



CIVIL AVIATION SAFETY AUTHORITY OF PNG

PNG Civil Aviation Rule Part 43

General Maintenance Rules

Applicable 14 December 2020

DESCRIPTION

Part 43 prescribes the requirements for the maintenance and release to service after maintenance of aircraft, and components to be fitted to aircraft, that are required by Part 91 to have an airworthiness certificate issued under Part 21.

Bulletin

This Part first came into force on 1 January 2011 and now incorporates the following amendments:

Amendment	Effective Date
Amendment 1	1 January 2011
Amendment 2	1 February 2018
Amendment 3	13 November 2018
Amendment 4	14 December 2020

Summary of amendments:

Amendment 4:

(Docket 20/08/CAR43/07)

- (1) Schedule of Rules. Editorial corrections made to rule 43.51 title; Inserted missing rule title “43.119 Technical log completion”
- (2) Rules 43.51(a)(3)(ii) – missing requirement added;
- (3) Rules 43.103(c)(1) - editorial amendments;
- (4) Rule 43.113(b)(2)(iv) - rule amended for licenced aircraft maintenance engineer.
- (5) Rules 43.207(a) and (b); Appendices A, B, C, D, E and F opening applicability sentence; Appendix A(23)(ii); Appendix B(9)(ii); Appendix C. C.2(b)(3)(ii), (7)(ii); Appendix D.D.1, D.2.2(c)(5,6, 13,14,16) and Appendix F - editorial amendments and corrections;

Schedule of Rules

Subpart A —General.....	6
43.1 Purpose	6
43.3 Reserved.....	6
43.5 Reserved	6
Subpart B —Maintenance.....	6
43.51 Persons to perform maintenance	6
43.53 Performance of maintenance	7
43.55 Recording of overhaul	8
43.57 Minimum inspection.....	8
43.59 Radio station tests and inspections	8
43.61 Altimeter system tests and inspections.....	8
43.63 Transponder tests and inspections	8
43.65 Emergency locator transmitter tests and inspections.....	8
43.66 Non-destructive testing	9
43.67 Welding.....	9
43.68 Maintenance records.....	9
Subpart C — Release to Service	10
43.101 Persons to certify release to service.....	10
43.103 Requirements for certifying release-to-service.....	11
43.105 Certifying release-to-service after maintenance	12
43.107 Inoperative equipment	12
43.109 Defects	12
43.111 Reserved	13
43.113 Duplicate inspection of control systems	13
43.115 Engine performance checks.....	14
43.117 Reserved	14
43.119 Technical log completion	14
Subpart D — Aircraft Airworthiness Review.....	15
43.151 Persons to perform review	15
43.153 Review requirements	15
43.155 Certifying review.....	16
43.157 Reserved	16
Subpart E — Certifying Conformity Following Major Modification or Major Repair.....	16
43.201 Requirement for certification.....	16
43.203 Persons to certify conformity	17
43.205 Certifying requirements.....	17

43.207 Certification.....	17
Appendix A — Maintenance performed by a person under rule 43.51(a)	18
Appendix B — Aircraft Radio Station Inspection.....	20
Appendix C — Minimum Inspection	21
C.1 General.....	21
C.2 Inspections	21
Appendix D — Altimeter System Tests and Inspections	24
D.1 Aircraft not equipped with a transponder:	24
D.2 Aircraft equipped with a transponder	24
D.2.1 The static pressure system test:.....	24
D.2.2 The altimeter test:	24
D.2.3 The automatic pressure altitude reporting equipment and ATC transponder system integration test:	26
Appendix E — ATC Transponder Tests and Inspections	29
E.1 General.....	29
E.2 Radio reply frequency test.....	29
E.3 Suppression test.....	29
E.4 Receiver sensitivity test	30
E.5 RF peak output power test	30
E.6 Mode S diversity transmission channel isolation test	30
E.7 Mode S address test.....	30
E.8 Mode S formats test	31
E.9 Mode S all-call interrogations test	31
E.10 Mode S ATCRBS-only all-call interrogation test.....	31
E.11 Mode S Squitter test.....	31
Appendix F — Emergency Locator Transmitter Tests and Inspections.....	31

Subpart A —General

43.1 Purpose

This Part prescribes rules governing—

- (1) the maintenance of aircraft which are required by Part 91 to have an airworthiness certificate issued under Part 21, Subpart D; and
- (2) the release to service after maintenance of aircraft which are required by Part 91 to have an airworthiness certificate issued under Part 21, Subpart D; and
- (3) the maintenance, and the release to service after maintenance, of components to be fitted to aircraft which are required by Part 91 to have an airworthiness certificate issued under Part 21, Subpart D; and
- (4) the conduct of an airworthiness review.

43.3 Reserved

43.5 Reserved

Subpart B —Maintenance

43.51 Persons to perform maintenance

- (a) Except as provided in paragraphs (b) and (c), a person must not perform maintenance on an aircraft or aircraft component unless that person—
 - (1) is authorised to perform the maintenance by the holder of an aircraft maintenance organisation certificate, issued with an appropriate rating in accordance with Part 145; or
 - (2) for the maintenance specified in Appendix A; holds
 - (i) a current pilot licence with an aircraft type rating for the aircraft issued in accordance with Part 61; or
 - (ii) a current aircraft maintenance engineer who holds a licence, rating or certificate issued in accordance with Part 66.
 - (3) for maintenance performed outside of Papua New Guinea-
 - (i) is authorised by the holder of a maintenance organisation certificate issued under Part 145; or
 - (ii) is authorised by the holder of a maintenance organisation certificate or approval issued by a recognised national aviation authority in the State where the maintenance is being performed.
 - (4) performs the maintenance under the direct supervision of an appropriate person referred to in paragraphs (a)(1) or(a)(3).
- (b) The holder of a maintenance organisation certificate must not grant an authorisation to a person under paragraph (a)(1) unless that person holds-
 - (1) a current aircraft maintenance engineer licence in an appropriate category and with an appropriate rating issued in accordance with Part 66; or

- (2) holds a current aviation maintenance specialist certificate, with appropriate endorsement, issued in accordance with Part 66.
- (c) A person referred to in paragraph (a)(2) must be appropriately trained and certified as competent by the holder of a maintenance organisation certificate issued under Part 145 to perform the maintenance on the aircraft type.
- (d) The holder of a maintenance organisation certificate issued under Part 145 must not grant an authorisation to a person under paragraph (a)(3)(1) unless that person holds a current aircraft maintenance engineer licence in an appropriate category and with an appropriate rating issued in accordance with requirements equivalent to Part 66 by a recognized national aviation authority.
- (e) A person authorized by a foreign maintenance organisation as provided for in paragraph (a)(3) must hold—
 - (1) a current aircraft maintenance engineer licence in an appropriate category and with an appropriate rating issued in accordance with requirements equivalent to Part 66 by a recognized national aviation authority; or
 - (2) qualifications and have experience acceptable to the Director for the maintenance to be performed.

