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INTERNATIONAL STANDARD

Cable management systems – Specifications for extra-heavy-duty electrical steel conduit fittings and accessories

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CABLE MANAGEMENT SYSTEMS – SPECIFICATIONS FOR EXTRA-HEAVY-DUTY ELECTRICAL STEEL CONDUIT FITTINGS AND ACCESSORIES

FOREWORD

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International Standard IEC 61950 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories.

This third edition cancels and replaces the second edition published in 2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

– change in title and scope to cover only fittings and accessories for use with extra-heavy-duty electrical rigid steel (EHDERS) conduits;
– new and updated definitions of terms;
– addition of requirements for expansion, expansion-deflection and deflection fittings;
– deletion of requirements for cast metal boxes.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
23A/887/FDIS	23A/890/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types are used:

- requirements proper: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

CABLE MANAGEMENT SYSTEMS – SPECIFICATIONS FOR EXTRA-HEAVY-DUTY ELECTRICAL STEEL CONDUIT FITTINGS AND ACCESSORIES

1 Scope

This document specifies requirements for conduit fittings, including conduit bodies used with extra-heavy-duty electrical rigid steel (EHDERS) conduit conforming to IEC 60981.

This document does not include requirements for fittings intended for installation in potentially explosive atmospheres.

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.

IEC 60981:2019, *Extra heavy-duty electrical rigid steel conduits*

ISO 68-2, *ISO general purpose screw threads – Basic profile – Part 2: Inch screw threads*

ISO 263, *ISO inch screw threads – General plan and selection for screws, bolts and nuts – Diameter range 0,06 to 6 in*

ISO 301, *Zinc alloy ingots intended for castings*

ISO 5864, *ISO inch screw threads – Allowances and tolerances*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
angle fitting
fitting with or without a cover (or cap) intended to change the direction of the conduit entering a box or an enclosure

3.2
box
enclosure without a cover but with means for mounting a cover, and provision for the entrance of conduit and cable fittings

3.3
box fitting
connector whose primary function is to join threadless or threaded metal conduit to knockout openings or threaded openings in a box or enclosure

3.4
bushing
discrete or integral fitting provided to protect conductors from abrasion and intended for use where they enter or leave the conduit system

3.4.1
insulating bushing
fitting consisting of a polymeric insulator provided to protect wires from abrasion and intended for use where conductors enter or leave the conduit

3.4.2
insulated bushing
bushing having a metallic collar with an insulated shoulder

3.4.3
insulating liner bushing
bushing used in the portion of a fitting where the conductors exit the conduit

3.4.4
bushing outlet
metallic or non-metallic collar with an insulating material cover having holes for the individual conductors

3.4.5
non-insulating bushing
bushing made of metallic material

3.5
capped elbow
elbow with a removable cover that provides access to interior of the conduit system during conductor pulling

3.6
compression-type fitting
style of fitting that is provided with a gland nut that, when wrench tightened, uniformly compresses a split ring that secures the fitting to the conduit

3.7
concrete-tight
so constructed that when embedded in freshly mixed concrete there is no ingress of concrete aggregate (Portland-type cement and sand) under specified test conditions

3.8
conduit body
means that provides access through (a) removable cover(s) to the interior of the system at a junction of two or more conduit sections or at a termination point

Note 1 to entry: Cast, sheet metal, non-metallic, and other boxes such as FS and FD or larger boxes and fittings such as capped elbows and service entrance elbows are not classified as conduit bodies.

3.9
connector
fitting intended to terminate conduit to a box or enclosure and capable of providing other functions such as sealing and earthing

3.10
coupling
fitting intended to join two lengths of EHDERS conduit

3.11
deflection fitting
fitting intended to compensate only for lateral or angular deflection in a span of conduit

3.12
elastomer
rubber or any thermosetting polymer having properties similar to those of rubber

3.13
elbow
conduit bend that changes the direction of the axis of a conduit system

3.14
enclosure
box with a cover, so constructed to provide a defined degree of protection for personnel against accidental contact with live parts, and also for the enclosed equipment against specified environmental conditions

3.15
expansion fitting
fitting that compensates only for linear expansion and contraction of a span of conduit

3.16
expansion-deflection fitting
fitting that compensates for linear expansion and contraction, and compensates for lateral or angular deflection in a span of conduit

3.17
EHDERS conduit
extra-heavy-duty rigid steel conduit
part of a closed wiring system of circular cross-section, made of steel of welded construction, capable of providing extra-heavy mechanical protection to conductors or cables and for use as an equipment earthing conductor when installed utilizing appropriate fittings

3.18
fitting
means for securing conduit to a box or enclosure, or conduit system

3.19
hub
fitting intended for use with threaded conduit for connection to an enclosure

3.20
junction box
box with a cover joining different runs of conduit and cable and providing space for the connection and branching of the conductors enclosed

Note 1 to entry: There are no openings in the cover.

