

Specification for Line Pipe

ANSI/API SPECIFICATION 5L
FORTY-FOURTH EDITION, OCTOBER 1, 2007

EFFECTIVE DATE: OCTOBER 1, 2008

ERRATA, JANUARY 2009
ADDENDUM 1, FEBRUARY 2009
EFFECTIVE DATE: AUGUST 1, 2009
ADDENDUM 2, APRIL 2010
EFFECTIVE DATE: OCTOBER 1, 2010
ADDENDUM 3, JULY 2011
EFFECTIVE DATE: JANUARY 1, 2012

CONTAINS API MONOGRAM ANNEX AS PART OF U.S. NATIONAL
ADOPTION

**ISO 3183:2007 (Modified), Petroleum and natural gas industries—
Steel pipe for pipeline transportation systems**



AMERICAN PETROLEUM INSTITUTE



Currently in preview, click buy full version

Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them. However, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to substitute the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

All rights reserved. No part of this work may be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, N.W., Washington, D.C. 20005.

Copyright © 2007 American Petroleum Institute

API Foreword

This standard shall become effective on the date printed on the cover but may be used voluntarily from the date of distribution.

Standards referenced herein may be replaced by other international or national standards that can be shown to meet or exceed the requirements of the referenced standard.

This American National Standard is under the jurisdiction of the API Subcommittee 5 on Tubular Goods. ISO 3183 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries, SC2, Pipeline transportation systems*.

In this American National Standard, certain technical modifications have been made. These technical modifications from the ISO Standard have not been incorporated directly into this API (US) national adoption. The normative modifications have been noted with an arrow (\rightarrow) adjacent to the clause, table, figure, etc. that has been modified. (Annex N)

A complete list of modifications can be found in the normative Annex N.

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually and updated quarterly by API, 1220 L Street, N.W., Washington, D.C. 20005.

Suggested revisions are invited and should be submitted to the Standards and Publications Department, API, 1220 L Street, NW, Washington, DC 20005, standards@api.org.

Contents

Page

| | |
|--|----|
| API Foreword | ii |
| Foreword | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Conformity | 1 |
| 2.1 Units of measurement | 1 |
| 2.2 Rounding | 1 |
| 2.3 Compliance to this International Standard | 1 |
| 3 Normative references | 2 |
| 4 Terms and definitions | 5 |
| 5 Symbols and abbreviated terms | 10 |
| 5.1 Symbols | 10 |
| 5.2 Abbreviated terms | 12 |
| 6 Pipe grade, steel name and delivery condition | 13 |
| 6.1 Pipe grade and steel name | 13 |
| 6.2 Delivery condition | 13 |
| 7 Information to be supplied by the purchaser | 15 |
| 7.1 General information | 15 |
| 7.2 Additional information | 15 |
| 8 Manufacturing | 18 |
| 8.1 Process of manufacture | 18 |
| 8.2 Processes requiring validation | 20 |
| 8.3 Starting material | 20 |
| 8.4 Tack welds | 20 |
| 8.5 Weld seams in COW pipe | 21 |
| 8.6 Weld seams in SAW pipe | 21 |
| 8.7 Weld seams in double-seam pipe | 21 |
| 8.8 Treatment of weld seams in EW and CV pipes | 21 |
| 8.9 Cold sizing and cold expansion | 21 |
| 8.10 Strip/plate end welds | 22 |
| 8.11 Jointers | 22 |
| 8.12 Heat treatment | 22 |
| 8.13 Traceability | 22 |
| 9 Acceptance criteria | 22 |
| 9.1 General | 22 |
| 9.2 Chemical composition | 23 |
| 9.3 Tensile properties | 27 |
| 9.4 Hydrostatic test | 29 |
| 9.5 Bend test | 29 |
| 9.6 Flattening test | 29 |
| 9.7 Guided bend test | 30 |
| 9.8 CVN impact test for PSL 2 pipe | 30 |
| 9.9 LWT test for PSL 2 welded pipe | 31 |
| 9.10 Surface conditions, imperfections and defects | 32 |
| 9.11 Dimensions, mass and tolerances | 33 |
| 9.12 Finish of pipe ends | 38 |
| 9.13 Tolerances for the weld seam | 40 |
| 9.14 Tolerances for mass | 43 |
| 9.15 Weldability of PSL 2 pipe | 43 |

| | | |
|---------------------|---|------------|
| 10 | Inspection | 44 |
| 10.1 | Types of inspection and inspection documents | 44 |
| 10.2 | Specific inspection | 45 |
| 11 | Marking | 67 |
| 11.1 | General | 67 |
| 11.2 | Pipe markings | 67 |
| 11.3 | Coupling markings | 69 |
| 12 | Coatings and thread protectors | 6 |
| 12.1 | Coatings and linings | 69 |
| 12.2 | Thread protectors | 71 |
| 13 | Retention of records | 70 |
| 14 | Pipe loading | 71 |
| Annex A | (normative) Specification for welded jointers | 72 |
| Annex B | (normative) Manufacturing procedure qualification for PSL 2 pipe | 73 |
| Annex C | (normative) Treatment of surface imperfections and defects | 75 |
| Annex D | (normative) Repair welding procedure | 76 |
| Annex E | (normative) Non-destructive inspection for other than sour service and offshore service | 82 |
| Annex F | (normative) Requirements for couplings (PSL 1 only) | 94 |
| Annex G | (normative) PSL 2 pipe with resistance to ductile fracture propagation | 97 |
| Annex H | (normative) PSL 2 pipe ordered for sour service | 104 |
| Annex I | (normative) Pipe ordered as “Through the Flowline” (TFL) pipe | 116 |
| Annex J | (normative) PSL 2 pipe ordered for offshore service | 118 |
| Annex K | (normative) Non-destructive inspection for pipe ordered for sour service and/or offshore service | 133 |
| Annex L | (informative) Steel designations | 138 |
| Annex M | (informative) Correspondence of terminology between ISO 3183 and its source documents | 141 |
| Annex N | (normative) Identification/Explanation of Deviations | 142 |
| Annex O | (informative) API Monogram | 165 |
| Bibliography | | 168 |

Annex N

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 Directive – 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 3183 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 2, *Pipeline transportation systems*.

