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**Thermoplastics pipes for the  
transport of fluids — Determination of  
Charpy impact properties —**

**Part 2:  
Test conditions for pipes of various  
materials**

*Tubes thermoplastiques pour le transport des fluides —  
Détermination des caractéristiques au choc Charpy —*

*Partie 2: Conditions d'essai pour différentes matières constitutives de  
tubes*

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## 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories -- Test methods and basic specifications*.

This second edition cancels and replaces the first edition (ISO 9854-2:1994), which has been technically revised.

The main changes are as follows:

- the title has been revised;
- throughout the document, unplasticized poly(vinyl chloride), for extrusion, impact modified (PVC-U, EP) has been replaced by high-impact poly(vinyl chloride) (PVC-HI);
- throughout the document, polypropylene (PP) and propylene-copolymer have been replaced by propylene homopolymer (PP-H), propylene impact polymer (PP-B) and propylene random copolymer (PP-R);
- propylene random copolymer with modified crystallinity (PP-RCT), oriented unplasticized poly(vinyl chloride) (PVC-O), and polyethylene (PE) have been added in the Scope;
- the normative references listed in [Clause 2](#) have been updated;
- [Clause 3](#), Terms and definitions, has been added;
- the title of [Table 1](#), PVC-U and PVC-U, EP pipes, has been replaced by PVC-U, PVC-HI and PVC-O pipes;
- PVC-O has been added in [Table 1](#);

- the terms "external diameter" and "wall thickness" have been replaced by "nominal outside diameter,  $d_n$ " and "nominal wall thickness,  $e_n$ " in [Tables 1, 2, 3](#) and [4](#);
- the title of [Table 4](#), Polypropylene (PP) and propylene-copolymer pipes, has been replaced by PP-H, PP-B, PP-R and PP-RCT pipes;
- PP-RCT has been added in [Table 4](#);
- [Subclause 4.2](#) has been added specifying method B, and including specifications on PE pipes ([4.2.6](#));
- [Tables 5, 6, 7, 8](#) and [9](#) have been added, including details for notched specimen. [Table 9](#) also specifies PE pipes.

A list of all parts in the ISO 9854 series can be found on the ISO website.

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](http://www.iso.org/members.html).

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## Introduction

This document specifies the test parameters for determining the impact properties of thermoplastics pipes.

The test can be carried out at  $-20\text{ °C}$ ,  $0\text{ °C}$  or  $23\text{ °C}$ , depending on the pipe material and/or size.

Data obtained from specimens of different dimensions are not directly comparable.

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# Thermoplastics pipes for the transport of fluids — Determination of Charpy impact properties —

## Part 2: Test conditions for pipes of various materials

### 1 Scope

This document specifies the values or options chosen for the test parameters (i.e. the impact energy, specimen dimensions, specimen type, specimen supports and test temperature) for both unnotched and notched specimens, for testing the impact resistance (pendulum method) of thermoplastics pipes of the following materials, in accordance with ISO 9854-1.

It applies to pipes made of unplasticized poly(vinyl chloride) (PVC-U), high-impact poly(vinyl chloride) (PVC-HI), oriented unplasticized poly(vinyl chloride) (PVC-O), chlorinated poly(vinyl chloride) (PVC-C), acrylonitrile/butadiene/styrene (ABS), acrylonitrile/styrene/acrylate (ASA), propylene homopolymer (PP-H), propylene impact polymer (PP-B), propylene random copolymer (PP-R), propylene random copolymer with modified crystallinity (PP-RCT), and polyethylene (PE).

### 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 9854-1:2023, *Thermoplastics pipes for the transport of fluids — Determination of Charpy impact properties — Part 1: General test method*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9854-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 4 Specific test conditions

#### 4.1 Method A

##### 4.1.1 General

For testing in accordance with ISO 9854-1, the values or options for the test parameters shall conform to those specified in [Tables 1, 2, 3, or 4](#), and with [4.1.2, 4.1.3, 4.1.4 or 4.1.5](#), as appropriate, depending on the material from which the pipe is made, and its size.

##### 4.1.2 PVC-U, PVC-HI and PVC-O pipes

See [Table 1](#).

4.1.3 PVC-C pipes

See Table 2.

4.1.4 ABS and ASA pipes

See Table 3.

4.1.5 PP-H, PP-B, PP-R and PP-RCT pipes

See Table 4.

Table 1 — PVC-U, PVC-HI and PVC-O pipes

| Pipe dimensions |             |                      | Specimen type <sup>a</sup> | Specimen supports         | Impact energy<br>J | Test temperature<br>°C |        |       |
|-----------------|-------------|----------------------|----------------------------|---------------------------|--------------------|------------------------|--------|-------|
| $d_n$<br>mm     | $e_n$<br>mm | Sample cut direction |                            |                           |                    | PVC-U                  | PVC-HI | PVC-O |
| <25             | All         | longitudinal         | 1                          | ISO 9854-1:2023, Figure 1 | 15                 | 23 ± 2                 | 0 ± 2  | 0 ± 2 |
| ≥25 but <75     | All         |                      | 2                          | ISO 9854-1:2023, Figure 2 | 15                 |                        |        |       |
| ≥75             | ≤9,5        |                      | 2                          | ISO 9854-1:2023, Figure 2 | 15                 |                        |        |       |
| ≥75             | >9,5        |                      | 3                          | ISO 9854-1:2023, Figure 2 | 50                 |                        |        |       |
| ≥75 but <160    | All         | circumferential      | 4                          | ISO 9854-1:2023, Figure 3 | 15                 |                        |        |       |
| ≥160            | ≤9,5        |                      | 4                          |                           | 15                 |                        |        |       |
| ≥160            | >9,5        |                      | 5                          | 50                        |                    |                        |        |       |

<sup>a</sup> See ISO 9854-1:2023, Table 1.

