

Petroleum and natural gas industries — Design and operation of subsea production systems —

Part 1:

General requirements and recommendations

AMENDMENT 2: Revised Annex L

Industries du pétrole et du gaz naturel — Conception et exploitation des systèmes de production immergés —

Partie 1: Exigences générales et recommandations

AMENDEMENT 2: Ajout de l'Annexe L

normes et recommandations
iteh STANDARD PREVIEW
 out de l'Annexe L
 (standards.iteh.ai)

ICS 75.180.10

ISO 13628-1:2005/DAmD 2

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bb16-4b65-9f3e-87074de12195/iso-15424-1-2015>

The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 15/1993, ce document est distribué en version anglaise seulement.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT 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.

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 13628-1:2005/DAmD 2](https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2)

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2>

Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

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.

Amendment to ISO 13628-1:2005 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, Subcommittee SC 4, *Drilling and production equipment*.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 13628-1:2005/DAMD 2](https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2)

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2>

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

ISO 13628-1:2005/DAmD 2

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2>

Petroleum and natural gas industries — Design and operation of subsea production systems —

Part 1: General requirements and recommendations

AMENDMENT 2: Revised Annex L

Page 2, Clause 3, add the following Terms and definitions

carbon steel

generic term to designate the full range of carbon and carbon-manganese steels used in the construction of conventional oilfield equipment

clad carbon steel

carbon steel with a liner or layer in another metallic material, such as a nickel base or stainless steel alloy, metallurgical bonded to the carbon steel.

corrosion resistant alloys**CRAs**

alloys that are intended to be resistant to general and localized corrosion in oilfield environments that are corrosive to carbon steels

extrados

outer curved section of the bend arc

intrados

inner curved section of the bend arc

low alloy steel

steel with a total alloying element content of less than about 5 %, but more than specified for carbon steel

minimum design temperature

the lowest anticipated metal temperature during system operation including transient conditions

Page 3, 3.2, add the following abbreviated terms

ACCP	ASNT Central Certification Program
ASNT	American Society of Non-destructive Testing
CRA	corrosion resistant alloy
DAC	distance amplitude curve
FBH	flat bottom hole
FL	fusion line
HAZ	heat affected zone
MDT	minimum design temperature
MPS	manufacturing procedure specification
NA	not applicable
NDT	non destructive testing
ppm	parts per million (1/1 000 000)
PT	penetrant testing
PWHT	post weld heat treatment
QTC	qualification test coupon
SMYS	specified minimum yield strength
UT	ultrasonic testing
WM	weld metal
WPS	welding procedure specification
WPQR	weld procedure qualification record

it'eh STANDARD PREVIEW
(standards.iteh.ai)

ISO 13628-1:2005/Amd 2

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2>

Page 231, add the following Informative Annex L

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 13628-1:2005/Amd 2

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2>

Annex L (informative)

Materials and welding of manifold piping and jumpers

Annex L (informative) Materials and welding of manifold piping and jumpers	4
L.1 Ordering information	6
L.1.1 General	6
L.1.2 Items to be agreed upon	6
L.2 Material standards and testing requirements	7
L.2.1 General	7
L.2.2 Pipe and pipe-fittings	7
L.2.3 Forged components	8
L.2.4 Chemical composition and weldability	9
L.2.5 Test sampling of base materials	9
L.2.5.1 General	9
L.2.5.2 Test sampling of forgings and hot isostatically pressed components	9
L.2.6 Mechanical and corrosion testing of base materials	10
L.2.6.1 General	10
L.2.6.2 Tensile testing	10
L.2.6.3 Charpy V-notch impact requirements	10
L.2.6.4 Hardness testing	11
L.2.6.5 Microstructure examination	11
L.2.6.6 Corrosion testing	11
L.2.7 Non-destructive inspection of components	12
L.2.7.1 Seamless pipes and fittings	12
L.2.7.2 Welded pipes and fittings	12
L.2.7.3 Forgings	12
L.2.7.4 NDT Personnel qualifications	13
L.3 Bolting materials	13
L.4 Bending and other forming operations	13
L.4.1 General	13
L.4.2 Cold forming	13
L.4.3 Hot induction bending	13
L.4.3.1 General	13
L.4.3.2 Essential variables	14
L.4.3.3 MPS qualification and production bend testing	14
L.5 Overlay welding and buttering of components	15
L.5.1 General	15
L.5.2 Corrosion resistant overlay	16
L.5.3 Weld buttering	16
L.6 Welding and non-destructive testing of piping systems	16
L.6.1 Welding qualification requirements	16
L.6.1.1 General	16
L.6.1.2 Non-destructive testing of test welds	17
L.6.1.3 Mechanical and corrosion testing	17
L.6.1.4 Essential variables	18
L.6.2 Welding requirements	19
L.6.2.1 General	19
L.6.2.2 Welding coordination	20
L.6.2.3 Welding inspection and qualification of welding inspectors	20
L.6.2.4 Welder and welding operator qualification	20
L.6.2.5 Welding consumables	20
L.6.2.6 Interpass temperature	21
L.6.2.7 Backing and shielding gas	22
L.6.2.8 Welding of clad materials	22

