



DPC: 24/30474126 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 02 September 2024

Origin: International

Latest date for receipt of comments: 26 October 2024

Project No. 2023/01038

Responsible committee: PRI/88 Plastics piping systems

Interested committees:

Title: Draft BS ISO 16611 Plastics piping systems for drainage and sewerage without pressure. Non-circular pipes and joints made of glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resins (UP). Dimensions, requirements and tests.

Please notify admin.start@bsigroup.com if you are aware of any keywords that might assist in clarifying or identifying the standard or of the content of this standard:

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 26 October 2024

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 16611

Plastics piping systems for drainage and sewerage without pressure — Non-circular pipes and joints made of glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resins (UP) — Dimensions, requirements and tests

*Systèmes de canalisation en plastiques pour réseaux
d'assainissement sans pression — Tuyaux non-circulaires,
assemblages de tuyaux et raccords en plastiques
thermodurcissables renforcés de verre (PRV) à base de résines de
polyester non saturé (UP) — Dimensions, exigences et essais*

ICS: 91.140.80; 93.030; 23.040.20; 23.040.45

This document is circulated as received from the committee secretariat.

ISO/TC 138/SC 6

Secretariat: **ASI**

Voting begins on:
2024-09-02

Voting terminates on:
2024-11-25

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENTS AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

Reference number
ISO/DIS 16611:2024(en)

Full document details: 24/30474126 DC

© ISO 2024  **Documents**
Document Sharing Hub



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 General requirements	8
4.1 Classification	8
4.1.1 Categories	8
4.1.2 Nominal size	8
4.2 Materials	8
4.2.1 General	8
4.2.2 Reinforcement	8
4.2.3 Resin	8
4.2.4 Aggregates and fillers	8
4.2.5 Elastomers	9
4.2.6 Metals	9
4.3 Wall construction	9
4.3.1 Inner layer	9
4.3.2 Structural layer	9
4.3.3 Outer layer	9
4.3.4 Appearance	9
4.4 Reference conditions for testing	9
4.4.1 Temperature	9
4.4.2 Properties of water for testing	10
4.4.3 Loading conditions	10
4.4.4 Conditioning	10
4.4.5 Measurement of dimensions	10
4.4.6 Elapsed time for determination of long-term properties, (x)	10
4.5 Joints	10
4.5.1 General	10
4.5.2 Types of joint	10
4.5.3 Flexibility of the jointing system	10
4.5.4 Sealing ring	11
4.5.5 Adhesives	11
4.6 Assessment of conformity	11
5 Pipes	11
5.1 Geometrical characteristics	11
5.1.1 Dimensions	11
5.2 Mechanical characteristics	12
5.2.1 General	12
5.2.2 Short-term bending modulus	13
5.2.3 Long-term creep bending modulus	14
5.2.4 Short-term bending strength	14
5.2.5 Long-term bending strength	15
5.2.6 Resistance to strain corrosion	16
5.2.7 Minimum initial longitudinal tensile strength	16
5.3 Marking	18
6 Fittings	18
6.1 All types	18
6.1.1 General	18
6.1.2 Diameter series	18
6.1.3 Mechanical characteristics of fittings	18
6.1.4 Installed leak tightness of fittings	19

6.1.5	Dimensions.....	19
6.2	Marking.....	19
7	Joint performance.....	19
7.1	General.....	19
7.1.1	Requirements.....	19
7.1.2	Test temperature.....	19
7.1.3	Dimensions.....	19
7.2	Flexible joints.....	20
7.2.1	General.....	20
7.2.2	Maximum allowable draw.....	20
7.2.3	Maximum allowable angular deflection.....	20
7.2.4	Maximum allowable misalignment.....	20
7.2.5	Flexible non-end-load-bearing joints with elastomeric sealing rings.....	20
7.3	Rigid joints.....	21
7.3.1	Wrapped or cemented.....	21
Annex A (informative) Examples for static calculation.....		23
Bibliography.....		24

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).

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/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. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee *[or Project Committee]* ISO/TC *[or ISO/PC]* 138 *[Plastics pipes, fittings and valves for the transport of fluids]*, Subcommittee SC 06 *[Reinforced plastics pipes and fittings for all applications]*.

