

Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications —

Part 1: Vulcanized rubber

The European Standard EN 681-1:1996, with the incorporation of amendments A1:1998, A2:2002 and A3:2005, has the status of a British Standard

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PRI/70, Elastomeric seals for joints in pipework and pipelines, upon which the following bodies were represented:

British Gas plc

British Plastics Federation

British Precast Concrete Federation Ltd.

British Rubber Manufacturers' Association Ltd.

Chartered Institution of Water and Environmental Management

Clay Pipe Development Association Limited

Concrete Pipe Association

Ductile Iron Producers' Association

Fibre Cement Manufacturers' Association Limited

Malaysian Rubber Producers Research Association

RAPRA Technology Ltd.

Society of British Water Industries

Water Companies Association

Water Services Association of England and Wales

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National foreword

This British Standard has been prepared by Technical Committee PRI/70 and is the English language version of EN 681-1:1996, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*, including amendments A1:1998, A2:2002, A3:2005 and Corrigendum August 2002, published by the European Committee for Standardization (CEN).

The start and finish of text introduced or altered by CEN amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

EN 681-1:1996 was produced as a result of international discussions in which the United Kingdom took an active part.

EN 681-1:1996 has been approved by CEN member bodies under the weighted voting procedures introduced in 1988 to coincide with the introduction of “New Approach” Directives from the Commission of the European Community.

To ensure that these products do not have any detrimental effects on the quality of water intended for human consumption, the materials of construction in contact with water will be tested in accordance with the method standards being developed by CEN/TC 64 concerned with effects of materials on water quality.

In the absence of these standards, the respective national standard, BS 6920 applies.

This standard supersedes requirements for vulcanized rubber seals types W, D, H and S, used in water and drainage applications as given in BS 2494 and these types will be withdrawn by amendment. Other Parts of BS EN 681 will be published in the future to supersede requirements for type T and type G seals in BS 2494.

Attention is drawn to paragraph 2 of the European foreword. It was decided by CEN/TC 208 that there would be a one year transition period during which vulcanized rubber seals may be produced to either BS 2494 or BS EN 681-1. Following the changeover period, BS 2494 will be amended to delete requirements for vulcanized rubber seals, i.e. by October 1997.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standard Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii the EN title page, pages 2 to 19 and a back cover.

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English version

Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber

(includes amendments A1:1998, A2:2002 and A3:2005)

Garnitures d'étanchéité en caoutchouc —
Spécification des matériaux pour garnitures
d'étanchéité pour joints de canalisations utilisées
dans le domaine de l'eau et de l'évacuation —
Partie 1: Caoutchouc vulcanisé
(inclut les amendements A1:1998, A2:2002 et
A3:2005)

Elastomer-Dichtungen —
Werkstoff-Anforderungen für
Rohrleitungs-Dichtungen für Anwendungen in der
Wasserversorgung und Entwässerung —
Teil 1: Vulkanisierter Gummi
(enthält Änderungen A1:1998, A2:2002 und
A3:2005)

This European Standard was approved by CEN on 1996-04-07; amendment A1 was approved by CEN on 1998-05-28, amendment A2 was approved by CEN on 2002-02-25 and amendment A3 was approved by CEN on 2005-07-14. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 208, Elastomeric seals for joints in pipework and pipelines, the Secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 1996, and conflicting standards shall be withdrawn at the latest by October 1996.

This standard has been prepared under a mandate issued to CEN by the European Commission and the European Free Trade Association and supports Essential Requirements of EU Directives.

For the relationship with the EU Directives, see informative Annex ZA, which is an integral part of this standard.

This Part is based on ISO 4633 and ISO 9631, bringing these two sets of requirements (for cold and hot water respectively) under one specification. The major changes from ISO 4633 and ISO 9631 have been to incorporate requirements for effect on water quality and ozone resistance. The emphasis in respect of low temperature testing has moved away from hardness measurement to compression set, which is more discriminating.

A European Standard is to be prepared for material effects on water quality and when published it is intended that materials comply with the requirements of that standard.

