available.

**(13) Minimum Crew.** Include the minimum crew required for normal operation when established by regulation. Identify the location of the pilot-in-command station, as necessary.

**(14) Number of Seats.** The following are some design considerations that may limit the number of seats:

- (a)** In *transport category aircraft*, the following may limit the passenger capacity: emergency exit requirements, oxygen requirements, demonstration of emergency evacuation procedures, or the structural strength of the floor. Other considerations may also apply. Note that cabin attendants are not included in the maximum number of passengers.
- (b)** For *aircraft other than transport category*, indicate the number of seats and the moment arms of the seats. The seat moment arms are typically those of the seat occupants rather than the actual seats. The occupant's C.G. may be assumed at a point 8.5 inches forward and 10.5 inches above the intersection of the seat back and the seat bottom, with the upholstery compressed approximately the same as when the seat is occupied. Typically, the moment arms of adjustable seats are given for the mean or average location. If the C.G. range is critical, the extreme positions may be defined.
- (c)** If the *aircraft is not approved for passenger seats*, insert “none.”

**(15) Maximum Compartments Weights.** Show the maximum weight capacity and moment arm of each baggage compartment. List the floor loading densities, as appropriate.

**(16) Fuel Capacity.** Give the total capacity of each fuel tank installed in the aircraft and its moment arm, and the amount of usable and unusable fuel in each. Include a note to add the unusable fuel to the certificated empty weight of the aircraft.

**(17) Oil Capacity.** Same considerations as fuel capacity.

**(18) Maximum Operating Altitude** (when appropriate).

**(19) Control Surface Movements.** Include the total travel in each direction of each movable control surface on the aircraft. This information is included as a convenience to maintenance personnel and FAA representatives and is not intended to prescribe control movements as an item of inspection unless a specific statement to that effect is included. If the flight characteristics of the aircraft require close tolerance on the control movements, it is necessary to have a method to make accurate measurements. In such cases, it is generally satisfactory to list the maximum movements either in terms of degrees or in terms of distance from a well-defined point. In either case, the points of measurement must be defined to ensure accurate measurements. If the description of the maximum movement or the specified means of measuring control surface movement is too complicated to be included in the TCDS, refer to an FAA-accepted maintenance manual or FAA-approved drawing that defines the maximum movement and method of measurement.

**(20) Manufacturer's Serial Numbers.** Include the manufacturer's serial numbers for each aircraft under a particular model. The number should be in the same form as it appears on the manufacturer's aircraft data plate. If aircraft are being manufactured under more than one manufacturer or production approval, separate the serial numbers by the manufacturer or production approval.

**(21) Import Requirements.**

**(a)** For imported aircraft, describe the document used by the country of manufacture to certify that the individual aircraft conforms to the type design and is in a condition for safe operation (see 14 CFR § 21.183(c)). This document is the basis for showing if an imported aircraft is eligible for a U.S. airworthiness certificate. The description must be clear and complete. An acceptable import statement follows:

“A U.S. airworthiness certificate may be issued on the basis of [NAME OF COUNTRY] Certificate of Airworthiness for Export signed by a representative of [FOREIGN CIVIL AVIATION AUTHORITY], containing the following statement: “The aircraft covered by this certificate has been examined and found to comply with [DOCUMENT IDENTIFIER, TITLE REVISION, AND SO FORTH] approved under U.S. Type Certificate No. [TYPE CERTIFICATE NUMBER] and to be in a condition for safe operation.”

**(b)** Title 14 CFR § 21.183(c) or § 21.185(c) is the U.S. airworthiness certification basis for an aircraft type certificated under 14 CFR § 21.29 and imported from the country of manufacture.

**(c)** Title 14 CFR § 21.183(d) or § 21.185(b) is the U.S. airworthiness certification basis for an aircraft type certificated under 14 CFR § 21.29 and imported from a country other than the country of manufacture (for example, a third-party country).

(d) Title 14 CFR §§ 21.183(d) or 21.183(b) is the U.S. airworthiness certification basis for issuing an airworthiness certificate to an aircraft type certificated under 14 CFR § 21.21 and imported from a country in which it was manufactured under a licensing arrangement.

(e) Title 14 CFR § 21.183(d) is the U.S. airworthiness certification basis for an aircraft originally type certificated under 14 CFR § 21.21, transferred outside the United States, and re-imported.

(f) Find additional guidance in FAA AC 21-23, Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products Imported into the United States.

**(22) Certification Basis.**

(a) Define the applicable regulations and amendments, special conditions, and the effective date of the applicable 14 CFR sections. For each change in the TC, record the applicable regulations that are different from the regulations recorded at TC issuance.

(b) Include a note if the manufacturer obtained a TC under the delegation option authorization.

(c) Indicate whether the applicant showed compliance with the applicable ditching provisions and ice protection criteria.

(d) Identify all special conditions, exemptions, and ELOS findings.

(e) Include the TC number and the date the FAA issued the TC.

(f) Include the date of application for the TC.

(g) For small airplanes, and other aircraft if applicable, indicate if the aircraft has an operational restriction, such as: Day VFR only, Day-Night VFR only.

(h) If the airplane is RVSM capable, indicate the effectivity and modifications required to be RVSM approved, if necessary.

**(23) Production Basis.**

(a) If the FAA has issued a PC to the TC holder, list the PC number. If the FAA issued a PC under the delegation option authorization procedure, include the following statement:

A production certificate was issued and the manufacturer is authorized to issue airworthiness certificates under the delegation option authorization provisions of 14 CFR part 21.

(b) If the FAA has not issued a PC, insert the following:

“None. Before original airworthiness certification of each aircraft, an FAA representative must perform a detailed inspection for workmanship, materials, conformity with the approved technical data, and a check of the flight characteristics. In the event of an application for a standard airworthiness certificate or, if an applicant intends to produce a new aircraft under 14 CFR § 21.183(d), and the applicant is manufacturing, building, or assembling to another

person's type certificate, the applicant must provide written evidence of permission from the type certificate holder. Conduct of such activity without written evidence of permission may be a violation of 49 U.S.C. § 44704(a)(3)."

(c) If a licensee of the TC holder is manufacturing aircraft, list the licensee's name and PC number, with the aircraft serial numbers produced by the licensee.

(d) If the PC is canceled and the TC remains active, the production status is defined as follows:

"None. Before original airworthiness certification of each aircraft manufactured subsequent to (date of cancellation of PC), an FAA representative must perform a detailed inspection for workmanship, materials, conformity with the approved technical data, and a check of the flight characteristics. In the event of an applications for a standard airworthiness certificate or if an applicant intends to produce a new aircraft under 14 CFR § 21.183(d) , and the applicant is manufacturing, building, or assembling to another person's type certificate, the applicant also must provide written evidence of permission from the type certificate holder. Conduct of such activity without written evidence of permission may be a violation of 49 U.S.C. § 44704(a)(3)."

**(24) Equipment.**

(a) Use the following statement:

"The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification."

(b) List the additional or special equipment found necessary for type certification, and the exceptions to the prescribed minimum equipment. List alternates to equipment found necessary for certification. Do not list on the TCDS the optional items of equipment, except engines and propellers for which the aircraft manufacturer gets approval. Show the equipment list supplied by the manufacturer with each aircraft.

**(25) Service Information.** For import products only, add a statement on the TCDS to reflect how service information will be handled. For example:

"Service bulletins, structural repair manuals, vendor manuals, AFMs, and overhaul and maintenance manuals, which contain a statement that the document is approved by the [NAME OF THE FOREIGN CIVIL AVIATION AUTHORITY], are accepted by the FAA and are considered FAA approved. (These approvals pertain to the design data only)."

## CHAPTER 4. CHANGES IN TYPE DESIGN

### 4-1. GENERAL.

**a. Introduction.** Title 14 of the Code of Federal Regulations (14 CFR) part 21 addresses changes to TCs (see 14 CFR Subpart D) and STCs (see 14 CFR Subpart E). Also, ACO engineers are requested to provide technical assistance to support the different FAA offices approving changes to in-service aeronautical products. The FAA permits a wide latitude in the approval process for minor changes to type design. Major changes to type design are approved using a process that mirrors the type certification process described in chapter 2 of this order. Most frequently, a major change to type design is approved by STC process. The STC process has some considerations different from the TC process. These include the major and minor change decision, and addressing the “fit” of the STC on the TC’d product.

**b. Organization of this Chapter.** The sections in this chapter use the following organizational scheme. The first grouping (paragraphs 4-2 through 4-7) includes items that are either general to product modifications or that apply to more than just the STC process. The second grouping (paragraphs 4-8 through 4-15) describes FAA STC approval process considerations. And the third grouping (paragraphs 4-16 through 4-22) are “how-to” instructions unique to STC projects.

**4-2. MAJOR AND MINOR DESIGN CHANGES.** The FAA issues amended TCs or STCs for approval of major changes to type design. The FAA classifies minor and major changes in 14 CFR § 21.93 by outlining what constitutes a “minor change.” As such, the FAA and the applicant agree on the magnitude of the effects of the proposed change to determine its classification. In 14 CFR § 21.95, the rule states that minor changes in type design may be approved under a method acceptable to the Administrator prior to the submittal to the Administrator of any substantiating or descriptive data. Minor changes to a type design are at a minimum recorded in the descriptive data, with the FAA and the applicant determining an acceptable process for approving the data supporting the type design changes. Approval of changes deemed to be major (14 CFR § 21.97) requires the applicant to submit all substantiating and descriptive data for inclusion in the type design before FAA approval.

**4-3. CERTIFICATION BASIS FOR CHANGED AVIATION PRODUCTS.** In Amendment 21-77 to 14 CFR part 21, Subparts B, D, and E, the FAA established the current rules for determining the certification basis for changes to TCs. See the current version of Order 8110.48 for FAA directive material on determining the certification basis for changes to TCs. Specifically, 14 CFR § 21.101 requires an applicant for a change to a TC to show the changed product complies with the airworthiness requirements applicable to the category of the product in effect on the date of application for approval of the change, except where the following happens:

- a.** The change is not significant,
- b.** Areas of the product are not affected by the change,

c. Compliance of the affected areas with the current version of the airworthiness requirements would not contribute materially to the level of safety of the changed product, or

d. It would be impractical (on a cost basis) to require that compliance be shown to the latest version of the applicable airworthiness requirements.

e. If the change consists of a new or substantially complete redesign of a component or system and the existing certification basis does not provide adequate standards for the design change – that is, the change includes features that were not foreseen in the existing certification basis, then the applicant must comply with later appropriate regulations. If no later regulation(s) exist, special conditions (14 CFR § 21.101(d)) are required.

**4-4. FIELD APPROVALS.** The differences between major changes in type design, major alterations or repairs are a source of misunderstanding in the aviation industry. All major changes to type design must be approved using the STC or amended TC procedures. Order 8300.10, Airworthiness Inspector's Handbook, Vol. 2, Chapter 1, Field Approval Process, provides a decision flow chart for the field approval process, and a major alteration job aid containing specific examples of when the FAA will require a proposed modification to be approved as an STC. Both the flow chart and the job aid aim to ensure the field approval process is not used when the applicant either changes a TC's limits or changes many individual features that collectively must be evaluated to assure a changed product complies with its certification basis. Flight Standards Aviation Safety Inspectors (ASIs) may consult the ACO to determine if the scope and complexity of the proposed modification warrant an STC, or if other methods may be used to approve the data.

**a. "Field Approvals Are Modifications to Individual Products."**

(1) Field approvals are a means by which Flight Standards ASIs, under the provisions of 14 CFR parts 43 and 145, return an altered or repaired product to service. To return the product to service, Flight Standards may approve data applicable to an individual item by endorsing an FAA Form 337, Major Repair and Alteration. The ASI signs block 3 of FAA Form 337 to show FAA approval of the technical data or installations used to accomplish the major repair or major alteration.

(2) A modifier may create descriptive or substantiating data to support a field approval (FAA Form 337 with FAA inspector approval). Also, a modifier may give the FAA inspector acceptable data seeking the inspector's approval of the data for a specific major repair and alteration.

(3) DERs with the appropriate special authorization may also develop data in support of a specific major alteration or repair. If the DER data are all that are needed to support the FAA Form 337, then there is no need for an FAA inspector's endorsement. However, care must be taken to insure that all aspects of the alteration are addressed by the data presented. If the major alteration or repair requires data in addition to the DER-approved data, then the FAA inspector may determine that a field approval is appropriate. In such a case, when the FAA inspector is satisfied that all the appropriate requirements have been met, then the FAA inspector approves the FAA Form 337 by signing in the space on the form indicated "For FAA Use Only."

**b. Informal Support Request for Field Approvals.** For more information on the field approval process, see Order 8300.10, Vol. 2, Chapter 1. This order provides a process by which a modifier and an ASI determine whether a proposed modification should be an STC. The ASI may informally ask for ACO engineering help in determining if the complexity of either the modification or the aircraft being modified requires an STC.

(1) Flight Standards inspectors may request FAA engineering personnel to help them confirm the assumptions on which they base their approval of the data supporting the major alteration or repair. See Order 8300.10 for examples that aid the ASIs in the “evaluation” determination of major alterations/repairs.

(2) The inspector may also ask ACO engineering personnel to help determine whether a proposed modification has appropriate and comprehensive data or whether additional data are needed. (Examples of this are categorized as the “engineering” determination in Order 8300.10, Vol. 2, Chapter 1, Figure 1-3, “Major Alterations Job Aid”).

**c. Formal Request for Support of Field Approvals.** Order 8300.10 also describes a process by which the FSDO inspector may formally request FAA engineering help to support a field approval. Note, when ACO engineering assistance is formally requested for review of the data associated with a major alteration or repair, the ACO’s concurrence becomes an attachment to the FAA Form 337.

**4-5. COMPLIANCE INSPECTION.** For changes to a type design, a compliance inspection may ensure the boundaries and interfaces of the change to the original type design are correctly addressed. Because a change to a type design may consist of many individual changes, a compliance inspection will help to determine the individual pieces fit together to make a compliant whole changed product. For example, the installation of a complete interior for a transport category airplane typically requires a cabin compliance inspection. Many of the cabin safety rules contained in 14 CFR §§ 25.78 through 25.820 are addressed by a cabin compliance inspection. Because the applicant rarely has access to the original design data, compliance inspections are all the more important for STCs. See paragraph 2-6f of this order for general discussions of compliance inspections.

**4-6. EXPERIMENTAL CERTIFICATE.** FAA engineering and manufacturing inspection personnel will discuss with the applicant if an experimental certificate will be required for the project aircraft.

**a.** The FAA requires the applicant to conduct developmental flight testing under an experimental certificate issued for research and development. Also, FAA engineering may require certification flight testing to be conducted under an experimental certificate issued to show compliance to the regulations. For more information, see Order 8130.29.

**b.** The FAA must issue an experimental certificate if operating limitations are required to protect the public on the ground. The FAA must also issue an experimental certificate if the flight test requires that an aircraft be flown in a manner that approaches the limits set in the existing type certificate. This condition would happen if the flight test would require or may encounter performance that is significantly outside the aircraft’s normal operations.

c. The ACO engineer will indicate on the TIA if an experimental certificate for showing compliance with the regulations is required. Indicate this in the instructions to the Manufacturing Inspector on the supplemental page for Block 18.

**4-7. REVISIONS TO PERFORMANCE DATA.** The applicant must review existing published performance data for the TC'd product to determine if the change to the aircraft adversely affects performance. Applicants must correct in their proposed AFM supplement performance data that could mislead the operator (due to changes in performance caused by the STC). If the data that is adversely affected by the STC is not data of the type requiring FAA approval, the AFM supplement must contain a note stating the STC makes the published data invalid. The ACO may approve the continued use of the performance data that remain correct or become more conservative as a result of the change. The ACO does not issue the STC until it approves the AFM supplement.