43.53 Performance of maintenance

- (a) A person performing maintenance on an aircraft or component must—
 - (1) be familiar with the maintenance actions required for the continued airworthiness of that aircraft or component; and
 - (2) use adequate housing and facilities for the necessary disassembly, inspection, and reassembly of the aircraft or component; and
 - (3) use—
 - (i) methods, techniques, and practices that are specified in the instructions for continued airworthiness issued for the aircraft or component; or
 - (ii) equivalent methods, techniques, and practices that are acceptable to the Director; and
 - (4) use materials, parts, and appliances in accordance with the requirements of Subpart I of Part 21; and
 - (5) use the tools, equipment, and test equipment necessary to ensure completion of the work in accordance with paragraph (3); and
 - (6) use the test equipment recommended by the manufacturer, or equivalent test equipment that provides the same capability for the person conducting the test to ensure that the equipment being tested is in airworthy condition; and
 - (7) if specified in the maintenance procedures, use the special test equipment recommended by the manufacturer or equivalent test equipment that is acceptable to the Director; and
 - (8) perform the maintenance so as to ensure that the aircraft or component meets every applicable airworthiness requirements; and

- (9) on completion of the maintenance, ensure that the condition of the aircraft or component is satisfactory for release to service and is at least equal to its original or properly modified condition with regard to—
 - (i) aerodynamic function; and
 - (i) structural strength; and
 - (ii) resistance to vibration and deterioration; and
 - (iii) other qualities affecting airworthiness.
- (10) on completion of the maintenance, ensure that the aircraft or component is compliant with the applicable certification requirements for aircraft noise and engine emission.

43.55 Recording of overhaul

A person must not state in any maintenance document entry required by any CAR that an aircraft, airframe, engine, propeller, or other aircraft component, has been overhauled unless it has been—

- (1) disassembled, cleaned, inspected and repaired as necessary, and reassembled, using methods and techniques acceptable to the Director; and
- (2) tested in accordance with standards or technical data approved by the Director.

43.57 Minimum inspection

A person performing an aircraft inspection required by Part 91 must perform as a minimum the inspections listed in Appendix C.

43.59 Radio station tests and inspections

A person performing an inspection of an aircraft radio station required by Part 91 must perform the tests and inspections listed in Appendix B.

43.61 Altimeter system tests and inspections

A person performing an inspection of the altimeter system required by Part 91 must perform the tests and inspections listed in Appendix D.

43.63 Transponder tests and inspections

A person performing an inspection of the transponder required by Part 91 must perform the tests and inspections listed in Appendix E.

43.65 Emergency locator transmitter tests and inspections

A person performing a test and inspection of an emergency locator transmitter as required under Subpart F of Part 91 must perform the applicable tests and inspections specified in Appendix F.

43.66 Non-destructive testing

- (a) A person performing maintenance on an aircraft or aircraft component where the applicable maintenance data requires a non-destructive test using fluorescent penetrant, magnetic particle, eddy current, ultrasonic or radiography methods must hold an aviation maintenance specialist certificate issued under Part 66 for the application of a specified NDT technique using specified equipment.
- (b) A person must perform non-destructive testing using appropriate methods, techniques and practices acceptable to the Director.

43.67 Welding

- (a) A person performing maintenance on an aircraft or aircraft component where the applicable maintenance data requires welding to be performed must hold an aviation maintenance specialist certificate issued under Part 66 for the application of a specified welding technique using specified equipment.
- (b) A person must perform welding using appropriate methods, techniques and practices acceptable to the Director.

43.68 Maintenance records

- (a) Except as provided in paragraph (b), a person performing maintenance on an aircraft or component must, on completion of the maintenance, record the following information in the appropriate maintenance logbook:
 - (1) details of the maintenance including, where applicable,
 - (i) the identity of any inspection carried out; and
 - (ii) a description of the work performed; and
 - (iii) the technical data used; and
 - (iv) the requirement for an operational flight check if the maintenance requires a flight check under rule 43.103(a)(4):
 - (2) if a component is removed or fitted during the maintenance—
 - (i) a description of the component; and
 - (ii) its part number and serial number, if any; and
 - (iii) the references to the applicable release documentation:
 - (3) details of any measurements or test results, including the results of any ground or air tests that have been performed as part of that maintenance:
 - (4) for altimeter system test and inspection, the date and maximum altitude to which the altimeter has been tested:
 - (5) if an AD is actioned as part of the maintenance, -
 - (i) the AD number; and
 - (ii) the revision date; and
 - (iii) the means of compliance:

- (6) the name and certificate number of the facility where the maintenance was carried out;
- (7) the reasons for performing the maintenance.
- (b) A person performing maintenance on an aircraft or a component may use associated worksheets to record the details of the maintenance performed if—
 - (1) a summary of maintenance performed is recorded in the appropriate maintenance logbook; and
 - (2) the worksheets are referenced in the summary of maintenance required under paragraph(b)(1).
- (c) A person performing maintenance on an aircraft to rectify a defect or to carry out an inspection that is entered in the technical log must on completion of the maintenance—
 - (1) record the completion of the maintenance in the technical log; and
 - (2) record the details required by paragraph (a) in the appropriate maintenance logbook; or
 - (3) if the maintenance logbook is not readily available, forward written details of the maintenance to the place where the maintenance logbooks are held by a means, where practicable, other than carriage in the aircraft on which the maintenance has been performed.
- (d) A person performing maintenance on an aircraft or a component must, after recording the details required by paragraphs (a) to (c), include the following information as part of the maintenance record:
 - (1) the person's name;
 - (2) the person's signature except if the maintenance logbook or worksheet is in electronic format;
 - (3) the person's licence number, certificate number or authorisation number issued by a Part 145 maintenance organisation;
 - (4) the date of completion of the maintenance.
- (e) The person required under any of paragraphs (a) to (d) to record the details of maintenance performed must record the details accurately and legibly in ink or by other permanent means in the English language.
- (e) Any alteration to, or erasure of, entries in a maintenance record must—
 - (1) be indicated by a single strike through of the original entry in such a manner that the original detail is still legible; and
 - (2) be certified by a person making the alteration or erasure.

