
**Aerospace — Preformed flexible steel wire
rope for aircraft controls —**

Part 2:
Technical specification

*Aéronautique et espace — Câbles en acier souples préformés pour
commandes d'aéronefs —*

Partie 2: Spécifications techniques

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2020-2 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 12, *Mechanical system parts*.

This first edition of ISO 2020-2 together with ISO 2020-1 cancels and replaces ISO 2020:1984.

ISO 2020 consists of the following parts, under the general title *Aerospace* — *Preformed flexible steel wire rope for aircraft controls*:

- *Part 1: Dimensions and loads*
- *Part 2: Technical specification*

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Aerospace — Preformed flexible steel wire rope for aircraft controls —

Part 2: Technical specification

1 Scope

This part of ISO 2020, in conjunction with ISO 2020-1, specifies the inspections and tests as well as acceptance and qualification conditions for preformed flexible steel wire ropes for aircraft controls.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 2020. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 2020 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2020-1:1997, *Aerospace — Preformed flexible steel wire rope for aircraft controls — Part 1: Dimensions and loads*.

ISO 2408:1985, *Steel wire ropes for general purposes — Characteristics*.

ISO 9001:1994, *Quality systems — Model for quality assurance in design, development, production, installation and servicing*.

ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing*.

3 General requirements

Manufacture and workmanship shall be in accordance with the best practice for high quality aircraft wire ropes consistent with the requirements of this part of ISO 2020. The finished cable shall be uniform in construction and securely laid, free from kinks, loose wires, loose strands or other defects. A maximum of one broken wire is permissible on a rope length of 300 mm.

Tucked joints may be in wires of diameter equal to or less than 0,2 mm. For wires of diameter greater than 0,2 mm the joints shall be made by brazing or electric welding. In the same strand, joints shall be not less than 6 m apart.

4 General inspections and tests

All wire rope shall be examined for workmanship and finish to determine compliance. For this purpose, the wire rope shall travel no faster than 30 m/min and shall be stopped for closer inspection when necessary. This inspection shall take place at the time the wire rope is wound on shipping reels. Any discard from the head or starting end of the manufacturing reel shall be removed prior to winding of the shipping reel.

The manufacturer shall make available the necessary equipment for testing a rope to the conditions of this part of ISO 2020.

Before every inspection and test the inspector shall be satisfied that the measuring instruments are correctly calibrated. Inspections and tests referred to in 5.1 to 5.10 shall be carried out on each lot produced.

5 Specific requirements, inspections and test methods

Specific requirements, inspections and test methods are given in 5.1 to 5.10.

No.	Characteristics	Requirements	Inspections and test methods	Q ¹⁾	A ¹⁾
5.1	Materials	In accordance with ISO 2020-1.	Chemical analysis or certificate of conformity of the manufacturer of the semi-finished product.	×	×
5.2	Dimensions	In accordance with ISO 2020-1.	The actual diameter of the rope shall be measured after production with a measuring device with jaws broad enough to cover not less than two adjacent strands. At each of three points spaced at least 1 m apart, two measurements shall be taken at right angles to each other. The average of these six measurements shall fall within the specified maximum and minimum diameters. Each end of each manufactured length shall be measured in this manner. These measurements shall be made on a straight portion of the rope under no tension.	×	×
5.3	Masses	In accordance with ISO 2020-1.	Using a suitable method.	×	
5.4	Lubrication	During rope manufacture a suitable lubricant shall be applied so that each wire is coated. The lubricant shall reduce internal friction and inhibit corrosion. It shall be resistant in the service temperature range and shall have good lubrication properties.	Visual examination and certificate of conformity of the grease manufacturer.	×	×
5.5	Surfaces	Flattening of wire surfaces of the rope due to manufacture are permissible as long as the requirements of ISO 2020-1 are met.	Visual examination.	×	×

No.	Characteristics	Requirements	Inspections and test methods	Q ¹⁾	A ¹⁾
5.5.1	Surface treatment of zinc coated ropes	The requirements of ISO 2020-1 shall be met.	Testing according to the Keller-Bohaczek method.	×	×
5.6	Preforming	The increase in the diameter of the wire rope after cutting shall not exceed the value indicated in table 1.	It shall be possible to lead the cut end through a bore with the maximum permissible diameter. Other suitable measuring methods, e.g. profile projectors or measuring magnifiers, are permissible. To avoid distorting the cable ends, it is recommended that cutting be carried out electrically or using cutters with constricting jaws.	×	×
5.7	Actual breaking load	The minimum breaking load according to ISO 2020-1 shall be met.	The actual breaking load of the wire rope shall be determined in accordance with ISO 3108.	×	×
5.8	Elongation	The requirements of ISO 2020-1 shall be met.	From each wire rope of the 7 × 7 and 7 × 19 constructions a sufficient length shall be selected to provide an unobstructed minimum test length of 500 mm between the jaws of the test machine. This test length shall be progressively loaded (max. 10 mm/min) until 60 % of the minimum breaking load is reached. This load shall be maintained for 1 min. It shall then be released to 2 % of the minimum breaking load. Under this initial load a gauge length of 250 mm shall be marked or another suitable measuring device with a minimum distance of 100 mm between cutting edges shall be applied. The rope shall then be progressively loaded (max. 10 mm/min) until 60 % of its minimum breaking load is reached and its elongation determined when 5 %, 10 %, 25 %, 40 % and 60 % of the minimum breaking load are reached.	×	×