L.6.2.9	Welding of O-lets	22
L.6.2.10	Production test.....	22
L.6.2.11	Post weld heat treatment	22
L.7	Inspection and non-destructive testing of welds (NDT).....	23
L.7.1.1	General.....	23
L.7.1.2	Qualification of inspectors and NDT-operators.....	23
L.7.1.3	Extent of visual inspection and non-destructive testing.....	23
L.7.1.4	Ultrasonic testing.....	23
L.7.1.5	Acceptance criteria.....	24
L.8	Repair.....	24

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 13628-1:2005/Amd 2

<https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2>

L.1 Ordering information

L.1.1 General

Annex L is informative; however users may, by agreement between the interested parties, consider the provisions to be either requirements or guidelines.

This Informative Annex specifies the requirements for subsea pressure-containing components and pipe assemblies for production of hydrocarbons and water/gas well-injection service, e.g. manifolds, jumpers and flow loops, fabricated in carbon, low-alloyed and stainless steels, and nickel based alloys. It includes all interfacing welds between manifolds and connecting components such as valves and connectors but excludes such items as valves, hubs, flexible pipes, control systems and support structures as templates covered by other standards.

It is based on using ASME B31.8 as the governing design code and gives additional requirements to that code. For installation where a different design code from ASME B31.8 applies the requirement of that different code shall govern unless this is less stringent than required by this Annex.

There are no specified pressure limitations for the application of this Annex.

L.1.2 Items to be agreed upon

Some requirements are specified as options or alternatives and must be clarified between contracting parties, when ordered under this specification.

Requirement

iTeh STANDARD PREVIEW
(standards.iteh.ai)

References

a) Annex mandatory	Annex L
b) Use of other product reference standards ISO 13628-1:2005/DAMD 2	L.2.1
c) Use of separated test blocks https://standards.iteh.ai/catalog/standards/sist/de53bfa1-bbf6-4b65-9f3e-87074d6c19fd/iso-13628-1-2005-damd-2	L.2.5.2
d) Corrosion testing of 22Cr Duplex	L.2.6.6.2
e) Volumetric testing of forgings in stainless steels	L.2.7.3
f) Weld overlay welding method	L.5.1
g) Chemical composition of weld overlay	L.5.2
i) Weld details and procedures for any nickel alloy buttering on low alloy steel	L.5.3
j) Volumetric testing method of weld buttering	L.5.3
k) Applicable welding code	L.6.1.1
l) Use of socket welds	L.6.1.5.1
m) Production test program	L.6.1.12
n) Piping systems in carbon steel with cleanliness requirements	L.6.1.2
o) Degree of oxidation during induction bending	L.6.2.7
p) Qualifications of NDT personnel	L.7.1.2

L.2 Material standards and testing requirements

L.2.1 General

All components that may be exposed to cathodic protection shall comply with the following material usage limitations.