3.21
knockout
portion of the wall of a box or enclosure that may be removed readily at the time of installation in order to provide an unthreaded opening for the attachment of conduit, or conduit and cable fittings

3.22
liquid-tight
intended for use in wet industrial environments which contain machine oils and coolants

3.23
fitting locknut
component provided with a fitting that attaches an externally threaded connector to an unthreaded opening in a box or enclosure and is capable of providing electrical continuity

3.24
conduit locknut
internally threaded fitting for use on threaded conduit intended to inhibit turning and to provide a secure joint, and is capable of providing electrical continuity

3.25
nipple
externally threaded fitting that serves as a short conduit between closely spaced enclosures

3.26
offset fitting
connector or coupling that offsets the axis of a conduit

3.27
outlet box
box that provides access to a wiring system and has provision for the entrance of conduit, or conduit and cable fittings and means for the mounting of a cover

3.28
pull box
box with a cover that is installed in one or more runs of conduit to facilitate pulling the conductors through the conduit system

3.29
pull fitting
fitting that permits conductors to be pulled at locations other than a box

3.30
wet location type fitting
fitting so constructed or protected as to exclude beating rain under specified test conditions

3.31
reducing coupling
fitting intended to join lengths of two different sizes of conduit

3.32
service-entrance head
enclosed fitting intended for use at service entrances where a service drop is connected to a service-entrance conduit

3.33
threadless fitting
fitting intended for use with unthreaded rigid conduit

3.34
type test
test made on a specimen for the conformity of the design of a given product to the requirements of the relevant standard

4 General requirements

4.1 Tests

Tests according to this document shall be type tests.

4.2 Metallic materials

4.2.1 General

4.2.1.1 The wall thickness of fittings shall conform to the values given in Table 1 when measured at least 3,2 mm from the edge of the fitting. If a taper is provided to permit easy withdrawal of the part from the die, the thickness shall be not less than that required at the base of threads when measured 0,8 mm from the edge of the fitting.

Compliance is checked by measurement.

Table 1 – Wall thickness of fittings

Material of fitting	Wall thickness Unthreaded parts	Minimum thickness at base of thread
	mm	mm
Sheet steel or machine steel	0,63	0,63 [a] 0,50 [b]
Sheet aluminium	0,78	0,78
Die-cast aluminium, die-cast zinc, or malleable iron	1,57	0,78
Sand-cast aluminium, sand-cast steel, sand-cast bronze or cast iron	3,17	2,36 [c] 1,57 [d]
NOTE The letter "H" in footnotes [c] and [d] denotes designations for EHDERS conduit.		
[a] At the base of cut threads. [b] At the base of rolled threads. [c] At the base of threads in fittings of the 27H conduit designation and larger sizes. [d] At the base of threads in fittings of the 21H conduit designation and smaller sizes.		

4.2.1.2 The minimum thickness is specified in 4.2.1.1 and does not apply to gland rings of compression-type fittings.

4.2.1.3 Zinc die-casting material shall conform to the requirements of ISO 301 for alloy $ZnAl_4Cu_2$.

4.2.2 Corrosion protection

Ferrous metal fittings shall have zinc plating of adequate thickness or have an alternate corrosion protection coating according to IEC 60981:2019.

Compliance of the zinc plating is checked by measurement according to 9.10 and Table 2.

This requirement does not apply to the following:

a) a fitting of stainless steel need not be so protected;

b) cut edges, including punched or threaded holes, need not be so protected.

NOTE 1 Most non-ferrous materials such as copper, zinc, aluminium, and their alloys are generally suitable for indoor and outdoor applications without the need for a protective coating.

NOTE 2 For applications involving severe or unusual corrosive environments, additional corrosion protection or materials having special characteristics can be required as determined by investigation.

Table 2 – Thickness of zinc coating

Type of fitting and material	Thickness of coating	
	Average[a] mm	Minimum mm
A fitting part, locknut or clamp intended for assembly inside a box	0,003 8	0,002 5
Outside of a sheet-steel or a machined-steel coupling, connector, bushing, or conduit locknut	0,012 7	0,010 2
Inside of a sheet-steel or machined-steel fitting	-	[b]
Malleable iron or cast-iron fittings	-	[b]
Screws	-	[b]

[a] The average thickness shall be determined by averaging at least three measurements. Each measurement shall be taken on a different surface, when possible. When it is required to take multiple measurements on a single surface, they shall be spaced equally over that surface.

[b] The minimum thickness of the coating on these fittings and components is not specified. Evidence of corrosion protection provided shall be verified by visual inspection.

4.3 Non-metallic materials

4.3.1 Flammability

Non-metallic material of a fitting shall resist the propagation of flame, where:

a) material plaques shall not flame for more than 30 s after any of the first four applications, or for more than 1 min after the fifth application of the test flame;

b) the finished product material shall not:

   1) openly flame for more than 1 min after the final application of the test flame, or

   2) be consumed;

c) there shall not be an opening in the material such that a 6,4 mm diameter rod passes freely through without force after the material has returned to ambient temperature;

d) there shall not be a visible flame on the surface of the plaque or the sample opposite the surface to which the test flame has been applied;

e) there shall not be glowing or burning particles during the test.

With reference to 4.3.1 b) 2), a polymeric throat or throat liner located in a metal fitting of the 16H or 21H designation that is consumed during the test complies with the requirement.

Compliance is checked by the test in 9.4.

4.3.2 Materials for bushings and insulating liners

Materials for bushings and insulating liners shall be resistant to flame and heat. Bushings shall comply with 4.3.1 b), d), and e).

Compliance is checked by the tests in 9.7.1.

The inside diameter of the throat of a bushing or an insulating bushing shall not be reduced to a dimension less than 90 % of the minimum value specified in Table 3.