BOOK 2 - ACCEPTABLE MEANS OF COMPLIANCE (AMC)

1 General

1.1 Book 2 contains Acceptable Means of Compliance (AMC). They are non-requirements that are provided as joint interpretations, explanations and/or acceptable means of compliance and have been agreed for inclusion into the CS 30N.

1.2 A product for which compliance with requirements in accordance with published AMC material was shown is assured of the Agency's acceptance of such method.

2 Presentation

2.1 The AMC are presented in full page width on loose pages, each page being identified by the date of issue or the Amendment number under which it is amended or reissued.

2.2 The numbering system used is in accordance with AMC 11.050 para 4.1.

2.3 Explanatory notes not forming part of the AMC text appear in a smaller type face.

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SUBPART B - FLIGHT

AMC 30N.40
General
See CS 30N.40

The minimum ground handling crew should be specified in relation to the static heaviness or lightness and the maximum permitted surface wind speed (see CS 30N.237(b)).

AMC 30N.45
General
See CS 30N.45

(a) Conditions to be covered in the Flight Manual: - Performance data is determined and scheduled in the Flight Manual for ranges of conditions selected for the Airship, however at least that prescribed in (1), (2) and (3) below should be included.

Note: It is advisable to schedule performance data to cover the widest ranges of conditions in which the Airship is likely to operate. However, the graphical information need not be extended to the most favourable end of each range provided that where this is not done a statement is included in the Flight Manual stating what performance is to be assumed for the remainder of the range (e.g. for temperatures below I.S.A., the performance shall be taken as that appropriate to I.S.A.).

(1) Altitude

(i) For Take-off and Landing: - Aerodrome altitudes from sea-level to 2440 m (8000 ft) above sea-level, or to 305 m (1000 ft) below the Ballonet Ceiling, whichever is the lesser.

Note: For Airships with normally aspirated engines the variation of performance with altitude may be shown by means of a pressure/density altitude correction.

(ii) For En-route: - From sea-level to the maximum likely operating altitude appropriate to the temperature or to the maximum altitude limit, whichever is the lesser.

(2) Temperature: - For all data, from I.S.A. -33.3 °C to I.S.A. +22.2 °C.

Note: For Airships with normally aspirated engines the variation of performance with temperature may be shown by means of a pressure/density altitude correction.

(3) Wind: - For Take-off Distance and Landing Distance, zero wind. Corrections for the effect of wind should be scheduled.

(b) Extrapolation: - In establishing the data for inclusion in the Flight Manual it is acceptable to extrapolate by calculation within the limits detailed below. In all cases an acceptable degree of conservatism shall be included; this may be less than that called for below, if evidence is offered to substantiate a reduced degree of conservatism.

(1) Altitude: - Take-off performance

(i) One Test Location: - Where performance is determined at one location only, the data may be extrapolated for altitudes not greater than 5000 ft above and below the test altitude, provided that:

(A) for altitudes below the test altitude a degree of conservatism equal to 0.5 times the calculated effect of altitude is applied,

(B) for altitudes above the test altitude a degree of conservatism equal to 1.5 times the calculated effect of altitude is applied.

(ii) Two Test Locations: - Where performance is determined at two locations separated by an altitude h of not less than 2000 ft, the data may be extrapolated for altitudes not more than 5000 ft above the upper test altitude, and for altitudes not more than 5000 ft below the lower test altitude provided that:

(A) for altitudes more than h below the lower test altitude a degree of conservatism equal to 0.8 times the measured effect of altitude is applied,

(B) for altitudes between h below the lower test altitude and h above the upper test altitude no degree of conservatism needs to be applied,

(C) for altitudes more than h above the upper test altitude a degree of conservatism equal to 1.2 times the measured effect of altitude is applied.

(2) Temperature: Take-off and Climb Performance

(i) One Test Location: - Where performance is determined at one location only, the data may be extrapolated for temperature not more than 20°C above and below the mean test temperature, provided that:

(A) for temperatures below the test temperature a degree of conservatism equal to 0.5 times the calculated

effect of temperature is applied,

(B) for temperatures above the test temperature a degree of conservatism equal to 1.5 times the calculated effect of temperature is applied.

(ii) Two Test Series: - Where performance is determined on two occasions or at two locations differing in ambient temperature by t°C, the data may be extrapolated for temperatures not more than 20°C below the lower test temperature, and for temperatures not more than 20°C above the higher test temperature provided that it is not less than 10°C, and

(A) for temperatures more than t°C below the lower mean test temperature a degree of conservatism equal to 0.8 times the measured effect of temperature is applied;

(B) for temperatures between t°C below the lower mean test temperature and t°C above the higher mean test temperature no degree of conservatism needs to be applied;

(C) for temperatures more than t°C above the higher mean test temperature a degree of conservatism equal to 1.2 times the measured effect of temperature is applied.

(3) Static Heaviness

(i) Take-off and Climb Performance

(A) One Test Heaviness: - Where performance is determined at one value of heaviness only, the data may be extrapolated without limit, provided that:

(1) the tests are carried out at not less than 95% of the maximum heaviness permitted for take-off, and

(2) for values of heaviness below that tested, a degree of conservatism equal to 0.5 times the calculated effect of heaviness is applied.

