BS ISO 13460-1:2015

BSI Standards Publication

Agricultural irrigation equipment — Plastics saddles

Part 1: Polyethylene pressure pipes

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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ISO 13460-1

First edition
2015-10-15

Agricultural irrigation equipment — Plastics saddles —

Part 1: Polyethylene pressure pipes

Materiel agricole d'irrigation — Selles de derivation en matiere plastique —

Partie 1: Tuyau en polyethylene utilise sous pression

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Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
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The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 18, *Irrigation and drainage equipment and systems*.

This first edition of ISO 13460-1 cancels and replaces ISO 13460:1998, which has been technically revised and renumbered.

INTERNATIONAL STANDARD ISO 13460-1:2015(E)

Agricultural irrigation equipment — Plastics saddles —

Part 1: Polyethylene pressure pipes

1 Scope

This part of ISO 13460-1 specifies the required properties and test methods for plastics saddles for assembly on polyethylene (hereinafter "PE") pressure pipes used in above-ground and underground irrigation systems conveying water at temperatures not exceeding 50 °C.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

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 3459, *Plastic piping systems — Mechanical joints between fittings and pressure pipes — Test method for leaktightness under negative pressure*

ISO 4427-2, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 2: Pipes*

ISO 8779, *Plastics piping systems — Polyethylene (PE) pipes for irrigation — Specifications*

ISO 17885, *Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications*

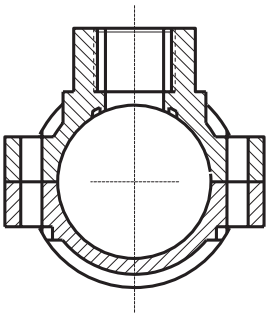
3 Terms and definitions

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

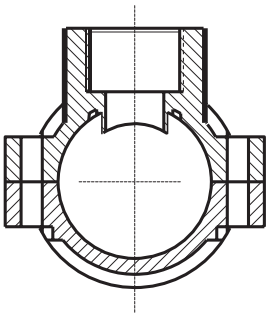
3.1
saddle
fitting used to connect a branch outlet to a polyethylene pipe through a boring in the wall of the pipe

3.2
branch outlet
outlet of a saddle the axis of which is perpendicular to the axis of the pipe on which the saddle is installed

Note 1 to entry: See Figure 1.



a) Without protrusion into the pipe



b) With protrusion into the pipe

Figure 1 — Examples of plastics saddles

3.3
nominal size
numerical designation used to refer to the size of a saddle which is identical to the nominal diameter of the pipe on which it is intended for assembly

3.4
nominal pressure
PN
used to classify a saddle which is identical to the nominal pressure of the pipe on which it is intended for assembly

4 Materials

Metal parts of a saddle shall be corrosion-resistant.

All parts of a saddle coming in contact with water shall be resistant to agricultural chemicals used in irrigation, such as fertilizer solutions, plant protection materials and fluids used for removal of blockages in emitters and emitting pipe systems.

Plastics parts of a saddle that are exposed to ultraviolet radiation in working conditions under which the saddle operates shall be resistant to ultraviolet radiation.

Plastics parts that enclose waterways shall be opaque or shall be provided with an opaque cover.

5 Workmanship and appearance

The saddle shall be free of burrs or other features likely to damage the pipe or present a safety hazard during installation. The bore of the saddle outlet shall be free of irregularities which may restrict water flow.

The saddle shall be designed to cause minimum interference to the flow of water in the pipe on which it is installed.

Internal and external surfaces of the saddle shall be clean and free of grooves, pinholes, voids or other features likely to affect the performance and service of the system.

The saddle shall be manufactured at such diameter and within such tolerances that will permit its use with PE pipes in accordance with ISO 4427-2 and ISO 8779.

6 Branch outlet

The branch outlet shall have a threaded connection or another type of connection suitable for connecting a pipe or a fitting.

A threaded connection shall have a thread that conforms to ISO 7-1 or ISO 228-1 as an integral thread or be provided with an adaptor to such a thread.

A plastic female thread bigger than 25,4 mm shall be provided with a metal reinforcing ring.

A metal reinforcing ring is also recommended for smaller plastic female threads.

7 Material strength test

Perform the following pressure test on an injection-moulded tubular test piece with the dimensions shown in Figure 2 and made of the same plastics material as the saddle body.

The wall thickness of the test specimen (e), shown in Figure 2, shall not be less than 2,9 mm and not more than 4,6 mm.

Dimensions in millimetres

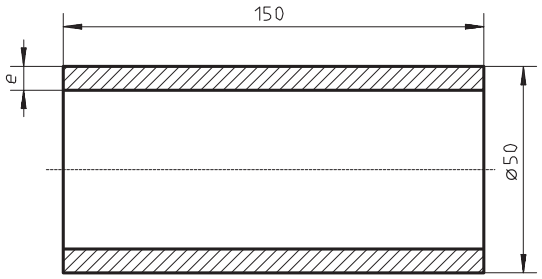


Figure 2 — Test specimen

Test the specimen in accordance with ISO 1167-1 under the test conditions specified in Table 2.

