

Second edition
2011-05-15

Corrected version
2011-06-01

**Plastics pipes and fittings — Butt fusion
jointing procedures for polyethylene (PE)
pipes and fittings used in the
construction of gas and water
distribution systems**

*Tubes et raccords en matières plastiques — Modes opératoires
d'assemblage par soudage bout à bout de tubes et raccords en
polyéthylène (PE) utilisés pour la construction de systèmes de
distribution de gaz et d'eau*



Reference number
ISO 21307:2011(E)

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Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope.....	1
2 Normative references	1
3 Terms and definitions	2
4 Butt fusion joining process.....	3
4.1 General	3
4.2 Principle.....	4
4.3 Cleaning the pipe or fitting ends, planing unit and heater surfaces.....	4
4.4 Clamping the components	4
4.5 Planing the pipe or fitting ends.....	5
4.6 Aligning the pipes or fittings.....	5
4.7 Measuring the drag pressure	5
4.8 Melting the pipe or fitting ends.....	5
4.9 Joining the pipe or fitting ends.....	5
4.10 Cooling the pipe or fitting ends.....	5
5 Butt fusion joining procedures.....	5
5.1 Single low-pressure fusion joining procedure.....	6
5.2 Dual low-pressure fusion joining procedure.....	7
5.3 Single high-pressure fusion joining procedure	8
6 Quality control	9
6.1 General	9
6.2 Joint integrity testing	9
6.3 Non-destructive quality control procedures.....	9
Annex A (informative) Examples of single low-pressure, dual low-pressure and single high-pressure procedures.....	10

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 21307 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transports of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*.

This second edition cancels and replaces the first edition (ISO 21307:2009), which has been technically revised.

This corrected version of ISO 21307:2011 incorporates the following corrections:

- 5.1: The first sentence has been modified.
- 5.2: The first sentence has been modified.
- Table A.1: The title has been modified.
- A.3: The subclause heading has been modified.
- Table A.3: The title has been modified.

Introduction

With the increasing use of bimodal polyethylene (PE) materials such as PE 80 and PE 100, more and more PE compounds are appearing on the pipe market accompanied by proposals for butt fusion procedures that often differ for the same materials. The aim of standardization is to encourage the use of similar procedures for similar materials. There is a need to examine current practice on a global scale and establish the best procedure(s) for the highest-quality, most reliable and efficient construction of PE butt fusion systems for gas and water distribution.

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Plastics pipes and fittings — Butt fusion jointing procedures for polyethylene (PE) pipes and fittings used in the construction of gas and water distribution systems

1 Scope

This International Standard establishes general principles regarding the procedure used in the construction and quality assessment of butt fusion joints incorporating fittings (ISO 8085-2) and pipes used in the construction of gas (ISO 4437) and water (ISO 4427) distribution systems made with equipment that complies with ISO 12176-1 and installed in accordance with ISO/TS 10839, relevant codes of practice, national regulations or industry guidance. Specifically, this International Standard specifies a number of proven butt fusion jointing procedures for pipes and fittings with a wall thickness up to and including 70 mm. This International Standard takes into consideration the materials and components used, the fusion jointing procedure and equipment and the quality assessment of the completed joint. It can be applied in conjunction with appropriate national regulations and standards.

NOTE It is important that pipe or fitting manufacturers and equipment manufacturers be consulted when undertaking butt fusion jointing of pipes with a wall thickness greater than 70 mm.

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 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 3: Preparation of components*

ISO 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 4: Preparation of assemblies*

ISO 4065, *Thermoplastics pipes — Universal wall thickness table*

ISO 4427 (all parts), *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply*

ISO 4437, *Buried polyethylene (PE) pipes for the supply of gaseous fuels — Metric series — Specifications*

ISO 8085-2, *Polyethylene fittings for use with polyethylene pipes for the supply of gaseous fuels — Metric series — Specifications — Part 2: Spigot fittings for butt fusion, for socket fusion using heated tools and for use with electrofusion fittings*

ISO/TS 10839, *Polyethylene pipes and fittings for the supply of gaseous fuels — Code of practice for design, handling and installation*

ISO 12176-1¹⁾, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

ISO 13953, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*

ASTM F2634, *Standard test method for laboratory testing of polyethylene (PE) butt fusion joints using tensile-impact method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

- 3.1 cooling-cycle reduced pressure**
reduced pressure, used in the cooling cycle of the dual low-pressure procedure after jointing time
- 3.2 cooling time in the machine under pressure**
time period during which the butt fusion joint remains under pressure when still clamped in the machine
- 3.3 cooling time in machine without pressure or out of machine**
additional cooling period that may be required after the cooling time under pressure to ensure optimum joint strength, particularly when working at high ambient temperatures and prior to rough handling or pipe installation
- 3.4 drag pressure**
gauge pressure required to overcome, on a given machine, the sliding frictional drag force of the machine and pipe
- 3.5 fusion jointing pressure**
actual pressure exerted on the pipe or fitting ends during jointing
- 3.6 gauge pressure**
actual pressure read by the gauge of the butt fusion jointing machine
- 3.7 heater plate removal time**
heater plate dwell time
time taken to separate the pipe or fitting ends from the heater plate, remove the heater plate and close the carriage in order to bring the molten pipe or fitting ends together
- 3.8 heater plate temperature**
measured temperature on the surface of the heater plate where the pipe or fitting wall cross-section makes contact
- 3.9 heat soak pressure**
pressure required to maintain the pipe or fitting in contact with the heater plate

1) To be published. (Revises ISO 12176-1:2006)