INTERNATIONAL STANDARD

ISO 15398

First edition
2012-12-01

Specifications for thermoplastics covers and frames for manholes and inspection chambers used in non-traffic areas

Spécifications pour couvercles et cadres en matériaux thermoplastiques pour regards et chambres d'inspection utilisés dans les zones sans circulation

Reference number
ISO 15398:2012(E)

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Published in Switzerland

Contents

Page

Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 15398 was prepared by Technical Committee 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)*.

Introduction

This International Standard is based on the results of the work being undertaken in ISO/TC 138 "*Plastics pipes, fittings and valves for the transport of fluids*", CEN Committee TC 165 and CEN Committee TC 155.

They are supported by separate standards on test methods and by European Standards for covers and frames to which references are made throughout the System Standard.

Specifications for thermoplastics covers and frames for manholes and inspection chambers used in non-traffic areas

1 Scope

This International Standard specifies the definitions and requirements for thermoplastics covers and frames for inspection chambers and other such pipeline access products installed in light vehicular access and pedestrian areas and manufactured from unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP), polypropylene with mineral modifier (PP-MD) or polyethylene (PE). The products are rated up to B 125 max. and are intended for use either inside or outside buildings including swimming pool areas but are not intended for use in the carriageway of trafficked areas.

This International Standard is only applicable to those covers and frames where the manufacturer has clearly stated in the documentation how the frames are installed and assembled to the intended access product, identifying as necessary the manufacturer and grades of product or riser to which the frame is intended to fit.

NOTE 1 The cover and frame are normally manufactured by injection moulding.

NOTE 2 Fibre reinforced covers and frames are not covered by this International Standard.

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.

ISO 580, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating*

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

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

ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method*

ISO 2507-1, *Thermoplastics pipes and fittings — Vicat softening temperature — Part 1: General test method*

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

ISO 3127, *Thermoplastics pipes — Determination of resistance to external blows — Round the-clock method*

ISO 3506-1, *Mechanical properties of corrosion-resistant stainless steel fastners — Part 1: Bolts, screws and studs*

ISO 3506-2, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 2: Nuts*

ISO 4435, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U)*

ISO 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 4892-3, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

ISO 8256:2004, *Plastics — Determination of tensile-impact strength*

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

ISO 8773, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP)*

ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

ISO 13229, *Thermoplastics piping systems for non-pressure applications — Unplasticized poly(vinyl chloride) (PVC-U) pipes and fittings — Determination of the viscosity number and K-value*

ISO 13272, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP), polypropylene with mineral modifiers (PP-MD) and polyethylene (PE) — Specifications for manholes and inspection chambers in traffic areas and underground installations*

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*

ISO 21138-3, *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 3: Pipes and fittings with non-smooth external surface, Type B*

EN 124:1994, *Gully tops and manhole tops for vehicular and pedestrian areas — Design requirements, type testing, marking, quality control*

EN 681-1, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

EN 681-2, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers*

EN 681-3, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 3: Cellular materials of vulcanized rubber*

EN 681-4, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 4: Cast polyurethane sealing elements*

EN 12164:2011, *Copper and copper alloys — Rod for free machining purposes*

ENV 12633:2003, *Method of determination of unpolished and polished slip/skid resistance value*

CEN/TS 14541, *Plastics pipes and fittings for non-pressure applications — Utilization of non-virgin PVC-U, PP and PE materials*

EN 14680, *Adhesives for non-pressure thermoplastic piping systems — Specifications*

EN 14758-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene with mineral modifiers (PP-MD) — Part 1: Specifications for pipes, fittings and the system*

EN 14814, *Adhesives for pressure thermoplastic piping systems — Specifications*

3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in ISO 4435, ISO 8772, ISO 8773, ISO 21138-1, ISO 21138-2, ISO 21138-3, EN 14758-1, ISO 13272, ISO 1043-1 and the following apply.

