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ISO 8180

Third edition
2020-06

Ductile iron pipelines — Polyethylene sleeving for site application

Canalisations en fonte ductile — Manche en polyéthylène pour application sur site

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Foreword

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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).

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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 5, *Ferrous metal pipes and metallic fittings*, Subcommittee SC 2, *Cast iron pipes, fittings and their joints*.

This third edition cancels and replaces the second edition (ISO 8180:2006), which has been technically revised. The main changes compared to the previous edition are as follows:

— recommended installation methods have been added;

— the references and presentation have been reviewed and improved.

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

Ductile iron pipelines — Polyethylene sleeving for site application

1 Scope

This document specifies the characteristics of polyethylene film, commonly called polyethylene sleeving, used as additional protection against corrosion for ductile iron pipelines, particularly when laid in aggressive soil conditions.

This film, the efficiency of which has been proved by experience, takes the form of a sheet or tube fitted around the pipes and fittings, on-site, immediately before pipe-laying.

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

ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets*

ISO 7765-1, *Plastics film and sheeting — Determination of impact resistance by the free-falling dart method — Part 1: Staircase methods*

ISO 6383-2, *Plastics — Film and sheeting — Determination of tear resistance — Part 2: Elmendorf method*

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:

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

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

3.1
polyethylene sleeving
sleeving of piping with *polyethylene film* (3.2) in tube or sheet form

3.2
polyethylene film
film extruded from virgin polyethylene raw material

3.3
regenerated product
polyethylene film (3.2) made by using recycled material, which could be mixed by different material, from different sources

4 Raw material

4.1 Characteristics

The material used for making the film shall be polyethylene or a mixture of polyethylene and/or ethylene and olefin copolymers.

When tested in accordance with ISO 1183-1, its density shall be between 910 kg/m^3 and 935 kg/m^3.

NOTE The raw material used to produce film to this document typically has a volume resistivity of at least 10^{15} Ω·cm and the finished film typically has a dielectric strength of at least 32 V/µm.

4.2 Additives and impurities

If protection against ultra-violet rays is required, the material shall be stabilized by the addition of an appropriate product; if carbon black is used for this purpose, the addition shall be in the range of 2 % to 3 % by mass.

Antioxidants may be added, but shall not be greater than 0,5 % by mass.

Any impurities in the polymer shall be less than 0,1 % by mass.

The product shall not contain any plasticizers or fillers.

4.3 Regenerated products

Regenerated products may be used provided they comply with the requirement of this document.

5 Polyethylene sleeving

5.1 Appearance

The film shall not have holes, splits, punctures, perforations or any other detrimental defects affecting its strength or impermeability.

5.2 Dimensions

5.2.1 Width

The minimum flat width of tube or sheet is as given in Table 1.

Table 1 — Minimum polyethylene width

DN	Minimum polyethylene width	
	Flat tube	Sheet
80	255	510
100	305	610
125	375	750
150	400	800
200	505	1 010
250	620	1 240
300	710	1 420
350	855	1 710
400	900	1 800

Table 1 *(continued)*

DN	Minimum polyethylene width	
	Flat tube	Sheet
450	1 000	2 000
500	1 070	2 140
600	1 270	2 540
700	1 485	2 970
800	1 695	3 390
900	1 900	3 800
1000	2 105	4 210
1100	2 315	4 630
1200	2 520	5 040
1400	2 940	5 880
1500	3 150	6 300
1600	3 355	6 710
1800	3 770	7 540
2000	4 185	8 370
2200	4 385	8 770
2400	4 780	9 560
2600	5 180	10 360

5.2.2 Thickness

The nominal thickness of the polyethylene sleeving shall be not less than 200 µm. The negative tolerance on the nominal thickness shall not exceed 10 %.

Per designer's recommendation, thicker polyethylene sleeving or double polyethylene sleeving can be used to protect the pipeline in more aggressive environment.

6 Mechanical properties

6.1 Tensile strength

When tested in accordance with ISO 527-3, using test specimens of type 2, a gauge length of 50 mm and a rate of grip separation of 500 mm/min, the tensile stress at break of the film in the longitudinal and transverse directions shall be not less than 20 MPa.

6.2 Elongation

When tested in accordance with ISO 527-3, using test specimens of type 2 a gauge of 50 mm and a rate of grip separation of 500 mm/min, the elongation at fracture of the film in the longitudinal and transverse directions shall be not less than 500 %.