Subpart C — Release to Service

43.101 Persons to certify release to service

- (a) A person must not certify an aircraft or aircraft component for release to service after maintenance unless that person—
 - (1) is authorised to certify such aircraft or components for release to service after maintenance by the holder of an aircraft maintenance organisation certificate issued with an appropriate rating in accordance with Part 145; or
 - (2) has performed the maintenance under rule 43.51 (a)(2); or

- (3) for maintenance outside of Papua New Guinea is authorised to certify such aircraft or components for release to service after maintenance by-
 - (i) the holder of a maintenance organisation certificate issued under Part 145; or
 - (ii) the holder of a maintenance organisation certificate or approval issued by a recognised national aviation authority in the State where the maintenance is being performed.

43.103 Requirements for certifying release-to-service

- (a) A person must not certify an aircraft or aircraft component for release to service after maintenance unless-
 - (1) the maintenance has been performed in accordance with this Part; and
 - (2) the person meets the requirements of rule 43.101; and
 - (3) in respect of that maintenance, the aircraft or aircraft component is fit for release to service; and
 - (4) if the aircraft has undergone maintenance that may have appreciably affected the flight characteristics or operation of the aircraft, -
 - (i) a satisfactory operational flight check has been carried out in accordance with rule 91.613 and the completion of the flight check is recorded in the aircraft maintenance logbook or worksheet, and the technical log; or
 - (iii) ground tests, inspections, or both, show conclusively that the maintenance has not appreciably changed the flight characteristics or substantially affected the flight operation of the aircraft and details of the ground tests and inspections, as the case may be, have been recorded in the aircraft maintenance logbook or worksheet; or
 - (iv) the release-to-service is for the purpose of performing the operational flight check required under paragraph a)(4)(i)
- (b) A person must not certify an aircraft or aircraft component for release to service after the performance of a major modification or a major repair unless-
 - (1) that person meets the requirements of rule 43.101; and
 - (2) the major modification or major repair has been certified for conformity with acceptable technical data in accordance with Subpart E; and
 - (3) in respect of that major modification or major repair, the aircraft or component is fit for release-to-service; and
 - (4) if the acceptable technical data under paragraph (b)(2) includes changes to the operating limitations or flight data in the aircraft flight manual, the changes have been incorporated into the flight manual.
- (c) The person responsible for certifying an aircraft for release-to-service under paragraph (a)(4)(iii) for the purpose of an operational flight check must record in the aircraft maintenance logbook or worksheet, and the technical log-
 - (1) the following statement of release-to- service:
“In respect of the recorded work, the aircraft is released-to-service for an operational flight check only”; and
 - (2) adjacent to the statement of release-to-service-

- (i) the person's name; and
- (ii) the person's signature except if the maintenance logbook or work sheet is in electronic format; and
- (iii) the person's licence number, certificate number, or authorisation number issued by a Part 145 maintenance organisation; and
- (iv) the date of entry.

43.105 Certifying release-to-service after maintenance

- (a) Except as required in paragraph (b), a person who certifies an aircraft or component for release to service after maintenance must record the following information in the appropriate maintenance logbook or worksheet, and the technical log as may be necessary, immediately adjacent to the details of the maintenance that is required to be recorded under rule 43.68—
- (1) the person's name; and
 - (2) the person's signature except if the maintenance logbook or worksheet is in electronic format; and
 - (3) the person's licence number, certificate number, or authorisation number issued by a Part 145 maintenance organisation; and
 - (4) the date of entry; and
 - (5) the following statement of release-to-service if the maintenance logbook, worksheet, or technical log, as the case maybe, does not include a preformatted equivalent statement:

*"The maintenance recorded has been carried out in accordance with the requirements of Papua New Guinea Civil Aviation Rule Part 43 and in respect of that maintenance the (aircraft) * (component) * is released to service "*.

*delete as applicable

- (b) If a component is not installed on, or allocated to, an aircraft, the person certifying the component for release to service must certify the release-to-service on—
- (1) an Authorised Release Certificate for a component that is to be released outside the Part 145 maintenance organisation under which the person who is certifying the release to service is exercising that privilege; or
 - (2) an Authorised Release Certificate or a Serviceable Tag for a component that is to be released for use within the Part 145 maintenance organisation under which the person who is certifying the release to service is exercising that privilege.

43.107 Inoperative equipment

A person who certifies an aircraft or component for release to service that includes inoperative instruments or equipment that are permitted to be inoperative under Part 91.537 must, before signing the statement of release-to-service as required under rule 43.105-

- (1) list the inoperative equipment in the technical log; and
- (2) place a placard on each inoperative instrument and on or adjacent to the cockpit controls of each item of inoperative equipment, marking each item *Inoperative*.

43.109 Defects

If a person who is responsible under this Part for certifying an aircraft or component for release-to-service does not release the aircraft or component to service because a defect has not been cleared, that person must before further flight of the aircraft—

- (1) enter the details of the defect in the technical log; and
- (2) if practicable, ensure that defect is entered in the appropriate maintenance logbook; and
- (3) adjacent to the details of the defect that person may have entered under paragraph (1) and (2) enter -
 - (i) his or her name and signature; and
 - (ii) his or her licence number, certificate number, or authorisation number issued by a Part 145 maintenance organization; and
 - (iii) the date of entry.