**4-8. SUPPLEMENTAL TYPE INSPECTION REPORT (STIR).** Manufacturing inspectors should use FAA Form 8110-26 to record results of inspections and tests conducted on the modified product. These inspections and test results are part of the STC project. For STCs resulting in extensive structural or mechanical changes to the certificated product, use the appropriate TIR form as a guide for inspections to identify if the STC makes existing product features non-compliant. Engineering personnel and the manufacturing inspector should discuss if this will be done when planning the conformity inspection. The manufacturing inspector should complete the STIR in the same manner as the TIR (See paragraph 2-7b of this order.). See paragraph 5-3 of this order for more information on factors that manufacturing inspectors should employ to determine an appropriate level of inspection and evaluation, based on the complexity of the modification.

**4-9. WHEN WILL THE FAA ISSUE STCs?**

a. The FAA will issue an STC for a major change to type design of a type-certificated product when the change is not great enough to require a new TC (14 CFR § 21.113). Any person may apply for an STC, however TC holders may apply for an amendment to their original TC.

b. STCs are not normally issued for replacement parts; PMAs are issued instead. Only in unique circumstances where the installation of the replacement part represents a major change in type design would an STC be issued. This STC would then be the design approval basis for the subsequent approval of a PMA so that replacement parts for that STC design can be manufactured and supplied as such."

c. The FAA will issue an STC for the installation of an article approved by a TSO, when the addition of the TSO-approved article is a major change in type design for the product on which it is being installed. Persons other than the TSO authorization holder may get approval for design changes to the TSO article as part of the approval for a change to the TC'd product under 14 CFR part 43 or under the applicable airworthiness regulations. In any case, the STC must address installation requirements of the changed TSO article on the certificated product.

**4-10. WHEN WILL THE FAA NOT ISSUE AN STC?** The FAA will not issue an STC to manufacturers or applicants outside the United States, except under the terms of a bilateral agreement. Also, the FAA will **not** issue an STC to do the following:

- a. Approve minor changes in type design,
- b. Approve replacement or modification parts, unless the installation of the replacement or modification part represents a major change in type design for the product,
- c. Approve design changes to TSO articles,
- d. Combine two or more STCs without additional showing of compliance,
- e. Modify foreign-registered aircraft without involvement of the CAA of the state of registry, as described in paragraph 4-15 of this order, or
- f. Approve a one-only modification of a foreign-registered aircraft, unless the particular conditions listed in paragraph 4-15c of this order are satisfied.

**4-11. TECHNICAL REQUIREMENTS FOR AN STC.**

- a. The applicant must comply with the requirements of 14 CFR § 21.115, including the submittal of the data to show compliance with the applicable certification basis (See paragraph 2-6 of this order).
- b. The applicant must ensure the changes to the product comply with the latest amendments to the regulations when the FAA considers the change to be significant (see 14 CFR § 21.101 and Order 8110.48).
- c. The FAA issues an STC after it:
  - (1) Completes all necessary tests and compliance inspections,
  - (2) Finds that the applicant's technical data meet the applicable regulations, and
  - (3) Finds no feature or characteristic makes the changed product unsafe.

**d. STCs for "Multiple" or "One-Only" Installations.** For multiple STCs, all drawings or other data must be adequate to reproduce the parts approved under the STC, and to reproduce the installation procedures on other serial numbers of the same model TC product identified on the STC certificate. For one-only STCs, submitted drawings or other descriptive data only need to be sufficient for one modification. The descriptive data may consist of marked photographs, sketches, and word descriptions. As with multiple STCs, the data supporting a one-only STC must show the aircraft complies with the applicable airworthiness regulations. A one-only STC cannot be amended and the holder is not eligible for an FAA production approval, such as a PMA.

#### 4-12. COMPATIBILITY EXAMINATION.

a. A new design change should be compatible with previous design changes. This ensures that the changed product continues to comply with its certificated airworthiness requirements. The PACO should ensure the STC is specific in identifying the product configuration for which the change is approved. The PACO does this by ensuring the applicant determines previously approved modifications are compatible with the design change.

b. **Changes Requiring Coordination with the CMACO.** Appendix 1, figure 6 of this order lists product changes requiring the PACO coordination with the CMACO during the project and to get concurrence from the CMACO before issuing the STC. See paragraph 4-18 of this order for information on establishing CMACO participation on the project. For PMA projects, see Order 8110.42 for information on coordination with the CMACO.

**NOTE:** The PACO will coordinate installation eligibility determination with the CMACO for projects making extensive structural or mechanical changes to the certification product.

c. **Changes Affecting Existing ADs.** Appendix 1, figure 6 of this order requires the PACO to coordinate with the CMACO for proposed modifications involving any part affected by an AD. The applicant must evaluate the proposed design change's effect on compliance with ADs that apply to the product. If the design change affects AD compliance, applicants must get approval for alternative methods of compliance (AMOC), per the AD. The PACO should coordinate this with the CMACO to verify the applicant's review of applicable ADs is complete and accurate before issuing the STC. If an applicant must get approval for AMOCs, indicate on the STC a reference to the AMOC approval letter issued by the CMACO. Before concurring, the CMACO will issue the AMOC letter to the PACO. The PACO then issues the STC.

d. **Discretionary CMACO Project Participation.** Aside from the changes listed in appendix 1, figure 6 of this order, the PACO may request CMACO participation at the beginning of the project. The PACO may indicate this on the CPN. Alternatively, the PACO may communicate informally with the CMACO on any project to explore whether the proposed modification may affect any specific design features requiring special consideration, tests, or analyses during the certification program. The accountable directorate may also be able to provide the PACO information on relevant experience from the product's original certification program. For projects not involving the changes listed in appendix 1, figure 6 of this order, the CMACO's concurrence is not required for issuance of the STC.

#### 4-13. APPROVED MODEL LIST (AML) STCs.

a. An AML STC process is appropriate to approve the installation of a change on more than one type-certificated product when the following happens:

(1) The installation instructions for the change on each type-certificated product are specific and objective, and

(2) The evaluation of the effect of the change applies to all type-certificated products addressed by the approval.

conducted in U.S. airspace, coordinate with the local CAA responsible for issuing the appropriate airspace authorization.

**c. Considerations for One-Only STCs on Foreign-Registered Aircraft.** ACOs may accept applications for one-only STCs involving non-U.S. registered aircraft, when the United States is the state of design, and one or more of the following conditions are present:

(1) For mandated safety enhancements, such as Traffic Collision Avoidance Systems (TCAS II), Enhanced Ground Proximity Warning Systems (EGPWS), and Reduced Vertical Separation Minimum (RVSM) equipment,

(2) Diplomatic aircraft,

(3) Aircraft owned by Heads of State,

(4) Responding to a CAA request for support as described in subparagraph 4-15.b.(3) above, and

(5) U.S.-manufactured aircraft that receive their final outfitting as one-only STC out of “completion centers.” The completion centers can be either inside or outside the United States (for example, Executive Aircraft Interiors, Boeing Business Jets (BBJ)), if the aircraft is completed under U.S. control.

**NOTE:** An ACO can authorize a designated alteration station (DAS) to develop an STC applicable to a foreign-registered, U.S. state of design aircraft as long as one of the above conditions is met. The ACO and the DAS must follow the procedures in Order 8100.9, DAS, DOA, and SFAR 36 Authorization Procedures.

#### **4-16. STC AND AMENDED STC APPLICATIONS.**

**a. Using Application Form.** The applicant must submit the STC application, FAA Form 8110-12 (See appendix 1, figure 2 of this order), to the geographic ACO, as listed in appendix 7 of this order. The geographic ACO contacts other ACOs, if it needs their technical support. Applicants must complete application FAA Form 8110-12, Blocks 1, 2, 3, 6, and 7 when the following occurs:

(1) They introduce a major change in the type design (to be accomplished per 14 CFR §§ 21.111 through 21.119),

(2) They intend to make major changes to the type design of an STC they hold (amended STC). Applicants must check Supplemental Type Certificate in block 2. Then, in block 6b, they must specify that the application is for an amendment and give the STC number. Examples of cases when the STC should be amended are:

(a) An STC holder wants to add product models to the STC, unless the FAA has given the STC holder an AML STC as discussed in paragraph 4-13 above.

(b) The STC amendment introduces a new major change in type design as discussed in paragraph 4-2 above.

(c) The proposed change will revise the limitations and conditions section of the STC.

b. In addition to FAA Form 8110-12, the applicant must include a detailed description of the modification, the type of aeronautical product, information on the manufacturer and model number of the aeronautical product as specified on the Type Certificate Data Sheet (TCDS) involved, location of the modification to be conducted (design and installation), a letter outlining who will prepare the engineering data required to substantiate the change, and a schedule for completion of the project. The applicant should also submit a statement, if necessary, that a project initiation meeting is needed or desired.

**4-17. ESTABLISHING AN STC PROJECT.** The ACO establishes STC and amended STC projects using the same process for establishing TC projects. See chapter 2, paragraph 2-4 of this order for detailed information on how to establish a type certification project, and how to prepare and submit the CPN form (see appendix 1, figure 4 of this order) to the accountable directorate. Direct the applicant to review FAA AC 21-40, Application Guide for Obtaining a Supplemental Type Certificate.

**4-18. ESTABLISHING ACO TO ACO COORDINATION.** If the project is of a type listed in appendix 1, figure 6 of this order, and the PACO is different from the CMACO for the affected product, then:

a. The PACO sends the CPN to the CMACO and the accountable directorate for the product. The CMACO manager assigns a supporting CMACO engineer, who then contacts the PACO project manager. The project manager coordinates the project with the CMACO-assigned engineer.

b. The PACO project manager:

- (1) Discusses all issues involving the project with the CMACO-assigned engineer,
- (2) Establishes the CMACO's level of involvement (that is, offer guidance on compliance, attend meetings, and so forth), and
- (3) Ensures all technical issues are addressed.

c. The PACO project manager makes a written record of any significant project discussions, and gives a copy of this record to the CMACO. The PACO project manager keeps a copy for the project file.

d. CMACO-assigned engineers get technical support from their office to help the PACO on the assigned project.

e. The CMACO-assigned engineer coordinates with the PACO on the certification program plan.

f. The CMACO assists the PACO on certain post-certification activity. This happens since the CMACO is most familiar with the certificated product and maintains contact with the certificate holder.

#### 4-19. PREPARING FAA FORM 8110-2, SUPPLEMENTAL TYPE CERTIFICATE.

**a. STC Numbers.** The certifying ACO assigns an STC number that identifies the type of product and the location of the issuing ACO. See appendix 1, figure 5 of this order, ACOS Project, TC, and STC Numbering System, for details on how to number an STC.

**b. Certificate Issued To.** The name and street address of the person to whom the ACO issues the STC should match exactly the name and street address on the FAA Form 8110-12. AIR-140 will validate the accuracy of the STC with relation to the exact name and address of the applicant.

**c. Certification Basis.** The certifying ACO must include the complete certification basis on FAA Form 8110-2.1 (the continuation sheets of FAA Form 8110-2), unless it is identical to that shown on the TCDS of the TC product and the ACO references the TCDS on the STC. When the certification basis differs from the original basis, the ACO must include the applicable portions of the certification basis as shown on the TCDS of the TC product, including all ELOS findings, exemptions, and directly related amendments. If other amendments are also involved, such as those with effective dates before the date of the STC application, the STC certification basis must reflect the combination of applicable regulations. The ACO shows this combination by listing the regulations and amendment level of each regulation for the changed product. When STC special conditions exist, the ACO must list them by number and date, and explain them on the STC continuation sheet, if appropriate. See appendix 2, figure 4 of this order.

**d. Original Product.** Include the TC number and the TC holder's name of the product being altered as shown on the product specification or TCDS. List all applicable models with model designations identical to those on the TCDS. Do not use the make-model-series description of the original product, unless it has been confirmed with the applicant that this installation eligibility is correct.

**e. Description of Change.** Include a description of the design change and identify the controlling document (for example, the Master Drawing List). Include required references as part of the design change, such as AFM supplements, ICA, loading instructions, drawings, drawing lists, and so forth. When producing multiple parts or kits, request the applicant to separate the installation data from the manufacturing data. Then, include the installation data list on the STC so the installer knows what data are required for installation of the design change.

**f. Limitations and Conditions.** This section identifies the specific limitations and conditions required for full compliance with the STC. At a minimum, include the following:

(1) Clearly show references to previous design changes. These changes are the ones enabling the newly altered product to be airworthy or those required to complete the installation. Identify here whether the STC is limited to a product definition more specific than the make-model-series description on the TCDS.

(2) For multiple STCs, include the following notes:

The installer must determine whether this design change is compatible with previously approved modifications.

If the holder agrees to permit another person to use this certificate to alter a product, the holder must give the other person written evidence of that permission.

(3) When approving a one-only STC, include the following note:

You cannot use descriptive data about this design change to duplicate other products. This approval is limited to only the installation made in (Make of Product) \_\_\_\_\_ Model \_\_\_\_\_ Serial No. \_\_\_\_\_. This STC does not permit manufacturing of parts for multiple installations.

(4) Include a statement similar to the following, when the STC makes provisions for equipment installation but STC does not include approval of the equipment. This prevents completion of the installation without further approval or prevents use of the equipment provisions for other purposes:

The FAA has not certified the equipment for which these provisions are intended. You must get additional FAA approval to install this equipment. The FAA must evaluate the installation to ensure it complies with the applicable airworthiness standards.

(5) For STCs that change a product's TCDS, the applicant must develop the revised information for the STC, when the applicant's change requires revision of any information contained on the product's TCDS. Include this information in this section of the STC following the TCDS format.

**g. Date of Application.** Include the date of application from FAA Form 8110-12.

**h. Date of Issuance.** This is the date the ACO initially issued the STC. Do not release the STC or STC number, or give it to the applicant, before this date.

**i. Date Reissued.** This is the date that the ACO reissued the STC. If the ACO previously reissued the STC, add the new reissue date to those dates existing from each prior reissue. The ACO reissues an STC to do the following; other changes to the certificate are considered amendments:

- (1) Change the holder's name or address,
- (2) Transfer the STC to a new holder,
- (3) Correct administrative errors, or

(4) Replace a lost or destroyed original.

**j. Date Amended.** This is the date that the ACO amended the STC. If the ACO previously amended the STC, add the new amended date to those dates existing from each prior amendment. The ACO amends an STC for changes in the following sections of the STC: Original Product, Description of Change, or Limitation and Conditions.

**k. Signature and Title.** The manager of the issuing ACO or a delegated person signs the STC.

**l. Revision Control.** If the STC is more than one sheet, use a revision control system like that used for a TCDS (See paragraph 3-4 of this order.).

**m. Continuation Sheets.**

(1) Use FAA Form 8110-2.1 when you need more space to do the following:

- (a) Describe the design change,
- (b) Identify the regulations and the complying amendments, and
- (c) Include additional limitations and conditions, such as operation limitations, equipment installations, weights, and so forth.

(2) In the STC, reference the continuation sheets in a note under the applicable paragraph, for example, "See continuation sheets 3 through x." Insert "END" below the last sentence on the continuation sheet. Number all continuation sheets and give the latest effective date of the STC. This date is the latest issuing date or the last amendment date.

**NOTE:** Reserve page 2 of the STC document (FAA Form 8110-2) as a sheet for transfer endorsements.

**n. Transfer of an STC.** The procedures for transferring an STC are the same as those for a TC (See paragraph 3-2f of this order.).

**o. Duration of an STC.** An STC is effective until it is surrendered, suspended, or revoked, or until a termination date is otherwise established by the Administrator. The procedures for surrendering, suspending, or revoking an STC are identical to the procedures for a TC (See paragraphs 3-2g and 3-2h of this order).

**p. Issuance.** After determining the design change complies with the regulations, the project manager recommends to the ACO manager or delegated person to issue the STC.

**q. Permission Statement.** The ACO notifies STC holders that they must give written evidence to another person authorized to use the STC data to modify an aircraft, aircraft engine, or propeller. This written evidence is known as the permission statement. To be acceptable to the Administrator, the permission statement must contain (at a minimum) a written agreement specifying the products to be altered, the STC number, and the persons given consent to use the

STC. STC holders may list more information, if they so desire. See an example in appendix 2, figure 5 of this order.

