

INTERNATIONAL STANDARD

IEC 60981

Second edition
2004-05

**Extra-heavy duty electrical
rigid steel conduits**

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

<https://standards.itih.ai/standards/iec/7dce6ca-e774-4caa-b992-cb35e435dc02/iec-60981-2004>



Reference number
IEC 60981:2004(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC 60981

Second edition
2004-05

Extra-heavy duty electrical rigid steel conduits

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

<https://standards.itih.ai/standards/iec/7dce6ca-e774-4caa-b992-cb35e435dc02/iec-60981-2004>

© IEC 2004 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

P

For price, see current catalogue

CONTENTS

| | |
|--|----|
| FOREWORD..... | 3 |
| 1 Scope..... | 5 |
| 2 Normative references..... | 5 |
| 3 Terms and definitions | 5 |
| 4 General requirements | 6 |
| 4.1 Tests..... | 6 |
| 4.2 Circular cross-section | 6 |
| 4.3 Wall thickness | 6 |
| 4.4 Surface condition..... | 6 |
| 4.5 Welding..... | 6 |
| 4.6 Cleaning..... | 6 |
| 4.7 Protective coating..... | 6 |
| 5 Dimensions..... | 7 |
| 5.1 Dimensions | 7 |
| 5.2 Threads..... | 7 |
| 6 Zinc coating..... | 7 |
| 7 Threading and chamfering | 7 |
| 8 Couplings | 8 |
| 8.1 General..... | 8 |
| 8.2 Coupling threads | 8 |
| 9 Elbows and nipples | 8 |
| 10 Ductility | 8 |
| 10.1 Bending properties..... | 8 |
| 10.2 Ductility of zinc coating | 8 |
| 11 Marking | 9 |
| 11.1 General..... | 9 |
| 11.2 Required information..... | 9 |
| Annex A (normative) Test for thickness of zinc coating on extra heavy-duty electrical rigid steel (EHDERS) conduits..... | 15 |
| Figure 1 – Dimensions of threads for EHDERS conduit..... | 11 |
| Figure 2 – Basic form of taper thread | 12 |
| Figure 3 – Limits on crest and root truncation of external and internal threads | 13 |
| Figure 4 – Dimensions of a ferrous metal coupling..... | 14 |
| Table 1 – Dimensions and mass of EHDERS conduit..... | 9 |
| Table 2 – Dimensions of couplings | 10 |
| Table 3 – Dimensions of 90° elbows | 10 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXTRA HEAVY-DUTY ELECTRICAL RIGID STEEL CONDUITS

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60981 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 1989. This edition constitutes a technical revision. It incorporates two main changes to the first edition, including:

- the addition of provisions for alternative coatings to zinc, and
- revisions to ductility requirements.

The text of this standard is based on the following documents:

| FDIS | Report on voting |
|--------------|------------------|
| 23A/443/FDIS | 23A/445/RVD |

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

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

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

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

Withdrawing

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

<https://standards.iteh.ai/catalog/standards/iec/7dce6ca-e774-4caa-b992-cb35e435dc02/iec-60981-2004>

EXTRA HEAVY-DUTY ELECTRICAL RIGID STEEL CONDUITS

1 Scope

This International Standard specifies requirements for EHDERS (extra heavy-duty electrical rigid steel) conduits, couplings, nipples and elbows for electrical installations, including communications and fibre optics. This standard also specifies threads for these components.

It is not applicable to the conduits specified in IEC 60423.

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.

IEC 61950, *Cable management systems – Specification for conduit fittings for electrical installations for extra-heavy duty metal conduit*

3 Terms and definitions

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

3.1

extra heavy-duty electrical rigid steel conduit (EHDERS)

part of a closed wiring system of circular cross-section made of welded steel construction capable of providing extra heavy mechanical protection to conductors or cables in electrical installations and used as an equipment earthing conductor when installed utilizing appropriate fittings

3.2

straight conduit

straight length of EHDERS without a coupling

3.3

finished conduit

straight length of EHDERS with one coupling attached

3.4

threaded coupling

internally threaded steel cylinder for connecting two sections of EHDERS conduit.

3.5

elbow

curved section of EHDERS conduit threaded at each end

3.6

nipple

straight section of EHDERS conduit not more than 0,6 m long and threaded at each end

3.7

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 standard shall be type tests.

Unless otherwise specified, the tests shall be carried out at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$.

Unless otherwise specified, each test shall be carried out on two new samples. If a sample tested in accordance with this standard fails, two additional samples shall be tested, both of which shall comply with all the requirements of this standard.

