

ISO 9854-1 THERMOPLASTICS PIPES FOR THE TRANSPORT OF LIQUID AND GASEOUS MEDIA – Determination of Charpy Impact Properties – Testing Equipment

Description

1 Scope

This document specifies two general test methods, Method A and Method B, for determining the impact strength of notched and unnotched specimens cut from thermoplastic pipes for the transport of liquid and gaseous media:

- Method A: test method for unnotched specimens cut from thermoplastics pipes for the transport of liquid and gaseous media;
- Method B: test method for notched specimens cut from thermoplastics pipes for the transport of liquids.

The selection of Method A or Method B shall be made in accordance with the relevant product standard.

This document does not establish a reference test method for determining pipe impact strength. ISO 3127, using a

falling mass, is the reference method. This document may be used for scientific research, material testing or pipe

inspection where measurements by the reference method are not possible.

The document applies to both isolated batches and continuously produced pipes

5 Test apparatus

5.1 Pendulum impact-testing machine

The principles, characteristics and verification of a suitable pendulum impact-testing machine shall conform to ISO 13802.

Where required, the machine may incorporate temperature-control equipment capable of maintaining the specified test temperature.

Method A: impact velocity 3.8 m/s; pendulums providing maximum impact energies of 15 J and 50 J; conical striker tip angle $30^\circ \pm 1^\circ$ and tip radius (2.0 ± 0.5) mm; supports in accordance with Figures 1 and 2 for longitudinal specimens and Figure 3 for transverse specimens.

Method B: impact velocity 2.9 m/s; impact machine capable of providing absorbed energy between 10% and 80% of the available pendulum energy, with the same $30^\circ \pm 1^\circ$ striker and (2.0 ± 0.5) mm tip radius; supports in accordance with Figure 4.

5.2 Micrometers and gauges

Micrometers and gauges capable of measuring the principal specimen dimensions to 0.02 mm are required. For the remaining thickness h_N of notched specimens, the micrometer measuring tip shall have a profile corresponding to the notch type.

5.3 Conditioning equipment

A thermostatically controlled enclosure or liquid bath capable of bringing the specimens to the specified temperature T_c . Any bath liquid used shall not adversely affect the physical properties of the specimens.

5.4 Temperature-measuring equipment

capable of verifying the specified temperature to within $\pm 0.5^\circ\text{C}$.

6 Test specimens

6.1 Preparation

Specimens shall be cut from the pipe in accordance with ISO 2818 and 6.2.1 (Method A) or 6.2.2 (Method B), as applicable. Any surface that contacts the supports or the pendulum at impact shall be smooth and free from burrs. Chamfering shall be avoided.

6.2 Cutting and dimensions

6.2.1 Method A

For pipes with nominal outside diameter d_n up to 25 mm, each specimen shall be a pipe length (100 ± 2) mm, specimen type 1.

For $25 \text{ mm} < d_n < 75 \text{ mm}$, each specimen shall be cut longitudinally and shall conform to type 2 or type 3 dimensions.

For $75 \text{ mm} < d_n < 160 \text{ mm}$, specimens shall be cut both longitudinally and transversely.

Longitudinal specimens shall be type 2 or 3; transverse specimens shall be type 4.

For $d_n \geq 160 \text{ mm}$, longitudinal specimens shall be type 2 or 3, and transverse specimens shall be type 4 or 5.