**r. Import Notification.** If approving the STC following the requirements of 14 CFR § 21.29, then use the above-listed certifying ACO preparation instructions. Insert the word “IMPORT” immediately below “Supplemental Type Certificate.” Include data from the CAA’s original STC to describe the design change and limitations as appropriate. See an example in appendix 2, figure 3 of this order.

#### **4-20. ACO REPORT OF STC.**

##### **a. Information Required for the RGL Website.**

(1) All ACOs must send electronic copies of STCs, with the certification basis continuation sheets, to the Delegation and Airworthiness Programs Branch (AIR-140) within 2 weeks of STC issuance. AIR-140 will publish the STC and its continuation sheets on the RGL website, so they will be available to the public.

(2) The STC data on the RGL website are for information purposes only. Possession of the STC document does not constitute rights to the design data or installation of the modification. The STC and its supporting data (drawings, instructions, specifications, and so forth) are the property of the STC holder. Anyone using the STC must contact the STC holder for rights to use the STC and the associated design data.

**b. Availability of STC Data.** ACOs must make copies of STCs, including the continuation sheets, available to anyone who requests them. The ACO must answer the requestor in writing, identifying the STC by number, and attach a copy of the STC to the letter. In the letter, the ACO must state, “Possession of the supplemental type certificate (STC) does not constitute rights to the installation of the modification or its design data. The STC and related information (drawings, data, specifications) are the property of the STC holder. The FAA will not release proprietary data without authorization from the holder. The user must get installation approval or data rights from the STC holder.”

**4-21. OTHER FOREIGN STCs.** A U.S. holder of an STC may apply for STC validation by a foreign CAA if the United States has a bilateral agreement with that CAA’s country. The specific bilateral agreement must be consulted to determine the scope of the agreement. Once a determination has been made that the holder may apply, a project manager must follow Order 8110.52. If a CAA seeks to issue its own approval for a design change based on a U.S. STC, and the agreement makes no provisions for validation, then a project manager should support the CAA by ensuring that the applicant provides them the information that the CAA will need to act as state of design for its issued approval. If the CAA does not communicate any specific data needs, the list of information required by Transport Canada is a good example of useful supporting data (See appendix 5 of this order for the list of information).

#### **4-22. FAA VALIDATION OF A CAA STC UNDER BILATERAL AGREEMENTS.**

**a. IPA with STC provisions.** A foreign holder of an STC may apply for U.S. validation of the STC when there is an established Bilateral Aviation Safety Agreement, Implementation Procedures for Airworthiness (BASA IPA) that includes STCs in its scope. The specific procedures are covered in each individual BASA IPA agreement and Order 8110.52.

**b. IPA with no STC Provisions.** If there are no provisions for 14 CFR § 21.29 validation in the IPA, then the ACO must consider whether undue burden provisions (14 CFR §§ 21.43 and 21.137) apply. When an undue burden provision applies, the ACO should not accept the application. Guidance on undue burden decision papers is in Order 8100.11, Developing Undue Burden and No Undue Burden Decision Papers under 14 CFR part 21. If the FAA accepts the project, the ACO should use the same discretion it uses for any type certification project. The ACO should use discretion because the FAA will have state of design and continued airworthiness responsibility for the approval of the STC after it is issued. See appendix 2, Figure 3 for a sample STC issued under bilateral agreements.

#### **4-23. OBTAINING A CANADIAN STC BY VALIDATION OF A U.S. STC.**

**a. Request for Canadian STC.** A U.S. resident and holder of a U.S. STC may apply for a Canadian STC under the United States/Canada BASA IPA.

**b. Applicability of Canadian STC.** Transport Canada's CAA only issues a Canadian STC to an aeronautical product that has either a Canadian Type Approval, an FAA TC accepted by Canada, or an equivalent approval document recognized by Transport Canada.

**c. Canadian STC Application Procedures.**

(1) A Canadian STC applicant applies through the FAA ACO that certified the STC. See appendix 5, figure 1 of this order for the Canadian STC application request format. This is a multi-purpose form for U.S. and Canadian applicants to use. The granting authority fills in the STC number and issue date.

(2) The PACO sends the Canadian STC application to the Transport Canada regional managers (See appendix 5, figure 2 of this order for the address list) in the Canadian region where the aeronautical product is to be modified. The applicant should identify the location of the aeronautical product. The PACO sends this information to the regional manager.

(3) The application is sent to Transport Canada headquarters in Ottawa, Canada, if a product is not being presently modified (for example, there is no current Canadian customer for the modification).

(4) Typically the Canadian STC applicant must submit the following documents with the application to Transport Canada (see appendix 5, figure 3 for a sample letter):

- (a) Canadian STC application,
- (b) Copy of FAA STC,
- (c) Compliance checklist – include any special conditions, ELOS findings, or exemptions applicable to the FAA STC,
- (d) Copy of the AFM supplement,
- (e) Copy of the master drawing list,

- (f) A copy of the manufacturing and installation instruction drawings,
- (g) ICA,
- (h) Weight and balance data,
- (i) Maintenance or repair manual supplements, and so forth, and
- (j) A required statement from the ACO stating that it found compliance to the applicable Transport Canada regulations.

**d. Document Review.** After Transport Canada reviews the documents, it may request additional reports and documents or request a familiarization meeting with the applicant to assist in processing the STC application. Transport Canada may also require special conditions, additional airworthiness requirements, or familiarization flights for the modified aircraft. If this happens, the PACO must cooperate fully with Transport Canada and provide all documents and assistance consistent with the United States/Canada BASA IPA.

**e. Issuance of Canadian STC.** After satisfactory completion of the familiarization flights, Transport Canada issues an STC to the applicant. Transport Canada then sends the STC to the PACO, which sends the original to the applicant.

(e) Did the drawing include all information needed to inspect the part, the material to be used, the treatment of the material (such as hardness, finish, and any special process specifications)?

(f) Did the drawing include applicable test specifications? Did the ACO engineer review these test specifications?

**(6) Adequacy of Inspection Records.**

(a) Do the inspection records show all inspections conducted?

(b) Do they show who conducted the inspection?

(c) Do they indicate the results of the inspection and disposition of unsatisfactory conditions?

(d) Are procedures adequate to ensure re-inspection of parts that are reworked or replaced? (This includes inspection of installation of new parts and inspection of the parts.)

**(7) Material Review Action.**

(a) Is the material review procedure documented and adequate to ensure disposition for nonconformities?

(b) Is there adequate corrective action for observed nonconformities to prevent reoccurrence?

(c) Have “use as is” or “repair” dispositions for non-conformances been submitted to FAA engineering for review, and have they been incorporated in the type design (one-time only engineering orders)?

**(8) Previously Produced Parts.**

(a) If the design specifies parts of previously type-certificated products and these parts are taken from production stock, were precautions taken to determine whether these parts may have been subjected to material review action? Nonconforming parts should not be used unless it can be shown that they will have no adverse effects or they are re-inspected to record all deviations for FAA engineering evaluations.

**NOTE:** Additional guidance for the use of previously produced parts is located in paragraph 2-5.c(3) of this order.

(b) Have the previously accepted deviations been made a part of the current design data submitted? Are they listed by the applicant on FAA Form 8130-9?

**(9) Software.**

(a) Are all software products (version description document, source code, object code, documentation, test procedures, loaded hardware/firmware, and so forth) properly identified, including revision levels, when compared to the hardware and software engineering drawings?

(b) Have all software problem reports been properly dispositioned?

(c) Do the records indicate all software products, including support software, and procedures have been placed under configuration control?

(d) Have the verification and acceptance tests been successfully executed, to approved test procedures, and recorded?

(e) Are there records indicating the object code was compiled from released source code by approved procedures?

(f) Do records indicate technical acceptance of the software, before loading into the system or product?

(g) Does the product load correctly with released object code to released procedures?

(h) Is the load verified per applicable procedures, for example, checksums, cycle redundancy checks, load maps?

(i) Does the software successfully execute the initialization procedure?

(j) Are there any indications of noncompliance with the manufacturer's procedures?

**NOTE:** See Chapter 4 of Order 8110.49, Software Approval Guidelines, of this order for more information on the process for software part conformity inspection and software installation conformity inspection.

**5-4. INSPECTIONS CONDUCTED OUTSIDE THE DISTRICT OFFICE.** When the conformity inspection is conducted outside its geographic area of responsibility, the project MIDO sends FAA Form 8120-10 (with all applicable information) to the MIDO conducting the conformity. After sending the conformity request, direct contact between the ACO engineer and the manufacturing inspector may resolve questionable items quickly. The manufacturing inspector should:

a. Record the inspections on the FAA Form 8100-1.

b. Forward the Form 8100-1 to the project MIDO.

c. Attach FAA Form 8130-3, Airworthiness Release Certificate, to the prototype parts. The Form 8130-3 should show the part number, the drawing change to which it was inspected, and the serial number or other identification.

#### **5-5. STREAMLINED CONFORMITY INSPECTION NOTIFICATION PROCESS.**

a. Several ACOs and MIDOs streamline their conformity request/inspection process for certain applicants. This speeds up the notification of conformity inspections to designated

**f. Process Phase Evaluation.** The manufacturing inspector and the ACO project manager can recommend approval or rejection of the process after the five phases that follow have been completed:

(1) **Phase I.** The manufacturing inspector and the ACO project manager should evaluate the basic information of the process. It is important to see that the process information is orderly and complete. Otherwise, it may lead to misinterpretation and confusion, causing the end article to exceed type design limits.

(2) **Phase II.** Manufacturing inspectors and ACO project manager should review the actual process and the process specification. During the review, they should look for the variables that must be controlled to ensure a conforming and consistent product. Some variables that may affect product quality are:

- (a) Raw materials and equipment used to make the part,
- (b) Production facilities and environment,
- (c) Inspection and test equipment, and
- (d) Production operators.

(3) **Phase III.** The manufacturing inspectors and the ACO project manager should verify that the process specification identifies ways to control the variables. These controls should establish:

- (a) The unit of measure and acceptance limits,
- (b) A description of the measurement techniques, and
- (c) Actions to take when the actual measurement does not meet acceptance

standards.

(4) **Phase IV.** Manufacturing inspectors should verify that the articles are being processed following the process specification. They should also verify the material, methods, tools, and equipment called for in the specification are being used. Since the end results depend on closely following the process instructions, correct any deviation or discrepancy on the initial runs.

(5) **Phase V.** Since the inspection of the processed articles is the main point of any process evaluation, the manufacturing inspector should determine whether the process can consistently produce articles in conformity with the type design requirements. The applicant should describe this process in the quality plan. When the process is followed, all parts produced should be of equal quality.

**g. Non-Destructive Inspection Method Evaluation.** The procedure for evaluating a nondestructive inspection (NDI) method is similar to the procedure in paragraph 5-6f above.

However, the applicant should show the following (to the manufacturing inspector's satisfaction):

- (1) The NDI method can detect the allowable defect size and location specified by the engineering drawing,
- (2) The inspection results are repeatable, and
- (3) Instruments required to perform the inspection meet the procedural acceptability requirements.

#### **5-7. REQUESTS FOR CONFORMITY INSPECTION FROM FOREIGN CAAs.**

**a. Requirements Under a Bilateral Agreement.** When allowed by the bilateral agreement, the FAA may request a foreign CAA to conduct a conformity inspection on our behalf. Request for conformity inspection or other technical assistance under a bilateral agreement must be forwarded by the FAA and cannot be delegated to another organization or FAA designee.

**b. Request for a Conformity Inspection.** To request the inspection, the PACO should send the foreign CAA a short cover letter with an FAA Form 8120-10 attached. In the letter, the ACO should include an FAA point of contact with phone and fax numbers. On the Form 8120-10, the ACO should identify the company, location, part number, drawing and revision level, and other necessary data to conduct the inspection. The ACO must also show the name of an FAA project manager to contact for project questions. The request should include any special instructions or items of special emphasis that the CAA should consider while performing any conformity inspections. For example, the ACO may ask the CAA to verify critical drawing dimensional and interface dimensional requirements, plating, heating treating, welding, and so forth.

**c. Disposition of Deviations.** After completing all conformity inspections on behalf of the requesting authority, the FAA or the foreign CAA will complete and return all their respective documentation to the requesting authority, as notified. On the conformity certification for the particular part, the foreign CAA of the country in which the supplier is located will note all deviations from the requirements notified by the design approval applicant's airworthiness authority. Any nonconformity described as a deviation should be brought to the attention of the FAA or the foreign CAA for evaluation and disposition of its effect on safety and the validity of the test under consideration. The FAA or the foreign CAA should receive a report stating the disposition required on each deviation before an FAA Form 8130-3 or issuance of the foreign equivalent form.

#### **5-8. CONFORMITY INSPECTION RECORD REPORTING.**

**a. Reporting Conformity Inspections.** On the FAA Form 8100-1, manufacturing inspectors should report all conformity inspections they conducted or tests they witnessed. They should include all discrepancies, nonconformities, and corrective actions. When they find nonconformities or discrepancies, manufacturing inspectors should send a copy of the applicable documents to the ACO project manager following previously agreed-on procedures for

perform no work on the aircraft after completion of the Phase II inspection, unless the manufacturing inspector agrees.

**NOTE:** FAA personnel or designees are not authorized to perform any mechanical work on the aircraft.

(c) The manufacturing inspector can witness the inspection using the following:

- 1 The TIR (applicable FAA Form 8110-(4, 5, 6, 7, or 8)), as a guide,
- 2 Title 14 CFR or Civil Air Regulations (CAR) as a basic reference, and
- 3 Applicable TIA instructions.

(d) If the inspection reveals unsatisfactory conditions, the manufacturing inspector should discuss them with the applicant's representatives. The manufacturing inspector should make every reasonable effort to communicate and coordinate with the applicant and the ACO. The manufacturing inspector should witness all ground operable systems as required by the TIA. Only the applicant's personnel should operate the particular system. Manufacturing inspectors should also witness the weighing of the aircraft and verify scale accuracy as required by the TIA. During each flight test, they should verify equipment installed, including test equipment, to determine flight loadings. They should also verify the weight and balance report. The report should show the actual empty weight center of gravity and the list of equipment installed. The manufacturing inspector and flight test engineer should keep a copy of the report.

**NOTE:** During this phase, it may be necessary to verify weights and moment arms of equipment items.

(e) Almost invariably there will be inspection items left over that cannot be determined at this time, such as instrument markings, placards, unusable fuel, and so forth. These inspections can be completed during Phase III when an opportunity arises and before type certification.

### **(3) Phase III – Coordinated Ground-Flight Inspection.**

(a) **Return to Flight Status.** When the aircraft has been returned to flight status after completing Phase II, the manufacturing inspector must ensure that the aircraft is airworthy and ready for flight testing. Manufacturing inspectors must also determine that the applicant corrected all unsatisfactory items before the FAA flight test. They also should coordinate all nonconformities with the ACO project manager before releasing the aircraft for the FAA flight test. It is important that the assigned manufacturing inspector be knowledgeable of the TIA requirements and the operation of the aircraft and its systems. This ensures the safe completion of the TIA-mandated flight test. The MIDO manager determines that the manufacturing inspector has the appropriate knowledge, experience, skills, and proficiency to assess the aircraft's condition before flight testing. Initially manufacturing inspectors decide if the test aircraft is ready for FAA flight testing. They base their decision on whether they find the aircraft is in a condition for safe operation and for the testing to be conducted. The manufacturing inspector and the flight test personnel should mutually agree on a system for informing the ACO

project manager of daily changes to the aircraft and any problems encountered during flight test. Cooperation between the assigned manufacturing inspector and flight test pilot is crucial to the safe and professional completion of flight testing. The FAA flight test pilot should not fly a test aircraft without coordinating with the assigned manufacturing inspector or the ACO project manager, as previously approved by the manufacturing inspector. This ensures that the manufacturing inspector or project manager released the aircraft for flight. This should not prohibit multiple flights, so long as the assigned manufacturing inspector has:

- 1 Reviewed all planned aircraft configurations for the desired test,
- 2 Conducted any necessary inspections, and
- 3 Coordinated this information with the FAA flight test pilot.