6.3 Impact resistance

When tested in accordance with ISO 7765-1 Method A, the impact resistance of the film shall be not less than 900 g.

6.4 Propagation tear resistance

When tested in accordance with ISO 6383-2, the propagation tear resistance of the film in the longitudinal and transverse directions shall be no less than 20 N.

7 Marking

The polyethylene film supplied shall bear a card or label giving the following information:

a) the manufacturer's name or trademark;

b) the year of manufacture;

c) the number of this document, i.e. ISO 8180;

d) the nominal film thickness;

e) the applicable range of nominal pipe diameter size(s).

8 Storage and transportation

The polyethylene sleeving shall be suitably packaged and protected by the manufacturer for transportation and storage.

When the polyethylene sleeving is stored prior to use, it shall be properly protected from direct sunlight.

9 Conditions of use and fitting

Recommended installation methods are given in Annex A. For determining when polyethylene sleeving is required and also the method of fitting, the user should refer to appropriate national specifications or to the manufacturers' catalogues.

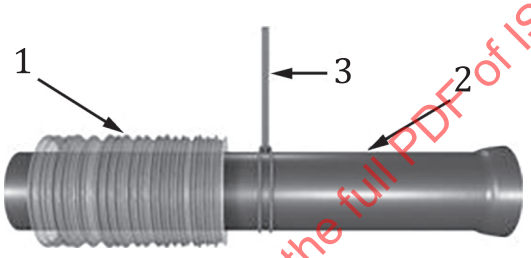
Annex A
(informative)

Installation methods

A.1 Installation on pipes with polyethylene tubes

A.1.1 Methods for dry trench conditions

a) Cut a section of the polyethylene tube about 0,6 m longer than the pipe section. Clean the pipe surface, remove all lumps of clay, mud, cinders, etc. Lift the pipe with a cable, and slip the polyethylene tube around the pipe from the spigot end. Bunch the polyethylene tube accordion-fashion on the spigot end, see Figure A.1.

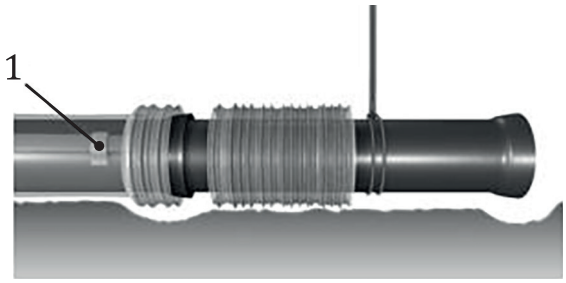


Key

1 polyethylene tube
2 ductile iron pipe
3 cable (fabric-type cable, padded cable or necessary protection between cable and pipe)

Figure A.1

b) Dig a shallow bell hole in the trench bottom at the joint location to facilitate the polyethylene tube installation. Lower the pipe into the trench and make up the joint with the preceding section of pipe, see Figure A.2.



Key

1 adhesive tape

Figure A.2

c) Move the cable to the socket end and spread the polyethylene tube over the entire barrel of the pipe, see Figure A.3.

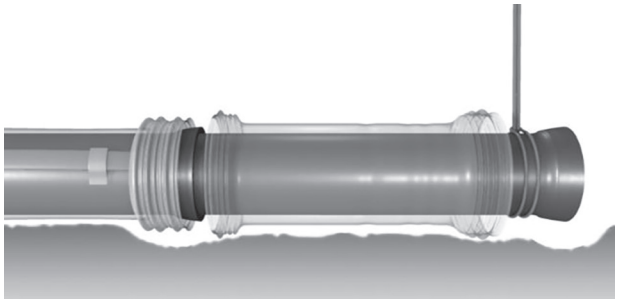
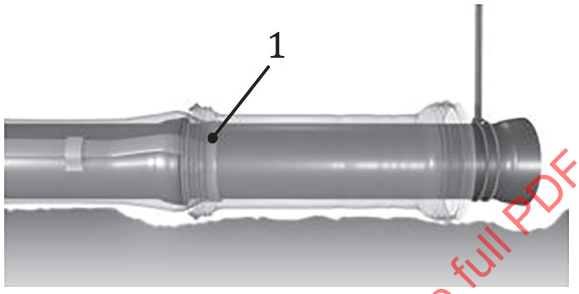


Figure A.3

d) Make the overlap by pulling the bunched polyethylene tube from the previous pipe to the new one, secure it in place before the socket with adhesive tape, see Figure A.4.