43.111 Reserved

43.113 Duplicate inspection of control systems

- (a) A person must not certify an aircraft or component for release-to-service after the initial assembly, subsequent disturbance, or adjustment of any part of an aircraft control system or component control system unless-
 - (1) the applicable requirements of Subpart C have been complied with; and
 - (2) a duplicate safety inspection has been carried out to ensure that-
 - (i) the control system of the aircraft or the component, as the case maybe, functions correctly; and
 - (ii) in respect of the maintenance that has been performed, the control system is assembled correctly and every required locking mechanism is in place; and
 - (3) the certification and signatures required by paragraphs (c) and (d) have been completed.
- (b) The duplicate safety inspection required by paragraph (a)(2) must be carried out by-
 - (1) a person who meets the requirement of rule 43.101 to certify the aircraft or component for release-to-service; and
 - (2) another person who is nominated by the person specified in paragraph (b)(1) and has adequate training, knowledge and experience to carry out the safety inspection, and who holds-
 - (i) a current aircraft maintenance engineer licence issued in accordance with Part 66; or
 - (ii) a current aviation maintenance specialist certificate issued in accordance with Part 66; or
 - (iii) a current pilot licence with a rating on the aircraft type issued in accordance with Part 61; or
 - (iv) a current authorisation issued by the holder of a maintenance organisation certificate issued in accordance with Part 145 who holds an aircraft engineer licence; or
 - (v) a current appropriate maintenance engineer licence or approval issued under the appropriate authority of an ICAO Contracting State.

- (c) The person specified in paragraph (b)(1) must enter in the appropriate maintenance logbook or worksheet-
- (1) the identification of the control system that has been inspected; and
 - (2) the detail scope and extent of the safety inspection that has been carried out; and
 - (3) the following statement-
"We certify that a duplicate safety inspection has been carried out and the identified control system of the aircraft/component functions correctly, and in respect of the maintenance performed, the control system is assembled and locked correctly. "
- (d) The following details of each person specified in paragraph (b)(1) and (b)(2) must be entered in the maintenance logbook or worksheet adjacent to the statement required under paragraph(c)(3):
- (1) the name of each person:
 - (2) the signature of each person except if the maintenance logbook or worksheet is in electronic format:
 - (3) the licence number, certificate number, or authorisation number issued by a Part 145 maintenance organization, for each person:
 - (4) the date of entry.

43.115 Engine performance checks

- (a) Except as provided in paragraph (b), a person must not certify an aircraft for release-to-service after the following maintenance activities unless an engine performance check has been performed in accordance with the aircraft manufacturer's recommendations:
- (1) an engine change:
 - (2) a propeller change:
 - (3) any other maintenance if the aircraft manufacturer recommends an engine performance check after the maintenance.
- (b) A person who certifies an aircraft for release-to- service after an engine performance check that is required in paragraph (a) must ensure that the following information is recorded in the appropriate maintenance logbook or worksheet:
- (1) the ambient conditions of temperature and atmospheric pressure:
 - (2) the details of the results of the engine performance check.

43.117 Reserved

43.119 Technical log completion

A person must not certify an aircraft or aircraft component for release to service in an aircraft technical log unless each applicable section of the technical log is completed, including details of any deferred rectification.

Subpart D — Aircraft Airworthiness Review

43.151 Persons to perform review

A person must not perform an aircraft airworthiness review unless they hold an inspection authorisation issued under Part 66.

43.153 Review requirements

- (a) Except as provided in paragraph (b), a person performing an aircraft airworthiness review must, within the 30-day period immediately before certifying that the review has been completed—
- (1) check that the aircraft conforms to its type certificate data sheet or equivalent type data acceptable to the Director; and
 - (2) check that every instrument and item of equipment required under Subpart F of Part 91 is fitted; and
 - (3) check that since the last aircraft airworthiness review or inspection for issue of an airworthiness certificate—
 - (i) every modification and repair has been correctly recorded and certified for release to service referencing the applicable technical data listed in Appendix C to Part 21; and
 - (ii) all due maintenance specified in the applicable maintenance programme has been correctly recorded and certified for release to service; and
 - (iii) every airworthiness directive relevant to the aircraft type and its installed components has been assessed and certified as being "embodied", "found embodied", or "not applicable" that the reason is stated; and
 - (iv) every repetitive airworthiness directive that is repetitive is recorded in the repetitive section of the appropriate maintenance logbook; and
 - (v) every defect recorded in the technical log has been rectified and the aircraft released to service or the defective instruments and equipment are recorded in the technical log and placarded as inoperative if they are permitted to be inoperative under rule 91.537; and
 - (vi) every applicable release to service has been completed and certified in accordance with Subpart C; and
 - (vii) the recorded weight and balance data in the aircraft logbook reflects any changes to the aircraft's weight and balance and that the recorded weight and balance data is within the published weight and balance limitations for the aircraft; and
 - (viii) the flight manual, including every applicable supplement, is the current version for the aircraft in its existing state; and
 - (4) check that the overall and finite life of each lifed component is recorded and is within the limits laid down in the applicable manufacturer's document and, if practicable, verify serial numbers by physical inspection; and
 - (5) perform a general condition inspection of the aircraft.
- (b) The requirements in paragraph (a)(1) and (a)(3)(i) do not apply to an aircraft issued with a special category airworthiness certificate under Subpart D of Part 21.

43.155 Certifying review

- (a) Subject to paragraph (b), a person who performs and certifies an aircraft airworthiness review must on completion of the review—
- (1) certify that the review has been completed by entering the following statement in the appropriate maintenance logbook:
"I hereby certify that an airworthiness review has been carried out on this aircraft and that the current requirements of the Papua New Guinea Civil Aviation Rules 43.153(a) have been complied with"; and
 - (2) adjacent to that statement, enter:
 - (i) the person's name; and
 - (ii) the person's signature, except if the maintenance logbook is in electronic format; and
 - (iii) the person's inspection authorisation number, and
 - (iv) the date that the review was completed; and
 - (3) in accordance with paragraph (c), enter the due date for the next airworthiness review in the appropriate section of the aircraft technical log;
 - (4) forward a report of the review to the Director in a form acceptable to the Director-
 - (i) within 7 days from the date of completing and certifying the review in accordance with paragraphs (a)(1) and (a)(2); or
 - (ii) if the review is not completed and certified in accordance with paragraphs (a)(1) and (a)(2), within 7 days from the expiry of the 30-day period specified in rule 43.153(a) for completing the review.
- (b) Except for instruments and equipment that are permitted to be inoperative in accordance with rule 91.537, a person who performs an aircraft airworthiness review must not certify the review as being complete unless every defect has been rectified and the aircraft certified for release-to-service in accordance with Subpart C.
- (c) The due date for the next aircraft airworthiness review must not be more than 1 year after the date the review is certified under paragraph (a).

