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Steel wire ropes for the petroleum and natural gas industries — Minimum requirements and terms of acceptance

Câbles en acier pour les industries du pétrole et du gaz naturel — Exigences minimales et conditions de réception

Reference number
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 105, *Steel wire ropes*.

This second edition cancels and replaces the first edition (ISO 10425:2003), which has been technically revised.

The main changes are as follows:

— tolerance, difference of diameter measurements of compacted strands and compacted (swaged) ropes have been added (see 4.3);

— the breaking forces of the more common classes, sizes and grades of compacted strands and compacted (swaged) ropes have been added to the breaking force tables (see Annex C);

— some sizes of well-measuring wire have been added to the diameter tables (see Annex E).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

In recognition of equipment already in use and originally designed to accommodate rope sizes (nominal rope diameters) based on “Imperial” units, some of the more common “converted SI unit” sizes have also been included.

In addition, and in recognition of equipment already in use and designed to operate with ropes having specific rope grades (e.g. IPS), based on “US” wire levels, these grades have also been included in order to give prominence to the required minimum values of breaking force associated with these grades and help to ensure that existing design safety levels are maintained.

Having due regard to size and breaking force for a particular rope class or construction, in some cases it is possible to safely substitute a US customary size and grade with one based solely on SI units and grade, and vice-versa. To assist in this process, this document gives a size range for each nominal rope diameter and equivalent minimum breaking forces (converted from US customary units) for comparison, although it is recommended that the equipment designer or rope manufacturer (or other competent person) is consulted prior to ordering a substitute rope.

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Steel wire ropes for the petroleum and natural gas industries — Minimum requirements and terms of acceptance

1 Scope

This document specifies the minimum requirements and terms of acceptance for the manufacture and testing of steel wire ropes not exceeding rope grade 2160 for the petroleum and natural gas industries.

Typical applications include tubing lines, rod hanger lines, sand lines, cable-tool drilling and clean out lines, cable tool casing lines, rotary drilling lines, winch lines, horse head pumping unit lines, torpedo lines, mast-raising lines, guideline tensioner lines, riser tensioner lines, mooring and anchor lines. Wire ropes for lifting slings and cranes, and wire for well-measuring and strand for well-servicing are also included.

The minimum breaking forces for the more common sizes, grades and constructions of stranded rope are given in tables. However, this document does not restrict itself to the classes covered by those tables. Other types can also conform with its requirements. The minimum breaking force values for these wire ropes are provided by the manufacturer.

For information only, other tables present the minimum breaking forces for large diameter stranded and spiral ropes (i.e. spiral strand and locked coil), while approximate nominal length masses for the more common stranded rope constructions and large diameter stranded and spiral ropes are also given.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2232, *Round non-alloy steel wires for general purpose wire ropes, large diameter wire ropes and mine hoisting wire ropes —Specifications*

ISO 4345, *Steel wire ropes — Fibre main cores — Specification*

ISO 4346, *Steel wire ropes for general purposes — Lubricants — Basic requirements*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 7800, *Metallic materials — Wire — Simple torsion test*

ISO 7989-2, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc-alloy coating*

ISO 17558, *Steel wire ropes — Socketing procedures — Molten metal and resin socketing*

ISO 17893, *Steel wire ropes — Vocabulary, designation and classification*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17893 and ISO 7989-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Requirements

4.1 Material

4.1.1 Wire

The wires for stranded ropes and well-servicing strand of carbon steel shall, before fabrication, conform to the diameter, tensile, torsion, and when applicable, coating requirements specified in Annex A.

The methods of test for wires of tensile strength grades 1 370 N/mm^2, 1 570 N/mm^2, 1 770 N/mm^2, 1 960 N/mm^2 and 2 160 N/mm^2 shall be in accordance with those given in ISO 2232.

The methods of test for wires of tensile strength grades Levels 2, 3, 4 and 5 shall be in accordance with Annex B.

For those wire ropes where a wire rope grade is applicable, the tensile strength grade of the wires shall be subject to the limits given in Table 1.

NOTE The minimum breaking force values of those wire ropes of grades 1770, 1960 and 2160 as covered by Tables C.1 through C.24 are calculated on the basis of wire rope grade and not individual wire tensile strength grades or levels.

Table 1 — Range of wire tensile strength grades

Rope grade	Wire tensile strength grades N/mm^2
1770 or IPS	1 570 or Level 2 to 1 960 or Level 4
1960 or EIP	1 770 or Level 3 to 2 160 or Level 5
2160 or EEIP	1 960 or Level 4 to 2 160 or Level 5

For those wire ropes (e.g. larger diameter ropes) where a wire rope grade is not applicable, the tensile strength grades of the wires shall be one, or a combination, of those given in Annex A.

All wires of the same nominal diameter in the same wire layer shall be of the same tensile strength grade.

Well-measuring wire and wires used in the manufacture of well-servicing strand shall normally be of carbon steel but other materials (e.g. stainless steel) may be used.

The purchaser should specify any particular material requirements.

4.1.2 Core

Cores of stranded ropes shall normally be of steel or fibre, although other types, such as composites (e.g. steel plus fibres or plastics) or cores made of solid polymer, may also be supplied.

The purchaser should specify the type of core.

Fibre cores shall conform to ISO 4345.

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