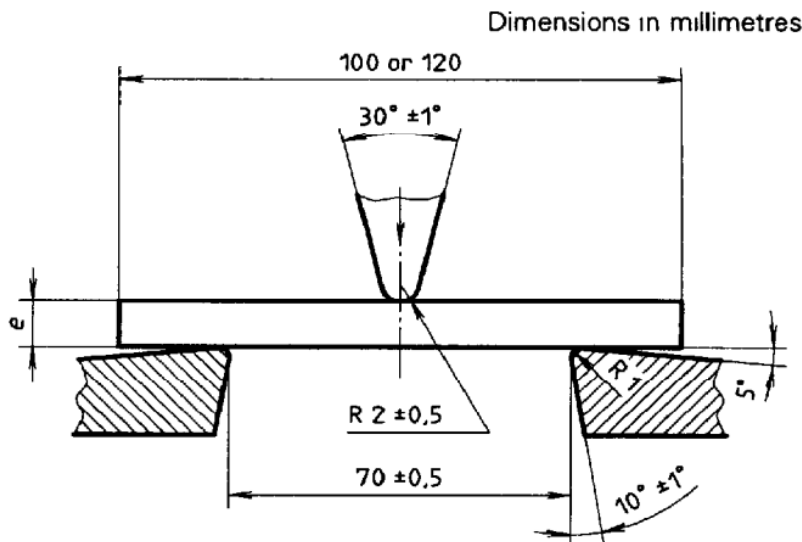


Figure 1 — Striking edge and supports for standard bar test piece

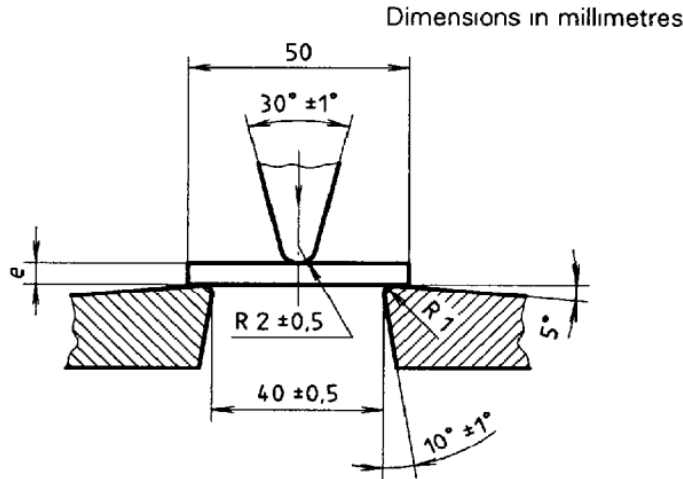


Figure 2 — Striking edge and supports for small bar test piece

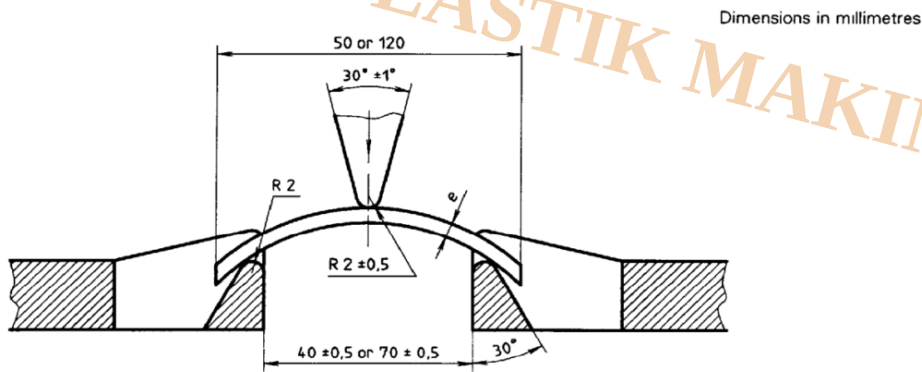


Figure 3 — Supports for convex test piece

6.2.2 Method B

Each notched specimen shall be cut from the pipe in accordance with 6.1 and shall conform to one of the specimen types in Table 1. For types 7 and 9, both surfaces shall be machined to the dimensions specified. A type A notch shall then be made in accordance with ISO 179-1: notch angle $45^\circ \pm 1^\circ$ and notch-tip radius (0.25 ± 0.05) mm. The notch shall be located at the specimen center within ± 1 mm.