43.157 Reserved**Subpart E — Certifying Conformity Following Major Modification or Major Repair****43.201 Requirement for certification**

Before an aircraft that is issued with a standard or restricted category airworthiness certificate under Subpart D of Part 21 can be released to service following major modification or major repair, certification for conformity with acceptable technical data in accordance with the requirements of this subpart is required.

43.203 Persons to certify conformity

- (a) A person must not certify that an aircraft or component conforms to acceptable technical data following a major modification or a major repair unless that person—
 - (1) holds a certificate of inspection authorisation issued in accordance with Subpart E of Part 66; or
 - (2) holds an authorisation, issued by the holder of a Part 145 maintenance organisation certificate, to certify conformity of the aircraft or component; or
 - (3) is authorised by the manufacturer of the aircraft or component to certify conformity of the aircraft or component.
- (b) For the grant of an authorisation under paragraph (a)(2), the holder of a Part 145 maintenance organisation certificate must establish that the holder has received formal training in type design at least equivalent to that required for the issue of an inspection authorisation under Part 66.

43.205 Certifying requirements

A person certifying conformity of an aircraft or aircraft component following a major modification or a major repair must before certifying to that effect, ensure that the modification or repair conforms to the applicable technical data acceptable to, or approved by, the Director.

43.207 Certification

- (a) A person who certifies that an aircraft or aircraft component conforms to the applicable technical data required by rule 43.205 following a major modification or a major repair must complete form CA 337 and provide the holder of the certificate of registration for the aircraft with a copy of the completed form.
- (b) A person who certifies conformity on a form CA 337 must forward a copy of the completed form to the Director within seven days of the completion of the certification.

Appendix A — Maintenance performed by a person under rule 43.51(a)

The following aircraft maintenance may be performed by a person under rule 43.51(a):

- (1) replacement of landing gear wheels or tail skid shoes:
- (2) servicing of landing gear wheel bearings, such as cleaning and greasing:
- (3) replacement of defective safety wiring or cotter pins:
- (4) greasing and lubrication that does not require disassembly other than removal of access panels, fairings, or cowls:
- (5) simple or temporary fabric patch repairs where—
 - (i) the repair is not applied to any flying control surface; and
 - (ii) the repair does not require the removal of any control surface or structural parts; and
 - (iii) the repair does not involve restringing or rib stitching:
- (6) restoration of damaged or worn decorative coatings and application of preservative or protective material to components, provided the work does not involve—
 - (i) removal or disassembly of any primary structure; or
 - (ii) disturbance of any operating system; or
 - (iii) the restoration, preservation, or protection of a control surface; or
 - (iv) a significant repaint of the aircraft:
- (7) simple or temporary repairs to fairings, non-structural cover plates and cowlings if there is no change to contour that would interfere with proper airflow:
- (8) replacement of any cowling not requiring removal of the propeller or disconnection of any flight control:
- (9) replacement of side windows of non-pressurised aircraft, provided the work does not interfere with the structure or any operating system:
- (10) replacement of seat belts and harnesses:
- (11) replacement of the aircraft battery and check of fluid level and specific gravity:
- (12) replacement of fuses and lights:
- (13) removal and replacement of piston engine spark plugs and cleaning and setting spark plug gaps:
- (14) removal and replacement of turbine engine igniters:
- (15) replacement of any hose connections except hydraulic connections:
- (16) replacement of pre-fabricated fuel lines:
- (17) removal and replacement of brake pads:
- (18) replenishment and replacement of engine oil:
- (19) replacement and cleaning of fuel, oil, and air strainers and filters:
- (20) GPS equipment maintenance including—
 - (i) the installation and removal of GPS receivers if the receiver has quick disconnect capabilities, any subsequent test requirements are built in to the receiver, and the

applicable information for the installation and removal of the equipment is immediately available; and

(ii) the routine updating of GPS receiver database information:

(21) replenishment of hydraulic fluid in hydraulic reservoirs:

(22) inspection of chip detector plugs if there are documented manufacturer or company instructions available to the person carrying out the inspection:

(23) compressor washing if—

(i) the installation of the wash equipment does not require the disassembly of any primary engine control system; and

(ii) the applicable information for the washing is immediately available and includes the applicable information for the washing is immediately available and includes procedures for the installation and removal of any wash equipment and the safe operation of the engine during the wash runs and any necessary drying runs; and

(iii) a second person is present throughout the process.

(24) installation and removal of seats, doors, and role equipment if—

(i) the configuration of the aircraft with the particular equipment installed or removed has been approved; and

(ii) the aircraft flight manual incorporates the necessary information for the safe operation of the aircraft with the equipment installed or removed, including weight and balance data for each configuration; and

(iii) the applicable information for the installation and removal of the equipment is immediately available; and

(iv) no special tooling, special equipment, or subsequent inspection is required:

(25) the completion of repetitive airworthiness directive inspections between scheduled inspections if—

(i) no special tooling or special equipment is required; and

(ii) any conditions stated in the airworthiness directive can be complied with:

(26) operating the self-test function on an emergency locator transmitter:

(27) deferral of defects relating to inoperative instruments and equipment if the aircraft can be operated with inoperative instruments and equipment in accordance with rule 91.537:

(28) the performance of routine maintenance that is intended by the aircraft manufacturer to be performed by a pilot provided no special tooling or equipment is required:

(29) pulling and collaring of circuit breakers:

(30) bird strike inspections by pilots, and where evidence of damage is found, an inspection by a Licensed Aircraft Maintenance Engineer is required.

