BRITISH STANDARD

BS EN
362:2004

Personal protective equipment against falls from a height — Connectors

The European Standard EN 362:2004 has the status of a British Standard

ICS 13.340.99

National foreword

This British Standard is the official English language version of EN 362:2004. It supersedes BS EN 362:1993, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/5, Industrial safety belts and harnesses, which has the responsibility to:

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EN 362

December 2004

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English version

Personal protective equipment against falls from a height - Connectors

Équipement de protection individuelle contre les chutes de hauteur - Connecteurs

Persönliche Schutzausrüstung gegen Absturz - Verbindungselemente

This European Standard was approved by CEN on 20 October 2004.

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Foreword

This document (EN 362:2004) has been prepared by Technical Committee CEN/TC 160 “Protection against falls from height including working belts”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

This document supersedes EN 362:1992.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 89/686/EEC.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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1 Scope

This document specifies the requirements, test methods, marking and information supplied by the manufacturer for connectors. Connectors conforming to this document are used as connecting elements in personal fall protection systems, i.e. fall arrest, work positioning, rope access, restraint and rescue systems.

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.

EN 363, *Personal protective equipment against falls from a height — Fall arrest systems.*

EN 364:1992, *Personal protective equipment against falls from a height — Test methods.*

EN 365, *Personal protective equipment against falls from a height — General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging.*

EN 20139:1992, *Textiles — Standard atmospheres for conditioning and testing (ISO 139:1973).*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 363 and the following apply.

3.1
connector
openable device used to connect components, which enables the user to assemble a system in order to link himself/herself directly or indirectly to an anchor

3.2
self-closing connector
connector with a self-closing gate

3.3
basic connector (class B)
self-closing connector intended to be used as a component, see Figure 1

3.4
multi-use connector (class M)
basic or screw link connector intended to be used as a component, which may be loaded in the major and minor axis

3.5
termination connector (class T)
self-closing connector designed to allow the fixing as an element of a sub-system in such a way that the loading is in a predetermined direction, see Figure 2

3.6
anchor connector (class A)
connector which closes automatically, designed to be linked directly to a specific type of anchor as a component, see Figure 3

NOTE Types of anchors are e.g. an eye-bolt, a pipe or a beam.

3.7
screwlink connector (class Q)
connector which is closed by a screw-motion gate, which is a load bearing part of the connector when fully screwed up (see Figure 4), intended to be used only for long-term or permanent connections

3.8
gate
part of the connector which can be moved to open it

NOTE The gate can, for example, move by pivoting about a hinge (hinged gate), or by a sliding motion (sliding gate) or by a screw motion (screw-motion gate).

3.9
self-closing gate
gate which moves automatically to the closed position when released from any open position

3.10
self-locking gate
self-closing gate with an automatic gate-locking feature

3.11
manual-locking gate
self-closing gate with a manually operated gate-locking feature

3.12
gate-locking feature
mechanism which, when in position, prevents the closed gate being opened inadvertently. A gate-locking feature may operate automatically (to the locked position) or be operated manually

3.13
gate opening
maximum gap for the passage of an element or a component into the connector and which allows the correct functioning of the gate-locking feature, see Figure 5