3.1 Terms and definitions

3.1.1
Inspection chamber
drainage or sewerage fitting used to connect drainage or sewerage installations and/or to change the direction of drainage or sewerage runs, which terminates at ground level

NOTE 1 It can be supplied either with an integral riser or a separate a riser shaft in both cases having a 200 mm minimum outer diameter and an inner diameter of less than 800 mm. For non-circular chambers the minimum clear opening should be 200 mm with a maximum opening width of 800 mm

NOTE 2 The opening at ground level permits the introduction of cleaning, inspection and test equipment and the removal of debris but does not provide access for personnel.

3.1.2
riser shaft
usually circular structure providing a vertical conduit between the base unit and the near ground level

NOTE The riser shaft can be supplied either as a separate component for site jointing to the base unit, or integrally formed with the base unit by the manufacturer.

3.1.3
near-surface components
components which, where provided, connect to the top of the riser shaft and provide a seating for the cover and its frame

3.1.4
telescopic part
part of the assembly that allows accommodation of settlement that might occur after installation and allows adjustment of the height of the chamber

3.1.5
cover frame
component that provides a stable support for the cover on its top surface and on its bottom surface attaches to the riser or near surface components or alternatively is imbedded in concrete as required by the installation details supplied by the manufacturer of the chamber or manhole

3.1.6
clear opening
CO
diameter of the largest circle that can be inscribed in the clear area of the frame

NOTE 1 Expressed in mm.

NOTE 2 See EN 124.

3.1.7
reformulated material
recyclable / reprocessable material that has been reformulated, by the use of additives and processing techniques, to meet an agreed specification

NOTE Typically the additives used would be stabilizers, pigments, etc; the reformulated material taking the form of homogeneous pellets, granules, powder, etc. with the produced batch having consistent physical properties.

3.2 Abbreviations

DN/ID nominal size, inside diameter related

DN/OD nominal size, outside diameter related

PVC-U unplasticized poly(vinyl chloride)

PE polyethylene

PP polypropylene

PP-MD polypropylene with mineral modifiers

4 Material

A material fulfilling the requirements in one of the standards listed in Table 1 may be used for manufacturing covers and frames without additional material requirements.

Table 1 — Standard materials and corresponding pipe standards

Standard material	Corresponding pipe standard
Unplasticized poly(vinyl chloride) (PVC-U)	ISO 4435, ISO 21138-2, ISO 21138-3 & ISO 13272
Polypropylene (PP)	ISO 8773, ISO 21138-2, ISO 21138-3 & ISO 13272
Polyethylene (PE)	ISO 8772, ISO 21138-2, ISO 21138-3 & ISO 13272
Polypropylene with mineral modifiers (PP-MD)	EN 14758-1 & ISO 13272

4.1 Other materials

When a material not fulfilling the material requirements of the standards listed in Table 1 is used for manufacturing covers and frames the requirements specified in Annex A and Table A.1 apply.

4.2 Utilization of non-virgin materials

Manufacturers may use their own rework material and externally purchased reformulated material with agreed specification up to their specified dosing levels for the manufacture of covers and frames.

Externally purchased re-processable and recyclable material (excluding reformulated) shall be permitted when classified as specified in CEN/TS 14541. Their suitability in a specific design shall be proven by testing as described in Annex A and their variability from batch to batch monitored via the material characteristics listed in Table A.1.

4.3 UV resistant formulations

Formulations meeting either the requirements of 4.3.1 or 4.3.2 shall be deemed to satisfy the non-equatorial ageing and tensile impact requirements of Table 4.

4.3.1 Carbon black requirements for UV resistant polyolefines

Black UV resistant polyolefines should contain at least 2.5 % by weight of carbon black when determined by ISO 6964. The carbon black should have a particle size in the range of 10 – 25 nm.

4.3.2 Titanium Dioxide requirements for UV resistant PVC-U

UV resistant PVC-U should contain ≥ 2 % of rutile titanium dioxide.

4.4 Sealing rings

The sealing ring material shall conform to EN 681-1, EN 681-2, EN 681-3 or EN 681-4, as applicable.

The sealing ring shall have no detrimental effects on the properties of the components.

NOTE Sealing rings may be retained using components made from materials other than those of the actual cover and frame.