**NOTE:** The FAA flight test pilot makes the final acceptance of the test aircraft for flight, as it relates to the operation of the aircraft and the integrity of the test. In this phase, coordination with the FAA flight test specialist is emphasized.

**(b) Instrumentation.** A qualified agency should calibrate instruments, gauges, recording devices, and so forth, which are used in official flight test. Applicants should provide affidavits signed by the qualified agency. The qualified agency should give copies of the affidavits to the flight test personnel before flight. Also, the manufacturing inspector must determine that the equipment is properly installed and safe for operation. Additional functional test may be required after installation.

**(c) Flight Loadings.** The manufacturing inspector should determine if the applicant carried out the various loading conditions specified by the flight test specialist. This includes a determination that the ballast used is accurately weighed, located, and safely secured.

**(d) Periodic Safety Checks.** Throughout the FAA flight test program, the manufacturing inspector should determine that the applicant has a plan to ensure that the aircraft is given adequate inspection. The inspection should reveal any unsafe conditions that may develop. The applicant must correct those conditions before further FAA flight test participation. The applicant should coordinate the frequency and extent of such checks with the manufacturing inspector. The manufacturing inspector should participate in the checks whenever practicable to determine compliance. The manufacturing inspector and flight test specialist should have a system for informing each other of daily changes to the airplane and problems encountered during flight test.

## **5-16. USING ENGINEERING DATA.**

**a. Inspecting to Original and Final Production Drawings.** For conformity inspection purposes only, the ACO project manager encourages applicants to submit drawings that they can readily expand into final production drawings. The ACO project manager realizes that this may not always be practical during product development and that it may be necessary for the manufacturing inspector to inspect engineering layouts or even sketches. When this happens, ACO project managers should advise the applicant that, before they will approve the TC or STC,

inappropriate, such as foreign type-validation flight testing, or tests in support of field approvals. In these cases, a letter will be prepared by the appropriate office authorizing participation by FAA flight test and manufacturing inspection personnel. In this letter, the office will specify in detail, what is to be accomplished. When applicant flight tests are performed early in a program (before the TIA), before an FAA conformity inspection is conducted, the resulting data may still be valid if it can be established that:

(a) Testing took place on an aircraft that was essentially identical to the article that is later conformed to the type design, and

(b) No significant changes were made between the time of the test and the subsequent conformity inspection.

(2) **Conformity of Test Article with Type Design.** Before starting any official flight tests, the responsible test personnel for the project and ground inspection personnel should verify that a conformity inspection has been conducted to ensure that the aircraft is in conformity with the design data appropriate for accomplishing the tests and the aircraft is determined to be safe for the flight intended. The manufacturing inspector must have documented any nonconformities. Flight tests should not start until the appropriate TIA issuing office issues a release and notifies the flight test personnel.

(3) **Checkout on Test Aircraft.** Test pilots for the assigned project arrange with a responsible official of the applicant's organization for an adequate and agreed upon checkout in the applicant's aircraft. They must complete the checkout before the FAA pilots conduct any official FAA flight tests. See Order 8110.41.

(4) **Pilot-in-Command.** The pilot-in-command is the applicant's pilot (except for single place aircraft). The FAA pilot should emphasize the pilot-in-command responsibility as part of the pre-flight briefing.

(5) **Spin Recovery Parachutes.**

(a) Spin recovery parachutes should be installed on all aircraft requiring spin testing for certification. Also, the FAA may require these installations for other high-angle-of-attack tests on aircraft where inadvertent spins or deep stalls are likely during testing.

(b) The FAA will consider other types of spin recovery devices such as anti-spin rockets, when the applicant proposes them. These systems have many unknown characteristics, which would require considerable engineering research and wind tunnel testing. The tail-mounted spin recovery parachute system has been proven to be an effective spin recovery system and is the preferred system. For help in sizing a spin chute, see NASA Technical Paper 1076, Spin-Tunnel Investigation of the Spinning Characteristics of Typical Single-Engine General Aviation Airplane Designs, dated November 1977.

(c) ACOs must carefully evaluate a spin recovery system installation to determine its structural integrity, reliability, susceptibility to inadvertent or unwanted deployment or jettison, and adequate or redundant jettison ability. The chute size, porosity, riser length, and lanyard length should be designed following NASA recommended practices to

ensure that the system is effective in spin recovery. Also, ACOs should refer to NASA recommendations when evaluating the design of the chute deployment and jettison systems. Find appropriate NASA recommendations in the following publications:

**1** Burk, Sanger M. Jr., Summary of Design Considerations for Airplane Spin-Recovery Parachute Systems; NASA TN D-6866, August 1972.

**2** Bradshaw, Charles F., A Spin-Recovery System for Light General Aviation Airplanes; NASA CP-2127, 14th Aerospace Mechanics Symposium, May 1980.

**3** Stough, Paul H. III, A Summary of Spin-Recovery Parachute Experience on Light Airplanes; AIAA Paper Number 90-1317, AIAA/SFTE/DGLR/SETP Fifth Biannual Flight Test Conference, May 1990.

**(6) Emergency Provisions.** The project test pilots should make sure all necessary safety equipment is provided and that all crew members know and are briefed on how to use this equipment. The pilots should anticipate the possible emergencies that could happen during a particular test phase and outline crew duties during emergencies.

**(7) Aircraft Characteristics for Air Traffic Control.** The project test pilot should ensure that the applicant has provided the specific aircraft identifier and performance information required by paragraph 2-6h(1) of this order.

**(8) Risk Management Process.** The signed TIA should reflect adherence with the Flight Test Risk Management Process established by the ACO/directorate in accordance with Order 4040.26. This ensures that the associated flight test risks are acceptable.

**e. Test Flight Planning.** Carefully plan each flight test before actual flight. FAA flight test personnel and the applicant should agree on a written schedule of what will be done during the test. The agreed upon schedule should show the applicable 14 CFR airworthiness regulations to which the flight tests are being conducted.

**(1) Concurrent Testing:** The FAA defines concurrent testing as those FAA certification tests that are performed simultaneously with the applicant's own tests. Concurrent testing may be performed in certain unique cases when the cognizant FAA manager considers them appropriate and practical to ease the burden on the applicant. Examples of typical concurrent tests are tests that are considered low risk such as avionics installation where a successful compliance showing will most likely occur. In addition, concurrent testing may include but not be limited to  $V_{mu}$ ,  $V_{mcg}$ ,  $V_{mca}$ , maximum brake energy tests and wet runway tests, which by their nature are impractical to repeat. For such tests, concurrent testing by the FAA may be performed provided that an appropriate level of risk management evaluation is completed per Order 4040.26. The regulatory support for this kind of testing is justified by 14 CFR 14 §§ 21.33 and 35. 14 CFR § 21.33 (a) requires that the applicant allow the FAA to do any inspection and any ground and flight test necessary to determine compliance with the applicable requirements of the Federal Aviation Regulations. 14 CFR § 21.35(a) and (b) require that the applicant make all the tests necessary to show compliance with the Federal Aviation Regulations. During concurrent testing, the FAA is making a judicious selection of flight tests that it may choose to participate in (14 CFR § 21.33). The FAA is also jointly determining compliance with the applicant thereby meeting the intent of 14 CFR § 21.35 which requires the applicant to make "all flight tests that the Administrator finds necessary". For concurrent flight

testing, all requirements of 14 CFR § 21.33 (b)(2) through (b)(4) and 14 CFR § 21.35 (a)(1) through (a)(4) must be met (see an explanation of (a)(4) (Applicant's Flight Test Report) below. Concurrent flight testing is not the same as conducting research and development with the applicant prior to TIA. The main concern in the development of these regulations has been to prevent FAA crews from being exposed to undue hazards during flight tests. Since the advent of FAA Order 4040.26, this concern has been mitigated by the mandatory Risk Management Process imposed by the Order. This is a requirement prior to any FAA flight test (regardless of its risk level) and with a corresponding TIA or LOA.

**(2) Applicant's Flight Test Report.** The Applicant's flight test report described in 14 CFR §21.35(a)(4) should detail the results of the applicant's company or developmental testing, completed for the purpose of showing compliance with the applicable regulations. In the event concurrent testing (described in Paragraph 5-19(e)(1) above) is agreed by the FAA, it is recognized that reporting cannot be accomplished for tests the applicant has not previously completed. Before testing is conducted concurrently with the FAA under TIA, the applicant's flight test report should sufficiently document that the aircraft has flown previously, is airworthy, and that it is in a condition for safe operation.

**f. Hazardous Flight Tests.** FAA flight test personnel are not authorized to participate in or conduct potentially hazardous flight tests until the flight test risk management process has been completed by the ACO, or the ACO has reviewed and accepted the risk mitigation procedures proposed by an applicant with an FAA approved risk management process.

**g. Certification Flight Hours.**

**(1)** As part of the TIR, the flight test crew (pilot and/or engineer) records certification flight test time. The TIR should include all flights during which an FAA crew member is conducting required evaluations, including flight to and from local test areas, flight in the traffic pattern, and so forth. The TIR also includes time required to conduct or witness systems evaluations and other certification tests, regardless of whether an FAA pilot is at the controls. Initial pilot familiarization may be considered official test time even though no specific tests are conducted.

**(2)** Certification flight time does not include ferrying to remote areas or tests conducted for purposes other than for determining compliance, regardless of whether an FAA pilot is at the controls.

**5-20. FUNCTION AND RELIABILITY TESTING.**

**a. Responsibility.** All technical specialties on the TCB may have some involvement in the function and reliability testing program.

**b. Monitoring and Evaluation.** The manufacturing inspector monitors the functioning of all cabin installations, evaluation of maintenance, and refueling at each stop. The manufacturing inspector should:

- (1)** Check critical parts and components as much as possible at each landing.
- (2)** Ensure the accuracy of the weight and balance, and the loading schedule.
- (3)** Determine that the product being tested conforms to the approved data.

(4) Perform other duties and inspections assigned by the TCB.

(5) Maintain a record of all demonstrations witnessed and all inspections conducted. Also, the manufacturing inspector should obtain records from the applicant of all maintenance performed.

(6) Report all information obtained during function and reliability testing on the applicable FAA Form 8110-XX, TIR, and provide a copy to the FAA flight test engineer for inclusion in the consolidated report of the test.

(7) Advise the FAA flight test pilot/specialist or the alternate of any special inspections or observations that are to be made.

(7) The applicant must submit a report showing that the aircraft had been flown in all maneuvers that show compliance with the flight requirements for getting an approved TC. The report should also address the limitations specified in 14 CFR §§ 21.83(h), 91.317, and 121.207.

(8) Applicants must prepare a provisional AFM containing all applicable limitations for operating the aircraft with a Class II provisional TC. The AFM must include limitations on weights, speeds, flight maneuvers, loading, and operation of controls and equipment, unless the applicant sets operating restrictions for each limitation not established.

(9) The applicant must establish an inspection and maintenance program to ensure the continued airworthiness of the aircraft.

(10) The applicant must show that a prototype aircraft has been flown for at least 100 hours. If the applicant is seeking to amend a provisional TC, the Administrator may reduce the number of required flight hours.

**6-2. TYPE CERTIFICATION IN RESTRICTED CATEGORY, 14 CFR § 21.25.** The FAA issues TCs to restricted category aircraft for use only in certain special-purpose operations specified by the Administrator. Restricted category aircraft include both civil-derived and military-derived aircraft. Each aircraft must meet its respective requirements for restricted category before the FAA issues a restricted category TC, approving it for one or more specific special-purpose operations. Refer to FAA Order 8110.56, Restricted Category Type Certification, for additional type certification policy.

**a. Civil-Derived Aircraft.** Title 14 CFR § 21.25(a)(1) addresses civil-derived aircraft that meet the airworthiness requirements of a standard category except those requirements that the Administrator finds inappropriate for the special purpose for which the aircraft is to be used. A standard category is one of: normal, utility, acrobatic, commuter or transport categories. The accountable directorate determines which requirements are inappropriate.

**b. Military-Derived Aircraft.** Title 14 CFR § 21.25(a)(2) addresses military-derived aircraft that are of a type manufactured in accordance with the requirements of, and accepted for use by, an armed force of the United States. Military aircraft types must have a 10-year satisfactory service history with the U.S. Armed Forces to be considered for restricted category type certification. Coordinate technical issues with the designated focal point MCO for the military aircraft model. Also, coordinate all military-derived restricted category aircraft certification projects with AIR-110.

**c. Special-Purpose Operations.** An aircraft TC'd in restricted category may only perform the special-purpose operations for which it has been approved. The FAA has approved the special-purpose operations identified in 14 CFR §§ 21.25(b)(1) through (b)(6), and those specified under 14 CFR § 21.25(b)(7) by AIR-100, acting on the Administrator's behalf. See FAA Order 8110.56 for a list of approved special-purpose operations.

**d. Safe for Its Intended Use.** To comply with 14 CFR § 21.25(a), applicants must show that no feature or characteristic of the aircraft makes it unsafe when it is operated under the limitations prescribed for its intended use. "Intended use" means any operation supporting the approved special-purpose operation. Expect the applicant to complete an assessment of the aircraft in the special-purpose mission operating environment. This might require a fatigue and loads analysis of the aircraft in the mission operating environment to establish the limitations for safe operation, including life limits of fatigue-critical and fatigue-sensitive components.

**NOTE:** For military surplus aircraft, the fatigue and load assessment can be based on a comparison of the special-purpose, mission operating environment with the aircraft's previous military operating environment. Nevertheless, the applicant must still comply with any other requirements necessary to ensure it is safe for its intended use.

**e. Level of Safety.** The level of safety for restricted category aircraft can be lower than the level for a standard category aircraft. However, to maintain an equivalent level of safety for the public, the FAA imposes certain operating restrictions (see 14 CFR § 91.313). This policy is not intended to eliminate any type certification procedural requirements, such as the need to address continued airworthiness.

**f. Noise Compliance.** Restricted category aircraft must comply with the applicable noise requirements of 14 CFR part 36 (see chapter 7, Noise Certification, of this order for more guidance).

**g. Coordination with AIR-110.** Coordinate all military-derived, restricted category, aircraft certification projects with AIR-110. This coordination is in addition to any other coordination and review activity with ACOs and directorates. Provide a copy of CPNs to AIR-110. Also, coordinate all issue papers and TCDSs with AIR-110 before issuing them.

**h. Refer to Order 8110.56,** for additional policy regarding restricted category type certification.

### **6-3. TYPE CERTIFICATION OF CIVIL-DERIVED AIRCRAFT (RESTRICTED CATEGORY), 14 CFR § 21.25(a)(1). [RESERVED]**

### **6-4. TYPE CERTIFICATION OF MILITARY-DERIVED AIRCRAFT (RESTRICTED CATEGORY), 14 CFR § 21.25(a)(2). [RESERVED]**

**6-5. ESTABLISHING NEW RESTRICTED CATEGORY SPECIAL PURPOSES, 14 CFR § 21.25(b)(7).** Under 14 CFR § 21.25(b)(7), AIR-100 may specify, on the Administrator's behalf, other special-purpose operations not listed in 14 CFR § 21.25(b)(1) through (6). For consideration of a new special purpose under 14 CFR § 21.25(b)(7), the applicant submits to the ACO a proposal, containing information, views, and arguments to support the new special purpose. The ACO then includes its comments and arguments, and sends the proposal to AIR-100, which:

- a.** Evaluates the proposal,
- b.** Solicits comments through publication in the Federal Register,
- c.** Makes a determination, and
- d.** Notifies the ACO and the accountable directorate of the results.

**NOTE:** For a list of approved special-purpose operations, see FAA Order 8110.56 or contact AIR-110.

**6-6. TYPE CERTIFICATION OF SURPLUS MILITARY AIRCRAFT, 14 CFR § 21.27.** Surplus military aircraft of the U.S. Armed Forces may receive type certification in normal, utility, acrobatic, commuter, or transport categories.

**a. Compliance, 14 CFR § 21.27(a).** The applicant must show compliance with the following requirements:

(1) Civil Air Regulations or the 14 CFR regulations in effect when the aircraft was accepted for operational use by the United States Armed Forces,

(2) Applicable retroactive requirements of 14 CFR § xx.2, and

(3) Noise and emissions requirements of 14 CFR parts 36 and 34.