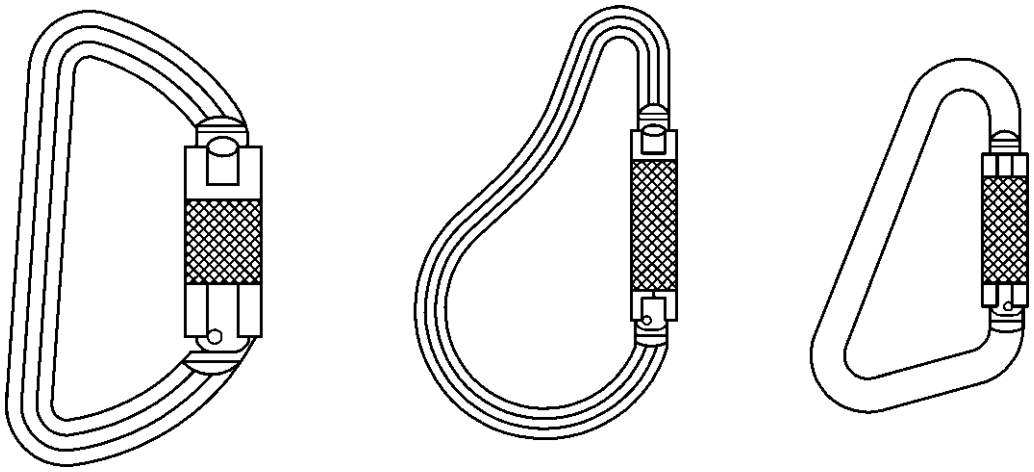
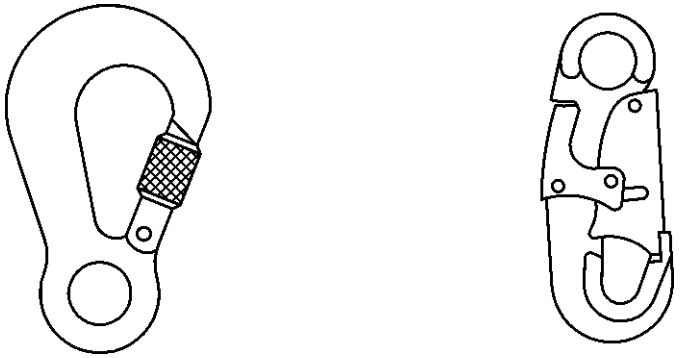


Figure 1 — Example of basic connector (class B)



a) Manual locking **b) Automatic locking**

Figure 2 — Example of termination connectors (class T)

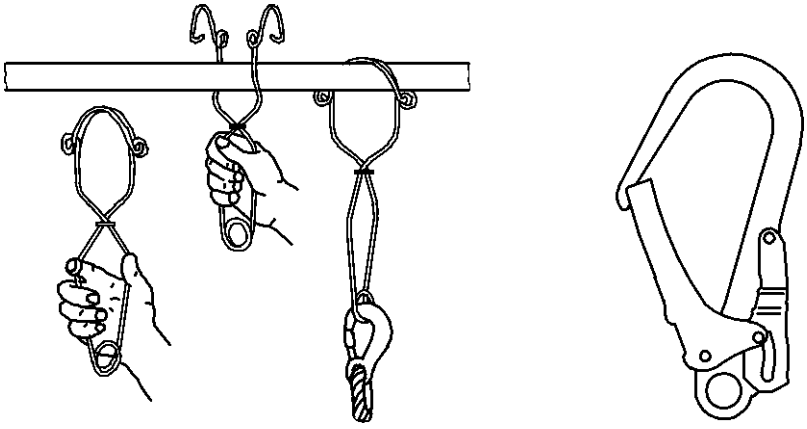


Figure 3 — Example of anchor connectors (class A)

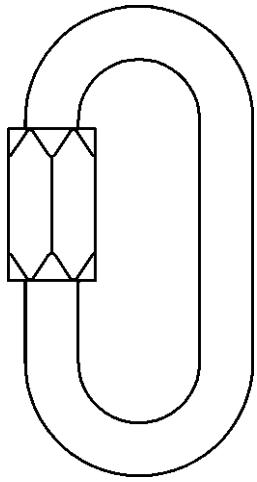
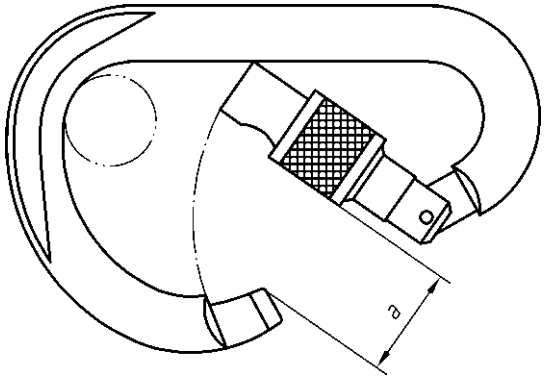


Figure 4 — Example of a screwlink connector (class Q)



Key

a gate opening

Figure 5 — Example of a gate opening

4 Requirements

4.1 General

4.1.1 Connectors shall not have sharp edges or burrs that may cause injury to the user, or that may cut, abrade or otherwise damage webbing or rope.