4.5 Metallic fixings

The material used for any metallic fixings shall normally conform to either ISO 3506-1 and -2 or a copper zinc lead alloy of EN 12164 (Table 2).

4.6 Solvent cement

Any solvent cement adhesive shall conform to EN 14680 or EN14814.

5 General characteristics

5.1 General

All covers shall be secured to their frames by screw fixings or other types of mechanical fixing. The fixings shall meet the requirements of 4.5.

All frames shall be provided with a means of securing them to riser shafts. Details of how the frame is secured to a shaft shall be described/specified in cover and frame manufacturers/suppliers literature.

For frames of PVC-U being connected to a PVC-U riser shaft this could be by use of solvent cement meeting the requirements of 4.6 otherwise fixings meeting the requirements of 4.5 should be used.

5.2 Removal of covers from frames

Provision shall be made for enabling effective loosening and opening of covers from frames by means of the usual tools. The method of loosening shall be described in the cover and frame manufacturer's/supplier's literature.

5.3 Appearance

When viewed without magnification, the internal and external surfaces of covers and frames shall be clean and free from defects likely to prevent conformity with this International Standard.

5.4 Colour

Covers and frames shall be coloured black or white unless otherwise specified by agreement between manufacturer and supplier.

6 Geometrical characteristics

6.1 Dimensions - general

The nominal internal diameter of the riser shaft to which the frame is intended to fit shall be used to classify the nominal size of covers and frames.

All dimensions shall be measured in accordance with ISO 3126.

NOTE The sizes of covers and frames and their associated riser shafts are subject to national safety regulations and / or local provisions regarding man-entry limitations. The installer should check for compliance prior to installation.

6.2 Total clearance between cover and frame

The total clearance between cover and frame should not exceed the following:

— Clear opening ≤ 400 mm – maximum clearance 2 mm

— Clear opening > 400 mm – maximum clearance 4 mm

6.3 Compatibility of seatings

When the cover is fitted into its frame as per the manufacturers instructions the rim of the cover shall not protrude by more than 2 mm above the upper edge of the frame.

6.4 Flatness of manhole covers

The upper surface of covers shall be flat within a tolerance of 2 % of the clear opening dimension.

Any deviation from flatness shall be convex, thus eliminating any dishing of the top surface that could lead to ponding in use.

6.5 Anti–skid pattern

Unless subject to the skid resistance provisions of Clause 10 all covers shall have a raised pattern or coarse textured surface. The raised pattern or surface texturing shall have a height of between 2 to 6 mm.

The total surface area of pattern or texture shall be as evenly spread over the surface of the cover as practicable to allow free draining. The area of raised pattern or texture shall not be less than 10 % and not more than 70 % of the total plan area of the cover.

7 Classification and installation

Gully tops and manhole tops are divided into the following loading classes:

A 15, A 35, B 125

The class of manhole top or gully top to be used in a particular installation depends upon the place of the installation. The selection of the appropriate class is the responsibility of the designer and installer. Where there is any doubt, the stronger class should be selected.

Class A 15

Areas which can only be used by pedestrians and pedal cyclists.

Class A 35

Private *household* driveways not part of the Public Highway.

Class B 125

Footways, pedestrian areas and comparable areas, car parks or car parking decks (areas not accessible by lorries or other heavy goods vehicles).

8 Mechanical characteristics

When tested as detailed in Table 2, the cover and frame shall conform to the corresponding requirements.

Table 2 — Mechanical characteristics of covers and frames

Test parameters		Test method	Requirement
Characteristic Parameter	**Test load P** kN		
Loading and permanent set	Class A15 – 15 Class A35 – 35 Class B125 - 125	EN 124 :1994 Clause 8 [a]	No collapse or cracks at full test load Maximum permanent set at 2/3 P CO [b] 100 Where CO is the clear opening see 3.1.7
Impact resistance	1 kg; 2,0 metres – class A 3.75 kg; 2,5 metres – class B r = 50 mm striker; *T* = (0 ± 3) °C [c]	Annex B	No cracks or other damages impairing the function of the cover.

[a] The cover and frame shall be supported in the test apparatus by a short section of the riser shaft that it is intended to fit to, or as otherwise specified by the manufacturer.