The test specimen shall not suffer fractures or any other type of damage during the test.

Table 1 — Test conditions

Material	Temperature °C	Induced stress σ MPa	Duration h
ABS	20	38,7	1
	70	4	1 000
PE 80	20	11,4	1
	80	4	1 000
PE 100	20	14,4	1
	80	5	1 000
PE-RT – Type 1	20	9,9	1
	95	3,4	1 000
PE-RT – Type 2	20	10,8	1
	95	3,6	1 000

Table 1 *(continued)*

Material	Temperature °C	Induced stress σ MPa	Duration h
PE-X	20	12,0	1
	95	4,4	1 000
POM-C	20	59	1
	95	6	1 000
POM-H	20	63	1
	60	10	1 000
PP-B	20	16	1
	95	2,6	1 000
PP-H	20	21	1
	95	3,5	1 000
PP-R	20	16	1
	95	3,5	1 000
PP-RCT	20	15,0	1
	95	3,8	1 000
PVC-U	20	42	1
	20	32	1 000
PVC-HI	20	42	1
	20	32	1 000
PVDF	20	32,6	1
	95	11,5	1 000
PPSU	20	57,2	1
	95	21,3	1 000
PSU	20	66	1
	95	9,7	1 000
PB	20	15,5	1
	95	6	1 000
PA 11 160	20	19	1 000
	80	10	165
PA 11 180	20	20	1 000
	80	11,5	165
PA 12 160	20	19	1 000
	80	10	165
PA 12 180	20	20	1 000
	80	11,5	165
PA12-GF30	20	50	1
	60	20	1 000
PA12-GF50	20	50	1
	60	20	1 000

Table 1 *(continued)*

Material	Temperature °C	Induced stress σ MPa	Duration h
PA12-GF65	20	50	1
	60	20	1 000
ECTFE	20	26	40
	80	8	170

NOTE If second- or third-party certification is applicable, this test can be omitted if the saddle manufacturer can present to the testing laboratory a satisfactory test report on the material's strength requirement compliance.

8 Mechanical and hydraulic characteristics

8.1 General

Test the specimens in accordance with the tests specified in 8.2 to 8.6 with each saddle assembled on a PE pipe. The nominal pressure of the pipe used in the tests shall be equal to or greater than the nominal pressure of the saddle.

If the branch outlet of the saddle has a fitting complying with ISO 17885 for connecting to a PE pipe, perform the pressure tests described in 8.2 to 8.6 with a pipe of the appropriate section and with a minimum free length of 3*D* measured from the branch outlet (where *D* is the nominal diameter of the pipe).

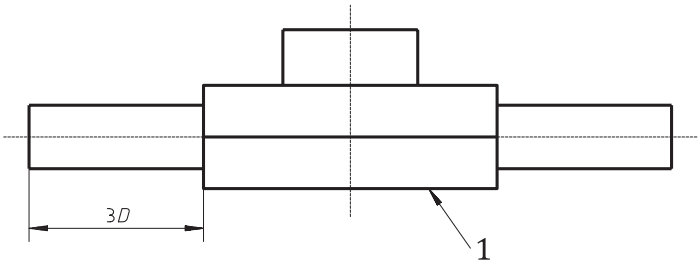
8.2 Resistance to short-term internal hydrostatic pressure

Assemble the saddle on a PE pipe of nominal diameter equal to the nominal size of the saddle, according to the manufacturer's instructions. The PE pipe shall extend at least three times its nominal diameter from each side of the saddle, as a free length (see Figure 3).

Plug the saddle branch outlet with a plug suited to the shape of the branch outlet connection.

Plug one end of the pipe and fill the complete assembly with water through the other end of the pipe, taking care to ensure that all air is expelled from the system.

Increase the pressure gradually and maintain the test conditions given in Table 2.



Key

1 saddle

Figure 3 — Extension of the PE pipe from each side of the saddle

Table 2 — Test conditions for resistance to short-term internal hydrostatic pressure

Temperature °C	Pressure bar	Test duration h
20 ± 2	1,5 × PN	1

There shall be no leakage, fracture, crack or other defect in the saddle or in the section of pipe on which the saddle is assembled.

8.3 Resistance to long-term internal hydrostatic pressure

Repeat the test described in 8.2 using the test conditions given in Table 1.

There shall be no leakage, fracture, crack or other defect in the saddle or in the section of pipe on which the saddle is assembled.