Appendix B — Aircraft Radio Station Inspection

Each person performing the inspection required by rule 43.59 must—

- (1) examine the maintenance records for service history and compliance with the applicable maintenance rules; and
- (2) inspect the bonding of mounting racks and shock mounts for corrosion and security; and
- (3) check that the VSWR of the transmission lines and aerials is less than 3:1 for the following:
 - (i) VHF Comm:
 - (ii) HF Comm (T/R to antenna coupler):
 - (iii) DME:
 - (iv) ELT; and
- (4) check that the system channeling is correct for the following:
 - (i) VHF Comm:
 - (ii) HF Comm (T/R to antenna coupler):
 - (iii) ILS:
 - (iv) VOR:
 - (v) DME; and
- (5) inspect and test the VHF Comm system to ensure that the performance of the system is acceptable during normal operation; and
- (6) inspect and test the HF Comm system to ensure that—
 - (i) the antenna integrity and insulation resistance is acceptable; and
 - (ii) the performance of the system is acceptable during normal operation; and
- (7) inspect and test the operation of ADF including—
 - (i) testing the sense antenna for integrity and insulation resistance; and (ii) testing the audio function; and
- (8) inspect and test the operation of ILS receivers with a field test set, including—
 - (i) testing flag warnings for modulation failure, centreline and glide path accuracies, sense, and course widths; and
 - (ii) testing the audio function; and
- (9) inspect and test the operation of VOR with a field test set, including—
 - (i) testing flag warnings for modulation failure; and
 - (iii) omni-radial resolving, and radio magnetic indicators, accuracy at 30° intervals; and
 - (iv) carrying out $\pm 1^\circ$ test for freedom of meter movement, sense, and course width; and
 - (v) testing the audio function; and
- (10) inspect and test the operation of the marker receiver with a field test set including—
 - (i) testing operations of 400, 1300 and 3000 Hz tones and associated lamps; and
 - (ii) where fitted, operation of hi/lo sensitivity; and
- (11) inspect and test the operation of DME with a field test set, including—
 - (i) testing range accuracy and ground speed readings; and
 - (ii) testing the audio function.
- (12) inspect and test the GPS/VOR coupling to the autopilot.

Appendix C — Minimum Inspection

This appendix applies to the requirements referred to in rule 43.57.

C.1 General

- (a) The aircraft and its components shall first be thoroughly cleaned.
- (b) The inspection shall be a thorough functional and visual check of the designated system, component, assembly, or installation.
- (c) The inspection shall be conducted with all applicable inspection panels, access doors, cowls, and detachable fairings and fillets, removed.

C.2 Inspections

- (a) All items shall be inspected for general condition that includes, as applicable, the following:
 - (1) correct operation, full and free movement in the correct sense:
 - (2) correct rigging, alignment, and tension:
 - (3) appropriate lubrication:
 - (4) correct fluid quantities or levels:
 - (5) correct gaseous pressures:
 - (6) security and cleanliness:
 - (7) legibility and correctness of markings and placards:
 - (8) wear within acceptable limits:
 - (9) no loose or missing fasteners:
 - (10) vents free from obstruction:
 - (11) correct clearance:
 - (12) bonding straps correctly positioned, undamaged, and secure:
 - (13) freedom from excessive—
 - (i) leakage; and
 - (ii) corrosion or deterioration of protective treatments; and
 - (iii) cracks and disbonds; and
 - (iv) deformation, scoring, chafing, flat spots, and fraying; and
 - (v) obstruction or other obvious damage; and
 - (vi) burning, arcing, or heat damage.
- (b) The following items shall be inspected using the following criteria and the general inspection criteria contained in paragraph(a):
 - (1) the components of the fuselage and hull group including—
 - (i) fabric and skin for deterioration, distortion, and other evidence of failure, and defective or insecure attachment of fittings; and

- (ii) systems and components for improper installation, apparent defects, and unsatisfactory operation:
- (2) the components of the cabin and cockpit group including—
 - (i) cabin and cockpit generally for uncleanliness and loose equipment that might foul the controls; and
 - (ii) cabin heating systems for sources of carbon monoxide contamination; and
 - (iii) seats and safety belts for poor condition, apparent defects, and security of adjustment devices; and
 - (iv) windows and windshields for deterioration and breakage; and
 - (v) instruments for poor condition, mounting, marking and, where practicable, improper operation; and
 - (vi) flight and engine controls for improper installation and improper operation; and
 - (vii) batteries for improper installation and improper charge; and
 - (viii) emergency exits for improper operation; and
 - (ix) all systems for improper installation, poor general condition, apparent or obvious defects, and insecurity of attachment:
- (3) the components of the engine and nacelle group including—
 - (i) the engine section for visual evidence of excessive oil, fuel, or hydraulic leaks, and sources of such leaks; and
 - (ii) studs and nuts for improper torquing or obvious looseness, and obvious defects; and
 - (iii) the engine for metal particles or foreign matter on screens and sump drain plugs and if there is weak cylinder compression, for improper internal condition and improper internal tolerances; and
 - (iv) engine mounts for cracks and looseness of mount to engine and airframe; and
 - (v) flexible vibration dampeners for poor condition and deterioration; and
 - (vi) engine controls for defects, improper travel, and improper safety; and
 - (vii) lines, hoses, and clamps for leaks, improper condition, and looseness; and
 - (viii) exhaust stacks for cracks, defects, and improper attachment; and
 - (ix) accessories for apparent defects and insecurity of mounting; and
 - (x) all systems for improper installation, poor general condition, defects, and insecure attachments; and
 - (xi) cowlings for cracks and defects:
- (4) the components of the landing gear group including—
 - (i) all units for poor condition and insecurity of attachment; and
 - (ii) linkages, trusses, and members for undue or excessive wear, fatigue, and distortion; and

- (iii) shock absorbing devices for improper charge; and
 - (iv) the retracting and locking mechanism for improper operation; and
 - (v) hydraulic lines for leakage; and
 - (vi) the electrical system for chafing and improper operation of switches; and
 - (vii) wheels for cracks, defects, and condition of bearings; and
 - (viii) tyres for wear and cuts; and
 - (ix) brakes for improper adjustment; and
 - (x) floats and skis for apparent or obvious defects and insecurity of attachment:
- (5) all components of the wing and centre section assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, and insecurity of attachment:
- (6) all components and systems that makeup the complete empennage assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, improper component installation, improper component operation, and insecurity of attachment:
- (7) the components of the propeller group including—
- (i) propeller assembly for cracks, nicks, binds, and oil leakage; and
 - (ii) bolts for improper torquing and lack of safety; and
 - (iii) anti-icing devices for improper operation and obvious defects; and
 - (iv) control mechanisms for condition, improper operation, insecure mounting, and restricted travel; and
 - (v) all components for improper installation, poor general condition, apparent or obvious defects, and insecurity of attachment:
- (8) the components of the radio group including—
- (i) radio and electronic equipment for improper installation and insecure mounting; and
 - (ii) wiring and conduits for improper routing, insecure mounting, and obvious defects; and
 - (iii) bonding and shielding for improper installation and poor condition; and
 - (iv) antenna, including trailing antenna, for poor condition, insecure mounting, and improper operation:
- (9) for a helicopter, systems and components for improper operations and obvious defects that include—
- (i) the drive shafts and similar systems; and
 - (ii) transmission system components; and
 - (iii) main rotors; and
 - (iv) auxiliary rotors:
- (10) each installed miscellaneous item that is not otherwise covered by this listing for improper installation and improper operation.