4.1.2 Materials, which may come into contact with the skin of a user, shall not be known to cause irritating and sensitization effects during normal use of the connector.

4.1.3 Connectors with a gate shall have a gate-locking feature, either automatic or manual.

4.1.4 Connectors with a self-locking gate shall lock the gate automatically when the gate shuts, and shall require at least two different deliberate manual actions to open the gate.

4.1.5 Connectors with a manual-locking gate, except screwlink connectors, shall require a deliberate manual action to lock the gate, and shall require at least two different deliberate manual actions to open the gate.

4.1.6 Screwlink connectors shall require at least four complete rotations of the screw-motion gate from the fully screwed up position to disengagement of the threads. The threads shall not be visible when the gate is locked.

4.1.7 The gate opening *a* shall be determined as described in 5.1.2 and verified that it is not less than that given by the manufacturer.

4.2 Static strength

When tested in accordance with 5.2, connectors shall withstand the load specified in Table 1 for a period of 3 min ± 3 s. At the end of the test, the gate shall still be closed.

Table 1 — Minimum static strength requirement for connectors

Description	Major axis Gate closed and unlocked kN	Major axis Gate closed and locked kN	Minor axis Gate closed kN
Basic connector (class B)	15	20	7
Multi-use connector (class M)	15	20	15
Termination connector (class T)	15	20	Not applicable
Anchor connector (class A)	15	20	Not applicable
Screwlink connector (class Q)	Not applicable	25	10

4.3 Gate function

When tested as described in 5.3, with the gate closed and locked, connectors with the exception of anchor connectors (class A) shall still open after being loaded to 6 kN.

4.4 Gate resistance (not for class Q-connectors)

4.4.1 Gate face

After testing with a force of (1 ± 0,02) kN in accordance with 5.4.1, the gate-locking feature of connectors shall still function correctly.

Where the gate locking feature does not encircle the connector body, e.g. Figure 2b) and Figure 3, the gate-locking feature shall withstand a force of (1 ± 0,02) kN without separating from the latch by more than 1 mm.

4.4.2 Gate side

When tested in accordance with 5.4.2, connectors with a gate locking feature that does not encircle the connector body, e.g. Figure 2b) and Figure 3, shall withstand a force of (1,5 ± 0,03) kN without any partial fracture. After this test the gate-locking feature shall still function correctly.

4.5 Corrosion resistance

When tested in accordance with 5.5, connector gates shall still function in accordance with 4.1.4. Evidence of corrosion of the base metal is not acceptable. The presence of tarnishing and white scaling is acceptable.

NOTE Conformity to this requirement does not imply suitability for use in a marine environment.

4.6 Marking and information

4.6.1 Marking of connectors shall be in accordance with Clause 6.

4.6.2 Information shall be supplied with connectors in accordance with Clause 7.

5 Test methods

5.1 Examination of design

5.1.1 General

One sample may be used for these tests.

Check that the connectors, in accordance with the definitions in Clause 3, meet the requirements of 4.1.1 to 4.1.7 by visual examination and simple check measurements.

5.1.2 Verification of the gate opening

Verify the gate opening a by using a calibrated rod which has a diameter corresponding to the gate opening specified in the information supplied by the manufacturer, see Figure 5. Pass the rod through the gate opening and check that it allows the correct closure and locking of the gate and free movement of the rod within the connector.

5.2 Static strength test

5.2.1 Apparatus

The static strength test apparatus is a conventional tensile testing machine. The force measuring apparatus for static testing shall conform to EN 364:1992, 4.1.1.The rate of loading shall lie within the range of 50 mm/min to 200 mm/min if the connector contains a textile element subject to stress during the test; or 20 mm/min to 50 mm/min otherwise.