**b. Compliance, 14 CFR § 21.27(b).** Some surplus military aircraft have civil counterparts. These aircraft may be listed on the civil TCDS with information about modifications required to make them eligible under the civil TC. The applicant must show compliance with the following requirements:

(1) Regulations governing the original civil aircraft TC for the surplus aircraft of the Armed Forces of the United States. This aircraft is a counterpart of a previously type certificated civil aircraft.

(2) Applicable retroactive requirements of § xx.2.

(3) Noise and emissions requirements of 14 CFR part 36 and part 34.

**c. Special Conditions.** Special conditions and later requirements may be imposed under 14 CFR § 21.27(e).

**d. Engine, Propellers, and Related Accessories Approval.** Engines, propellers, and their related accessories will be approved for use on these aircraft if the applicant shows the product provides substantially the same level of safety as would be provided by the appropriate sections of 14 CFR parts 33 and 35. The applicant shows this on the basis of the product's military qualification, acceptance, and service record.

**e. Equivalent Level of Airworthiness.** The FAA may relieve the applicant of strict compliance with appropriate Civil Air Regulations/14 CFR under 14 CFR § 21.27(d) if the method of compliance proposed by the applicant provides substantially the same level of airworthiness as the Civil Air Regulations/14 CFR. The FAA may use Armed Forces experience in making such a determination.

**6-7. MULTIPLE AIRWORTHINESS CERTIFICATION, 14 CFR § 21.187.** Aircraft can be certificated in multiple categories under 14 CFR § 21.187. See Order 8110.56 and Order 8130.2 for details.

## **6-8. AERIAL DISPENSING OF LIQUIDS.**

**a.** When approving firefighting aircraft, indicate on the TCDS or STC that the approval is for "aerial dispensing of liquids." Do NOT use terms such as "firefighting" as the mission or purpose. (For restricted category aircraft, the "aerial dispensing of liquids" mission is approved under the special purpose of forest and wildlife conservation.) The use of the term "aerial dispensing of liquids" is intended to avoid confusion over who approves firefighting operations. The U.S. Forest Service, Bureau of Land Management, and state forestry agencies approve firefighting operations. Each has the final responsibility for its own firefighting operations. The FAA approves the aircraft only for the dispensing function. The aircraft must be evaluated in its mission operating environment to ensure that "no feature or characteristic makes it unsafe."

**b.** FAA can accept applications for TC and STC projects for aircraft to be converted for air tanker operations under "aerial dispensing of liquids." All type certification projects for aerial dispensing of liquids should be considered as significant in accordance with this order and in coordination with the accountable directorate.

**c.** The FAA should not spend the resources to approve additional requirements the U.S. Forest Service, or other government agencies, impose on aircraft performing firefighting. This includes the determination of aircraft life limits, such as an operational service life (OSL), when the FAA does not have a requirement to establish one.

**d.** Coordinate all “aerial dispensing of liquids” certification projects with AIR-110. This includes providing a copy of the CPN, and coordinating issue papers, TCDSs, and STCs, as appropriate, before their issuance.

**THIS PAGE INTENTIONALLY LEFT BLANK**

**THIS PAGE INTENTIONALLY LEFT BLANK**

**THIS PAGE INTENTIONALLY LEFT BLANK**

**THIS PAGE INTENTIONALLY LEFT BLANK**

**THIS PAGE INTENTIONALLY LEFT BLANK**



## CHAPTER 7. NOISE CERTIFICATION

**7-1. OVERVIEW OF NOISE CERTIFICATION RULES.** Aircraft must comply with 14 CFR part 36, Noise Standards: Aircraft Type and Airworthiness Certification, before the FAA issues certain TCs, amended TCs, STCs, and airworthiness certificates, as specified in various sections of 14 CFR part 21.

**a.** Some type certification actions require the FAA to conduct an environmental analysis under Order 1050.1, Policies and Procedures for Considering Environmental Impacts. See paragraph 7-4 below for more information on this requirement.

**b.** Before issuing an original TC, the FAA must conduct a finding per the Noise Control Act of 1972 as amended by 49 U.S.C Section 44715. The FAA must conduct this finding regardless of whether the aircraft complies with 14 CFR part 36 or the National Environmental Policy Act (NEPA). Paragraph 7-3 gives more guidance on the Noise Control Act.

**7-2. NOISE CERTIFICATION BASIS.** The regulatory basis for complying with 14 CFR part 36 noise certification is the amendment in effect on the date of application. The PACO specialist or project manager should notify the noise certification applicant of any pending regulatory changes that may affect the project.

### **7-3. NOISE CONTROL ACT FINDING.**

**a.** Under the Noise Control Act of 1972, the FAA must determine whether the applicant for an aircraft can substantially decrease noise, before the FAA issues an original TC. The FAA must determine this for any aircraft of any category, regardless of whether 14 CFR part 36 applies to the aircraft. If the FAA can prescribe standards and regulations to help the aircraft's noise level substantially decrease, then it must use the regulatory process to determine how much noise reduction it will require before issuing an original TC. The standards and regulations must be consistent with the limitations of Title 49 U.S.C. § 44715(e).

**b.** The Noise Control Act finding must be made by the FAA, notwithstanding any delegation to companies, other private persons, or CAAs, or any procedures for type certifying foreign-manufactured aircraft. The FAA's Office of Environment and Energy (AEE) delegates the authority to make this finding to the appropriate directorate depending on the aircraft type. That directorate may not re-delegate the authority. This finding must meet the Noise Control Act of 1972 for original type certifications. A copy of each finding should be sent to the AEE.

**c.** The FAA must base its findings on actual examination of each type design. This examination must start as soon as possible after applicants submit their application for type certification. It must reflect noise reduction potentials that become evident during the certification process. The noise finding documentation is not limited to, but should include:

**(1)** The sources of audible noise – aerodynamic or otherwise – in the particular type design, including any noise measurements made, who made them, whether the FAA witnessed them, and an estimate of their reliability,

- (2) Technical alternatives and potential ways to reduce noise, including recommendations for choosing practical technical alternatives that may reduce noise,
- (3) An estimate of the expected degree of potential noise reduction associated with each alternative identified in paragraph 7-3c(2) below,
- (4) Investigation and review of the manufacturer's design information, data, and tests, and
- (5) The economical and technical reasons the FAA did not require the applicant to include noise reduction technical alternatives in the type design. There should be reasons for each noise reduction technical alternative identified in paragraph 7-3c(2) above (for example, acoustical lining).

d. If the FAA concludes that prescribing standards and regulations can substantially reduce noise, it should refer the matter to AEE for appropriate action.

#### **7-4. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA).**

a. Order 1050.1 sets policies and procedures and assigns responsibility for ensuring that the FAA complies with environmental procedures in the Council on Environmental Quality regulation. The Council on Environmental Quality regulation outlines how to implement NEPA procedures. To comply with NEPA requirements, the FAA must assess and analyze the potential environmental consequences.

b. Chapter 4 (paragraph 401) of Order 1050.1 contains examples of actions that normally require an environmental assessment. Chapter 4 (paragraph 404) of that order includes a decision process on whether to prepare a finding of no significant impact (FONSI) or environmental impact statement (EIS) for a proposed action based on its potential environmental impacts. Chapter 3 (paragraphs 303 and 307- 312) of Order 1050.1 identifies FAA actions that are categorically excluded from the requirement for an environmental analysis or an EIS, with the exception of extraordinary circumstances (paragraph 304).

#### **7-5. ACCEPTABLE MEANS OF COMPLIANCE.**

a. Federal aircraft noise certification regulations require that the demonstration of compliance must be made by the set of specified procedures under 14 CFR part 36 or an FAA-approved equivalent procedure, which may be substituted for one or more of the 14 CFR part 36 specifications. In general, applicants may propose equivalent procedures for any specification under the noise *measurement* and the *evaluation* portions of 14 CFR part 36. However, they may not use equivalent procedures for the noise *limits* portion of 14 CFR part 36.

b. FAA-approved equivalent procedures are those procedures shown to yield the same noise levels as if the applicant fully performed specified 14 CFR part 36 tests or analyses as prescribed. The FAA does not grant prior approval of generic equivalent procedures. Applicants must identify equivalent procedures in their Noise Compliance Demonstration Plan. The FAA must approve the procedures before applicants use them in their noise certification demonstration.

**b.** For primary, normal, utility, acrobatic, commuter, or transport category propeller-driven small airplanes without flight time before January 1, 1980, the type design must comply with 14 CFR part 36 and applicable airworthiness requirements.

**c.** For import airplanes, the country in which the airplane was manufactured must certify – and the FAA must find – that 14 CFR part 36 or the applicable airplane noise requirements of the country of manufacture and any other FAA requirements provide noise levels no greater than those provided by compliance with 14 CFR part 36.

#### **7-12. AIRWORTHINESS CERTIFICATES FOR RESTRICTED CATEGORY**

**AIRCRAFT.** Before the FAA can issue a restricted category airworthiness certificate, aircraft must meet requirements in paragraphs 7-12a and 7-12b below:

**a.** For propeller-driven small airplanes, 14 CFR § 21.185(d) specifies that the type design must comply with applicable 14 CFR part 36 noise requirements and airworthiness requirements. These airplanes do not include those designed for agricultural use, as defined in 14 CFR § 137.3, or those that dispense firefighting materials. They also must not have had any flight time before January 1, 1980.

**b.** For import airplanes, 14 CFR § 21.185(d) specifies that the country in which the airplane was manufactured must certify – and the FAA must find – that 14 CFR part 36 or the applicable airplane noise requirements of the country of manufacture and any other FAA requirements provide noise levels no greater than those provided by compliance with 14 CFR part 36.

**7-13. DESIGNATED ALTERATION STATION (DAS) LIMITS.** A DAS may not issue an STC involving the acoustical change requirements of 14 CFR part 36 until the FAA finds that the DAS meets the requirements in 14 CFR § 21.451(d).

**FIGURE 7-1. TYPE OF FAA APPROVAL CERTAIN AIRCRAFT NEED  
TO MEET 14 CFR PART 36 NOISE STANDARDS**

<b>If aircraft is:</b>	<b>And has no flight time before:</b>	<b>And:</b>	<b>Applicants must obtain:</b>
Transport category large airplane or turbojet powered airplane [14 CFR § 36.1(d)]	Dec. 1, 1973	Weighs greater than 75,000 lbs. and is NOT powered by JT3D engine	<ul style="list-style-type: none"> <li>• An original standard airworthiness certificate (14 CFR § 21.183)</li> <li>• Acoustical change approval under 14 CFR § 21.93 (see figure 7-2)</li> <li>• A TC, amended TC, or STC</li> </ul>
same as above	Dec. 31, 1974	Weighs greater than 75,000 lbs. and powered by JT3D engine	same as above
same as above	Dec. 31, 1974	Weighs 75,000 lbs or less	same as above
Commuter category or small propeller-driven airplane [14 CFR § 36.1(e)]	Jan. 1, 1980	Is not designed for: <ul style="list-style-type: none"> <li>• Agricultural operations as defined in 14 CFR § 137.3, effective Jan. 1, 1966</li> <li>• Dispensing firefighting materials</li> </ul>	<ul style="list-style-type: none"> <li>• An original standard (14 CFR § 21.183) OR restricted (14 CFR § 21.185) airworthiness certificate</li> <li>• Acoustical change approval under 14 CFR § 21.93 (see figure 7-3)</li> <li>• A TC, amended TC, or STC</li> </ul>
Helicopter (first civil version of a military helicopter)	—	Demonstrates noise levels no greater than the Stage 1 noise limits in 14 CFR § H36.305(a)(1)(ii) of Appendix H	<ul style="list-style-type: none"> <li>• A TC</li> <li>• FAA approval for a change in type design (see figure 7-4)</li> </ul>
Helicopter (subsequent versions of a military helicopter)	—	Complies with Stage 2 noise limits	<ul style="list-style-type: none"> <li>• A TC</li> <li>• FAA approval for a change in type design (see figure 7-4)</li> </ul>

**NOTE:** 14 CFR part 36 applies to all primary, normal, transport, and restricted category helicopters for which applicants submitted applications for a TC or a change in type design on or after March 6, 1986.

It does NOT apply to helicopters used for agricultural aircraft operations (14 CFR § 137.3), for dispensing firefighting materials, or for carrying external loads (14 CFR part 133 operations).

**FIGURE 7-2. CRITERIA FOR ENSURING DESIGN CHANGES  
TO STAGE 1, 2, 3, AND 4 SUBSONIC TRANSPORT CATEGORY LARGE OR  
TURBOJET-POWERED AIRPLANES MEET 14 CFR § 36.7 NOISE STANDARDS**

<b>If subsonic transport category large airplane or turbojet powered airplane is:</b>	<b>And:</b>	<b>Then airplane:</b>
Stage 1 before change in type design	Application submitted AFTER Sept. 17, 1971	<ul style="list-style-type: none"> <li>• Cannot exceed noise levels before change</li> <li>• Must use highest airworthiness approved power or thrust, before and after change</li> <li>• Must use quietest configuration for highest takeoff weight, during takeoff and sideline noise tests before change</li> </ul> <p>Applicant cannot use tradeoff provisions in section B36.6 of Appendix B of 14 CFR part 36 to increase Stage 1 noise levels</p>
same as above	Application submitted BEFORE Sept. 17, 1971	<ul style="list-style-type: none"> <li>• Cannot exceed noise levels before change</li> </ul> <p>Applicant cannot use tradeoff provisions in section B36.6 of Appendix B of 14 CFR part 36 to increase Stage 1 noise levels</p>
Stage 2 before change in type design	Airplane powered by turbojet engine with bypass ratio of 2 or more	<ul style="list-style-type: none"> <li>• Cannot exceed quieter of Stage 3 noise limit + 3 EPNdB or Stage 2 noise limit, whichever is lower</li> <li>• Must use quietest configuration for highest takeoff weight, during flyover and lateral noise tests before change</li> </ul> <p>Applicant CAN use tradeoff provisions in section B36.6 of Appendix B of 14 CFR part 36 to determine noise limits</p>
same as above	Airplane NOT powered by turbojet engine with bypass ratio of 2 or more	<ul style="list-style-type: none"> <li>• Cannot be Stage 1 after change</li> <li>• Must use quietest configuration for highest takeoff weight, during flyover and lateral noise tests before change</li> </ul>

**FIGURE 7-2. CRITERIA FOR ENSURING DESIGN CHANGES  
TO STAGE 1, 2, 3, AND 4 SUBSONIC TRANSPORT CATEGORY LARGE OR  
TURBOJET-POWERED AIRPLANES MEET 14 CFR § 36.7 NOISE STANDARDS  
(CONTINUED)**

<b>If subsonic transport category large airplane or turbojet powered airplane is:</b>	<b>And:</b>	<b>Then airplane:</b>
Stage 3 before change in type design	Application submitted ON OR AFTER Aug. 14, 1989	• Must remain a Stage 3 airplane after change
same as above	Application submitted BEFORE Aug. 14, 1989 AND The FAA required that the airplane be Stage 3 compliant before change	• Must remain a Stage 3 airplane after change
same as above	Application submitted BEFORE Aug. 14, 1989 AND The FAA did NOT require that the airplane be Stage 3 compliant before the change	• Must be a Stage 2 or remain Stage 3 airplane after the change
same as above	Airplane becomes a Stage 4 after the change	• Must remain a Stage 4 airplane after the change
Stage 4 before change in type design		• Must remain a Stage 4 airplane after the change

**NOTE:** If the applicant is NOT proposing an acoustical change to the subsonic transport category large airplane or turbojet-powered airplane, 14 CFR § 36.7 does not apply.