This second edition of ISO 3183 cancels and replaces ISO 3183-1:1996, ISO 3183-2:1996 and ISO 3183-3:1999 which have been technically revised. It is the intent of TC 67 that the first and second edition of ISO 3183 shall both be applicable, at the option of the purchaser (as defined in 4.37), for a period of six months from the first day of the calendar quarter immediately following the date of publication of this second edition, after which period ISO 3183-1:1996, ISO 3183-2:1996 and ISO 3183-3:1999 will no longer be applicable.

Introduction

This International Standard is the result of harmonizing the requirements of the following standards:

- API Spec 5L;
- ISO 3183-1:1996;
- ISO 3183-2:1996;
- ISO 3183-3:1999.

In the preparation of this second edition of ISO 3183, the technical committee recognized that there are two basic levels of standard technical requirements for line pipe and, therefore, agreed to establish requirements for two product specification levels (PSL 1 and PSL 2). Level PSL 1 provides a standard quality level for line pipe. Level PSL 2 has additional mandatory requirements for chemical composition, notch toughness and strength properties and additional NDE. Requirements that apply to only PSL 1 or to only PSL 2 are so designated. Requirements that are not designated to a specific PSL designation apply to both PSL 1 and PSL 2. A table comparing this edition of ISO 3183 with the with the predecessor International Standard ISO 3183 (all parts) and API Spec 5L and used in the harmonization of these documents is given for information in Annex M.

The technical committee also recognized that the petroleum and natural gas industry often specifies additional requirements for particular applications. In order to accommodate such needs, optional additional requirements for special applications are available, as follows:

- PSL 2 pipe ordered with a qualified manufacturing procedure (Annex B);
- PSL 2 pipe ordered with resistance to ductile fracture propagation in gas pipelines (Annex G);
- PSL 2 pipe ordered for sour service (Annex H);
- pipe ordered as “Through the Flowline” (TFL) pipe (Annex I);
- PSL 2 pipe ordered for offshore service (Annex J).

The requirements of the annex(es) apply only when it is (they are) specified on the purchase order.

When pipe is ordered for dual or multiple applications, the requirements of more than one annex for special applications can be invoked. In such instances, if a technical conflict arises due to applying the requirements of more than one annex for special applications, the most stringent requirement applicable to the intended service shall apply.

This International Standard does not provide guidance on when it is necessary to specify the above supplementary requirements. Instead, it is the responsibility of the purchaser to specify, based upon the intended use and design requirements, which, if any, of the supplementary requirements apply for a particular purchase order.

Since ISO 3183 is the result of harmonizing documents of different heritage, consideration has had to be given to traditional symbols (denoting mechanical or physical properties or their values, dimensions or test parameters) and the format of equations that have been widely used and which (in their traditional format) often maintain strong links with other widely used standards and specifications, and with the original scientific work that led to their derivation. Accordingly, although in some instances changes to established symbols and equations have been made to optimize alignment with the ISO/IEC Directives, Part 2, in other instances, some

symbols and equations, most specifically those in 9.2 and Clause F.4, have been retained in their traditional form to avoid causing confusion in this post-harmonization stage. Where changes have been made, care has been taken to ensure that the new symbol replacing the traditional one has been fully and clearly defined. Consideration for complete alignment with the ISO/IEC Directives, Part 2, will be given at the next revision of this International Standard.

Currently in preview, click buy full version

Currently in preview, click buy full version

Petroleum and natural gas industries — Steel pipe for pipeline transportation systems

1 Scope

This International Standard specifies requirements for the manufacture of two product specification levels (PSL 1 and PSL 2) of seamless and welded steel pipes for use in pipeline transportation systems in the petroleum and natural gas industries.

This International Standard is not applicable to cast pipe.

2 Conformity

2.1 Units of measurement

In this International Standard, data are expressed in both SI units and USC units. For a specific order item, unless otherwise stated, only one system of units shall be used, without combining data expressed in the other system.

For data expressed in SI units, a comma is used as the decimal separator and a space is used as the thousands separator. For data expressed in USC units, a dot (on the line) is used as the decimal separator and a space is used as the thousands separator.

2.2 Rounding

Unless otherwise stated in this International Standard, to determine conformance with the specified requirements, observed or calculated values shall be rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with ISO 31-0:1992, Annex B, Rule A.

NOTE For the purposes of this provision, the rounding method of ASTM E 29-04 ^[1] is equivalent to ISO 31-0:1992, Annex B, Rule A.

2.3 Compliance to this International Standard

A quality system should be applied to assist compliance with the requirements of this International Standard.

NOTE ISO/TS 29001 ^[2] gives sector-specific guidance on quality management systems.

A contract can specify that the manufacturer shall be responsible for complying with all of the applicable requirements of this International Standard. It shall be permissible for the purchaser to make any investigation necessary in order to be assured of compliance by the manufacturer and to reject any material that does not comply.

→
Annex N

→
Annex N