5.2.2 Preparation of test samples

a) Test samples containing a textile element shall be conditioned in accordance with EN 20139 at the standard temperate atmosphere for testing and shall include the relevant pre-conditioning specified in Clause 3 of that document. The static strength tests can be performed outside the conditioning room, but the temperature shall be (23 $\pm$ 5) °C and the tests shall begin within 5 min of removal from conditioning.

b) Test samples without a textile element may be tested without conditioning.

c) Each test shall be carried out on a new sample.

5.2.3 Method

5.2.3.1 Major axis testing

Mount the connector in the tensile testing machine and apply the load by means of two bars with a radius of (6 ± 0,1) mm, which are arranged to be perpendicular to the major axis. It is important that the connector is free to locate itself on the bars at the start of the test and as the load is applied. The bars shall be well coated with molybdenum based grease where they come into contact with a metal part of the test sample.

If the connector is tested in a horizontal axis test machine, the connector shall be positioned in a vertical plane with the gate being the lower of the two major axis sides.

If the connector is tested in a vertical axis test machine, apply a small force to the connector at right angles to the direction of loading to bias the gate away from the bars initially. The bias force shall be approximately equal to the gravitational weight of the connector.

Apply the required minimum force in accordance with Table 1 or in accordance with the claims of the manufacturer, if higher. Observe that the requirements of 4.2 or the claims of the manufacturer are met.

If a connector has a lanyard incorporated, which is intended to be loaded directly, apply the force to the lanyard by a bar with a radius of (5 ± 0,1) mm.

NOTE If the lanyard fails at the bar, the test is not counted.

5.2.3.2 Minor axis testing

Mount the connector in the tensile testing machine by clamping or fixing it in such way that the centre line of the gate is perpendicular to the direction of the load lying in the plane of the connector. Examples of load directions are shown in Figure 6.

