
**Wrapped electrofoaming joints for
polyethylene (PE) piping systems with
smooth outer wall for gravity drains
and sewers**

*Enveloppes d'assemblage électro-expansibles pour les systèmes de
canalisations en polyéthylène (PE) à paroi extérieure lisse pour les
collecteurs et branchements d'assainissement gravitaire*

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Contents

Page

| | |
|---|-----------|
| Foreword | iv |
| Introduction | v |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms and definitions | 2 |
| 3.1 General terms and definitions..... | 2 |
| 3.2 Geometrical terms and definitions..... | 2 |
| 3.3 Material terms and definitions..... | 3 |
| 4 Symbols and abbreviated terms | 4 |
| 4.1 Symbols..... | 4 |
| 4.2 Abbreviated terms..... | 4 |
| 5 Material | 4 |
| 5.1 Material for the main layer..... | 4 |
| 5.2 Material for the foaming layer..... | 4 |
| 6 General requirements | 4 |
| 6.1 General description of the wrapped electrofoaming joints..... | 4 |
| 6.2 Appearance..... | 5 |
| 6.3 Colour..... | 6 |
| 6.4 Electrical properties..... | 6 |
| 7 Geometrical characteristics | 6 |
| 7.1 General..... | 6 |
| 7.2 Dimensions of the wrapped electrofoaming joint..... | 6 |
| 7.3 Dimensions of the clamping band..... | 8 |
| 8 Mechanical characteristics | 8 |
| 8.1 Joint material integrity..... | 8 |
| 8.2 Other mechanical characteristics..... | 8 |
| 8.2.1 Preparations and pretreatment of test pieces..... | 8 |
| 8.2.2 Test conditions and requirements..... | 8 |
| 9 Performance requirements | 9 |
| 10 Marking | 9 |
| 10.1 General..... | 9 |
| 10.2 Minimum required marking..... | 9 |
| Annex A (informative) Wrapped electrofoaming joint joining procedure guide | 11 |
| Bibliography | 13 |

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 on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 1, *Plastics pipes and fittings for soil, waste and drainage (including land drainage)*.

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Introduction

This document is the specification for electrofoaming plastic pipe joints used in non-pressure underground drainage and sewerage for polyethylene (PE) piping systems with smooth outer wall.

The wrapped electrofoaming joints may also be applied to pipes with diametrically deviated pipe ends.

The installation procedures specified in this document are intended to describe the proper joining method of electrofoaming joints.

An informative guidance for the joining procedure of products complying with this document is provided in [Annex A](#).

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Wrapped electrofoaming joints for polyethylene (PE) piping systems with smooth outer wall for gravity drains and sewers

1 Scope

This document specifies the definitions and requirements for wrapped electrofoaming joints for polyethylene (PE) piping systems with smooth outer wall for underground drains and sewer without pressure.

This document specifies product range, material characteristics, test methods and test parameters, dimension and characteristics of wrap.

This document is applicable to jointing pipes which have external wall thickness greater than 1,4 mm and a diameter up to DN/OD 2000, or DN/ID 2200.

NOTE 1 For dimensions larger than DN/OD 2000, or DN/ID 2200, this document can serve as a general guide regarding appearance, colour, physical and mechanical characteristics as well as performance requirements.

NOTE 2 Such products are intended to be used with pipes made from virgin and reworked materials.

2 Normative references (standards.iteh.ai)

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 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 2: Preparation of pipe test pieces*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 8772, *Plastics piping systems for non-pressure underground drainage and sewerage — Polyethylene (PE)*

ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification, designation and design coefficient*

ISO 13254, *Thermoplastics piping systems for non-pressure applications — Test method for watertightness*

ISO 13953, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*

ISO 21138-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 1: Material specifications and performance criteria for pipes, fittings and system*

ISO 21138-2, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 2: Pipes and fittings with smooth external surface, Type A*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4435, ISO 8772, ISO 21138-1, ISO 21138-2, ISO 13272, and ISO 1043-1 and the following 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 General terms and definitions

3.1.1

structured-wall pipes and fittings

products that have an optimized design with regard to material usage to achieve the physical, mechanical and performance requirements of ISO 21138-1

3.1.2

solid-wall pipe and fitting

polyethylene pipe and fitting intended for use for non-pressure underground draining and sewerage

Note 1 to entry: Products defined by this term shall comply with ISO 8772.

3.1.3

main layer

PE layer to maintain the foaming layer in contact with the pipe surfaces

3.1.4

foaming layer

PE layer to which substances are added in order to ensure expansion under specified heating conditions, to obtain the final properties of the jointing

3.1.5

wrapped electrofoaming joint

joint consisting of a *main layer* (3.1.3) and a *foaming layer* (3.1.4) and which can be wrapped around the pipes

3.1.6

clamping band

metallic ancillary maintaining the wrapped *electrofoaming joint* (3.1.5) in position during the assembly procedure and which can be removed after cooling

3.1.7

electrofusion welding machine

electric power source that supplies constant current and/or voltage to connect the pipe with the *wrapped electrofoaming joint* (3.1.5)

3.2 Geometrical terms and definitions

3.2.1

nominal size DN

numerical designation of the size of a component, other than a component designated by thread size, which is approximately equal to the manufacturing dimension in millimetres

3.2.2

nominal size DN/OD

nominal size related to the outside diameter

3.2.3**nominal size DN/ID**

nominal size related to the inside diameter

3.2.4**nominal diameter**

d_n

specified diameter, in millimetres, assigned to a nominal size (DN/OD or DN/ID)