[b] *CO*/50 for *CO* < 450 mm with a maximum value of 6,5 mm.

[c] For cold climate use the test temperature should be T = (–20 ± 3) °C.

9 Physical characteristics

When tested in accordance with the test method detailed in Table 3 any injection moulded PVC-U components shall conform to the requirements of Table 3.

Table 3 — Physical characteristics of PVC-U injection moulded components

Test parameters		Test method	Requirement
Characteristic	Value		
Effect of heating [a]	Test temperature (150 ± 2) °C Heating time	Method A of ISO 580:2005 – air Shall conform to ISO 580:2005	[b]

[a] Large test pieces may be cut to fit the oven.

[b] 1) Within a radius of 15 times the wall thickness around the injection point(s) the depth of cracks, delamination or blisters shall not exceed 50 % of the wall thickness at that point;

2) Within a radius of 10 times the wall thickness from the diaphragm zone the depth of cracks, delamination or blisters shall not exceed 50 % of the wall thickness at that point;

3) Within a radius of 10 times the wall thickness from the ring gate the length of cracks, running through the overall thickness of the wall shall not exceed 50 % of the wall thickness at that point;

4) The weld line shall not have opened more than 50 % of the wall thickness at that line;

5) In other parts of the surface the depths of cracks and delaminations shall not exceed 30 % of the wall thickness at that point. Blisters shall not exceed a length of 10 times the wall thickness.

10 Performance and durability requirements

10.1 General performance

When tested in accordance with the artificial ageing test and the tensile impact tests in column 1 of Table 4 all thermoplastic components of covers and frames shall meet the respective requirements given in column 2 of Table 4. When tested in accordance with the skid resistance test in column 1 of Table 4 the surface of the thermoplastic cover shall meet the minimum skid resistance requirement given in column 2 of Table 4.

Table 4 — Fitness for purpose requirements

Characteristic	Requirement	Test parameters		Test method
Artificial ageing [a]	The change of colour shall not exceed stage 3 of the grey scale according to EN 20105-A02	Radiation energy Cycling and temperature regime	2,6 GJ/m^2 [b] Method 1 of EN 513:1999	Method A of ISO 4892-2 (Xenon test): artificial weathering [b]
		or [c]		
		Exposure time Cycle: - irradiation - condensation	1600 h [b] (UVA 351 lamp) 6h at (50 ± 5) °C 2h at (50 ± 5) °C	ISO 4892-3 (QUV test)
Tensile impact strength after artificial ageing [a]	≥ 50 % of the value before ageing	Test temperature Test piece	(23 ± 2) °C Shall conform to ISO 8256:2004, Table 6	Method A of ISO 8256
Skid resistance [d]	35 minimum	Test temperature Test Piece	23 ± 2 °C As Annex C	Annex C

a) This is intended as a type test for each formulation and colour and may be carried out using samples from components other than covers and frames. Products manufactured from a compound meeting the requirements of Clause 4.3 need not be subject to these requirements.

b) In countries with high u/v (equatorial latitudes) these values should be increased accordingly by the National standards body

c) In cases of dispute, the method of ISO 4892-2:1994 (Xenon test) shall be used.

d) Optional test for products not manufactured in accordance with Clause 6.5

11 Marking of covers and frames

11.1 Marking of covers and frames

Marking elements shall be printed or formed either directly on the component or on a label, in such a way that, after storage, handling and installation, the required legibility is maintained.

NOTE 1 Table 5 specifies two levels of legibility for each of the required markings, coded as follows:

– a = durable in use;

– b = legible at least until the system is installed.

NOTE 2 The manufacturer is not responsible for marking being made illegible due to actions during installation and use such as painting, scratching, covering of the components or by use of e.g. detergents on the components unless agreed with, or specified by the manufacturer.

Marking shall not initiate cracks or other types of defects, which would adversely influence the performance of the fitting.

If the marking is by indentation, the depth of indentation should not be greater than 0,25 mm.

The size of the marking shall be such that the marking is legible without magnification.

