INTERNATIONAL STANDARD

ISO 13478

Second edition
2007-08-15

Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full-scale test (FST)

Tubes en matières thermoplastiques pour le transport des fluides — Détermination de la résistance à la propagation rapide de la fissure (RCP) — Essai grandeur nature (FST)

Reference number
ISO 13478:2007(E)

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Published in Switzerland

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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.

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 13478 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 13478:1997), which has been technically revised.

Introduction

Test methods that measure the resistance of internally pressurized plastics pipes to rapid fracture propagation (RCP) have been standardized: ISO 13477 [1] and this International Standard. The S4 method specified in ISO 13477 utilizes short lengths of pipe to determine a critical RCP pressure or temperature for the pipe. Longer pipes up to 20 m in length are the basis of this full-scale test (FST) method for measurement of these critical parameters. On the one hand, the S4 method uses internal baffles to prevent rapid decompression of the internal test pressure, thus ensuring that the high-speed crack tip is exposed to the full pipe pressure throughout the test. The FST, on the other hand, has no baffles installed and is more related to field service. The crack tip is subjected to a reducing pressure by decompression effects as the crack propagates. This arrangement reflects the RCP mode of failure of long pipelines and is assumed to be the reference test method. The critical RCP values derived from each test are different but can be correlated experimentally. A mathematical equation for correlation has been developed for polyethylene (PE) pipes (see ISO 13477).

Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full-scale test (FST)

1 Scope

This International Standard specifies a full-scale test (FST) method for determining the arrest or propagation of a crack initiated in a thermoplastics pipe at a specified temperature and internal pressure. The method is also suitable for the determination of defined critical pressure, critical stress and critical temperature parameters.

It is applicable to the assessment of the performance of thermoplastics pipes intended for the supply of gases or liquids. In the latter case, air could also be present in the pipe.

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 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 1: General method*

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

ISO 11922-1, *Thermoplastics pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 11922-1 and the following apply.

3.1
critical pressure
p_c
highest crack-arrest pressure below the lowest crack-propagation pressure

3.2
critical hoop stress
σ_c
highest crack-arrest hoop stress below the lowest crack-propagation hoop stress

3.3
critical temperature
T_c
lowest crack-arrest temperature above the highest crack-propagation temperature