Key

1 adhesive tape

Figure A.4

e) Pull the polyethylene tube from the new pipe to cover the previous sleeve layer and overlap the joint at least 25 mm. Secure it in place with adhesive tape, see in Figure A.5.

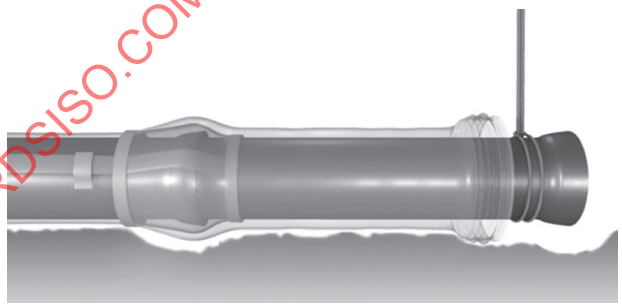


Figure A.5

f) Fold excess polyethylene back over the top of the pipe, and secure the fold at approximately every 0,9 m locations along the pipe with adhesive tape, see Figure A.6 and A.7. The adhesive tape should be adequately applied (preferably around the surface of the pipe) to tightly secure the polyethylene tube. This step is very important to provide the complete protection offered by polyethylene encasement.

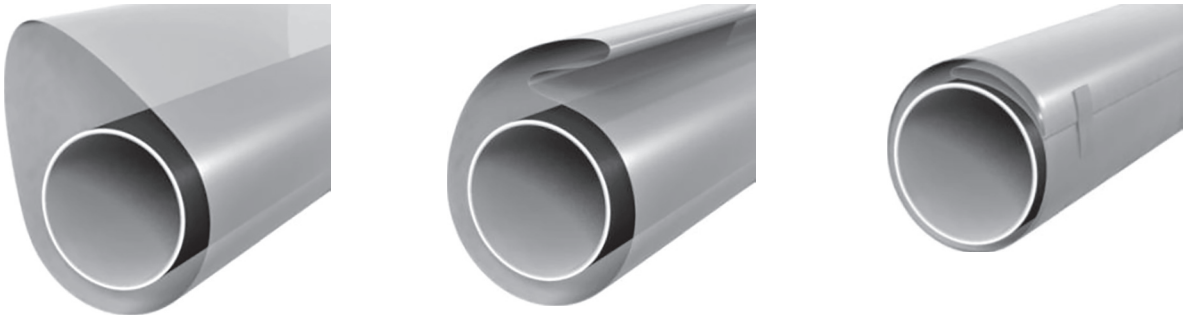


Figure A.6

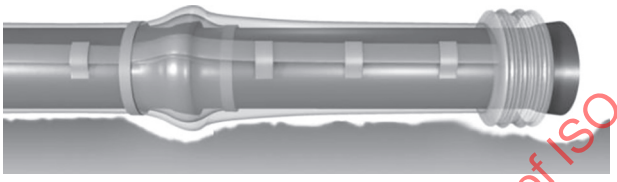


Figure A.7

g) Repair all small rips, tears or other damage with adhesive tape. Large damage can be repaired with a sheet of polyethylene and the edges of the repair area should be sealed with adhesive tape. See Figure A.8.

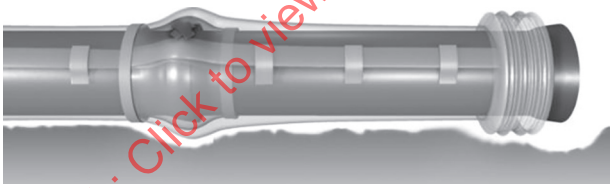
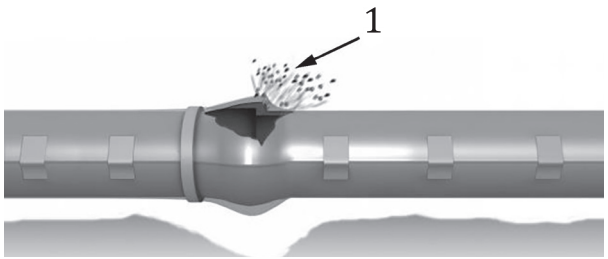


Figure A.8

h) Carefully backfill according to the requirement of design or standards. To prevent the damage during backfilling, allow adequate slack in the tube at the joint and a soft cover (ex. a straw mat) can be used on the top of the polyethylene sleeve. Backfill should be free of cinders, rocks, boulders, nails, sticks or other materials that might damage the polyethylene (at least those in direct contact with the polyethylene). Avoid damaging the polyethylene when using tamping devices. See Figure A.9.