Dimensions in millimetres

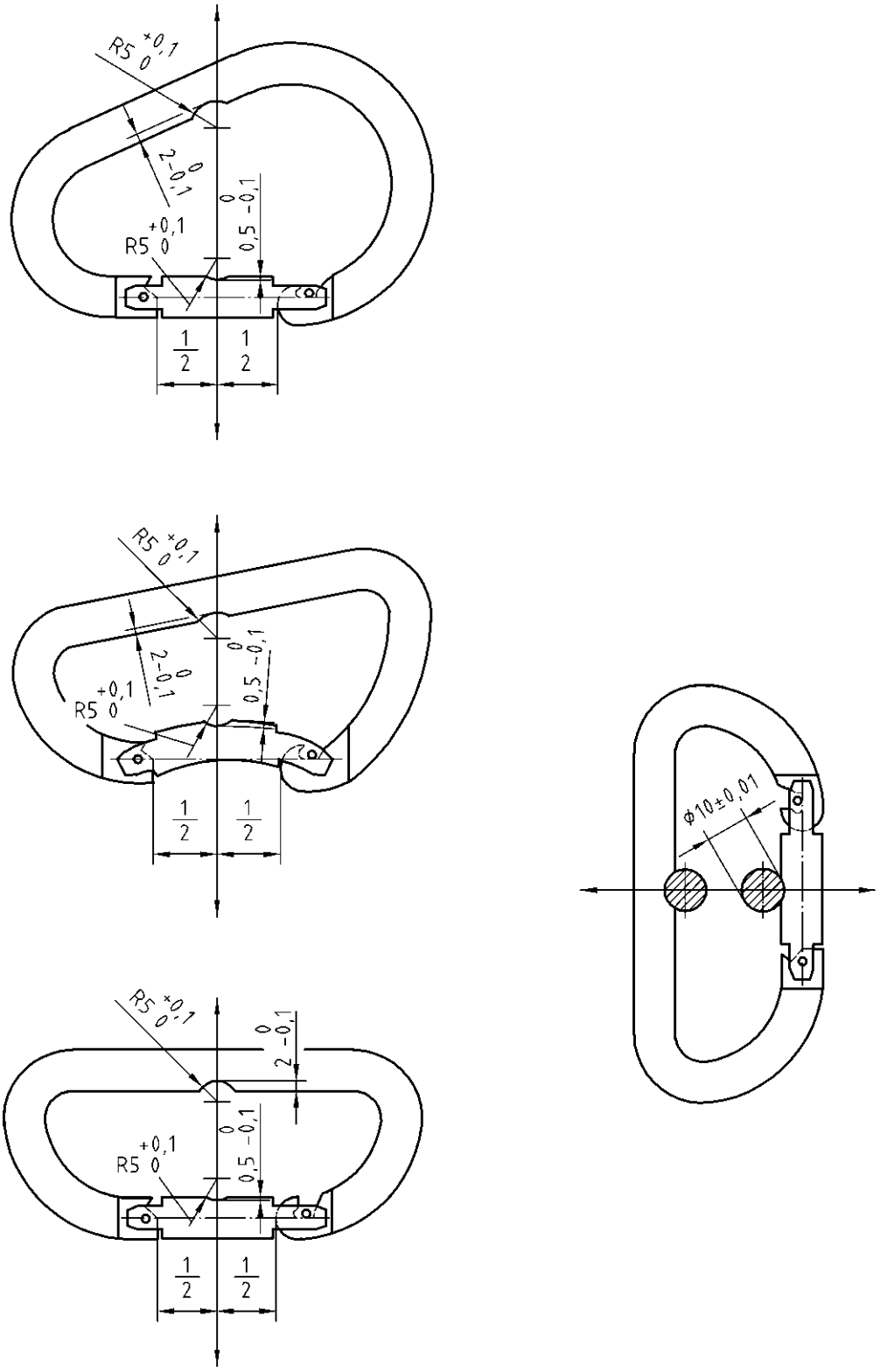


Figure 6 — Minor axis test

Carry out the minor axis test in a similar manner to 5.2.3.1, but the loading bars shall have a radius of (5 ± 0,1) mm and they shall not be coated with grease.

In order to avoid movement of the loading bars during the test, grooves can be made in the body, the gate and/or the gate-locking feature of sufficient depth to ensure location of the bars (in accordance with Figure 6). These grooves shall not be subsequently the cause of failure. Alternatively clamps may be used to ensure the location of the bars.

Connectors fitted with manually operated gate-locking feature shall be tested in the unlocked position. If this is not practicable, the gate-locking feature may be removed.

Apply the required minimum force in accordance with Table 1 or in accordance with the claims of the manufacturer, if higher. Observe that the requirements of 4.2 or the claims of the manufacturer are met.

5.3 Gate function test

The test shall be carried out on a new sample.

With the connector in the tensile machine apply the specified force along the major axis for a period for (10 ± 1) s. Unload and check that the gate opens as intended.