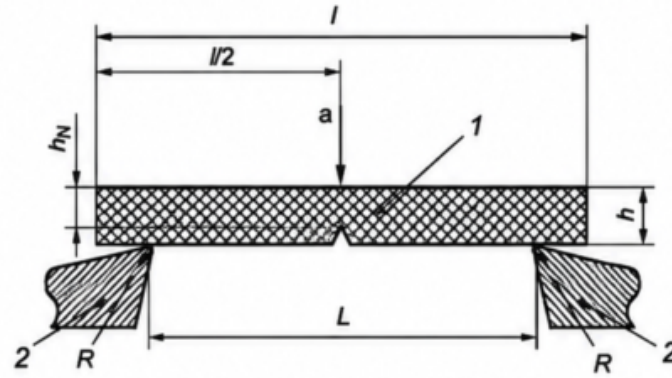
- a) Flatwise impact, $e \leq 6$ mm: type 6, longitudinally cut, notch on the original inner pipe surface.
- b) Flatwise impact, $e > 6$ mm: type 7, longitudinally cut, notch on the machined inner surface.
- c) Edgewise impact, $e \leq 6$ mm: type 8, longitudinally cut, notch on a surface cut from the pipe.
- d) Edgewise impact, $e > 6$ mm: type 9, longitudinally cut, notch on a surface cut from the pipe.

Table 1 - Specimen dimensions

Method	Impact direction	Cut direction	Type	Length l (mm)	Width b (mm)	Thickness h (mm)	Remaining hN (mm)	Span L (mm)
A	-	Longitudinal	1	100 ± 2	Whole pipe	-	Unnotched	70.0 ± 0.5
A	-	Longitudinal	2	50 ± 1	6.0 ± 0.2	e	Unnotched	40.0 ± 0.5
A	-	Longitudinal	3	120 ± 2	15.0 ± 0.5	e	Unnotched	70.0 ± 0.5
A	-	Transverse	4	50 ± 1	6.0 ± 0.2	e	Unnotched	40.0 ± 0.5
A	-	Transverse	5	120 ± 2	15.0 ± 0.5	e	Unnotched	70.0 ± 0.5
B	Flatwise	Longitudinal	6	50 ± 1	6.0 ± 0.2	e	80% of e	40.0 ± 0.5
B	Flatwise	Longitudinal	7	80 ± 2	10 ± 0.5	4.0 ± 0.2	3.2 ± 0.2	62.0 ± 0.5
B	Edgewise	Longitudinal	8	50 ± 1	e	6.0 ± 0.5	4.8 ± 0.2	40.0 ± 0.5
B	Edgewise	Longitudinal	9	80 ± 2	4.0 ± 0.5	10.0 ± 0.5	8.0 ± 0.2	62.0 ± 0.5

e = wall thickness of the pipe as manufactured.

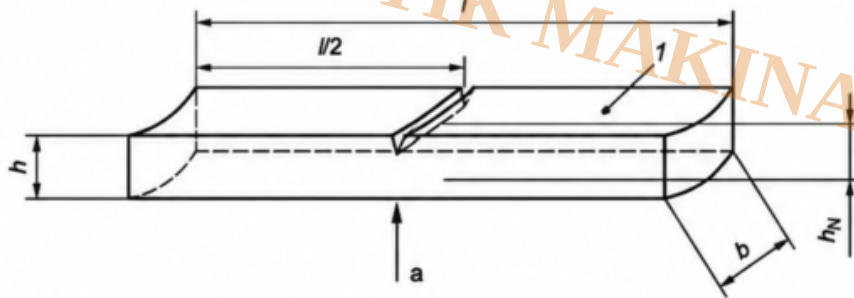
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^a Direction of impact.