Key

1 do not allow backfill to damage the polyethylene sleeve

Figure A.9

As an alternative to the above reference method, the polyethylene tube may also be installed with one layer at the junction area.

First, bunch the polyethylene tube on the end of the pipe, and circumferentially tape it to the barrel behind the insertion line.

Second, take up the slack in the tube along the barrel, fold excess polyethylene back over the top of the pipe and then use pieces of tape across the fold to securely hold it.

Third, lower the pipe into the trench and make up the joint with a preceding pipe.

Fourth, secure the polyethylene in place behind the preceding bell by using a circumferential wrap of tape, pull back the bunched polyethylene from the preceding pipe and make the overlap at junction area.

Fifth, place another circumferential wrap of tape on the overlapping polyethylene, securing it to the spigot side of the joint. See Figure A.10.

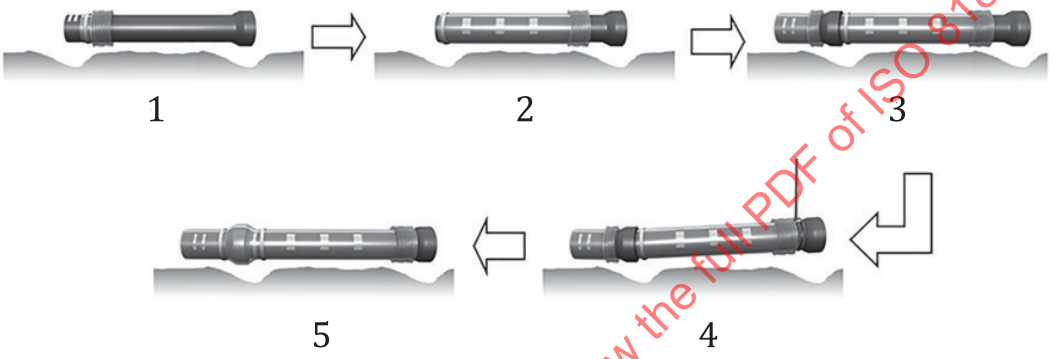


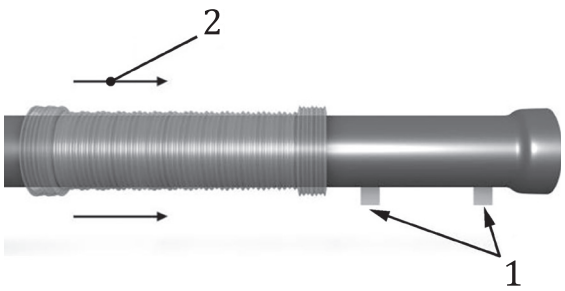
Figure A.10

Adequate slack should be kept in the polyethylene tube at the joint to allow for the permissible joint deflection.

A.1.2 Wet trench conditions or installation below the water table

In wet, sloppy trench conditions, the pipe should be completely covered by the polyethylene tube before it is lowered into the trench. The installation method is illustrated below.

a) Cut the polyethylene tube to a length approximately 0,6 m longer than the pipe section. Slip the tube over the pipe. Dust, debris and clay should be cleared from the pipe surface before the encasing sleeve is put on. See Figure A.11.



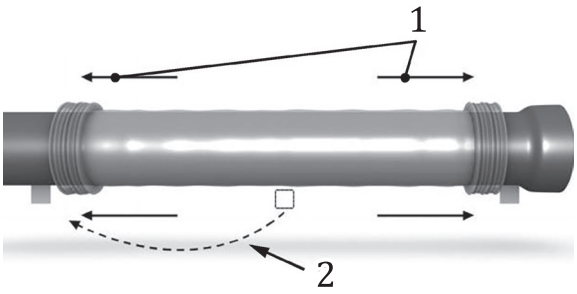
Key

1 support

2 the installation direction of polyethylene tube

Figure A.11

b) Spread the polyethylene tube over the entire barrel of the pipe, pushing back both ends of the tube until they clear both pipe ends. Make sure the tube is entered on the pipe to provide a 0,3 m overlap at each end. See Figure A.12.