(A) Two Values of Test Heaviness: - Where performance is determined at two values of heaviness differing by an amount h, the data may be extrapolated without limit provided that:

(1) the higher of the values of test heaviness is not less than 95% of the maximum heaviness permitted for take-off; and

(2) for values of heaviness more than h kg below the lower test heaviness a degree of conservatism equal to 0.8 times the measured effect of heaviness is applied;

(3) for values of heaviness between h kg below the lower test heaviness and the maximum heaviness permitted for take-off, no conservatism need be applied.

(ii) Landing: - Performance data should normally be determined at not less than two values of test heaviness.

(A) The lower value should be within 10% of the minimum value of heaviness (maximum value of lightness) permitted for landing, and

(B) the higher value should not be less than 95% of the maximum value permitted for landing, and no conservatism need be applied to the measured effect of heaviness performance.

Where one extreme of the permitted range of heaviness can be shown to be clearly non-limiting, without testing, the proposed test programme and degree of extrapolation conservatism should be discussed with the Agency.

AMC 30N.51
Take-off
See CS 30N.51

(a) The take-off technique should permit adequate control at all points in the take-off, both with all engines operating and in the event of a power unit failure, in all wind speeds up to the maximum permitted for take-off. Adequate allowance should be made for pilot reaction times as well as for the necessity for the pilot to carry out such drills and procedures as may reasonably be used in operation. Appropriate allowance should also be made for any foreseeable failure or malfunction of the devices for which credit is taken (e.g. Vectored Thrust), and for variations in static heaviness within the permitted range.

(b) In establishing the measured take-off distance (see CS 30N.51(b)), the achievement of the 50 ft screen height should be assessed on the basis of the lowest part of the airship, or the lowest part of the handling ropes, whichever is the lower, clearing the screen.

(c) In establishing the measured accelerate-stop distance (see CS 30N.51(c)), the means of retardation for which performance credit may be taken should be discussed with the Agency.

(d) In establishing the minimum space required for take-off (see CS 30N.51(e)(2)), the width of the minimum space required for take-off defined in (e)(2) is based on the assumptions that:

(1) rectangular spaces will be used in condition of light cross-winds only, and

(2) the deviation from the centre-line due to engine failure in still air conditions will not exceed 10 m.

If either of these conditions is not met, the required width should be discussed with the Agency.

AMC 30N.65
Climb: all engines operating
See CS 30N.65

Information should be provided on the Maximum Rates of Climb and Descent to be used in the event of failures in the primary means of supplying air to, or controlling pressure in, the Ballonets.

AMC 30N.255
Ground handling characteristics
See CS 30N.255

The ground handling of airships is a classical problem area that needs to be notified with high importance. As airships of this category have to deal with large numbers of passengers and/or considerable cargo weights, the definition of procedures and the necessary minimum-crew should also consider failure conditions (for example: engine failure and/or loss of control).

Further issues, that should be considered, are:
Ground crew co-ordination: ground crew chief and responsibility sharing/hand over between ground crew chief and pilot, airship tie down or ballast procedure for loading and unloading, on-mast/off-mast responsibility, ground pressure control/ surveillance.

Appropriate wind limitations should be determined.

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SUBPART D - DESIGN AND CONSTRUCTION

AMC 30N.613
Material strength properties and design values
See CS 30N.613

Design values could be those contained in or determined from the following publications (obtainable from the Superintendent of Documents, Government Printing Office, Washington, DC 20402) or other values approved by the Agency: MIL-HDBK-5, 'Metallic Materials and Elements for Flight Vehicle Structure'; MIL-HDBK-17, 'Plastics for Flight Vehicles'; ANC-18, 'Design of Wood Aircraft Structures'; MIL-HDBK-23, 'Composite construction for Flight Vehicles'; and Federal Requirement 191-A, 'Textile Test Methods'.

(a) Design properties outlined in MIL-HDBK-5 may be used subject to the following conditions.

(1) Where applied loads are eventually distributed through a single member within an assembly, the failure of which would result in the loss of the structural integrity of the component involved, the guaranteed minimum design mechanical properties ('A' values) when listed in MIL-HDBK-5 must be met.

(2) Redundant structures in which the partial failure of individual elements would result in applied loads being safely distributed to other load carrying members may be designed on the basis of the '0.90 probability' ('B' values) when listed in MIL-HDBK-5. Examples of these items are sheet-stiffener combinations and multi-rivet or multiple-bolt connections.

(b) Design values greater than the guaranteed minima required by subparagraph (a) of this paragraph may be used if a 'premium selection' of the material is made in which a specimen of each individual item is tested before use to determine that the actual strength properties of that particular item will equal or exceed those used in design.

(c) Material correction factors for structural items such as sheets, sheet-stringer combinations, and riveted joints, may be omitted if sufficient test data are obtained to allow a probability analysis showing that 90% or more of the elements will equal or exceed allowable selected design values.

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