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Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems —

Part 5: Two-dimensional data coding of components and data exchange format for PE piping systems

Tubes et raccords en matières plastiques — Appareillage pour l'assemblage par soudage des systèmes en polyéthylène —

Partie 5: Codage bidimensionnel des données des composants et format d'échange de données pour les systèmes de canalisations en PE

Reference number
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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*.

A list of all parts in the ISO 12176 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The use of two-dimensional code is becoming increasingly popular because of the quantity of information that it is possible to group in a small space, and this can provide increased opportunities for manufacturers and customers. There are many benefits for the market, but the scope of this document is not to show all of them. The most important technical advantage of using a two-dimensional code is the possibility to apply a built-in correction level to the coding, so that, even with some scratches or missing parts, the operator can still use all information coded safely. Another important fact, for those that want to use the power of the whole traceability, is that any important information regarding the piping component can be stored in an electronic device, by reading only one code instead of two (ISO 12176-4 and ISO 13950) and thus avoiding overlapping information. This document provides a means for coding all aspects not covered by ISO 12176-4 or ISO 13950, e.g. large diameters, big saddles or other imperial sizes. This document also aims to standardize the transfer of data stored in the memories of electronic units to another electronic equipment (e.g. computer/data base) and to encourage, at any level, the use of the traceability for a further development of the polyethylene piping systems.

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Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems —

Part 5:
Two-dimensional data coding of components and data exchange format for PE piping systems

1 Scope

This document specifies an encoding system for data of components, assembly methods and jointing operations for polyethylene (PE) piping systems for gas, water and other industrial applications. These data can be used in a traceability system and/or used to perform the fusion of components by using equipment as specified in ISO 12176-1 and in ISO 12176-2.

This encoding system is explained in ISO/IEC 16022, ISO/IEC 18004 and ISO/IEC 24778 which refer to established code types, e.g. QR code.

Data to be encoded are: fusion cycle(s), traceability of manufactured products, other manufacturer's information that can also be given on websites such as voluntary certificates of quality and approvals.

This document specifies the export of data (type, format and sequence) from a data retrieval system.

Provisions of this document are applicable to polyethylene components conforming to ISO 4427-2, ISO 4427-3, ISO 4437-2, ISO 4437-3, ISO 4437-4 and ISO 15494, and can also be applicable to any other components used in PE systems.

ISO 13950 and ISO 12176-4, which partly cover the fields of application of this document, can be used in parallel.

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.

ISO/IEC 10646, *Information technology — Universal coded character set (UCS)*

ISO 12176-1, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

ISO 12176-2, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 2: Electrofusion*

ISO 12176-3, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 3: Operator's badge*

ISO/IEC 16022, *Information technology — Automatic identification and data capture techniques — Data Matrix bar code symbology specification*

ISO/IEC 18004, *Information technology — Automatic identification and data capture techniques — QR Code bar code symbology specification*

ISO/IEC 21778, *Information technology — The JSON data interchange syntax*

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ISO/IEC 24778, *Information technology — Automatic identification and data capture techniques — Aztec Code bar code symbology specification*

ASTM F 2897-15a, *Standard Specification for Tracking and Traceability Encoding System of Natural Gas Distribution Components (Pipe, Tubing, Fittings, Valves, and Appurtenances)*

3 Terms, definitions and abbreviated terms

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Terms and definitions

3.1.1
delimiter
character used to define a specific set of data

3.1.2
"]"
hexadecimal character code 5d
delimiter (3.1.1) of fields used in region data

3.1.3
"~"
hexadecimal character code 7e
delimiter (3.1.1) of sub-fields

3.1.4
fusion equipment
equipment that conforms to either ISO 12176-1 (butt fusion machine) or to ISO 12176-2 (control unit)

3.1.5
jointing process
act of jointing separate parts of a plastic piping system

Note 1 to entry: For the purpose of this document a fusion process can be either electro-fusion or butt fusion.

Note 2 to entry: For the purpose of this document jointing can also be performed using a mechanical fitting as defined in ISO 17885.

3.1.6
JSON
Java Script Object Notification
lightweight data-interchange format

Note 1 to entry: JSON is based on a subset of the JavaScript Programming Language Standard, ECMA-262 3rd Edition – December 1999.

Note 2 to entry: JSON is defined by ISO/IEC 21778.

3.1.7
JSON schema
JSON-based format for describing JSON data

Note 1 to entry: Published on https://json-schema.org.

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Note 2 to entry: The version of JSON-Schema used in this document is the “Draft 2019-09”.

3.1.8
multilevel fusion
sequence of more than one fusion phase on the same electro-fusion fitting, i.e. pre-heating, heat soak and fusion

3.1.9
multiplicity
defines how often an element can be present in the respective context

Note 1 to entry: Multiplicity’s symbols have the following meanings: 1 = exactly once; 1…* = at least once; 0…1 = optionally none or once; 0…* = optionally none or several times.

3.1.10
nominal target heating energy
heating energy to be reached at 20 °C before correction in conjunction with the ambient temperature

3.1.11
nominal target heating time
heating time to be reached at 20 °C before correction in conjunction with the ambient temperature

3.1.12
protocol
JSON object that contains one or more fusion records of a fusion device

Note 1 to entry: A fusion record is made by an electronic device, which is coupled with fusion equipment as described in ISO 12176-1 or ISO 12176-2.

3.1.13
UTF-8
8-bit Unicode Transformation Format
variable-width character encoding

Note 1 to entry: This is capable of encoding all 1, 112, 064 valid character code points in Unicode using one to four one-byte (8-bit) code units.

3.2 Abbreviated terms

Classification of pipes not in the International System of Units (SI):

CTS	copper tube size (dimensions in inches)
DIPS	ductile iron pipe size (dimensions in inches)
IPS	iron pipe size (dimensions in inches)

4 Barcode type, structure and contents

4.1 General

This data encoding system shall use alternatively a code type according to ISO/IEC 16022 (Data Matrix code), ISO/IEC 18004 (QR code), and ISO/IEC 24778 (Aztec code). A maximum of 1 024 bytes can be included in the two-dimensional code.

When the two-dimensional code conforms to ISO/IEC 18004 (QR code), the two-dimensional code shall be of the following characteristics:

a) minimum module width: 0,253 mm (valid for all versions);

b) minimum resolution: 300 dpi (valid for all versions);

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