5.4 Gate resistance tests

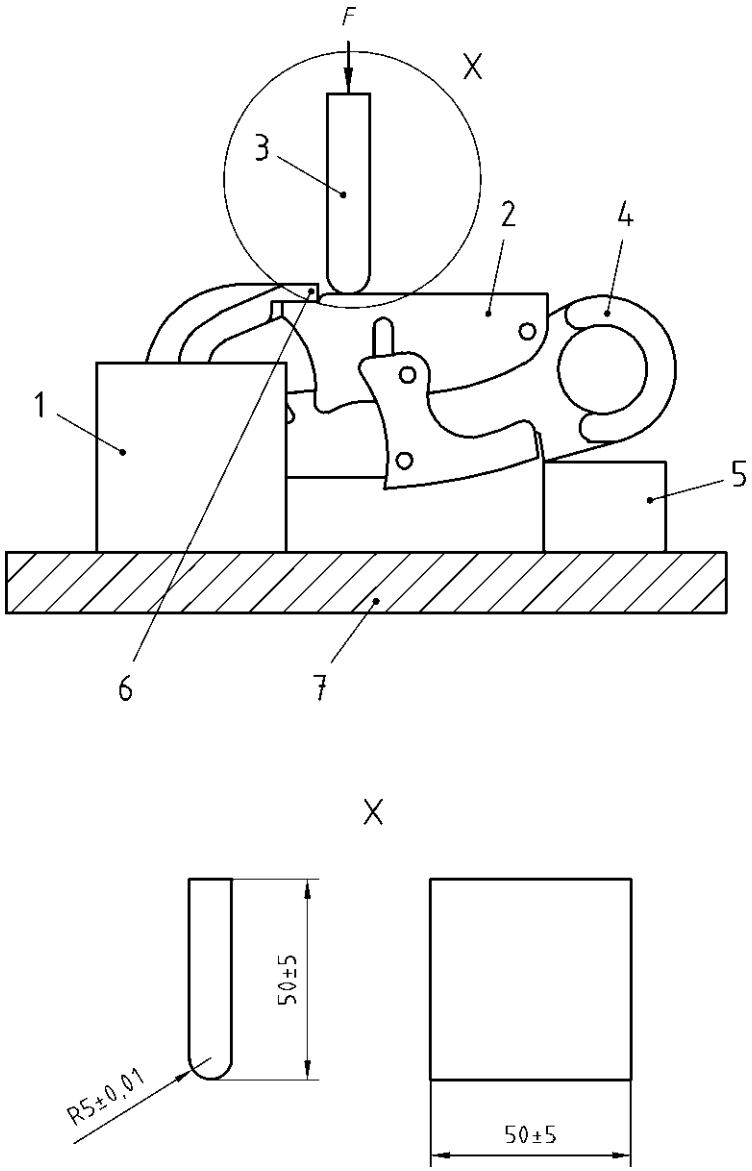
5.4.1 Gate face

Each test shall be carried out on a new sample.

Insert the connector into a fixture with the gate uppermost, so that the specified force is applied perpendicularly to the direction in which the gate opens. By means of a rigid bar (see Figure 7), apply the specified force for (90 ± 1) s to the gate at a point as close to the nose as possible. The rate of loading shall be within the range of 50 N/s to 150 N/s. Where required by 4.4.1, after (60 ± 1) s and with the force still applied, check for and measure any gap between the gate and the latch and record it.

An alternative for the resting block may be used, for example a round bar through the eye.

Dimensions in millimetres



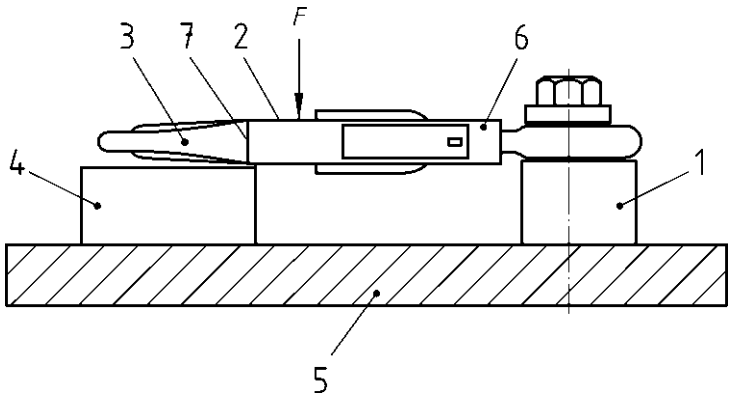
Key

1 Fixture
2 Gate
3 Load (rigid bar)
4 Connector
5 Resting block (alternatively a round bar to an eye)
6 Nose
7 Test bed

Figure 7 — Example of a gate face resistance test

5.4.2 Gate side

Insert the connector into a fixture with its side uppermost so that the specified force is applied in a perpendicular direction towards the gate as shown in Figure 8. The fixture shall be as close as possible to the ends of the gate without inhibiting the function of the gate. By means of a rigid bar (not shown in Figure 8, see Figure 7), apply the specified force for (60 ± 1) s to the gate at a point as close to the nose as possible. The rate of loading shall be 50 N/s to 150 N/s.