Appendix D — Altimeter System Tests and Inspections

This appendix applies to the inspection required by rule 43.61.

D.1 Aircraft not equipped with a transponder:

The altimeter must be tested by comparing it with a reference altimeter calibrated to a standard equivalent to the requirements in D.2 of this Appendix, allowing a maximum difference between the altimeter being tested and the reference altimeter of 50 feet.

D.2 Aircraft equipped with a transponder

D.2.1 The static pressure system test:

- (a) Ensure freedom from entrapped moisture and restrictions.
- (b) Ensure the leakage is within the following established tolerances:
 - (1) For unpressurised aeroplanes:
 - (i) **Method:** Evacuate any static pressure system incorporating a static port to a pressure differential of approximately 1 inch of mercury or to a reading, on the altimeter, 1000 feet above the aircraft elevation at the time of the test:
 - (ii) **Tolerance:** Without additional pumping for a period of 1 minute, the loss of indicated altitude shall not exceed 100 feet on the altimeter:
 - (2) For pressurised aeroplanes:
 - (i) **Method:** Evacuate the static pressure system until a pressure differential equivalent to the maximum cabin differential for which the aeroplane is type certificated is achieved:
 - (ii) **Tolerance:** Without additional pumping for a period of 1 minute, the loss of indicated altitude must not exceed 2 per cent of the equivalent altitude of the maximum cabin differential pressure or 100 feet, whichever is the greater
- (c) Determine that the static port heater, if installed, is operable.
- (d) Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the static pressure system and true ambient static air pressure for any flight condition.

D.2.2 The altimeter test:

- (a) Unless otherwise specified each test for performance may be conducted with the instrument subjected to vibration.
- (b) When tests are conducted with the temperature substantially different from an ambient temperature of approximately 25 degrees Celsius allowance should be made for the variation from the specified condition.
- (c) Altimeter tests shall be carried out in accordance with the following:

Scale error:

- (1) The altimeter with the barometric pressure scale at 1013.25 millibars, be subjected successively to pressures corresponding to the altitude listed in Table 1 up to the maximum normally expected operating altitude of the aircraft in which the altimeter is to be installed:

- (2) The reduction in pressure shall be made at a rate not exceeding 20 000 feet per minute to within approximately 2000 feet of the test point:
- (3) The test point shall be approached at a rate compatible with the test equipment:
- (4) The altimeter shall be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken:
- (5) The error at all test points shall not exceed the tolerances listed in Table 1:

Hysteresis:

- (6) The hysteresis test shall begin not more than 15 minutes after the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error tests prescribed in paragraphs (c)(1) to (5) and the hysteresis test shall commence while the altimeter is at this pressure:
- (7) Pressure shall be increased at a rate simulating a descent in altitude at the rate of 5000 to 20 000 feet per minute until within 3000 feet of the first test point which is 50 % of maximum altitude:
- (8) The test point shall then be approached at a rate of approximately 3000 feet per minute:
- (9) The altimeter shall be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken:
- (10) After the reading has been taken, the pressure shall be increased further, in the same manner as before, until the pressure corresponding to the second test point which is 40% of maximum altitude is reached:
- (11) The altimeter shall be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken:
- (12) After the reading has been taken, the pressure shall be increased further, in the same manner as before, until atmospheric pressure is reached:
- (13) The reading of the altimeter at either of the two test points shall not differ by more than the tolerance specified in Table 2 from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in paragraphs (c)(1) to (5):

After effect:

- (14) Not more than 5 minutes after the completion of the hysteresis test prescribed in paragraphs (c)(6) to (13), the reading of the altimeter, corrected for any change in atmospheric pressure, shall not differ from the original atmospheric pressure reading by more than the tolerance specified in Table 2:

Friction:

- (15) The altimeter shall be subjected to a steady rate of decrease of pressure approximating 750 feet per minute.
- (16) At each altitude listed in Table 3, the change in reading of the pointers after vibration shall not exceed the corresponding tolerance listed in Table 3:

Case leak:

- (17) The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18 000 feet, shall not change the altimeter reading by more than the tolerance shown in Table 2 during an interval of 1 minute:

Barometric scale error:

- (18) At constant atmospheric pressure, the barometric pressure scale shall be set at each of the pressures, falling within its range of adjustment that are listed in Table 4, and shall cause the pointer to indicate the equivalent altitude shown in Table 4 with a tolerance of 25 feet.
- (d) Altimeters that are of the air data computer type with associated computing systems, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer.

D.2.3 The automatic pressure altitude reporting equipment and ATC transponder system integration test:

- (a) Each test shall be conducted in accordance with paragraph (b).
- (b) Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points, to ensure that the altitude reporting equipment altimeters, and ATC transponders perform their intended functions as installed in the aircraft.
- (c) The difference between the automatic reporting output and the altitude displayed at the altimeter shall not exceed 125 feet.

TABLE 1— SCALE ERROR

Altitude	Equivalent pressure (millibars)	Tolerance +(feet)	Altitude	Equivalent pressure (millibars)	Tolerance +(feet)
-1000	1050.406	20	14000	595.239	100
0	1013.250	20	16000	549.152	110
500	995.075	20	18000	505.998	120
1000	977.166	20	20000	465.633	130
1500	959.518	25	22000	427.915	140
2000	942.129	30	25000	376.009	155
3000	908.117	30	30000	300.896	180
4000	875.105	35	35000	238.423	205
6000	811.996	40	40000	187.539	230
8000	752.624	60	45000	147.477	255
10000	696.817	80	50000	115.972	280
12000	644.408	90			

TABLE 2 — TEST TOLERANCES

Test	Tolerance ±(feet)
Case Leak Test	100
First test point (50% of maximum altitude)	75
Second test point (40% of maximum altitude)	75
After effect test	30

TABLE 3 — FRICTION

Altitude	Tolerance
1000	70
2000	70
3000	70
5000	70
10 000	80
15 000	90
20 000	100
25 000	120
30 000	140
35 000	160
40 000	180
50 000	250

TABLE 4 — PRESSURE ALTITUDE

Pressure (millibars)	Altitude (feet)
951.55	-1727
965.10	-1340
982.03	-863
998.96	-392
1013.25	0
1032.82	+531
1046.37	+893
1049.41	+974

Appendix E — ATC Transponder Tests and Inspections

This appendix applies to the tests and inspections referred to in rule 43.63.