Table 2 — PVC-C pipes

| Pipe dimensions |               |                      | Specimen type <sup>a</sup> | Specimen supports         | Impact energy<br>J | Test temperature<br>°C |
|-----------------|---------------|----------------------|----------------------------|---------------------------|--------------------|------------------------|
| $d_n$<br>mm     | $e_n$<br>mm   | Sample cut direction |                            |                           |                    |                        |
| <25             | All           | longitudinal         | 1                          | ISO 9854-1:2023, Figure 1 | 15                 | 23 ± 2                 |
| ≥25 but <75     | ≤4,2          |                      | 2                          | ISO 9854-1:2023, Figure 2 |                    |                        |
| ≥25 but <75     | >4,2 but ≤9,5 |                      | 3                          | ISO 9854-1:2023, Figure 2 |                    |                        |
| ≥75             | ≤9,5          |                      | 2                          | ISO 9854-1:2023, Figure 2 |                    |                        |
| ≥75             | >9,5          |                      | 3                          | ISO 9854-1:2023, Figure 2 |                    |                        |

<sup>a</sup> See ISO 9854-1:2023, Table 1.

Table 2 (continued)

| Pipe dimensions |             |                      | Specimen type <sup>a</sup> | Specimen supports         | Impact energy<br>J | Test temperature<br>°C |
|-----------------|-------------|----------------------|----------------------------|---------------------------|--------------------|------------------------|
| $d_n$<br>mm     | $e_n$<br>mm | Sample cut direction |                            |                           |                    |                        |
| ≥75             | All         | circumferential      | 4                          | ISO 9854-1:2023, Figure 3 |                    |                        |

<sup>a</sup> See ISO 9854-1:2023, Table 1.

Table 3 — ABS and ASA pipes

| Pipe dimensions |             |                      | Specimen type <sup>a</sup> | Specimen supports         | Impact energy<br>J | Test temperature<br>°C |
|-----------------|-------------|----------------------|----------------------------|---------------------------|--------------------|------------------------|
| $d_n$<br>mm     | $e_n$<br>mm | Sample cut direction |                            |                           |                    |                        |
| <75             | <3          | longitudinal         | 2                          | ISO 9854-1:2023, Figure 2 | 15                 | 23 ± 2                 |
| <75             | ≥3          |                      | 3                          | ISO 9854-1:2023, Figure 2 |                    |                        |
| ≥75             | <3          |                      | 2                          | ISO 9854-1:2023, Figure 2 |                    |                        |
| ≥75             | ≥3          |                      | 3                          | ISO 9854-1:2023, Figure 2 |                    |                        |
| ≥75 but <160    | All         | circumferential      | 4                          | ISO 9854-1:2023, Figure 3 |                    |                        |
| ≥160            | <3          |                      | 4                          |                           |                    |                        |
| ≥160            | ≥3          |                      | 5                          |                           |                    |                        |

<sup>a</sup> See ISO 9854-1:2023, Table 1.

Table 4 — PP-H, PP-B, PP-R and PP-RCT pipes

| Pipe dimensions          |                |                      | Specimen type <sup>a</sup> | Specimen supports         | Impact energy<br>J | Test temperature<br>°C |                       |
|--------------------------|----------------|----------------------|----------------------------|---------------------------|--------------------|------------------------|-----------------------|
| $d_n$<br>mm              | $e_n$<br>mm    | Sample cut direction |                            |                           |                    | PP-H                   | PP-B, PP-R and PP-RCT |
| <25                      | All            | longitudinal         | 1                          | ISO 9854-1:2023, Figure 1 | 15                 | 23 ± 2                 | 0 ± 2                 |
| ≥25 <sup>b</sup> but <75 | ≤4,2           |                      | 2                          | ISO 9854-1:2023, Figure 2 |                    |                        |                       |
| ≥25 <sup>b</sup> but <75 | >4,2 but ≤10,5 |                      | 3                          | ISO 9854-1:2023, Figure 2 |                    |                        |                       |
| ≥75                      | >4,2 but ≤10,5 |                      | 3                          | ISO 9854-1:2023, Figure 2 |                    |                        |                       |

NOTE When the wall thickness of the pipe is greater than 10,5 mm, Method B is preferred.

<sup>a</sup> See ISO 9854-1:2023, Table 1.

<sup>b</sup> For  $d_n$  25 pipes, product standards can define different specimen type for pipe impact test based on application.