**FIGURE 7-3. CRITERIA FOR ENSURING DESIGN CHANGES TO  
COMMUTER CATEGORY AND PROPELLER-DRIVEN SMALL AIRPLANES  
MEET 14 CFR § 36.9 NOISE STANDARDS**

<b>If applicant:</b>	<b>And airplane is:</b>	<b>Then:</b>
Makes acoustical change	<ul style="list-style-type: none"> <li>• Designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or</li> <li>• U.S.-registered airplane with flight time BEFORE Jan. 1, 1955; or</li> <li>• Land-configured airplane reconfigured with floats or skis</li> </ul>	Title 14 CFR § 36.9 does not apply
Makes acoustical change AND Submitted application BEFORE Jan. 1, 1975	<ul style="list-style-type: none"> <li>• NOT designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or</li> <li>• NOT U.S.-registered airplane with flight time AFTER Jan. 1, 1955; or</li> <li>• NOT land-configured airplane reconfigured with floats or skis</li> </ul>	Title 14 CFR § 36.9 does not apply
Makes acoustical change AND Submitted application AFTER Jan. 1, 1975	<ul style="list-style-type: none"> <li>• NOT designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or</li> <li>• NOT U.S.-registered airplane with flight time AFTER Jan. 1, 1955; or</li> <li>• NOT land-configured airplane reconfigured with floats or skis</li> </ul> <p align="center">AND</p> <ul style="list-style-type: none"> <li>• Type certified under Appendix F or G of Part 36</li> </ul>	Airplane may not exceed limits defined in 14 CFR § 36.501
same as above	<ul style="list-style-type: none"> <li>• NOT designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or</li> <li>• NOT U.S.-registered airplane with flight time AFTER Jan. 1, 1955; or</li> <li>• NOT land-configured airplane reconfigured with floats or skis</li> </ul> <p align="center">AND</p> <ul style="list-style-type: none"> <li>• NOT type certified under Appendix F or G of Part 36</li> </ul>	<p>After change in type design, airplane may not exceed the higher of these two:</p> <ul style="list-style-type: none"> <li>• Noise limits in 14 CFR § 36.501 or</li> <li>• Noise level before change in type design, measured and corrected per 14 CFR § 36.501</li> </ul>

**FIGURE 7-4. CRITERIA FOR ENSURING DESIGN CHANGES TO HELICOPTERS  
MEET 14 CFR PART 36 NOISE STANDARDS**

<b>If helicopter is:</b>	<b>And:</b>	<b>Then the applicant:</b>
Excepted from acoustic change requirements for change in type design under 14 CFR § 21.93	—	Only needs to show that parent (original), not derivative (modified), helicopter meets applicable 14 CFR part 36 requirements
Not excepted from acoustic change requirements for change in type design under 14 CFR § 21.93	Change in type design will NOT increase helicopter's certification noise levels	same as above
same as above	Change in type design WILL increase helicopter's certification noise levels	Must ensure derivative helicopter meets applicable 14 CFR part 36 requirements

Stage 1 helicopter:

- If the Stage 1 parent exceeds any Stage 1 limit for helicopters, the derivative's noise levels must not be greater than levels for the parent. The ACO will not approve the change in type design until the applicant reduces the derivative's noise levels to at least the parent helicopter's levels.

- If the Stage 1 parent helicopter does NOT exceed any Stage 1 limits, the derivative helicopter cannot exceed Stage 1 noise limits. The derivative may "acoustically grow" up to Stage 1 limits.

Stage 2 helicopter: If the parent is a Stage 2 helicopter, the derivative helicopter must be a Stage 2 helicopter. The derivative may "acoustically grow" up to the Stage 2 limits for helicopters.

**APPENDIX 1. FORMS AND GUIDANCE FOR  
CERTIFICATION PROJECTS (CONTINUED)****FIGURE 2. SAMPLE FAA FORM 8110-12 (CONTINUED)**

U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

**INFORMATION FOR APPLICANT****APPLICATION FOR TYPE CERTIFICATE, PRODUCTION CERTIFICATE,  
OR SUPPLEMENTAL TYPE CERTIFICATE****Paperwork Reduction Act Statement:**

This collection of information is for the purpose of issuing a U.S. Type Certificate, Production Certificate, or Supplemental Type Certificate to any applicant meeting the criteria established in 14 CFR part 21. The FAA uses the information to evaluate an applicant's application for a U.S. Type Certificate, Production Certificate, or Supplemental Type Certificate. The information on FAA Form 8110-12, Application for Type Certificate, Production Certificate, or Supplemental Type Certificate is solicited under the authority of 49 U.S.C. 44702 as implemented by 14 CFR part 21. The burden associated with completing FAA Form 8110-12 is 48 minutes. Providing this information is mandatory if an applicant wishes to obtain a Type Certificate, Production Certificate, or Supplemental Type Certificate. Confidentiality is neither provided nor necessary. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection of information is 2120-0018.

**Tear off this cover sheet before submitting this form.**

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

### FIGURE 3. STANDARDIZED CERTIFICATION PROJECT NOTIFICATION PROCEDURES

**1. Setting Up The Project.** Aircraft certification offices (ACO) use the Aircraft Certification Office Subsystem (ACOS), or equivalent means, to create and assign certification project numbers, and to assign a project manager (engineer) for type certification projects. ACOS, or equivalent means, generates the standardized certification program notification (CPN) form (see appendix 1, figure 4 of this order). The CPN form is then sent electronically to the accountable directorate for each type certification project.

**a. The CPN form** briefly describes the project. See a copy of the CPN form in figure 4 of this appendix.

**b. Determining Project's Significance.** ACO project managers (engineers) will initially state the project's significance – and ask for help from CSTAs and aircraft evaluation groups (AEG), if they need it. The accountable directorate standards staff posts the CPN on an FAA electronic bulletin board for CSTA review. The accountable directorate will ultimately decide the project's significance, regardless of whether the ACO agrees or disagrees. The accountable directorate assigns a project officer for significant projects. The project *manager* is the focal point for the ACO; the project *officer* is the focal point for the accountable directorate. When notifying an accountable directorate of the project, the term “significant” – used to describe a type or supplemental type certification project – means:

(1) Any new type certification application.

(2) Any application for an amended type certificate, or new or amended supplemental type certificate, in which:

(a) The design appears to require special conditions, exemptions, or equivalent safety findings, or the FAA determines it to be a significant change per 14 CFR § 21.101.

(b) The design uses novel or unusual methods of construction.

(c) The design changes the kinematics, dynamics, or configuration of either the flight control or rotordrive system.

(d) The design change would substantially alter the aircraft's flight characteristics.

**NOTE:** For project description purposes, the FAA considers flight items for which compliance can be qualitatively recorded or documented to be nonsignificant. However, the accountable directorate may opt to participate in flight testing.

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

### FIGURE 3. STANDARDIZED CERTIFICATION PROJECT NOTIFICATION PROCEDURES (CONTINUED)

(e) The design affects an area that has been the subject of a major service difficulty or accident.

(f) The design changes the engine configuration from reciprocating to turbo propeller or turbojet-powered, or changes from one engine or propeller model to a completely different engine or propeller model. (This does not include dash number changes. These dash numbers are known as series numbers.)

(g) The design affects the integrity of the basic load-bearing structure necessary for continued safe flight and landing or operation of the aircraft within approved limits.

(h) The design consists of new state-of-the-art systems or components that the FAA has not previously certificated or for which the FAA has not published adequate certification criteria.

(i) The certification is likely to be controversial or highly visible.

**c. In the case of PMA, determining whether or not application for a PMA is for critical or life-limited part.**

**d. Determining if Product Change is Significant** per 14 CFR § 21.101. See Figure 3, Significant Change versus Significant Project. Also, see Order 8110.48.

**e. Determining CSTA Involvement.** The ACO project manager (engineer) must consult with CSTAs when the design consists of new state-of-the-art systems or components that the FAA has not previously certificated or for which the FAA has not published adequate certification criteria. CSTAs are recognized experts in their fields on technical issues. They use their technical expertise to help the Aircraft Certification Service apply regulatory policies and practices to certify state-of-the-art technology. CSTAs do not directly develop new policy or methods of compliance. Rather, they work with the directorate standards staff and ACO who develop and implement new policy.

**f. Determining AEG Involvement.** The ACO project manager (engineer) must consult with AEGs when a product's operational and maintenance aspects need to be evaluated during the certification process. The AEGs are operations and airworthiness inspectors who work directly with aircraft certification personnel. They offer an operational perspective to engineering activities during the certification process. The AEGs:

(1) Advise manufacturers of operational and maintenance requirements during the design and certification process.

(2) Have the primary responsibility for evaluating aircraft and its systems for operational suitability and continued airworthiness.

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

### FIGURE 3. STANDARDIZED CERTIFICATION PROJECT NOTIFICATION PROCEDURES (CONTINUED)

(3) Analyze type design data and participate in the aircraft certification engineering compliance inspections and flight test programs, during the certification process.

**g. ACO to ACO Coordination.** If the project is of a type listed in appendix 1, figure 6, you must request CMACO participation. For other projects, you may request CMACO participation by indicating “Yes” on the form. “Not Determined” means that you are requesting the CMACO to determine if it will participate.

**h. Assigning Project Number.** As stated in paragraph 1 of this appendix, ACOS, or equivalent means, is an automated system that ACOs use to assign project numbers, and track and manage type certification programs. The assigned project number reflects the type of project and the PACO. (See appendix 1, figure 5, ACOS Project, TC, and STC Numbering System, for details of the numbering system.) Everyone should use the assigned project number in all correspondence, reports, and other documents about the project. If the project is canceled before it is completed, the assigned project number should be marked canceled.

#### 2. Standardized CPN Procedures.

**a. CPN Focal Point’s Responsibilities.** Within 10 working days from the time the ACO issues the project number by using ACOS, or equivalent means, each ACO will send the CPN by electronic mail to the CPN focal point for the accountable directorate standards staff. Within 10 working days from receiving the information, the focal point will post data from the ACO on the bulletin board as a CPN.

**b. Accountable Directorate’s Responsibilities.** The accountable directorate judges if the project is significant, regardless of whether the ACO agrees or disagrees. The accountable directorate then will assign a project officer to all significant projects. It also notifies the ACO of the assignment electronically within 10 working days of receiving the CPN.

**c. Formatting CPN’s Subject Line.** The subject line on the bulletin board for each CPN will begin with either the letter N for nonsignificant, or the letter S for significant CPNs, and the project number. Next is the product make/model and a brief description of the project. Examples are:

S, ST2922SE-T, 737/100/200/300/400/500, Winglets  
N, TD2943SE-T, 777, Radio Tuning Panel

**d. Alerting CSTAs and AEGs.** Initially the ACO will use the standardized CPN form to show CSTA and AEG involvement in the certification program. This is another means of alerting AEGs that they may be involved in a particular program. Direct contact between the ACO and the appropriate AEG office still remains the primary means of coordinating activities.

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

### FIGURE 3. STANDARDIZED CERTIFICATION PROJECT NOTIFICATION PROCEDURES (CONTINUED)

**e. Sending the CPN.** The ACO, with the use of ACOS, or equivalent means, electronically sends the CPN to all interested ACO parties – such as the project manager (engineer) and, in some instances, an administrative officer – when it posts the CPN to the CPN bulletin board.

**NOTE:** Applicants should send all correspondence on the project to the ACO where they sent their application.

**f. Retaining CPNs.** CPNs are to be retained in the bulletin board for ten years.

**g. Sample CPN Form.** See a copy of the standardized CPN form in appendix 1 of this order. It replaces the form in Order 8100.5, Aircraft Certification Service Mission, Responsibilities, Relationships, and Programs, Appendix 1. ACOS, or equivalent means, will generate the form and automatically insert the proper titles and information.

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

**FIGURE 3. STANDARDIZED CERTIFICATION PROJECT  
NOTIFICATION PROCEDURES (CONTINUED)**

### Significant Change vs. Significant Project

Significant Change	Significant Project
<p><b><i>Title 14 CFR § 21.19. Changes requiring a new certificate.</i></b></p> <p>Change in design, power, thrust, or weight is so extensive that substantially complete investigation of compliance with the applicable regulations is required.</p>	<p><b><i>Significant project requiring coordination with accountable directorate.</i></b></p> <p>(1) New TC application</p> <p>(2) ATC, STC, or ASTC application for:</p> <p>(a) Special conditions exemptions or equivalent safety findings.</p> <p>(b) Unusual methods of construction.</p> <p>(c) Flight control or rotordrive system changes.</p> <p>(d) Substantially altered flight characteristics.</p> <p>(e) Areas of major service difficulty.</p> <p>(f) Change from reciprocating to turboprop/jet or engine/prop change.</p> <p>(g) Affected load-bearing structures.</p> <p>(h) New state-of-the-art systems or components.</p> <p>(i) Controversial or visible issues.</p> <p>(j) For a small airplane with seating capacity of six (6) or more with a reasonable potential for use in a 14 CFR part 135 operation and include proposed changes that affect operational aspects of the airplane such as those which would require flight testing and/or revisions to the Airplane Flight Manual (AFM) or Maintenance Manual.</p>
<p><b><i>Title 14 CFR § 21.101(b)(1) Significant change requiring compliance to latest applicable regulations.</i></b></p> <p>Change is significant if:</p> <p>(i) General configuration or principles of construction are not retained.</p> <p>(ii) Assumptions used for certification of the product to be changed do not remain valid.</p>	

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

**FIGURE 4. STANDARDIZED CERTIFICATION PROJECT NOTIFICATION FORM**

<b>Subject:</b> <u><b>ACTION:</b> Certification Project Notification</u>	<b>Date:</b> _____
<b>From:</b> Project Manager, Aircraft Certification Office, XXX-xxx	
<b>To:</b> Manager, Standards Staff, XXX-110	
<b>Part A:</b> (To be completed by office receiving application)	
1. ACOS Project No.: _____	
2. Model Designation: _____	
3. Applicant: _____	
4. Address: _____	
5. Date of application: _____	
6. Type of project: TC___ ATC___ STC___ ASTC___ PMA___	
7. Is PMA for Critical/Life-Limited Part)? Yes ___ No ___	
8. Expected completion date: _____	
9. Project Manager: _____ Telephone Number _____	
10. Project Engineer: _____	
11. Description: _____	
12. We do ___ / do not ___ consider this a significant project per paragraph 1b under figure 3 of this appendix.	
13. We do ___ / do not ___ consider this a significant change per 14 CFR § 21.101(b)(1).	
14. CSTA Involvement? Yes___ No___ Not Determined___	
15. AEG Involvement? Yes___ No___ Not Determined___	
16. ACO to ACO Coordination? Yes___ No___ Not Determined___	
_____ Manager, (project, or ACO)	
<b>Part B:</b> (To be completed by Directorate)	
<b>Date:</b> _____	
<b>From:</b> <i>Project Officer Name for Manager, Standards Staff, XXX-110</i>	
<b>To:</b> Project Manager, Aircraft Certification Office, XXX-xxx	
We do ___ / do NOT ___ consider this project to be significant and have assigned _____ as our Project Officer.	
Please do ___ /do NOT ___ submit a draft Certification Project Plan.	
Signature authority ( ) is / ( ) is NOT delegated to your office.	
<b>Directorate ACOS Project No.:</b> _____	
File: _____	
<b>Part C:</b> (To be completed by accountable AEG office)	
<b>Date:</b> _____	
<b>From:</b> Manager, Aircraft Evaluation Group, XXX-AEG	
<b>To:</b> Project Manager, Aircraft Certification Office, XXX-xxx	
We ( ) do / ( ) do NOT need to be involved in this project, and have assigned _____ as the AEG representative(s).	
Please ( ) do / ( ) do NOT submit the following for AEG review:	

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

**FIGURE 4. STANDARDIZED CERTIFICATION PROJECT NOTIFICATION FORM  
(CONTINUED)**

<p><u>Part D:</u> (To be completed by CMACO)</p> <p><b>Date:</b></p> <p><b>From:</b> Manager, Aircraft Certification Office (CMACO), XXX-xxx</p> <p><b>To:</b> Project Manager, Aircraft Certification Office (PACO), XXX-xxx</p> <p>We ( ) do / ( ) do NOT need to be involved in this project, and have assigned _____ as the CMACO representative(s).</p> <p>Please ( ) do / ( ) do NOT submit the following for CMACO review:</p>
---

## **APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)**

### **FIGURE 5. ACOS PROJECT, TC, AND STC NUMBERING SYSTEM**

#### **PROJECT NUMBERING SYSTEM**

##### **Project Number = AA nnnnn YY-X Where:**

**AA** = Two alpha digits to identify the type of project; i.e.,

**TC** = New Type Certificate (TC)

**ST** = New Supplemental Type Certificate (STC)

**AT** = Amended Type Certificate

**SA** = Amended Supplemental Type Certificate

**TD** = Type Design Change

**SP** = Special Project

**PM** = Parts Manufacturer Approval (PMA)

**nnnnn** = ACOS assigned number; e.g., 00146

**YY** = Two alpha digits to identify the project Aircraft Certification Office (ACO); that is,

**AC** = ASW-150, Ft. Worth Airplane Certification Office

**AK** = ACE-115N, Anchorage Aircraft Certification Office

**AT** = ACE-115A, Atlanta Aircraft Certification Office

**BO** = ANE-150, Boston Aircraft Certification Office

**CE** = ACE-112, Small Airplane Directorate

**CH** = ACE-115C, Chicago Aircraft Certification Office

**DE** = ANM-100D, Denver Aircraft Certification Office

**EN** = ANE-140, Engine Certification Office, Boston

**LA** = ANM-100L, Los Angeles Aircraft Certification Office

**MC** = ACE-115M, Military Certification Office

**NY** = ANE-170, New York Aircraft Certification Office

**RC** = ASW-170, Ft. Worth Rotorcraft Certification Office

**SE** = ANM-100S, Seattle Aircraft Certification Office

**SC** = ASW-190, Ft. Worth Special Certification Office

**WI** = ACE-115W, Wichita Aircraft Certification Office

**X** = An alpha digit to identify the type of product; that is,

**A** = Small Airplane

**B** = Balloon

**E** = Engine

**G** = Glider

**P** = Propeller

**R** = Rotorcraft

**S** = Airship

**T** = Transport Airplane

**I** = Experimental

**Q** = Other, or not product

As an example, TC00125AT-A would be a TC project assigned by the Atlanta ACO on a small airplane with the assigned number 00125.

