UDC 629.7.064.5 : 621.316.923.1

Ref. No. : ISO/R 1547-1971 (E)

transbmie

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1547

PRECISION FUSE-LINKS FOR AIRCRAFT

GENERAL REQUIREMENTS

1st EDITION

May 1971

For each individual country the only valid standard is the national standard of that country.

Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1547, *Precision fuse-links for aircraft – General requirements,* was drawn up by Technical Committee ISO/TC 20, *Aircraft and space vehicles,* the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question led to the adoption of Draft ISO Recommendation No. 1547, which was circulated to all the ISO Member Bodies for enquiry in June 1968. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Italy	Switzerland
Belgium	New Zealand	Thailand
Canada	Peru	Turkey
Czechoslovakia	Poland	U.A.R.
Greece	South Africa, Rep. of	United Kingdom
Israel	Spain	

The following Member Bodies opposed the approval of the Draft :

Germany
Netherlands
U.S.S.R.

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

ISO Recommendation R 1547 May 1971

PRECISION FUSE-LINKS FOR AIRCRAFT

GENERAL REQUIREMENTS

1. SCOPE

This ISO Recommendation gives the general requirements for precision fuse-links suitable for use in aircraft electrical systems having voltage and frequency characteristics conforming to ISO Recommendation R 222*, *Voltages for aircraft electrical systems*, at any ambient temperature from – 65 °C to + 85 °C, and all altitudes from 0 to 24 400 m. Where mention is made of other "relevant ISO Recommendations" this refers to :

(1) ISO Recommendation R 1548, *Precision fuse-links for aircraft* (*Type A*);

(2) ISO Recommendation R 1549, *Precision fuse-links for aircraft* (*Type B*).

2. TERMINOLOGY

The terminology used in this ISO Recommendation is in conformity with the International Electrotechnical Commission (IEC) Publication 269, *Low-voltage fuses with high breaking capacity for industrial and similar purposes – Part 1 : General requirements*, as far as practicable.

3. DIMENSIONS

The dimensions of the fuse-links should comply with the relevant ISO Recommendation.

4. TEMPERATURE AND ALTITUDE RATING

4.1 The fuse-links should be suitable for use in all ambient temperatures from – 65 °C to + 35 °C and at all altitudes up to 24 400 m.

4.2 For ambient temperatures between 35 °C and 85 °C the fuse-link should be de-rated by 0.4 % of normal rated current for every one degree Celsius increase in ambient temperature above 35 °C.

5. CURRENT, VOLTAGE AND BREAKING CAPACITY RATINGS

The current ratings, the voltage ratings, and breaking capacity ratings of the fuse-links should be in accordance with the relevant ISO Recommendation.

---

* See also ISO Recommendation R 1540, *Characteristics of aircraft electrical systems* (in course of preparation).

6. ENVIRONMENT

The fuse-links should comply with the requirements of ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment,* including vibration (other than direct engine-mounting), acceleration, crash conditions, climatic and explosion proofness. They should not support mould growth and should not deteriorate even after storage for long periods in the tropics.

7. TEMPERATURE RISE

When the fuse-link is suitably mounted and attached to a cable complying with ISO Recommendation R 469, *Dimensions and conductor resistance of general purpose electrical cables with copper conductors for aircraft,* of the rating specified in the relevant ISO Recommendation, using an appropriate termination and carrying rated current continuously, the temperature of the attached cable due to the combined effects of ambient and temperature rise should not exceed the safe value for the insulation as specified in ISO Recommendation R 474, *Performance requirements for general purpose electrical cables with copper conductors for aircraft.*

8. TIME/CURRENT CHARACTERISTICS

The pre-arcing time/current characteristics of the fuse-links should comply with the requirements of the relevant ISO Recommendation.

9. ENDURANCE

The fuse-links should be capable of carrying at least 80 % of their rated current continuously at an ambient temperature of 85 ± 5 °C for a minimum period of 1000 hours without deterioration.

10. IDENTIFICATION AND MARKING

10.1 Every fuse-link should be clearly and indelibly marked with its rated current.

10.2 The manufacturer's name or identification and the number of the national standard should be marked either on the fuse-link or on the package.

11. TESTS

11.1 Except where specific details are listed below, tests should be in accordance with the practice and requirements of relevant national specifications for aircraft fuses. Evidence should be available to the purchaser that fuse-links identical to those supplied as covered by this ISO Recommendation have satisfactorily passed type tests conducted in accordance with section 12.

11.2 In order that a consistent standard of quality be maintained, the manufacturer should conduct production routine tests and production quality tests, the minimum requirements for which are indicated in sections 13 and 14.

11.3 Except where inappropriate, the tests should be conducted on fuse-links shielded from external draughts and fitted with minimum lengths of 0.6 m of cable of rating specified in the relevant ISO Recommendation, with appropriate terminations.