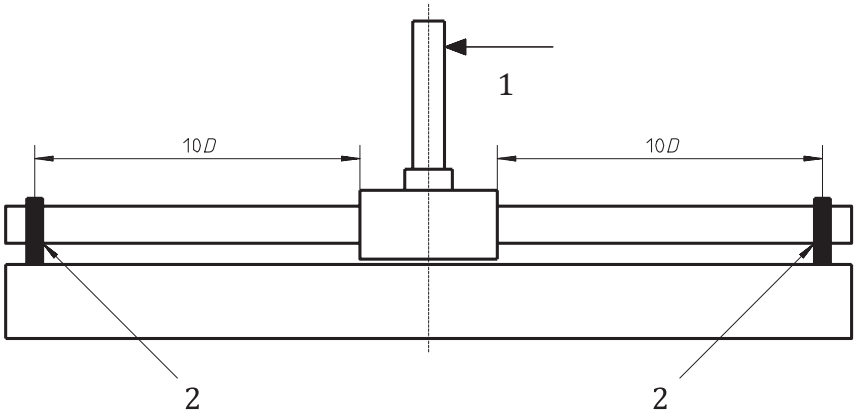
8.4 Resistance to internal under-pressure

When tested in accordance with ISO 3459, the saddle shall conform to the requirements of ISO 3459.

8.5 Resistance to pressure during application of a bending moment to the branch outlet

Assemble the saddle on a PE pipe of nominal diameter equal to the nominal size of the saddle, according to the manufacturer's instructions. Connect a suitable length of pipe to the branch outlet.

Fix the assembly to a flat and rigid surface as indicated in Figure 4 so that its ends are fixed to the surface at a distance not less than 10 times the nominal diameter of the pipe from both sides of the saddle.



Key

1 bending moment

2 fixation point of the pipe

Figure 4 — Setup for the bending moment test

Apply a hydraulic pressure to the system as specified in Table 3 while applying a bending moment, M, to the branch outlet, the numerical value of which is calculated from Formula (1):

$$M = 0{,}4\,D \tag{1}$$

where

M is the bending moment, in newton metres;

D is the nominal size of the saddle, in millimetres.

Apply the bending moment parallel to the pipe axis.

Table 3 — Test conditions for resistance to internal hydrostatic pressure during application of the bending moment

Temperature °C	Pressure bar	Test duration h
20 ± 3	1,5 × PN	1

There shall be no leakage, fracture, crack or other defect in the saddle or in the section of pipe on which the saddle is assembled.

8.6 Resistance to sliding of the saddle on the pipe

8.6.1 Preparation

Assemble the saddle on a PE pipe of nominal diameter equal to the nominal size of the saddle, according to manufacturer's instructions. Fix the pipe to a flat and rigid surface as shown in Figure 4.

8.6.2 Resistance to rotational sliding

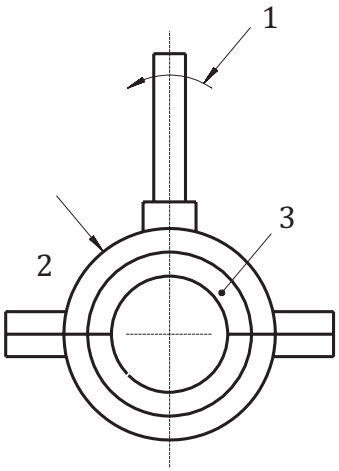
With the saddle assembled and the pipe fixed in position as indicated in Figure 4, apply a rotation moment, *T*, to the saddle (see Figure 5) for one minute, where *T* is calculated using Formula (2):

$$T = 0{,}4\ D \tag{2}$$

where

T is the rotation moment, in newton metres;

D is the nominal size of the saddle, in millimetres.



Key

1 rotation moment
2 saddle
3 pipe

Figure 5 — Application of rotation moment to the saddle

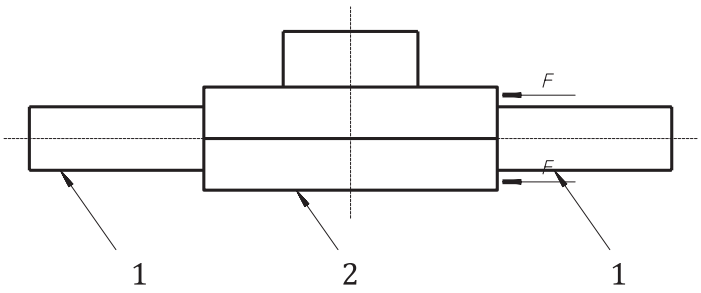
Apply the moment in a plane perpendicular to the axis of the PE pipe, using a suitable length of pipe connected to the branch outlet.

The saddle shall not rotate on the pipe as a result of the applied moment.

8.6.3 Resistance to axial sliding

With the saddle assembled and the pipe fixed firmly as indicated in Figure 4, apply a force, *F*, to the saddle parallel to the axis of the pipe, as indicated in Figure 6, for one minute. The force shall be applied in such a way that there are no resulting moments. The force, *F*, in newtons, shall be equal to the numerical value of the nominal size of the saddle in millimetres.

The saddle shall not slide on the pipe as a result of the applied force.



Key

1 pipe
2 saddle

Figure 6 — Application of horizontal force to the saddle

9 Marking

A saddle shall be marked with at least the following markings:

a) manufacturer's name or trademark;

b) material from which the body of the saddle is made;

c) nominal size of the saddle;

d) nominal size of the branch outlet;

e) thread size of a threaded branch outlet;

f) nominal pressure (can be marked on the packing or on a label).

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