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**Polyethylene (PE) pipes and fittings —  
Determination of the tensile strength and  
failure mode of test pieces from a butt-fused  
joint**

*Tubes et raccords en polyéthylène (PE) — Détermination de la résistance  
en traction et du mode de rupture d'éprouvettes prélevées dans des  
assemblages par soudage bout à bout*



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Printed 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.

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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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13953 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*.

# Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint

## 1 Scope

This International Standard describes a test method for determination of the tensile strength and tensile failure mode of butt-fused polyethylene (PE) pipe assemblies.

The method is applicable to butt-fused joints between PE pipes with a nominal outside diameter of not less than 90 mm.

The method may be used, together with other test methods, to evaluate the quality of the butt-fused joints.

## 2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 11414:1996, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion*.

## 3 Principle

A test piece machined from a butt-fused PE pipe joint to give a waisted section is subjected to a tensile stress at constant speed. When loading the test piece in a tensile-testing machine, the stress is concentrated through the jointed region and ultimate failure is in the vicinity of the joint.

The failure mode and tensile strength are used as criteria for the evaluation of the butt-fused joint.

The test is carried out at a temperature of  $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ .

## 4 Apparatus

**4.1 Room**, which can be controlled at a temperature of  $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ .

**4.2 Tensile-testing machine**, capable of sustaining between its clamping jaws a constant speed of  $5\text{ mm/min} \pm 1\text{ mm/min}$ , and equipped with means for recording the consequent applied force, and a device to detect test piece failure.

**4.3 Clamping device**, equipped with bars fitting into traction holes machined in the test piece.

**4.4 Measuring devices**, capable of determining the width and thickness of the test piece to within 0,05 mm (see 7.1).

**4.5 Template with the geometry of the test piece** (see Figures 1 and 2), to mark the shape of the test piece to be machined.