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

**FIGURE 5. ACOS PROJECT, TC, AND STC NUMBERING SYSTEM (CONTINUED)**

### TYPE CERTIFICATE NUMBERING SYSTEM

**Certificate Number = SX nnnnn YY-D**

**Where:**

**S** indicates a supplemental type certificate (blank if a type certificate)

**X** = An alpha digit to identify the type of product; that is,

- A** = Small Airplane
- B** = Balloon
- E** = Engine
- G** = Glider
- P** = Propeller
- R** = Rotorcraft
- S** = Airship
- T** = Transport Airplane

**nnnnn** = assigned number automatically generated by ACOS; for example, 00146.

**YY** = Two alpha digits to identify the issuing Aircraft Certification Office (ACO)

- AC** = ASW-150, Ft. Worth Airplane Certification Office
- AK** = ACE-115N, Anchorage Aircraft Certification Office
- AT** = ACE-115A, Atlanta Aircraft Certification Office
- BO** = ANE-150, Boston Aircraft Certification Office
- CE** = ACE-112, Small Airplane Directorate
- CH** = ACE-115C, Chicago Aircraft Certification Office
- DE** = ANM-100D, Denver Aircraft Certification Office
- EN** = ANE-140, Engine Certification Office, Boston
- LA** = ANM-100L, Los Angeles Aircraft Certification Office
- MC** = ACE-100M, Military Certification Office
- NY** = ANE-170, New York Aircraft Certification Office
- RC** = ASW-170, Ft. Worth Rotorcraft Certification Office
- SE** = ANM-100S, Seattle Aircraft Certification Office
- SC** = ASW-190, Ft. Worth Special Certification Office
- WI** = ACE-115W, Wichita Aircraft Certification Office

**D** = indicates Designated Alteration Station (DAS) issued STC (blank if not DAS issued)

As an example, SA00125AT would be an STC issued by the Atlanta ACO on a small airplane with the assigned number 00125.

## **APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)**

### **FIGURE 6. PROJECT SIGNIFICANCE FOR ACO TO ACO COORDINATION.**

**The Project ACO (PACO) must coordinate the types of projects listed below with the Certificate Management ACO (CMACO). Examples are as follows:**

#### **General**

- Any STC or repair that affects or replaces a critical or life limited structural or engine part, such as landing gear, thrust reversers, gear boxes, rotating engine parts, pistons, connecting rods, engine block and head.
- Modifications to empty/zero fuel weight.
- Externally mounted equipment. (excluding antennas)

#### **Engine/Prop/Fuel System/APU**

- Change in type or power rating of engine
- Propeller/propeller control replacement.
- Propeller installations that affect gear box/changes to mass balance.
- APU and APU compartment modifications.
- Fuel system modifications.
- Change to electronic engine controls or instruments.
- Nacelle modifications.

#### **Electrical/Avionics/Software**

- Software modifications that affect critical systems.
- Electrical modifications to aircraft with FADEC engines.
- Single pilot IFR certification modifications.
- New/novel avionics packages (glass cockpit, ECAS, and so forth)
- Electrical modifications powered from systems having automatic load shedding features.

#### **Systems**

- Major changes to fire detection/suppression systems.
- Hydraulic flight controls/ASAS.
- Icing protection systems.

#### **Rotorcraft**

- Rotorcraft mods affecting loads/vibration/fatigue/damage tolerance characteristics of main and tail rotor system/transmission system/gear box/main and tail rotor blades.

#### **Structural**

- Installation of cargo doors, passenger to cargo conversions.
- Changes to any primary or critical structure, including flight control surfaces.
- Assessment of flyable cracks in structure.

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

**FIGURE 7. SAMPLE TYPE CERTIFICATION PROJECT PLAN**

- A. Project No. \_\_\_\_\_, Revision No. \_\_\_\_\_, Revision date \_\_\_\_\_
- B. Model designation: \_\_\_\_\_
- C. Applicant: \_\_\_\_\_
- D. Address: \_\_\_\_\_
- E. Date of application: \_\_\_\_\_
- F. Type of project: \_\_\_\_TC \_\_\_\_STC \_\_\_\_Amended.
- G. Certification office: \_\_\_\_\_
- H. Project Manager: \_\_\_\_\_; Telephone No. \_\_\_\_\_
- I. Accountable Directorate: \_\_\_\_\_
- J. Project Officer: \_\_\_\_\_; Telephone No. \_\_\_\_\_
- K. General description: \_\_\_\_\_
- L. Significant features: \_\_\_\_\_
- M. Proposed certification basis: \_\_\_\_\_
- N. Exemptions needed: \_\_\_\_\_yes; \_\_\_\_\_no.
- O. Special conditions needed: \_\_\_\_\_yes; \_\_\_\_\_no.
- P. Proposed schedule:
1. Preliminary type board \_\_\_\_\_
  2. Preflight type board \_\_\_\_\_
  3. Other type boards \_\_\_\_\_
  4. TIA issuance \_\_\_\_\_
  5. Certificate issue/amend \_\_\_\_\_
- Q. Estimated employee/hours:
1. Accountable directorate \_\_\_\_\_
  2. Certification office \_\_\_\_\_
  3. Other \_\_\_\_\_

## APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

### FIGURE 7. SAMPLE TYPE CERTIFICATION PROJECT PLAN (CONTINUED)

R. Portions of certification basis where accountable directorate will:

1. Find compliance:
2. Conduct tests:
- 3.

S. Coordination required (and means of indicating concurrence):

1. TIA
2. Issues book
3. Certification Summary Report

T. Reporting requirements:

1. Recurrent
  - a.
  - b.
  - c.
2. One-time
  - a.
  - b.
  - c.

U. Documentation requirements:

1. Issues book? \_\_\_\_\_ yes, \_\_\_\_\_ no.
2. Certification Summary Report? \_\_\_\_\_ yes, \_\_\_\_\_ no.
3. Federal Register notices? \_\_\_\_\_ yes, \_\_\_\_\_ no.

V. Delegations by accountable directorate:

1. Certification Summary Report signature? \_\_\_\_\_
2. Certificate signature? \_\_\_\_\_
3. Other? \_\_\_\_\_

W. Approved on \_\_\_\_\_ by :

\_\_\_\_\_  
Manager, Accountable Directorate, XXX-XXXX



**APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)****FIGURE 3. SAMPLE SUPPLEMENTAL TYPE CERTIFICATE,  
FAA FORM 8110-2 (CONTINUED)**

**INSTRUCTIONS:** The transfer endorsement below may be used to notify the appropriate FAA Regional Office of the transfer of this Supplemental Type Certificate.

The FAA will reissue the certificate in the name of the transferee and forward it to him.

**TRANSFER ENDORSEMENT**

Transfer the ownership of Supplemental Type Certificate Number \_\_\_\_\_

to *(Name of transferee)*

\_\_\_\_\_

*(Address of transferee)*

\_\_\_\_\_

*(Number and street)*

\_\_\_\_\_

*(City, State, and ZIP Code)*

from *(Name of grantor) (Print or type)*

\_\_\_\_\_

*(Address of grantor)*

\_\_\_\_\_

*(Number and street)*

\_\_\_\_\_

*(City, State, and ZIP Code)*

Extent of Authority (if licensing agreement):

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date of Transfer: \_\_\_\_\_

Signature of grantor *(In ink)*:

\_\_\_\_\_

## APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

### FIGURE 4. SAMPLE DOCUMENTING A CERTIFICATION BASIS

United States Of America  
Department of Transportation - Federal Aviation Administration  
**Supplemental Type Certificate**  
*Number* ST00001DC

*This Certificate issued to* U.S. Cargo Conversion Company  
5201 Tranquility Lane  
Colorful, Colorado 80110

*certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part 25\* of the Federal Aviation Regulations.*

*Original Product Type Certificate Number:* A16WE

\* SEE PAGE 3

*Make:* The Boeing Company

*Model:* 737-300 Series

*Description of Type Design Change:* Conversion of a Boeing 737-300 passenger configuration to freighter configuration (including full cargo floor, main deck cargo door, interior and associated systems) in accordance with PCCC Master Drawing List PC-001, Revision B, dated March 23, 2001, or later FAA-approved revisions.

*Limitations and Conditions:* The installation should not be incorporated in any aircraft unless it is determined that the interrelationship between this installation and any previously approved configuration will not introduce any adverse effect upon the airworthiness of the aircraft.

(Limitations and Conditions continued on page 3 of 4)

*This certificate and the supporting data which are the bases for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by*

*Date of application:* March 20, 2001

*Date reissued:*

*Date of issuance:* April 24, 2002

*Date amended:*



*the Administrator of the  
Federal Aviation  
Administration.*

*By direction of the Administrator*

*(Signature)*

Manager, Aircraft Certification Office

*(Title)*

*Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.*

## APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

FIGURE 4. SAMPLE DOCUMENTING A CERTIFICATION BASIS (CONTINUED)

United States Of America  
Department of Transportation - Federal Aviation Administration  
**Supplemental Type Certificate**  
**(Continuation Sheet)**  
*Number* ST00001DC

Instructions for Continued Airworthiness (ICA), U.S. Cargo Conversion Company  
Document No. 123, Rev. A, dated 4/24/2002, or later FAA accepted revision must be made available to the operator at the time of installation.

*Certification Basis:*

Based on 14 CFR §§ 21.115 and 21.101, and the FAA policy for significant changes in FAA Order 8110.48, the certification basis for the Boeing Model 737-300 series passenger to Freighter is as follows:

- a. The type certification basis for Boeing Model 737 series airplanes is shown on TCDS A16WE for parts **not changed or not affected** by the change.
- b. The certification basis for parts **changed or affected** by the change since the reference date of application, March 20, 2001, is based upon part 25 as amended by Amendment 25-101. Based on 14 CFR §§ 21.115 and 21.101, and the FAA policy for significant changes in FAA Order 8110.48, the certification basis for this modification was determined to be:

**Regulations at the latest amendment 25-0 through 25-101**

25.1 - 25.31, 25.301 - 25.307, 25.561 - 25.563, 25.581, 25.601 - 25.625, 25.671 - 25.689, 25.729, 25.777, 25.783 - 25.793, 25.801 - 25.812, 25.843, 25.851 - 25.869, 25.871, 25.903, 25.1301, 25.1309, 25.1322 - 25.1326, 25.1351 - 25.1363, 25.1411 - 25.1423, 5.1431 - 25.1461, 25.1501, 25.1519 - 25.1533, 25.1541 - 25.1563, 25.1581 - 25.1585, Appendix F

**Regulations at an intermediate amendment**

25.574 Amendment 25-54  
25.629 Amendment 25-46  
Appendix H Amendment 25-54

**Regulations at the amendment level in TCDS A16WE**

25.25, 25.321 - 25.373, 25.471 - 25.519, 25.731 - 25.735, Appendix G

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

-----END-----

*Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.*

## APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

### FIGURE 4. SAMPLE DOCUMENTING A CERTIFICATION BASIS (CONTINUED)

The type design of the Windjet 100 series airplanes was approved by issuing Type Certificate A11DC. The Windjet 100 series airplanes were certified to amendment 22 of 14 CFR part 25. In June 2000, the TC was amended to include the Windjet 100AC. The Windjet 100AC is a retrofit of a Windjet 100 airplane with an Advanced Cockpit (AC). The following is based on information from the Windjet 100 Type Certificate Data Sheet (TCDS):

1. For all Model Windjet 100AC airplanes, issuance of a TC is based on compliance with the following:

a. **Conversion of a Windjet 100 to a Windjet 100AC can be accomplished by Windjet Aircraft Drawing SP10000.**

b. **The Certification Basis is defined as:**

(1) Title 14 CFR part 25, dated February 1, 1965, with Amendments 1 through 22

“Airworthiness Standards: Transport Category Airplanes,” and 14 CFR § 25.471 of Amendment 25-23, for all areas not affected by the change.

(2) Title 14 CFR part 25, dated February 1, 1965, including Amendments 25-1 through 25-89 for the change and all areas affected by the change. The following lists the Federal Aviation Regulations complied with through Amendment Level 25-89.