Key

1 Fixture
2 Gate
3 Connector
4 Resting block
5 Test bed
6 Hinge
7 Nose

Figure 8 — Gate side-load resistance test

5.5 Corrosion test

The test shall be carried out on a new sample.

Submit the connector to the salt spray test in accordance with ISO 9227 with initial exposure of 24 h followed by one hour drying, followed by an additional exposure of 24 h. Check if the requirements of 4.5 have been met.

6 Marking

Marking on the connector shall conform to EN 365 and any text shall be in the languages of the country of destination. In addition to conforming to EN 365, the marking shall include the following:

a) The model/type identification mark of the connector;

b) The number of this document, and the letter of the class, e.g. EN 362:2004/A;

c) If the minimum strength claimed by the manufacturer for the major axis is marked on the connector, the marking shall be for the closed and locked position in accordance with Figure 9. The marked strength shall be in a whole number of kN.

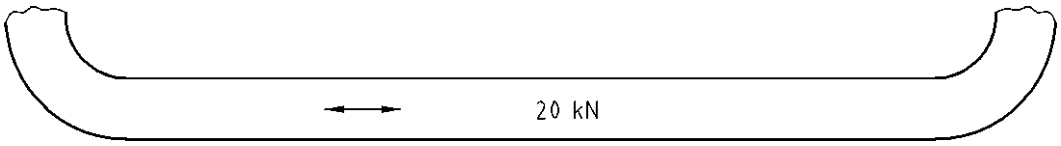


Figure 9 — Example of marking of major axis strength with gate closed and locked

7 Information supplied by the manufacturer

If a connector is a component, it shall be provided with information supplied by the manufacturer.

A manufacturer who incorporates a connector into another component, e.g. a lanyard, an energy absorber or a fall arrester shall adopt the information supplied by the manufacturer of the connector.

The information supplied by the manufacturer shall be provided in at least the language(s) of the country of destination. It shall conform to EN 365 and, in addition, shall include at least advice or information as follows:

a) the specific conditions under which the connector may be used;

b) for connectors with a self-closing and manual-locking gate, a recommendation that they should only be used where the user does not have to attach and remove the connector frequently, i.e. many times during a working day;

c) that care should be taken to avoid loading a connector across its gate;

d) for screwlink connectors (class Q), a statement that they should only be used where connections are infrequent;

e) for screwlink connectors (class Q), a warning that they are only safe for use when the screw-motion gate is fully closed and information how the user can check it;

f) the materials from which the connector is made;

g) the number of this document and the letter of the class, e.g. EN 362:2004/A;

h) the gate opening ‘a’ in mm;

i) advice that the length of the connector should be taken into account when used in any fall arrest system, as it will influence the length of a fall;

j) a warning for situations which may reduce the strength of the connector, e.g. connecting to wide straps.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 89/686/EEC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 89/686/EEC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 89/686/EEC

Clause(s)/sub-clause(s) of this EN	Essential Requirements (ERs) of Directive 89/686/EEC	Qualifying remarks/Notes
4.2	1.3.2	Lightness and design strength
4	3.1.2.2	Prevention of falls from height
4.1.1	1.2.1	Absence of risks and other "inherent nuisance factors"
4.1.1	1.2.1.2	Satisfactory surface condition of all PPE parts in contact with the user
4.1.2	1.2.1.1	Suitable constituent materials
4.1.3	1.2.1	Absence of risks and other "inherent nuisance factors"
4.1.4	2.1	PPE incorporating adjustment systems
4.1.5	2.1	PPE incorporating adjustment systems
4.1.6	2.1	PPE incorporating adjustment systems
4.1.7	1.2.1	Absence of risks and other "inherent nuisance factors"
4.3	1.2.1	Absence of risks and other "inherent nuisance factors"
4.4	1.2.1	Absence of risks and other "inherent nuisance factors"
4.5	1.3.2	Lightness and design strength
6	2.12	PPE bearing one or more identification or recognition marks directly or indirectly relating to health and safety
7	1.4	Information supplied by the manufacturer

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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