A European Standard is also to be prepared for microbiological deterioration requirements and when published it is intended that materials comply with the requirements of that standard.

Part 2 has been prepared by CEN/TC 208 in response to requests from CEN/TC 155 for a material specification for thermoplastic elastomer seals for use in conjunction with non-pressure thermoplastic pipe systems.

Part 3 has been prepared in response to those sections of the pipeline industry which employ cellular seals of vulcanized rubber.

Part 4 has been prepared in response to those sections of the pipeline industry which employ cast polyurethane seals.

According to the CEN/CENELEC Internal Regulations, the national standards organization of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This amendment EN 681-1:1996/A1:1998 to the EN 681-1:1996 has been prepared by Technical Committee CEN/TC 208, Elastomeric seals for joints in pipework and pipelines, the Secretariat of which is held by BSI.

This amendment to the European Standard EN 681-1:1996 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1998, and conflicting national standards shall be withdrawn at the latest by December 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A2

This document EN 681-1:1996/A2:2002 has been prepared by Technical Committee CEN/TC 208, Elastomeric seals for joints in pipework and pipelines, the Secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2002, and conflicting national standards shall be withdrawn at the latest by December 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A3

This document (EN 618-1:1996/A3:2005) has been prepared by Technical Committee CEN/TC 208 “Elastomeric seals for joints in pipework and pipelines”, the secretariat of which is held by BSI.

This Amendment to the European Standard EN 681-1:1996 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2006, and conflicting national standards shall be withdrawn at the latest by February 2006.

This document amends EN 681-1:1996, including amendments A1:1998 and A2:2002 and incorporating Corrigendum 1 August 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

The product (in accordance with this standard) which is in permanent or temporary contact with water, intended for human consumption, does not adversely affect the quality of the drinking water and does not contravene the EC Directives and EFTA Regulations on the quality of drinking water.

1 Scope

This standard specifies requirements for materials used in vulcanized rubber seals for:

- 1) cold potable water supply (up to 50 °C);
- 2) hot potable and non-potable water supply (up to 110 °C);
- 3) drainage, sewerage and rainwater systems (continuous flow up to 45 °C and intermittent flow up to 95 °C);

The different designations of seals specified are defined according to their type, application and requirements (see Table 4).

General requirements for finished joint seals are also given; any additional requirements called for by the particular application are specified in the relevant product standards taking into account that the performance of pipe joints is a function of the seal material properties, seal geometry and pipe joint design. This standard should be used where appropriate with product standards which specify performance requirements for joints.

This standard is applicable to joint seals for all pipeline materials, including iron, steel, clay, fibre cement, concrete, reinforced concrete, plastics and glass-reinforced plastics.

It is applicable to elastomeric components of composite or non-composite seals. In the case of composite seals for materials of hardness ranges from 76 IRHD to 95 IRHD the requirements for elongation at break, compression set and stress relaxation apply only when the material is participating in the sealing function, or the long term stability of the seal.

Joint seals made with an enclosed void as part of their design are included in the scope of this European Standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 37, Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties.

ISO 48, Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD).

ISO 188, Rubber, vulcanized — Accelerated ageing or heat-resistance tests.

ISO 471, Rubber — Times, temperatures, and humidities for conditioning and testing.

ISO 815, Rubber, vulcanized or thermoplastic — Determination of compression set at ambient, elevated or low temperatures.

ISO 816, Rubber, vulcanized — Determination of tear strength of small test pieces (Delft test pieces).

ISO 1431-1, Rubber, vulcanized or thermoplastic — Resistance to ozone cracking — Part 1: Static strain test.

ISO 1629, Rubber and latices — Nomenclature.

ISO 1817, Rubber, vulcanized — Determination of the effect of liquids.

ISO 2285, Rubber, vulcanized or thermoplastic — Determination of tension set at normal and high temperatures.

ISO 2859-1, Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.

ISO 3302, Rubber — Dimensional tolerances for use with products.