25. 125	25. 605	25. 685	25. 841	25. 1039	25. 1326	25. 1435	25. 1541
25. 145	25. 607	25. 689	25. 843	25. 1141	25. 1327	25. 1439	25. 1543
25. 149	25. 609	25. 693	25. 855	25. 1142	25. 1329	25. 1441	25. 1545
25. 207	25. 611	25. 699	25. 857	25. 1145	25. 1331	25. 1443	25. 1549
25. 301	25. 613	25. 703	25. 858	25. 1161	25. 1333	25. 1445	25. 1551
25. 303	25. 615	25. 729	25. 863	25. 1165	25. 1335	25. 1447	25. 1553
25. 305	25. 619	25. 733	25. 901	25. 1207	25. 1337	25. 1449	25. 1555
25. 307	25. 621	25. 771	25. 903	25. 1301	25. 1351	25. 1451	25. 1563
25. 397	25. 623	25. 773	25. 943	25. 1303	25. 1353	25. 1453	25. 1581
25. 399	25. 625	25. 777	25. 952	25. 1305	25. 1355	25. 1457	25. 1583
25. 405	25. 629	25. 779	25. 954	25. 1307	25. 1357	25. 1459	25. 1585
25. 561	25. 671	25. 783	25. 961	25. 1325	25. 1419	25. 1461	25. 1587

## APPENDIX 7. AIRCRAFT CERTIFICATION OFFICES

**APPENDIX 7. AIRCRAFT CERTIFICATION OFFICES**

<b>Anchorage Aircraft Certification Office (ACE-115N)</b> Federal Aviation Administration 222 West 7 <sup>th</sup> Ave #14 Anchorage, AK 99513-7587 Telephone: (907) 271-2668 FAX: (907) 279-6365	<b>Fort Worth Rotorcraft Certification Office (ASW-170)</b> Federal Aviation Administration 2601 Meacham Blvd. Fort Worth, TX 76137 Telephone: (817) 222-5170 FAX: (817) 222-5959
<b>Atlanta Aircraft Certification Office (ACE-115A)</b> Federal Aviation Administration 1895 Phoenix Blvd., Suite 450 Atlanta, GA 30349 Telephone: (770) 703-6035 FAX: (770) 703-6097	<b>Fort Worth Special Certification Office (ASW-190)</b> Federal Aviation Administration 2601 Meacham Blvd. Fort Worth, TX 76137 Telephone: (817) 222-5190 FAX: (817) 222-5959
<b>Boston Aircraft Certification Office (ANE-150)</b> Federal Aviation Administration 12 New England Executive Park Burlington, MA 01803 Telephone: (781) 238-7150 FAX: (781) 238-7170	<b>Los Angeles Aircraft Certification Office (ANM-100L)</b> Federal Aviation Administration 3960 Paramount Blvd. Lakewood, CA 90712 Telephone: (562) 627-5200 FAX: (562) 627-5210
<b>Chicago Aircraft Certification Office (ACE-115C)</b> Federal Aviation Administration 2300 East Devon Avenue Des Plaines, IL 60018 Telephone: (847) 294-7357 FAX: (847) 294-7834	<b>New York Aircraft Certification Office (ANE-170)</b> Federal Aviation Administration 1600 Stewart Avenue, Suite 410 Westbury, NY 11590 Telephone: (516) 228-7300 FAX: (516) 794-5531
<b>Denver Aircraft Certification Office (ANM-100D)</b> Federal Aviation Administration 26805 E. 68th Ave., Room 214 Denver, CO 80249 Telephone: (303) 342-1080 FAX: (303) 342-1088	<b>Seattle Aircraft Certification Office (ANM-100S)</b> Federal Aviation Administration 1601 Lind Avenue SW Renton, WA 98055-4056 Telephone: (425) 227-2180 FAX: (425) 227-1181
<b>Engine Certification Office (ANE-140)</b> Federal Aviation Administration 12 New England Executive Park Burlington, MA 01803 Telephone: (781) 238-7140 FAX: (781) 238-7199	<b>Wichita Aircraft Certification Office (ACE-115W)</b> Federal Aviation Administration 1801 Airport Road, Room 100 Wichita, KS 67209 Telephone: (316) 946-4100 FAX: (316) 946-4107
<b>Fort Worth Airplane Certification Office (ASW-150)</b> Federal Aviation Administration 2601 Meacham Blvd. Fort Worth, TX 76137 Telephone: (817) 222-5150 FAX: (817) 222-5959	<b>Military Certification Office (ACE-100M)</b> 8200 E. 34 <sup>th</sup> St. N. Bldg. 1000, Suite 1005 Wichita, KS 67226 Telephone: (316) 350-1580 FAX: (316) 350-1586



## APPENDIX 12. ISSUE PAPERS (CONTINUED)

that substantiate the proposal. An issue paper is the vehicle for documenting the evolution and conclusion of the request for an ELOS finding. Furthermore, the FAA has determined that an acceptable way in which to document the finalized ELOS findings would be for the certification office to prepare a memorandum containing the needed information for review and approval by the accountable directorate and then for the accountable directorate to notify the certification office of their review and concurrence of the ELOS. The issue paper originator or the project manager constructs the ELOS memorandum from the issue paper, ensuring that the memorandum contains the information called for in subparagraphs 2f (1) through (6) below. Use the issue paper conclusion to the maximum extent practical and assure that the language in the public document accurately reflects the issue paper conclusion.

It should be noted that the ELOS memorandum process is not intended to take the place of the issue paper process. In preparing the ELOS memorandum:

- (1) Introduce the background information including an explanation of the need for the ELOS,
- (2) List the applicable regulation(s),
- (3) Describe the features of the design or other program element that require the ELOS finding,
- (4) Describe any design changes, limitations, or equipment imposed that are the compensating features that allow granting the equivalency,
- (5) Explain how the actions taken provide an ELOS to that intended by the regulation, and
- (6) Include the ACO recommendation to the accountable directorate for approving the ELOS.

**NOTE:** Because the contents of this memorandum will be kept as part of the permanent records of the project files, care should be taken to ensure that any sensitive or proprietary information is kept out of the memo.

**NOTE:** The accountable directorate staff will assign a reference number to the ELOS memorandum to allow its access from the FAA's Regulatory and Guidance Library (RGL) electronic database. This ELOS memorandum number should be listed in the TCDS under the certification basis section (TCs and ATCs) or in the limitations and conditions section of the STC certificate.

**NOTE:** The accountable directorate will inform the certification office of their evaluation and concurrence of the ELOS. See appendix 15 for the standard ELOS Memorandum template. Also, refer to the RGL ELOS section for examples of ELOS memorandum request and acceptance documents."

- g. Unsafe Situations** that could preclude certification as defined in 14 CFR § 21.21(b)(2).

## APPENDIX 12. ISSUE PAPERS (CONTINUED)

**h. Areas of New Technology** or novel design that do not require a Special Condition but may require the development of an acceptable means of compliance with existing regulations that would set a national precedent.

**i. Items Requiring Use of a Special Certification Review** team for resolution, per paragraph 2-7e of this order.

**j. Changes in Interpretation.** New interpretation/ policy of existing regulations using precedent-setting new technology should be included in an issue paper at the early stages of the certification project.

**k. All other issues** that become controversial or may otherwise require TCB action to resolve.

### 3. Issue Paper Development.

**a.** New issue papers may be proposed to the TCB, through the program manager at any time during the process before final type certification. The issue paper format and instructions are provided in detail in appendix 13. Draft issue papers will be developed by the project team members for each significant issue as early in the program as practicable.

(1) Ideally, issue papers should initially be proposed at the preliminary TCBM and the “STATEMENT OF ISSUE” section of the issue paper should be developed. However, the major emphasis at Stage 1 of each issue paper should be to raise the issue to the FAA’s and applicant’s attention as early as practicable, providing concise “STATEMENT OF ISSUE” language that is clearly understood by all parties concerned with resolution. (Before releasing an issue paper at Stage 1, the “BACKGROUND” information should also be presented).

(2) Overall, the first priority should be placed on identifying, rather than resolving, significant issues. It is not expected that all significant issues will be identified or resolved before the TCBM. Quite often identification of issue papers does not occur until the significant features of the type design are discovered later in the certification process. These issue papers are generally issued at Stage 2, which includes the “FAA POSITION” statement. Issue papers should be developed, revised, and concluded as a concerted effort between the FAA, exporting CAA (if applicable), and the applicant.

(3) If the applicant has been made aware of the need for an issue paper, it is recommended that the issue paper first introduced to the applicant also contain the “FAA POSITION” statement that will be initially released at Stage 2. However, if controversial aspects and/or the nature of the issue require immediate and formal notification of the issue, the issue paper should be released at Stage 1.

(4) It is expected that the bulk of the type certification work will be accomplished through ongoing technical assessment activities by the project team members and other technical participants outside the framework of formal TCBMs. Progress on all items will be documented by normal entries in the official type certification project file. Progress on significant issues will also be indicated by updating existing issue papers or, if new significant issues are raised, by developing new issue papers.

**NOTE:** Issue papers are considered “draft issue papers” until they are coordinated through the appropriate TCB members and their initials appear on the board coordination grid.

## APPENDIX 12. ISSUE PAPERS (CONTINUED)

(5) Project officers are expected to keep the applicable technical specialists within other ACOs and the accountable directorate, and the chief scientific and technical advisor when needed, fully apprised of the technical issues encountered throughout the evaluation process. Depending on the stage, accountable directorate assistance in formulating the “FAA POSITION” and “CONCLUSION” should be obtained before the issue paper is submitted to the project team members for coordination. The primary purpose of accountable directorate review is to do the following:

(a) Ensure standardization of the issue paper by comparing it with similar issue papers from other projects, and

(b) Provide current policy related to the significant issue.

(6) All new or revised issue papers will be coordinated with the applicant and the project team members. If coordination with both the applicant and project team members happens without impasse, the issue papers can be closed by revising the issue paper without holding a formal TCBM.

(7) Before completing the “CONCLUSION” of the issue paper, every effort should be made to get agreement with the applicant on the issue paper’s final requirements, which will be stated in the “CONCLUSION.” If further discussions require applicants to revise their position, the issue paper should be revised accordingly and the conclusion subsequently developed.

(8) Approval by the accountable directorate of the “CONCLUSION” statement constitutes definition of the FAA requirement. The issue paper may be sent to the applicant directly or through the exporting CAA for foreign projects. Further discussions, correspondence, or appeals should focus on new information or proposals. Responses to such efforts should refer to the current stage and date of the issue paper. They also should indicate whether:

(a) The new effort is considered to provide new information warranting a reconsideration of, and revision to, the issue paper, or

(b) The issue paper conclusion stands as written.

(9) Draft copies of issue papers should not be sent to the applicant or exporting CAA (if applicable), unless help in developing the issue paper is needed. For example, the applicant’s help may be requested to confirm the technical correctness of the “BACKGROUND.” Also, it may be necessary for applicants to review their position as written in the issue paper to determine if it was conveyed properly. If it is unavoidable to send a draft issue paper, it must be clearly indicated that the issue paper is a draft and subject to change until final signature by the accountable directorate.

b. Issue papers that are signed by the accountable directorate are subject to review and may be releasable to the public because they document a final position, action, or decision taken by the FAA. In response to a request under the Freedom of Information Act (FOIA) concerning an FAA certification program, these issues papers must be reviewed according to procedures applicable to the office receiving the request. Conversely, the author of an issue paper may refer to official type certification project file documents in the body of the issue paper to reduce the number of details.

## **APPENDIX 12. ISSUE PAPERS (CONTINUED)**

c. Issue papers that are not signed by the accountable directorate will be considered documents prepared by government employees for use in effecting project management containing opinions, advice, deliberations, and recommendations made in the course of developing official action by the government. These will not be considered part of the official action. Therefore, draft issue papers will be considered as draft material exempt from public disclosure to the fullest extent possible under the Freedom of Information Act (FOIA), Section 552(b)(5) as implemented by Department of Transportation regulations, Part 7, Section 7.13 (49 CFR § 7.13). Draft issue papers may be retained by the TC-issuing ACO as working papers for corporate memory (see appendix 10, figure 3).

d. The initial publication of the issues book will be the principal product of the initial TCBM.

### **4. The Issues Book.**

a. The program manager should assemble and publish issue papers in the form of an Issues Book. The book will also provide a table of contents and introduction, and identify the project team members. Distribution will be made to the TCB members, project team members, the applicant, and the accountable and geographic Aircraft Certification directorate. An electronic version will simplify the ability to make the Issues Book available.

b. Updating will occur on an “as needed” basis, by revisions, as individual issue papers progress through stages. The program manager will distribute revised issue papers drafted by the project team members, circulate them electronically for coordination, and, together with revised table of contents pages, make the updated Issues Book available.

c. The Issues Book will be revised to add new issue papers or update existing issue papers without holding a formal TCBM, provided the new or updated issue papers can be cleared through the applicant and project team by routine coordination.

d. Following issuance of the TC, the issue book could be used as the basis for preparing a certification summary report, if the accountable directorate requires one. The certification summary report serves as a single source document that summarizes the record of the FAA examination of the type design, which is the basis for issuing the TC under 14 CFR § 21.21.

### **5. Technical Assessment Activities and Follow-on TCBMs.**

a. It is expected that the bulk of the type certification work will be accomplished through ongoing technical assessment activities by the project team members and other technical participants outside the framework of formal TCBM. Progress on all items will be documented by normal entries in the official type certification project file. Progress on significant issues will also be indicated by updating existing issue papers or, if new significant issues are raised, by developing new issue papers.

b. After the initial TCBM, new or updated draft issue papers will be coordinated with the applicant and the TCB members. If coordination with both the applicant and TCB members happens without impasse, the issue papers will be placed in the issues book by revision without holding a formal TCBM.

## APPENDIX 12. ISSUE PAPERS (CONTINUED)

c. Participant (TCB member or applicant) coordination on a new or updated issue paper means only:

(1) The participant understands all statements and agrees that the “branch action” involvement is correct, and

(2) The resolution status is accurately reflected by the paper.

d. Individual project team members are expected to keep their counterparts fully apprised of the technical issues encountered throughout the evaluation process whether or not these issues result in “issue papers.” Accountable directorate’s assistance in formulating the “FAA position” and “conclusion” should be obtained before the issue paper is submitted to the TCB members for coordination. Accountable directorate’s concurrence with an issue paper will be indicated by the project officer’s initials and date being inserted in the coordination grid by the project manager after telephonic or written authorization.

### 6. Impasse.

a. If an impasse is reached between TCB members, the ACO manager must resolve it after considering the views of all affected parties and the accountable directorate’s recommendations. However, the project’s accountable directorate can remove from the ACO the signature authority for any project, at any time, if a project’s progress is inconsistent with procedure or technical policy. In any case, the resulting decision becomes the basis for the FAA position in the issue paper.

b. The issue paper’s conclusion must result from TCB action. A formal interim TCBM may be called by the TCB chairman to hear conflicting views and to resolve the issue. A request for a formal TCBM may be made by either a TCB member or the applicant. If the chairman agrees that a formal TCBM is necessary, an agenda will be developed and discussions limited to the agenda items, to ensure that all participants have an opportunity to be fully prepared and adequately represented. Interim TCBMs should be scheduled to group together a number of agenda items unless resolution of a major issue is essential to avoid an unacceptable delay in the project.

c. Most issues should be capable of resolution informally by coordinating issue papers among the TCB members without a meeting.

d. Acceptance of the conclusion stated in an issue paper by the TCB chairman after receiving concurrence by the accountable directorate constitutes definition of the FAA requirement. Further discussions, correspondence, or appeals should focus on new information or proposals. Responses to such efforts should refer to the current stage of the issue paper, and indicate whether the new effort is considered to provide new information warranting a reconsideration and revision to the issue paper, or whether the issue paper conclusion stands as written.

**7. Issue Paper Format.** The issue paper format is described in appendix 13. A sample issue paper illustrating the evolution through several stages appears in appendix 14.



**APPENDIX 15. ELOS MEMORANDUM TEMPLATE****Federal Aviation  
Administration**

---

---

**Memorandum**

Date: [Type date here]  
To: Manager, \_\_\_\_\_ ACO, [Routing Symbol]  
From: Manager, Accountable Directorate, AXX-100  
Prepared by: [Originating ACO Engineer, Routing Symbol]  
Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Company X's project on a Model Y, FAA Project # LLXXXXCC-X

ELOS Memo#: LLXXXXCC-X-Z-Z

Regulatory Ref: 14 CFR § XX.XXX

---

---

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Accountable Directorate on the establishment of an equivalent level of safety finding for the *[enter aircraft designations]*.

**Background**

Top level description of project, and the need for an equivalent safety finding.

**Applicable regulation(s)**

14 CFR §§ XX.YYY, XX.ZZZ.

**Regulation(s) requiring an ELOS finding**

14 CFR § XX.YYY

## **APPENDIX 15. ELOS MEMORANDUM TEMPLATE (CONTINUED)**

### **Description of compensating design features or alternative Methods of Compliance (MoC) which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)**

As noted, describe the design features which related to granting of the ELOS removing any proprietary information. Note that the Method of Compliance (MoC) may be subject of an ELOS finding. See paragraph 2.4 j. (4) of this order.

### **Explanation of how design features or alternative Methods of Compliance (MoC) provide an equivalent level of safety to the level of safety intended by the regulation**

This section discusses how said compensating features previously discussed meet the level of safety intended by the regulation. Note that the Method of Compliance (MoC) may be subject of an ELOS finding. See paragraph 2.4 j. (4) of this order.

### **FAA approval and documentation of the ELOS finding:**

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper Z-Z. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Accountable Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) or in the Limitations and Conditions Section of the STC. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation(s):

14 CFR § XX.YYY Section Title (documented in ELOS Memo LLXXXXCC-X-Z-Z)]

\_\_\_\_\_  
Manager, Accountable Directorate,  
Aircraft Certification Service

\_\_\_\_\_  
Date

ELOS Originated by ACO:	ACO Manager	Routing Symbol
----------------------------	-------------	----------------