4.2 Circular cross-section

An EHDERS conduit shall have a circular cross-section sufficiently accurate to permit the cutting of threads in accordance with Figure 1.

4.3 Wall thickness

The wall thickness shall comply with the dimensions given in Table 1.

4.4 Surface condition

4.4.1 General

Surfaces of a conduit shall be free from slivers, burrs, scale and other defects likely to cause damage to conductors or cables. Compliance shall be checked by visual inspection of the external and internal surfaces.

4.4.2 Localized surface imperfections

Localized surface imperfections shall not exceed a depth of 12,5 % of the nominal wall thickness given in Table 1. Compliance of localized surface imperfections shall be checked by measurement.

4.5 Welding

The welding of all seams shall be continuous and carried out in a workmanlike manner. Compliance is checked by visual inspection.

4.6 Cleaning

The conduit shall be adequately cleaned before the application of the protective coating. The cleaning process shall leave the exterior and interior surfaces of the conduit in such a condition that the protective coating will be firmly adherent and smooth, as defined in 4.4.

4.7 Protective coating

4.7.1 Primary coating

The exterior surface shall be thoroughly and evenly coated with metallic zinc applied directly to the surface of the steel so that metal-to-metal contact and galvanic protection against corrosion are provided.

The interior surface shall be protected by a zinc or other suitable corrosion-resistant coating.

4.7.2 Secondary coating

When an additional coating is applied to enhance the primary coating, the evaluation for its degree of protection shall be optional.

4.7.3 Alternative coating

When an alternative coating is applied to enhance or replace the primary coating, the evaluation of the amount of corrosion protection provided shall be the subject of a separate standard.

5 Dimensions

5.1 Dimensions

The dimensions and mass of EHDERS conduit shall be in accordance with those given in Table 1.

5.2 Threads

5.2.1 General

The pitch and the length of the threaded portion at each end of each length of conduit, nipple, and elbow shall be as indicated in Figure 1 and shall be compatible with IEC 61950. The complete thread shall be tapered for its entire length, and the taper shall have a ratio of 1 to 16.

5.2.2 Pitch form

The form of thread profile, the dimensional relationships for form of thread and general notation are shown in Figure 2.

5.2.3 Angle of thread

The angle between the sides of the thread, measured in the axial plane, shall be 60°. The line bisecting this angle is perpendicular to the axis.

6 Zinc coating

The zinc coating on the outside surface shall have a minimum thickness of 0,02 mm. Compliance shall be checked by measurement. In case of a dispute, the minimum acceptable thickness shall be determined using the method described in Annex A.

7 Threading and chamfering

7.1 Each length of conduit, as well as each nipple and elbow shall be threaded at both ends. Each end shall be chamfered or otherwise treated to remove burrs and sharp edges.

7.2 Threads shall comply with the requirements of 5.2. If threads are cut after the zinc coating has been applied, the threads, before installation, shall be treated with a protective coating to prevent corrosion. This treatment shall not impair electrical continuity through the joint after installation.

8 Couplings

8.1 General

8.1.1 Corrosion protection

The exterior surface of couplings shall be protected by means of a zinc coating, which shall comply with the requirements of Clause 6, and the interior surface shall be treated to keep corrosion from taking place prior to installation onto the conduit.

8.1.2 Chamfering

Both ends of couplings shall be chamfered between 11° and 15°, to prevent damage to the start of the thread (see Figure 4).

8.1.3 Dimensions

The outside diameter and length of couplings shall be as indicated in Table 2. Each length of conduit shall be supplied with one coupling attached.

8.2 Coupling threads

8.2.1 Thread form

Coupling threads in accordance with this standard shall be straight (parallel) threads of the same thread form as the taper thread specified in 5.2.1.

8.2.2 Dimensions

The dimensions and pitch diameter limits shall be as indicated in Table 2, and the truncation shall be as indicated in Figure 3.

The major and minor diameters vary with the pitch diameter. The thread form shall be as indicated in Figure 2.

9 Elbows and nipples

Conduit elbows and conduit nipples shall have the same dimensions and quality employed in straight lengths of EHDERS conduit, and shall be treated, coated, threaded and marked for identification according to the requirements of this standard. The dimensions of 90° elbows shall be as indicated in Table 3.

10 Ductility

10.1 Bending properties

The specimen is deemed to have passed the test if after bending there is no cracking on the surface, or opening of the weld, visible under normal or corrected-to-normal vision.

10.2 Ductility of zinc coating

The ductility of protective coatings used on the exterior or interior surfaces of an EHDERS conduit shall be checked by the following test, which shall be carried out within one year of manufacture.

A specimen of conduit shall be bent at ambient temperature around a mandrel to a radius specified in Table 3.