PD 8010-1:2015+A1:2016

BSI Standards Publication

PUBLISHED DOCUMENT

Pipeline systems –

Part 1: Steel pipelines on land – Code of practice

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Publishing and copyright information

Published by BSI Standards Limited 2016

ISBN 978 0 580 94881 7

ICS 23.040.10; 75.200

The following BSI references relate to the work on this document:
Committee reference PSE/17/2
Drafts for comment 14/30286897 DC; 16/30344659 DC

Publication history

First published July 2004
Second (present) edition, March 2015

Amendments issued since publication

Date	Text affected
November 2016	A1 - See Foreword

Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 164, an inside back cover and a back cover.

Foreword

Publishing information

This part of PD 8010 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 March 2015. It was prepared by Subcommittee PSE/17/2, *Pipeline transportation systems*, under the authority of Technical Committee PSE/17, *Materials and equipment for petroleum*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

This part of PD 8010 supersedes PD 8010-1:2015, which is withdrawn.

Relationship with other publications

The PD 8010 series comprises:

- Part 1: *Steel pipelines on land – Code of practice*;
- Part 2: *Subsea pipelines – Code of practice*;
- Part 3: *Steel pipelines on land – Guide to the application of pipeline risk assessment to proposed developments in the vicinity of major accident hazard pipelines containing flammables – Supplement to PD 8010-1:2004*;
- Part 4: *Steel pipelines on land and subsea pipelines – Code of practice for integrity management*;
- Part 5: *Subsea pipelines – Guide to operational practice*.

This part of PD 8010 has been prepared to take into account the publication of BS EN 14161, which is based on ISO 13623. It provides a more comprehensive approach and covers a number of issues that are outside the scope of BS EN 14161.

This part of PD 8010 takes into account the publication of BS EN 1594 and IGEM/TD/1 Edition 5:2012.

BS EN 1594 and BS EN 12007 contain requirements for gas supply systems operating above and below 1.6 N/mm^2 (16 bar) respectively.

BS EN 13480-3 and BS ISO 15649, which incorporates ASME B31.3 by normative reference, give design stresses and guidelines for pipe materials required to operate outside the temperature range –25 °C to +120 °C, and for pipelines routed above ground on supports, racks and bridges. BS ISO 15649 also contains requirements for buried piping.

Information about this document

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags [A1⟩ ⟨A1]. Minor editorial changes are not tagged. Previous amendments are not indicated.

PD 8010-1:2015 was a full revision of the standard, and introduced the following principal changes:

- general updating of the text to take into account new standards and legislation introduced since the 2004 edition;
- update of the guidance for pipelines carrying carbon dioxide;
- update of the guidance on HIPPS, strain based design, fracture and fatigue.

This part of PD 8010 is intended for use by designers, manufacturers, operators and owners of pipelines. Clause **4** deals with health, safety and assurance and is relevant to all users of this document. Clause **5** to Clause **9** are mainly of relevance to designers. Clause **10** and Clause **11** are mainly of relevance to constructors. Clause **12** might be of relevance to both constructors and operators. Clause **13** and Clause **14** are mainly of relevance to operators.

The guidance given in this part of PD 8010 on the design of pipelines for the transmission of dry natural gas is based on the philosophy and guidance contained in the Institution of Gas Engineers and Managers' recommendations for transmission and distribution practice (IGEM/TD series). The IGEM's guidance is applicable to first, second and third family gases as defined in BS EN 437 provided the impact on design, material, operations and maintenance is taken into account. The 2012 revision of IGEM/TD/1 gives requirements for the transmission of dry natural gas (predominantly methane), at a maximum allowable operating pressure (MAOP) not exceeding 10 N/mm^2 (100 bar) at temperatures between a range of –25 °C and +120 °C inclusive. The scope of IGEM/TD/1 may be extended beyond 10 N/mm^2 (100 bar), but specific areas will require further justification and documentation that embraces a safety evaluation.

For pipelines laid on land which cross inland waterways experiencing extreme hydraulic conditions, PD 8010-2 might provide better guidance.

The International System of Units (SI) (see BS EN ISO 80000-1) is followed in this part of PD 8010, except for units of pressure where the bar equivalent is provided for information.