12. TYPE TESTS

12.1 Preliminary tests

All fuse-links subjected to type tests should first have passed the production routine tests prescribed in section 13. The fuse-links should also be subjected to a voltage drop test by the method described in the Annex. The mean value and the tolerance on the mean value should not exceed values quoted in the relevant ISO Recommendation.

* In course of preparation.

12.2 Group tests

12.2.1 After fulfilling the requirements of the tests referred to in clause 12.1, the fuse-links should be divided into groups for type testing as shown in the Table. The voltage drop across the fuse-link contacts should be measured at the completion of each of the tests prescribed in clauses 12.3.2, 12.3.3, 12.3.4, 12.4 and 12.6, and the value should not exceed 110 % of the initial value.

12.2.2 Should any fuse-link fail to pass the type tests, the fuse-links should be deemed not to comply with the requirements of this ISO Recommendation.

12.2.3 Items used in tests in any one group should not be used subsequently for tests in any other group, and should not be returned to bulk supply.

TABLE – **Type testing groups**

Group	Number of fuse-links required	Type of test	See clause
1	Six of maximum current rating and six of minimum current rating in each body size.	Contact robustness Vibration Acceleration Climatic cycling	12.3.1 12.3.2 12.3.3 12.3.4
2	One of any current rating in each body size.	Crash conditions	12.4
3	One of any current rating in each body size.	Mould growth	12.5
4	One of any current rating in each body size.	Tropical exposure	12.6
5	Six of maximum current rating in each body size.	Temperature rise	12.7
6	Six of maximum current rating in each body size.	Endurance	12.8
7	As required of maximum current rating in each body size.	Breaking capacity	12.9
8	As required of every current rating of each body size.	Minimum fusing current	12.10
9	As required of every current rating of each body size.	Time/current characteristics	12.11

12.3 Group 1

12.3.1 *Contact robustness.* The fuse-links should be subjected to a steady axial pull of 67.5 N applied for 10 seconds between the two end caps or tags. There should be no sign of fracture, displacement of the fuse element, or other deterioration.

12.3.2 *Vibration.* The fuse-links should be subjected to the appropriate vibration test described in ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment,* carrying rated current throughout the test.

* In course of preparation.

12.3.3 *Acceleration.* The fuse-links should be subjected to the appropriate acceleration tests described in ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment,* carrying rated current throughout the tests.

12.3.4 *Climatic cycling.* The fuse-links should be subjected to the appropriate cycles of climatic testing described in ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment,* current not being carried.

12.4 Group 2

Crash conditions. The fuse-links should be subjected to the appropriate crash condition test described in ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment.*

12.5 Group 3

Mould growth. The fuse-links should be subjected to tests in accordance with ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment.***

12.6 Group 4

Tropical exposure. The fuse-links should be subjected to the tropical exposure tests described in ISO Recommendation R . . .*, *Environmental and operational conditions of aircraft equipment.*

12.7 Group 5

Temperature rise. With the fuse-links suitably mounted and carrying rated current, the temperature rise in the attached cable (measured, when the temperature reading becomes stable, at the surface of the conductor beneath the insulation at a point 25.0 mm from the end of the insulation) should not exceed 40 °C for ferule-type fuse-links or 55 °C for tag type fuse-links.

12.8 Group 6

Endurance. The fuse-links, suitably mounted, should carry 80 % rated current continuously in an ambient temperature of 85 ± 5 °C for a period of 1000 hours. The voltage drop should be measured between fixed contacts at the commencement of the test and at regular intervals throughout. It should not at any time exceed 110 % of the initial value.

12.9 Group 7

Breaking capacity. The breaking capacity of the fuse-links should be tested in accordance with the method described in IEC Publication 269, *Low-voltage fuses with high breaking capacity for industrial and similar purposes – Part 1 : General requirements,* or by equivalent methods in accordance with the relevant national standard.

12.10 Group 8

Minimum fusing current. The minimum fusing current of the fuse-links should be determined in accordance with the method described in IEC Publication 269 for the duration of time stated in the relevant ISO Recommendation, or by equivalent methods in accordance with the relevant national standard. The values obtained should be not less than the minimum level indicated in the relevant time/current characteristic curve.

12.11 Group 9

Time/current characteristics. The time/current characteristics of the fuse-links should be determined in accordance with the method described in IEC Publication 269, or by equivalent methods in accordance with the relevant national standard. Pre-arcing times should be plotted against prospective current with both axes to logarithmic scale and the characteristic curve obtained should lie within the appropriate envelope shown in the relevant ISO Recommendation.

---

* In course of preparation.

** In the interim, mould growth requirements stated in IEC Publication 68-2-10 are recommended.