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Forged steel components for lifting slings — Grade 8

Accessoires en acier forgé pour élingues de levage — Classe T(8)

[Revision of first edition (ISO 8539:1986)]

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 8539 was prepared by Technical Committee ISO/TC 111, *Round steel link chains, chain slings, components and accessories*, Subcommittee SC 3, *Components and accessories*.

This second edition cancels and replaces the first edition.

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Introduction

The components covered by this International standard are normally supplied to be part of a sling, but they may also be used for other applications. In such instances it is important that the components design is checked to ensure its fitness for the intended use.

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Forged steel components for lifting slings — Grade 8

1 Scope

This International Standard specifies general requirements for forged steel components of grade 8 up to 63 t WLL, mainly for use in:

- chain slings in conformance with ISO 4778 & ISO 7593
- steel wire rope slings in conformance with ISO 7531
- textile slings

intended for lifting objects, materials or goods.

This standard does not apply to hand forged components and welded links, nor to other welded components.

Annex A is informative, and gives the bases for calculation of tabulated values of mechanical properties.

Annex B is informative, and gives an example of a designation system for forged steel lifting components of grade 8.

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2 Normative references

The following referenced documents are indispensable for the application 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 643, Steels - Micrographic determination of the ferritic or austenitic grain size

ISO 4778:1981, Chain slings of welded construction – Grade M(4), S(6) and 8(T)

ISO 7531, Wire rope slings for general purposes – Characteristics and specifications

ISO 7593, Chain slings assembled by methods other than welding – Grade T(8)

ISO 7500-1, Metallic materials – Verification of static uniaxial testing machines – Part 1: Tension/compression testing machines – Verification and calibration of the force measuring system

ISO 9001, Quality systems - Model for quality assurance in design/development, production, installation and servicing

ISO/IEC Guide 62, General requirements for bodies operating assessment and certification/registration of quality systems

EN 10025: 1993, Hot rolled products of non-alloy structural steels - Technical delivery conditions

EN 10228-1: 1999, Non-destructive testing of steel forgings – Part 1: Magnetic particle inspection

EN 10228-2: 1998, Non-destructive testing of steel forgings – Part 2: Penetrant testing

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3 Terms and Definitions

For the purpose of this document the following definitions apply.

3.1

working load limit (WLL)

maximum mass that a component is authorized to sustain in general lifting service, expressed as a code.

3.2

manufacturing proof force (MPF)

force applied to the component during the manufacturing proof test.

3.3

breaking force (BF)

maximum force reached during the static tensile test of the component, at which the component fails to retain the load.

3.4

traceability code

series of letters and/or numbers marked on a component that enables its manufacturing history, including the identity of the cast of steel used, to be traced.

3.5

competent person

designated person, suitably trained, qualified by knowledge and practical experience, and with the necessary instruction to enable the required test and examination to be carried out.

NOTE Clause 6.2 of EN ISO 9000:2000 gives guidance on training.

3.6

lot

specified number of components from which samples are selected for testing purposes, and that have been manufactured from the same cast of steel and subjected to the same heat treatment process.

4 Safety requirements

4.1 General

4.1.1 Articulation

The dimensions of the forged steel components shall be such as to ensure articulation so that the force imposed is transmitted in the intended direction.

4.1.2 Relative movement

Parts of mechanical joining devices, such as pins and their securing elements, shall be so designed and manufactured that, after assembly, no unintended displacement can occur.

NOTE The effects of wear, corrosion of securing elements or rough usage should be considered.

4.2 Materials

4.2.1 General

Within the limitations given in 4.2.2 to 4.2.4 the manufacturer shall select the type of steel, to be used so that the finished component, when suitably heat-treated conforms to the mechanical properties specified in this document.

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4.2.2 Type of steel

The steel shall be produced by an electric process or by an oxygen blown process.

4.2.3 Deoxidation

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The steel shall be fully killed as defined in EN 10025, be stabilized against strain-age embrittlement, and have an austenitic grain size of 5 or finer when tested in accordance with ISO 643.

NOTE This could be achieved, for example, by ensuring that it contains sufficient aluminium or an equivalent element to permit the manufacture of shackles stabilized against strain-age embrittlement during service; a minimum value of 0,025% of total aluminium is given for guidance.

4.2.4 Chemical composition

The steel shall contain alloying elements in sufficient quantities so that the finished component, when heat treated in accordance with 4.3, not only conforms to the mechanical properties specified in this International Standard, but also possesses low temperature ductility adequate for working satisfactorily in the temperature range -40 °C to 400 °C.

The steel shall contain at least two of the three alloying elements, in the minimum percentages shown in table 1.

Table 1: Chemical composition - Alloying elements

Element	Minimum mass content as determined by cast analysis %
Nickel	0,40
Chromium	0,40
Molybdenum	0,15

The steel shall contain no more sulfur and phosphorus than the limits given in table 2.

Table 2: Sulfur and phosphorus content

Element	Maximum mass content as determined by	
	Cast analysis %	Check analysis %
Sulfur	0,025	0,030
Phosphorus	0,025	0,030

4.3 Heat treatment

Each component shall be hardened from a temperature above the AC3 point and tempered before being subjected to the manufacturing proof force (MPF). The tempering temperature shall be a minimum of 400 °C.

The tempering conditions shall be at least as effective as a temperature of 400 °C maintained for a period of 1 h.

NOTE A method of verification is as follows. After the components have been reheated to and maintained for 1 h at 400 °C and then cooled to room temperature; they should conform in the finished condition to columns 3 and 4 of table 3.

Surface hardening shall not be permitted for load bearing parts of the component.