1 — specimen; 2 — supports; h — thickness of specimen; h_N — net thickness; l — length of specimen, equal to (50 ± 1) mm or (80 ± 2) mm;
 L — distance between supports (span), see ISO 1791:2023, Figure 6, equal to (40 ± 0.5) mm or (62 ± 0.5) mm;
 R — radius of support, equal to (1 ± 0.1) mm

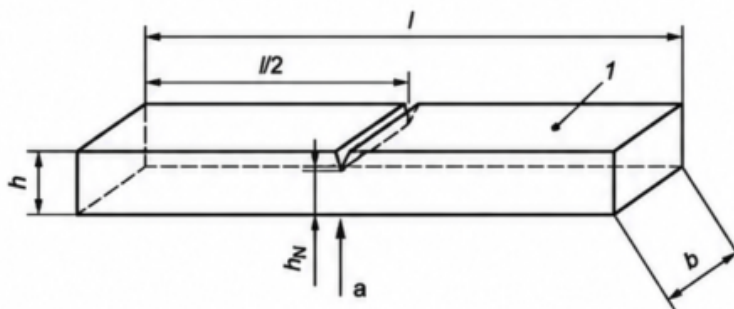
Figure 4 — Location of specimens of types 6, 7 and 9



^a Direction of impact.

1 — inner surface of the tube; b — width of specimen; h — thickness of specimen; h_N — net thickness; l — length of specimen

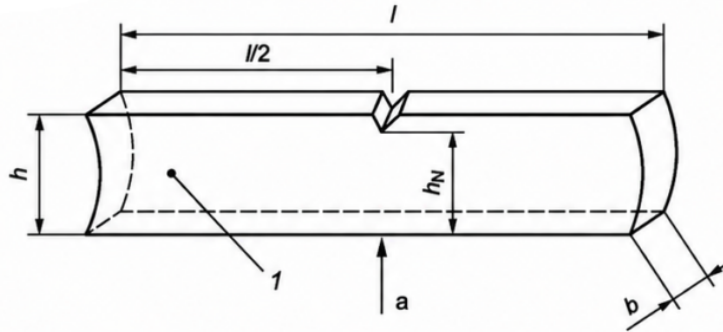
Figure 5 — Charpy impact on specimen type 6



^a Direction of impact.

1 — inner surface of the tube; b — width of specimen; h — thickness of specimen; h_N — net thickness; l — length of specimen

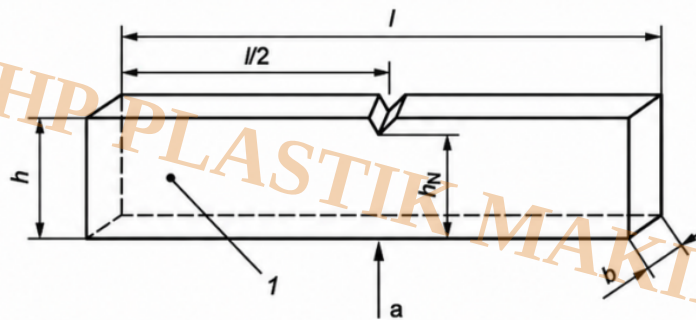
Figure 6 — Charpy impact on specimen type 7



^a Direction of impact.

1 — inner surface of the tube; b — width of specimen; h — thickness of specimen; h_N — net thickness; l — length of specimen

Figure 7 — Charpy impact on the edge of specimen type 8



^a Direction of impact.

1 — inner surface of the tube; b — width of specimen; h — thickness of specimen; h_N — net thickness; l — length of specimen

Figure 8 — Charpy impact on the edge of specimen type 9

[Pendulum Impact Tester \(Izod, Charpy, Tensile impact\)](#)

[ISO 179 Plastics " Determination of Charpy Impact Properties / Brief Test Method and Required Equipment](#)

[Pendulum Impact Tester \(IZOD\)- 15J](#)

[ISO 179 Plastics " Determination of Charpy Impact Properties / Brief Test Method and Required Equipment](#)

[Using Laboratory CNC for Making Samples of ISO 6259 ASTM D 638 , EN 527-3 , ISO 179-1 , ISO 180 & ASTM D256 \(Feasibility Study\)](#)

Category

1. Equipment for Standards
2. Standards
3. Uncategorized

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