This second edition cancels and replaces the first edition (ISO 16611:2017), which has been technically revised.

The main changes are as follows:

- Updating of normative references,
- Aligning the definition of the initial ring stiffness with other standards, see [3.4](#),
- Aligning the definition of the wet creep factor with other standards, see [3.6](#),
- Introduction of a new subclause on “Assessment of conformity”, see [4.6](#),
- Removing inconsistencies in [clause 7](#) “joint performance”.

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.

Introduction

The goal to establish this product standard is to standardize the requirements for non-circular GRP pipes.

This document specifies the requirements for non-circular GRP pipe systems, designed to be used for the renovation of existing channels or open cut installation.

This document specifies dimensions, requirements and tests of non-circular pipes including short and long-term properties. To establish long-term properties, it is recommended to use the circular pipes samples.

[Annex A](#) shows commonly used calculation methods but only as information. The calculation method is selected by the designer.

This document does not include the recommended practice for installation as this should be a separate document.

Plastics piping systems for drainage and sewerage without pressure — Non-circular pipes and joints made of glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resins (UP) — Dimensions, requirements and tests

1 Scope

This document specifies the required properties of the piping system and its components made from glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) intended to be used for drainage or sewerage without pressure including culverts.

It is the responsibility of the purchaser or specifier to make the appropriate selections taking into account their particular requirements and any relevant national regulations and installation practices or codes.

This document is applicable to non-circular GRP-UP pipes, with flexible or rigid joints, primarily intended for use in buried installations but may also be used to reline existing non-circular pipe lines.

NOTE 1 GRP-UP includes pipes with vinyl ester liners or made entirely from vinyl ester.

NOTE 2 Piping systems conforming to this document can be used also for non-buried applications provided the influence of the environment, e.g. from UV-radiation, and the supports are considered in the design of the pipes, fittings and joints.

This document is applicable to pipes, fittings and their joints of nominal sizes from DN 150 to DN 4000, which are intended to be used for the conveyance of surface water or sewage at temperatures up to 50 °C.

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 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 178, *Plastics — Determination of flexural properties*

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

ISO 4633, *Rubber seals — Joint rings for water supply, drainage and sewerage pipelines — Specification for materials*

ISO 8513, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Test methods for the determination of the initial longitudinal tensile strength*

ISO 8533, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods to prove the design of cemented or wrapped joints*

ISO 8639, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods for leaktightness and proof of structural design of flexible joints*

ISO 7685, *Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial ring stiffness*

ISO 10468, *Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the ring creep properties under wet or dry conditions*

ISO 10928, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Methods for regression analysis and their use*

ISO 10952, *Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of the resistance to chemical attack for the inside of a section in a deflected condition*

EN 681-1, *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

CEN/TS 14632, *Plastics piping systems for drainage, sewerage and water supply, pressure and non-pressure — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) — Guidance for the assessment of conformity*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/>

3.1

nominal size

$BN \times HN$

alphanumeric designation of size, which is common to all components in a piping system, it is a convenient pair of numbers for reference purposes that is related to the maximum internal breadth (B) and the maximum internal height (H)

Note 1 to entry: The designation for reference or marking purposes consists of the letters $BN(B) \times HN(H)$ and the numerical values for (B) and (H), when expressed in millimetres.

3.2

declared dimensions

dimensions which a manufacturer states to be the internal breadth (B) and height (H) produced in respect of a particular nominal size $BN \times HN$

3.3

specific ring stiffness

S

physical characteristic of a circular pipe which is a measure of the resistance to ring deflection per metre length under external load

Note 1 to entry: Specific ring stiffness is determined using formula below and is expressed in Newtons per square metre (N/m^2):

$$S = \frac{E \cdot I}{d_m^3}$$

where

E is the apparent modulus of elasticity, which can be derived from the result of the ring stiffness test, i.e. ISO 7685, expressed in Newtons per square metre (N/m^2);

d_m is the mean diameter of the pipe, in metres (m) (see 3.5);