NOTE 1 bar = 10^5 N/m^2 = 10^5 Pa. All references to pressure are gauge pressure, unless otherwise stated.

Hazard warnings

WARNING. This part of PD 8010 calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Use of this document

As a code of practice, this part of PD 8010 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of PD 8010 is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the drafting of this Published Document that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

Contractual and legal considerations

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

Compliance with a Published Document cannot confer immunity from legal obligations.

Particular attention is drawn to the following specific regulations:

- Construction (Design and Management) Regulations 2007 [1];
- Deregulation (Pipe-lines) Order 1999 [2];
- Electricity and Pipe-lines Works (Assessment of Environmental Effects) Regulations 1990 and subsequent amendments [3];
- Environmental Protection Act 1990 [4];
- Factories Act 1961 [5];
- Factories Act (Northern Ireland) 1965 [6];
- Gas Act 1995 [7];
- Gas Safety (Management) Regulations 1996 [8];
- Health and Safety at Work, etc. Act 1974 [9];
- Health and Safety at Work (Northern Ireland) Order 1978 [10];
- Oil and Pipelines Act 1985 [11];
- Petroleum Act 1998 [12];
- Pipe-line Works (Environmental Impact Assessment) Regulations 2000 [13];
- Pipe-lines Act 1962 [14];
- Pipelines Safety Regulations 1996 [15];
- Pipelines Safety Regulations (Northern Ireland) 1997 [16];
- Pipelines Safety (Amendment) Regulations 2007 [17];
- Planning Act 2008 [18];
- Pressure Equipment Regulations 1999 [19];
- Pressure Systems Safety Regulations 2000 [20];
- Town and Country Planning Act 1990 [21] in respect of planning permission for local pipelines.

Attention is also drawn to guidance notes published by appropriate authorities. For planning applications, consent and environmental regulations, it might be necessary to refer to local/regional authorities, e.g. Northern Ireland, Scotland, Wales, etc.

1 Scope

This part of PD 8010 gives recommendations for and guidance on the design, selection, specification and use of materials, routeing, land acquisition, construction, installation, testing, operation, maintenance and abandonment of land pipeline systems constructed from steel. The principles of this part of PD 8010 apply to new pipelines and major modifications to existing pipelines. It is not intended to replace or duplicate hydraulic, mechanical or structural design manuals.

This part of PD 8010 is applicable to pipelines intended for the conveyance of oil, gas, carbon dioxide and other substances that are hazardous by nature of being explosive, flammable, toxic, reactive, or liable to cause harm to persons or to the environment. It covers pipelines operating at temperatures between a range of –25 °C and +120 °C inclusive.

The extent of pipeline systems covered by this part of PD 8010 is shown in Figure 1.

NOTE Annex A shows the full range of onshore oil and gas pipeline systems covered by this part of PD 8010.

This part of PD 8010 does not give recommendations for subsea pipelines, which are covered in PD 8010-2.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

ASME B16.5, *Pipe flanges and flanged fittings* [1)]

ASME B16.9, *Factory-made wrought steel buttwelding fittings*

ASME B16.11, *Forged fittings, socket-welding and threaded*

ASME B16.20, *Metallic gaskets for pipe flanges – Ring joint spiral wound and jacketed*

ASME B16.21, *Nonmetallic flat gaskets for pipes flanges*

ASME B16.47, *Large diameter steel flanges*

ASME B31.3, *Chemical plant and petroleum refinery piping – Process piping*

ASME B31.8, *Chemical plant and petroleum refinery piping – Gas transmission and distribution piping systems*

ASME BPVC-VIII-1, *Boiler and pressure vessels code – Section VIII, Division 1: Rules for construction of pressure vessels – Design and fabrication of pressure vessels*

ASTM A193/A193M 12b, *Standard specification for alloy-steel and stainless steel bolting for high temperature or high pressure service and other special purpose applications*

ASTM A194/A194M 13, *Specification for carbon and alloy steel nuts for bolts for high-pressure or high-temperature service, or both*

[1)] American Society of Mechanical Engineers (ASME) standards are available from BSI Customer Services, Tel: +44 (845 0860) 9001.