International Standard 8793

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Steel wire ropes — Ferrule-secured eye terminations

Câbles en acier — Terminaisons manchonnées

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Foreword

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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 8793 was prepared by Technical Committee ISO/TC 105, *Steel wire ropes.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Steel wire ropes — Ferrule-secured eye terminations

1 Scope and field of application

This International Standard specifies minimum requirements for ferrule-secured eye terminations for general-purpose steel wire ropes complying with ISO 2408; the ferrules are made of steel, aluminium or copper. The eye termination may be made either as a Flemish eye or a turn back loop.

Prototype tests covering the type acceptance of ferrule-secured systems and routine quality control requirements for ferrule-secured eye terminations are also specified in this International Standard.

2 Reference

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

3 Definitions

3.1 ferrule-secured eye termination (mechanically spliced) : Eye termination made by forming an eye, which is secured by means of a ferrule pressed on the rope. There are two main types : the Flemish eye and the turn back loop.

3.1.1 Flemish eye : Eye termination where the rope end is split in two parts of three or four strands each, which are laid together again in the opposite direction, forming an eye which is symmetrical to the rope axis. The tails of the strands are distributed equally around the main body of the rope. They are fixed in this position by means of a ferrule (see figure 1).

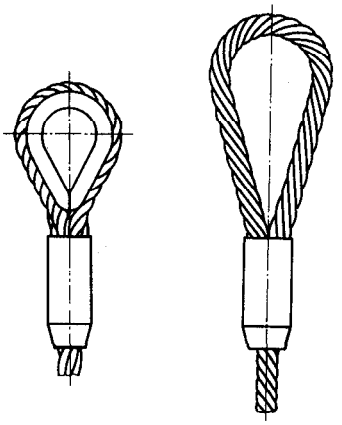

Figure 1 — Flemish eye

3.1.2 turn back loop : Eye termination where the rope as a whole is bent to form an eye, the rope end being fixed onto the main body of the rope by means of a ferrule (see figure 2).

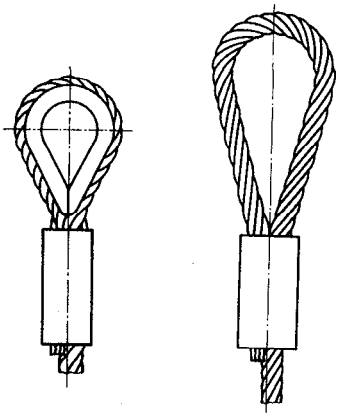

Figure 2 — Turn back loop

3.2 sponsor : The person or organization which takes responsibility for the material, design, dimensions, identification, prototype testing and manufacture of the ferrule and the specification of the method of application to wire ropes.

4 Types of wire ropes

All steel wire ropes for general purposes complying with ISO 2408 may be fitted with a ferrule-secured eye termination; however, the rope shall be suitably pre-formed for Flemish eyes and pre-forming is also recommended for turn back loops.

5 Ferrules

Electric welding of steel tubes for ferrules used on the Flemish eye is permitted provided that the welding is carried out prior to the tube drawing and annealing operations.

Ferrules of aluminium or copper shall be produced by a process which gives a completely seam-free hollow product.

Ferrules shall not have any defects which may affect the service performance.

After pressing, the ferrule shall be free from any tendency to cracking by ageing.

6 Matching of ferrules to wire rope

The matching of ferrules and wire ropes shall be in accordance with the instructions of the sponsor.

7 Preparation of the rope end

The rope shall be cut in such a manner that the wire ends are not hardened or welded together.

8 Forming the eye

8.1 Turn back loop

The sponsor shall give instructions regarding the correct positioning of the dead end of the rope. The whole length of the ferrule shall contain the dead end of the rope and the dead end shall be visible after pressing.

8.2 Flemish eye

The dead ends of the strands shall be long enough so that the ferrule can be pushed over them with the whole length of its cylindrical part.

9 Pressing operation

The pressing operation shall be carried out in accordance with the instructions of the sponsor.

10 Design requirements of the ferrule-secured eye termination

The design breaking strength of a ferrule-secured eye termination (Flemish eye or turn back loop) shall be at least 90 % of the minimum breaking force of the respective wire rope.

11 Prototype tests

Samples of each type of ferrule shall have passed the tests described in 11.1 and 11.2.

11.1 Tensile test to destruction

Two tests shall be carried out on each size of fibre-cored and steel-cored wire ropes for which the system is recommended.

The rope constructions used for test shall be 6×19 and 6×36 up to and including a nominal rope diameter of 14 mm and 6×36 for nominal rope diameters above 14 mm.

A ferrule-secured eye termination shall be formed without a thimble at each end of each test piece. The minimum distance between the inside ends of ferrules shall be 30 times rope diameter. The force shall be applied by means of round pins having a suitable diameter, threaded through the eye termination. Not more than 70 % of the minimum breaking force of the rope as specified in ISO 2408 shall be applied quickly; thereafter stress shall be applied steadily at a rate of not more than 10 MPa/s until the actual breaking load is reached.

The assembly shall have passed the prototype tensile test if the breaking force of both samples is in excess of 90 % of the minimum breaking force of the rope.

11.2 Durability

The tests shall be carried out on three rope sizes which shall represent, respectively, the smallest, middle and largest of those sizes for which the system is recommended.

The rope used for these tests shall have the following characteristics :

- construction from either the 6×19 or 6×36 group;
- tensile grade : 1 770 N/mm^2;
- fibre main core.

The tests shall be carried out on two assemblies of each size selected. The assemblies shall have a ferrule-secured eye termination at each end, and shall be fitted with solid thimbles. The length of clear rope between the ferrules shall be as for the prototype tensile test (see 11.1).

The tests shall be carried out in a tensile fatigue machine which shall be capable of producing substantially the same stress pattern at both the fixed and moving ends.

Each assembly shall be subject to a cyclic tension along the rope axis of from 15 % to 30 % of the minimum breaking force of the rope as specified in ISO 2408.

The machine frequency shall not exceed 15 kHz.

To comply with this International Standard each of the six assemblies selected for prototype tests shall withstand 75 000 cycles after which the breaking force of the assembly shall not be less than 80 % of the minimum breaking force of the rope.

12 Quality control of ferrule

12.1 Inspection during manufacture

The material from which the ferrule is made shall be inspected to ensure that it is free from visible flaws and defects.

12.2 Manufacturer's certificate

The ferrule maker or sponsor shall supply a certificate with each batch of ferrules stating that

a) the ferrules are identical, within manufacturing tolerances set by the sponsor, to those which were successfully submitted for the prototype tests (i.e. conform to type), and

b) the ferrules meet the relevant requirements laid down in this International Standard.

13 Quality control of assemblies

13.1 Inspection after pressing

After each eye termination has been secured, the ferrule shall be inspected to ensure that it is free from visible flaws or defects and that it has been pressed and secured in accordance with clause 8 and the instructions provided.

13.2 Routine tensile test

When agreed between the purchaser and the manufacturer, samples of completed assemblies selected at random shall be subjected to a routine tensile test. The breaking force of the assembly shall be not less than 90 % of the minimum breaking force specified for that rope.

14 Marking

The ferrule shall be durably marked to identify the assembly manufacturer.