3.2.5**outside diameter**

d_e

value of the measurement of the outside diameter through its cross-section at any point of a pipe or fitting, rounded to the next greater 0,1 mm

3.2.6**mean inside diameter**

d_{im}

average value of a number of equally spaced measurements of inside diameter in the same cross-section of a pipe or fitting

3.2.7**minimum fitting wall thickness**

e_{min}

measured fitting wall thickness at any point of the body of a component

3.3 Material terms and definitions**3.3.1****virgin material**

material in form such as granules or powder that have not been subjected to use or processing other than that required for their manufacture and to which no reprocessable or recyclable materials have been added

3.3.2**own reprocessable material**

material prepared from rejected unused pipes or fittings, including trimmings from the production of pipes and fittings, that will be reprocessed in a manufacturer's plant after having been previously processed by the same manufacturer by a process such as moulding or extrusion and for which the complete formulation is known

3.3.3**external reprocessable material**

material comprising either one of the following:

- a) material from rejected unused pipes or fittings, or trimmings there from, that will be reprocessed and that were originally processed by another manufacturer;
- b) material from the production of unused thermoplastics products other than pipes and fittings, regardless of where they are manufactured

3.3.4**recyclable material**

material comprising either one of the following:

- a) material from used pipes or fittings which have been cleaned and crushed or ground;
- b) material from used thermoplastics products other than pipes or fittings which have been cleaned and crushed or ground

4 Symbols and abbreviated terms

4.1 Symbols

| | |
|-----------|---|
| d_e | outside diameter |
| d_{em} | mean outside diameter |
| d_{im} | mean inside diameter |
| d_n | nominal diameter |
| t | fitting wall thickness (at any point) |
| t_{min} | minimum fitting wall thickness (at any point) |

4.2 Abbreviated terms

| | |
|-------|--|
| DN/ID | nominal size related to inside diameter |
| DN/OD | nominal size related to outside diameter |
| ID | inside diameter |
| OD | outside diameter |
| PE | polyethylene |
| S | pipes series S |
| SDR | standard dimension ratio |

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5 Material

5.1 Material for the main layer

The main layer shall be made from PE 80 or PE 100 material complying with ISO 12162.

The qualification of the material is granted as long as it fulfils the requirements of [7.1](#).

5.2 Material for the foaming layer

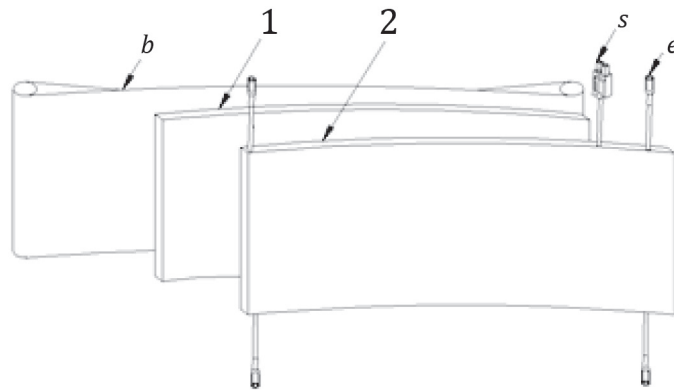
The base material for the foaming layer shall have a density from 911 kg/m³ to 940 kg/m³, when measured according to ISO 1183-1, to which may be added those additives that are needed to facilitate the manufacture of fitting conforming to the requirements of this document (e.g., foaming agent, adhesive agent).

The qualification of the material is granted as long as it fulfils the requirements of [7.1](#).

6 General requirements

6.1 General description of the wrapped electrofoaming joints

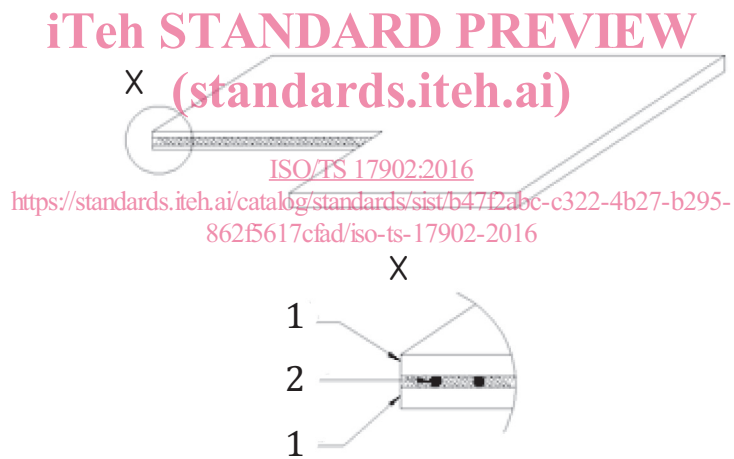
Wrapped electrofoaming joints consist of several layers (see [Figure 1](#) and [Figure 2](#)): foaming layer including electrical device and main layer.



Key

- 1 main layer of electrofoaming joint
- 2 foaming layer of electrofoaming joint
- b* clamping band of joint
- s* temperature sensor connection terminal
- e* electric connection terminal

Figure 1 — Schematics of electrofoaming joints



Key

- 1 foaming layer of electrofoaming joint
- 2 electric thermal wire embedded in foaming layer

Figure 2 — Schematics of foaming layer

6.2 Appearance

When viewed without magnification, wrapped electrofoaming joints shall meet the following requirements:

- the internal and external surfaces shall be smooth, clean and free from grooving, blistering, impurities, pores and any other surface irregularity likely to prevent conformity with this document;
- the ends of wrapped electrofoaming joints shall be square to their axis.