Table 5 — Minimum required marking of covers and frames

Aspect	Marking or symbols	Legibility code
- Number of this ISO Standard	ISO 15398	a
- Loading class to which cover and frame has been tested	A15	a
- Manufacturer's name and/or trade mark	XXX	a
- Nominal size(s) of cover and frame	e.g. 800	b
- Cold climate impact class (see Table 2)	*	b
- Higher U/V class (see Table 4)	U/V	b
- Material(s)	Either PVC-U or PVC, PP, PE or PP-MD	a
- Manufacturer's information	[a]	b

[a] For providing traceability the following details shall be given:

– the production period year in figures or in code;

– a name or code for the production site if the manufacturer is producing in different sites, nationally and/or internationally.

11.2 Additional documentation

The manufacturer shall provide an installation guide including at least the following:

— sizes and specification of the risers that the chamber is intended to be connected to;

— a specified means of supporting the frame if not intended to be fully supported by the riser (see Table 3 note a).

Annex A
(normative)

Material requirements for materials used in covers and frames

The minimum material requirements for covers and frames made of materials according to Clause 4.1 is specified in Table A.1.

The declared characteristics as specified by the manufacturer shall be as the material characteristic values of the product as specified in Table A.1.

Table A.1 — Material characteristics to be determined

Characteristic	Test method	Requirement	Injection-moulded				Recycled materials
			PE	PP	PP-MD [a]	PVC-U	
Density [b]	ISO 1183-1 or ISO 1183-2	Max. deviation from declared value [kg/m³]	± 25	± 25	± 25	± 25	± 25
Oxidation induction time at 200 °C (measured on product)	ISO 11357-6	Value	≥ 10	≥ 8	≥ 8	NA	PE: ≥ 10 PP: ≥ 8
K-value	ISO 13229	Max. deviation from declared value	NA	NA	NA	55 min	For PVC-U only: 55 min
Vicat softening point	ISO 2507-1	Minimum value	NA	NA	NA	≥ 75°C	For PVC-U only ≥ 75°C
MFR	ISO 1133-1[c]	Max. upper deviation from declared value	*Y* > 1,5: +20 % *Y* ≤ 1,5: +0,3 g/min	*Y* > 1,5: +20 % *Y* ≤ 1,5: +0,3g/min	*Y* > 1,5: +20 % *Y* ≤ 1,5: +0,3 g/min	NA	For all except PVC-U: *X* > 1,5: +20 % *X* ≤ 1,5: +0,3g/min
		Lower deviation	Free	Free	Free		Free

[a] For PP-MD, the PP base material shall have an OIT of 8 minimum.

[b] Any method of ISO 1183-1 and ISO 1183-2 may be used, provided the result of the determination is accompanied with a reference to the method used for the determination. In case of dispute, the immersion method given in ISO 1183-1 shall be used. Density is not applicable to low pressure moulding.

[c] For PE: 190 °C, 5kg - condition T. For PP: 230 °C, 2,16 kg - condition M.

"NA" denotes "Not applicable"; *Y* is the determined value when tested.

Annex B
(normative)

Impact test on covers and frames

B.1 Apparatus

The test equipment apparatus shall be as given in ISO 3127 using the d90 type striker with a mass of 1 kg or 3.75 kg as appropriate

B.2 Test pieces

Three test pieces shall be taken from representative samples of cover and frame. The test pieces shall be (21 ± 2) days old and conditioned in air at ambient temperature for at least 24 h prior to testing.

B.3 Test procedure

Support the cover and frame on a solid base in such a way that at least a 30 mm gap between cover and floor surface is achieved at point of impact.

Use a straight pipe with an internal diameter of 100 mm to 106 mm and a length of 2,0 m. Place one end of this pipe in the middle of the cover in a vertical position, perpendicular to the surface of the cover.

Annex C
(normative)

Skid resistance test

C.1 General

The measurement of skid resistance on a specimen shall be made using proprietary pendulum friction test equipment to evaluate the frictional properties of the specimen. The pendulum friction test equipment incorporates a spring loaded slider made of a standard rubber attached to the end of the pendulum. On swinging the pendulum, the frictional force between the slider and test surface is measured by the reduction in length of the swing using a calibrated scale.