E.1 General

- (a) The ATC transponder tests may be conducted using a bench check or portable test equipment.
- (b) If portable test equipment with appropriate coupling to the aircraft antenna system is used, operate the test equipment for ATCRBS transponders at a nominal rate of 235 interrogations per second to avoid possible ATCRBS interference.
- (c) For Mode S, operate the test equipment at a nominal rate of 50 Mode S interrogations per second.
- (d) An additional 3 dB loss is allowed to compensate for antenna coupling errors during receiver sensitivity measurements conducted in accordance with E.4 (b) below when using portable test equipment.

E.2 Radio reply frequency test

- (a) For all classes of ATCRBS transponders, interrogate the transponder and verify that the reply frequency is 1090 ± 3 MHz.
- (b) For classes 1B, 2B, and 3B Mode S transponders, interrogate the transponder and verify that the reply frequency is 1090 ± 3 MHz.
- (c) For classes 1B, 2B, and 3B Mode S transponders that incorporate the optional 1090 ± 1 MHz reply frequency, interrogate the transponder and verify that the reply frequency is correct.
- (d) For classes 1A, 2A, 3A, and 4 Mode S transponders, interrogate the transponder and verify that the reply frequency is 1090 ± 1 MHz.

E.3 Suppression test

- (a) When classes 1B and 2B ATCRBS transponders, or Classes 1B, 2B, and 3B Mode S transponders are interrogated at a rate between 230 and 1000 Mode 3/A interrogations per second or when Classes 1A and 2A ATCRBS transponders, or Classes 1B, 2A, 3A, and 4 Mode S transponders are interrogated at a rate between 230 and 1200 Mode 3/A interrogations per second—
 - (1) verify that the transponder does not respond to more than 1% of ATCRBS interrogations when the amplitude of P2 pulse is equal to the Pi pulse; and
 - (2) verify that the transponder replies to at least 90 % of ATCRBS interrogations when the amplitude of the P2 pulse is 9 dB less than the PI pulse.
- (b) If the test is conducted with a radiated test signal, the interrogation rate shall be 235 ± 5 interrogations per second unless a higher rate has been approved for the test equipment used at that location.

E.4 Receiver sensitivity test

- (a) Verify that, for any class of ATCRBS transponder, the minimum triggering level of the receiver for the system is -73 ± 4 dbm, or that for any class of Mode S transponder, the minimum triggering level of the receiver for Mode S format (P6 type) interrogations is -74 ± 3 dbm by use of a test set—
- (1) connected to the antenna end of the transmission line; or
 - (2) connected to the antenna terminal of the transponder with a correction for transmission line loss; or
 - (3) utilising radiated signals.
- (b) Verify that the difference in Mode 3/A and Mode C receiver sensitivity does not exceed 1 db for either any class of ATCRBS transponder or any class of Mode S transponder.

E.5 RF peak output power test

Verify that the transponder RF output power is within the following specifications for the class of transponder using the conditions prescribed in E.4(a):

- (1) For class 1A and 2A ATCRBS transponders, the minimum RF peak output power is at least 21.0 dbw (125 watts):
- (2) For class 1B and 2B ATCRBS transponders, the minimum RF peak output power is at least 18.5 dbw (70 watts):
- (3) For class 1 A, 2A, 3A, and 4 and those Class IB, 2B, and 3B Mode S transponders that include the optional high RF peak output power, the minimum RF peak output power is at least 21.0 dbw (125watts):
- (4) For class IB, 2B, and 3B Mode S transponders, the minimum RF peak output power is at least 18.5dbw (70 watts):
- (5) For any class of ATCRBS or any class of Mode S transponders, the maximum RF peak output power does not exceed 27.0 dbw (500 watts).

E.6 Mode S diversity transmission channel isolation test

For any class of Mode S transponder that incorporates diversity operation, verify that the RF peak output power transmitted from the selected antenna exceeds the power transmitted from the non-selected antenna by at least 20dB.

E.7 Mode S address test

Interrogate the Mode S transponder using the correct address and at least two incorrect addresses and making the interrogations at a nominal rate of 50 interrogations per second and verify that it replies only to its assigned address.

E.8 Mode S formats test

- (a) Interrogate the Mode S transponder with UF for which it is equipped and verify that the replies are made in the correct format using the surveillance formats UF=4 and 5. Verify that the altitude reported in the replies to UF=4 are the same as that reported in a valid ATCRBS Mode C reply.
- (b) Verify that the identity reported in the replies to UF=5 are the same as that reported in a valid ATCRBS Mode 3/A reply, if the transponder is so equipped, using the communication formats UF=20, 21, and 24.

E.9 Mode S all-call interrogations test

Interrogate the Mode S transponder with the Mode S - only all - call format UF=11, and the ATCRBS/Mode S all-call formats (1.6 microsecond P4 pulse) and verify that the correct address and capability are reported in the replies (downlink format DF=11).

E.10 Mode S ATCRBS-only all-call interrogation test

Interrogate the Mode S transponder with the ATCRBS - only all - call interrogation (0.8 microsecond P4 pulse) and verify that no reply is generated.

E.11 Mode S Squitter test

Verify that the Mode S transponder generates a correct squitter approximately once per second.

Appendix F — Emergency Locator Transmitter Tests and Inspections

The following inspections and tests must be carried out by the person referred to in rule 43.65 to ensure compliance with the requirements prescribed in subpart F of Part 91 for the inspection and testing of emergency locator transmitters;

- (1) inspect the emergency locator transmitter and its mountings and aerial connection for general condition particularly for corrosion or corrosion deposits:
- (2) operate the self-test function of the emergency locator transmitter and check for satisfactory performance in accordance with the manufacturer's instructions.