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International Standard



3189/3

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**Sockets for wire ropes for general purposes —  
Part 3: Special requirements for sockets  
produced by casting**

*Douilles pour câbles en acier d'usages courants — Partie 3: Exigences particulières concernant les douilles moulées*

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**Descriptors** : lifting equipment, wire rope, sockets (ropes), specifications, tests.

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3189/3 was prepared by Technical Committee ISO/TC 111, *Round steel link chains, lifting hooks and accessories*.

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# Socketts for wire ropes for general purposes — Part 3: Special requirements for sockets produced by casting

## 1 Scope and field of application

This part of ISO 3189 specifies the special requirements for materials, method of manufacture and quality control of sockets produced by casting. The general characteristics, critical dimensions, prototype test requirements, general quality control and conditions of acceptance are dealt with in ISO 3189/1.

## 2 References

ISO 261, *ISO general purpose metric screw thread — General plan.*

ISO 643, *Steels — Micrographic determination of the ferritic or austenitic grain size.*

ISO 965, *ISO general purpose metric screw thread — Tolerances.*

ISO 3189/1, *Socketts for wire ropes for general purposes — Part 1: General characteristics and conditions of acceptance.*

ISO 3189/2, *Socketts for wire ropes for general purposes — Part 2: Special requirements for socketts produced by forging or machined from the solid.*

ISO 4986, *Magnetic particle inspection of steel castings.*<sup>1)</sup>

## 3 General conditions of acceptance

Socketts shall comply with the requirements of ISO 3189/1 as well as with those in this part of ISO 3189.

## 4 Materials and heat treatment

### 4.1 Quality of materials

The steel used shall be produced by the open hearth or electric process, or by oxygen blown process or by any other equivalent process.

Socketts of this type shall be cast from non-alloy or alloy steel which shall meet the following requirements, as determined by a check analysis on a finished socket:

Sulfur, max.	0,050 %
Phosphorus, max.	0,050 %
Combined sulfur and phosphorus content, max.	0,080 %

Non-alloy steels shall have a maximum tensile strength of 600 MPa and an elongation of not less than 14 %. Alloy steels shall have a maximum tensile strength of 750 MPa and an elongation of not less than 15 %.

Within the above limitations, it is the responsibility of the socket-maker to select the steel so that, after any necessary heat treatment (see 4.2), the finished socket meets the performance requirements specified in this part of ISO 3189.

### 4.2 Heat treatment

Socket bodies and pins shall, if necessary, be heat-treated to ensure that, as quenched, martensitic structures are avoided in the finished socket.

## 5 Socket manufacture

Socketts complying with this part of ISO 3189 shall be (open) type I or (closed) type II, and shall conform to the critical dimensions specified in ISO 3189/1 (see table 1 and figures 1 and 2). The socketts shall be neatly and cleanly made.

### 5.1 Bodies

Surfaces of cast steel bodies shall be in a clean, descaled condition and all sharp edges shall be suitably radiused. All flashes or fins produced in manufacture shall be removed.

Minor surface defects may be removed by grinding, provided that the wall thickness at this point is not reduced below the socket-maker's declared minimum wall thickness.

Other small casting defects occurring during manufacture may be rectified by grinding and subsequent welding, provided that the thickness of sound material remaining at the defective point immediately before welding is at least 50 % of the original thickness. Furthermore, the extent of the welded repair, measured in any direction, shall not exceed 1,5 times the thickness of the metal at that point. The recognized method of repair shall comprise the following:

- thorough and adequate technical control of all stages of the repair;
- removal of defective metal by chipping or grinding;

1) At present at the stage of draft.

- c) verification of this removal by radiography, ultrasonics, magnetic flaw detection or dye penetrants;
- d) pre-heating the casting to requisite pre-heat temperature immediately prior to welding;
- e) filling the excavation with weld metal, the composition of the rod being chosen to give mechanical properties matching those of the casting;
- f) grinding the surface of the weld metal to the level of the adjacent metal of the socket;
- g) correct reheat treatment of each repaired socket body;
- h) verification of crack removal by radiographic or ultrasonic examination.

The pin holes shall be machined in one operation and the centreline of the holes shall be at right angles to the centreline of the socket basket.

## 5.2 Pins

The pins shall be forged, forged and machined, or machined from the bar, and may be threaded or plain, according to the purchaser's requirements.

The steel used shall comply with the requirements specified in ISO 3189/2.

The length of the plain portion of a threaded type pin shall be such that the nut will tighten against the shoulder of the pin and not against the outside face of the socket.

The threads on pins and associated nuts shall comply with the coarse pitch series, specified in ISO 261, and tolerance class 6g, specified in ISO 965.

A suitable safety device, such as a split cotter pin, shall be provided to prevent nuts accidentally becoming displaced.

## 6 Special quality control requirements for cast sockets

In addition to the general quality control requirements specified in ISO 3189/1, the following tests shall apply.

### 6.1 Magnetic flaw or dye penetrant method

Each socket shall be subjected to an approved method of particle crack detection. All external and internal surfaces shall be examined, and cracks, hot tears, rips or other detrimental defects shall not be accepted.

Acceptable levels of defect should be agreed between the purchaser and the manufacturer.

Guidance on acceptable levels is given in ISO 4986.

### 6.2 Radiographic tests

Radiographic tests shall be carried out. The number of samples shall be in accordance with the following table.

Lot or batch size (Number of sockets)	Sample size (Number of sockets)
2 to 8	2
9 to 15	3
16 to 25	5
26 to 50	8
51 to 90	13
91 to 150	20
151 to 280	32
281 to 500	50
501 to 1 200	80
1 201 to 3 200	125
3 201 to 10 000	200

Acceptable levels of defect should be agreed between the purchaser and the manufacturer. Guidance on acceptable levels is given in the annex.

### 6.3 Ultrasonic tests

As an alternative to the radiographic test, the sockets shall be subjected to ultrasonic tests. In such cases, the test method and the acceptable levels of defect shall be the subject of agreement between the purchaser and the manufacturer.

## Annex

## Radiographic tests — Examples of acceptable levels of defect

## A.1 Acceptable levels of defect for sections up to and including 51 mm

Socket fork and junction — Severity level 1 for cracks and tears  
Severity level 2 for other defects

Socket basket — Severity level 1 for cracks and tears  
Severity level 3 for other defects

A.2 Acceptable levels of defect for sections over 51 mm up to and including 114 mm<sup>1)</sup>

Category	Description	Acceptable level	
		Level	Section
A	Gas porosity	A 1	Fork and junction
A	Gas porosity	A 2	Basket
B	Sand and slag inclusion	B 1	Fork and junction
B	Sand and slag inclusion	B 2	Basket
C	Type 1 shrinkage	C1 1	Fork and junction
C	Type 1 shrinkage	C1 2	Basket
C	Type 2 shrinkage	C2 1	Fork and junction
C	Type 2 shrinkage	C2 2	Basket
C	Type 3 shrinkage	C3 1	Fork and junction
C	Type 3 shrinkage	C3 2	Basket
D	Cracks	Not permissible	Fork and junction
D	Cracks	CC 2	Basket
E	Hot tear	—	Fork and junction
E	Hot tear	EA 2	Basket
F	Inserts	—	Fork and junction
F	Inserts	EB 1	Basket

1) In accordance with ASTM E 186-75, *Standard reference radiographs for heavy-walled (2 to 4 1/2 in (51 to 114 mm)) steel castings.*

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