Key

1 the direction of spreading polyethylene sleeve

2 move the support from middle to spigot end

Figure A.12

c) Take up slack part on the top to fit the pipe snugly. Fold excess polyethylene tube back over the top of the pipe and secure the fold at approximately every 0,6 m interval along the pipe with adhesive tape to help minimize the space between the polyethylene and the pipe. This will keep groundwater from freely flowing beneath the encasement, which is essential to its performance. Seal the polyethylene sleeve with adhesive tape or plastic tie strap completely around the pipe at each pipe end, leaving sleeve ends free to overlap the adjoining pipe section. See Figure A.13.

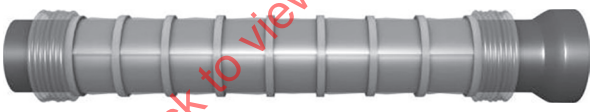


Figure A.13

d) Lower the pipe into the trench and make up the pipe joint. Cover the joint portion with the sleeve with an overlap of 0,3 m. Be careful not to damage the polyethylene when handling or jointing the pipes, see Figure A.14. Complete the installation and backfilling as per the dry trench condition steps d), e), g) and h) in A.1.1. (Take care to seal the ends of overlap completely around the pipe with adhesive tape or plastic tie straps.)

In case of pipes with polyethylene tube / sheet in wet trench condition or below water table, it shall be ensured that the adhesive tape used is resistant to deterioration of the adhesion while in contact with water.

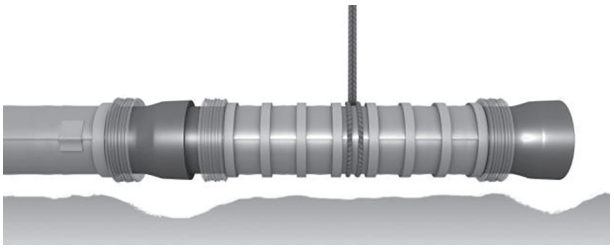


Figure A.14

A.2 For pipe with polyethylene sheet

a) Cut the polyethylene sheet to the length about 0,6 m longer than the pipe section, centre it on the pipe with a 0,3 m overlap at each pipe end and tie up at the joint.

b) Wrap the polyethylene sheet around the barrel and let the fold (1/4 of the sleeve width) on top of the pipe. Secure the sleeve along the pipe at approximately every 0,9 m interval with adhesive tape. See Figure A.15.

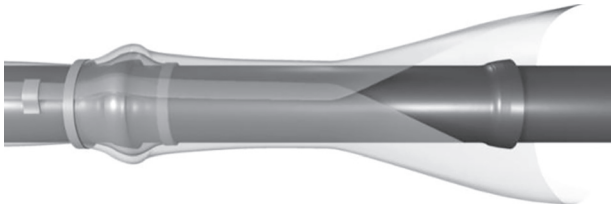


Figure A.15

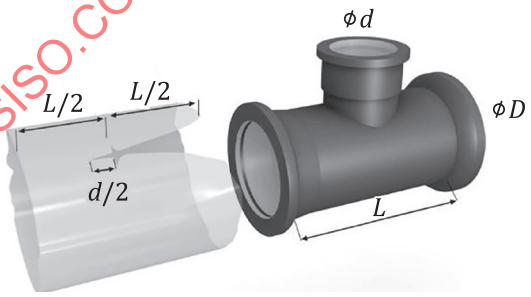
c) Lower the polyethylene-encased pipe into the trench and make up the joint. Complete the installation and backfilling as per the dry trench condition steps d), e), g) and h) in A.1.1.

A.3 Installation on fittings

A.3.1 Tee

a) Cut the polyethylene tube to the length of the main L and shear it axially to the half length of the tube. Then cut the sleeve in three perpendicular directions at the branch point with $d/2$ depth. Locate the polyethylene sleeve on the tee. See Figure A.16. Take up slack of the sleeve along the barrel of the main to make a fit space; fold excess polyethylene back over the top of the main. Secure and seal the polyethylene tube with adhesive tape, see Figure A.17.

While tapping on pipe wrapped with polyethylene sleeve two to three wraps of adhesive tape is to be used to have a proper thickness where the tapping machine is to be mounted.



Key

L the length of the main

ϕD the diameter of the main

ϕd the diameter of the branch

Figure A.16