C.2 Apparatus

Apparatus shall be

— a pendulum friction test equipment in accordance with ENV 12633:2003, Annex A,

— potable water.

C.3 Test pieces

A complete cover shall be used as a test piece, in situations whereby the width of a frame is greater than 25 mm the frame shall also be included in the test as a separate result, in the latter case the test report would show results for the surface of the cover and for the frame.

C.4 Test procedure

C.4.1 Validation and conditioning of the pendulum test equipment

The condition of the pendulum test equipment shall be validated according to the procedure for checking the state of a pendulum tester as described in ENV 12633:2003, Annex B. If the validation results are outside the range of the standard surface, the used slider shall be conditioned in accordance with ENV 12633:2003, A.2.1.10.

After this conditioning, if the validation results are still outside the range of the standard surface, the apparatus shall be investigated and recalibrated if necessary.

The pendulum test equipment shall be conditioned for a period of at least 30 min prior to the commencement of the test. The test equipment, test specimen and slider as well as water, shall be kept at a temperature of (20 ± 5) °C, during this time.

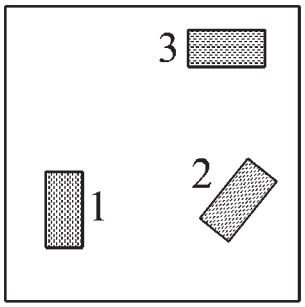
C.4.2 Procedure to determine skid resistance

C.4.2.1 Preparation of sample

The sample shall be cleaned using a dry cloth prior to testing.

C.4.2.2 Location of test areas

Where possible the test shall take place within a 0,5 m × 0,5 m grid as shown in Figure C.1. If it is clear that surface pattern varies across the test area, additional tests may be necessary to take this into account.



Key

1 Test location 1
2 Test location 2
3 Test location 3

Figure C.1 — Test locations

Testing shall be carried out at the three test locations as shown in Figure C.1, i.e. two shall be parallel to the major axes of the cover and one at and angle of 45° to the major axes. Where the test sample is smaller than 500 mm × 500 mm, a similar test pattern shall be adopted.

C.4.2.3 Setting up

The setting up of the pendulum, its zeroing and method of measurement shall be undertaken as described in ENV 12633. In addition, the base of the pendulum tester shall be weighted with a suitable material of mass > 6 kg and < 10 kg to arrest any possible movement during testing.

C.4.2.4 Checking strike distance

Where the surface patterning of the cover does not enable a pendulum strike distance of 126 mm to be achieved (i.e. slider in contact with cover material at start and end of strike distance), a length of less than 126 mm may be chosen. In this case, the actual strike distance shall be recorded, and the values obtained after testing shall be modified by a correction factor. The correction factor shall be determined by reference to standard test materials. Such reference materials shall be tested using the same strike distance as on the sample and also using the standard distance of 126 mm. The correction factor shall be the ratio of the two results.

NOTE Float glass plate and 300 grit waterproof silicon carbide paper have been found to be suitable reference materials.

C.4.2.5 Measuring the value of each specimen

The height of the pendulum arm shall be checked and adjusted so that in traversing the specimen, the rubber slider is in contact with it over the whole width of the slider and over the specified sweep length. The upper surfaces of the specimen and the rubber slider shall then be wetted just in front of the centre of the test location at a rate of 3 l/min applied immediately before each swing of the pendulum, being careful not to disturb the slider from its set position.

The pendulum and pointer shall then be released from the horizontal position and the pendulum arm caught on its return swing, before it touches the test specimen a second time. The position of the pointer

on the scale shall be recorded. This is the pendulum test value. This operation shall be repeated five times at each of the three locations shown in Figure C.1, re-wetting the specimen each time. The last three of the five readings shall be recorded for each test location.

The mean value of the last three of the five readings shall be determined for each test location according to Figure C.1. This shall be the skid value for each location. The mean of the two lowest skid values shall be calculated.

Bibliography

[1] ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method and basic specification*

ICS 83.140.99

Price based on 15 pages