- The hardness of weld and HAZ of any steel grade shall not exceed 350 HV10 (Non H₂S containing service conditions).
- Ferritic materials exposed to a cold deformation resulting in a permanent deformation in excess of 5,0 % should be given a solution or stress relieve heat treatment after the cold forming operation.
- Free machining steel grades shall in general not be used.
- The actual yield strength of components in any steel grade shall not exceed 900 MPa and 35 HRC or 328 HB in hardness.
- The hardness of components in nickel based alloys shall not exceed hardness values specified in ISO 15156-3.
- Titanium based alloys should not be used for applications involving exposure to cathodic protection.

For valves and connectors designed to ISO 10423/API 6A, the material requirements in that standard apply.

The pressure containing parts of the manifold structure should be formed from carbon, low alloyed, stainless steel or nickel based alloys as listed in section L.2.2 and L.2.3 below.

A detailed material specification for each type of product shall be established. This specification shall clearly identify all manufacturing and testing requirements.

All components shall be delivered with a material certificate according to ISO 10474 Type 3.1.B/EN 10204 Type 3.1 confirming all requirements of relevant component standard and additional requirements of this standard.

All materials for pipe, forgings and fittings shall be manufactured and used in accordance with the listed product specifications of the design standard and this standard. Use of other product standard has to be agreed and approved by the end user.

The requirements in the following clauses shall be in addition to or replace the corresponding requirements in the reference standards as relevant.

L.2.2 Pipe and pipe-fittings

The pipes and pipe-fittings shall either be manufactured by a seamless process hot working steel to form a tubular product without a welded seam, or longitudinal arc welded with process adding filler material.

Carbon and low alloy steel pipe and fittings shall conform to an appropriate reference standard suitable for the purpose of the application, such as those specified in Table L.1. The material grade should be limited upwards to 560 MPa (80 ksi) minimum specified yield strength. The delivery condition of pipes may be in normalised, thermo-mechanically treated or quenched and tempered condition. All fittings shall be used in normalised, normalised and tempered, annealed or quenched and tempered condition. Welded pipes and fittings shall conform to the requirements of Clause L.6.

For welded pipes and fittings the PQR/WPQR shall be qualified in accordance with ASME IX or ISO 15614-1, and comply with the base material requirements. All welding shall be carried out by welders qualified in accordance with ISO 9606 (all parts), ASME IX or EN 287/EN 1418.

Table L.1 — Reference standards for seamless and welded manifold pipe and pipe-fittings in carbon and low alloy steel

Standard	Product	Standard	Product
API 5L PSL2	Seamless and welded pipe	EN 10217-3	Welded pipe
ASTM A 333	Seamless pipe	EN 10216-3	Seamless pipe
DNV OS-F101	Seamless and welded pipe	ASTM A420	Seamless and welded fittings
ISO 3183 PSL2	Seamless and welded pipe	ASTM A860	Seamless and welded fittings

Stainless steel and nickel base alloy pipe shall conform to an appropriate reference standard suitable for the purpose of the application, such as those specified in Table L.2.

Table L.2 — Reference standards for seamless and welded manifold pipe and pipe-fittings in stainless steel alloy

Standard	Product	Standard	Product
ASTM A 312	Seamless pipe	EN 10216-5	Seamless pipe
ASTM A 358	Welded pipe	EN 10217-7	Welded pipe
ASTM A 790	Seamless pipe	ASTM A 403	Seamless and welded fittings
ASTM A 928	Welded pipe	ASTM A 815	Seamless and welded fittings
ASTM B 705	Seamless and welded pipe	ASTM B 366	Seamless and welded fittings

The following stainless steels and nickel alloys, solid or clad, are applicable to manifold piping:

- austenitic stainless steel (e.g. 316 SS and 6 Mo);
- duplex stainless steel (e.g. type 22Cr or 25 Cr duplex);
- nickel based alloys (e.g. Alloy 625 or Alloy 825).

For clad pipe, the carbon steel pipe shall conform to an appropriate reference standard suitable for the purpose of the application, such as those specified in Table L.1.

L.2.3 Forged components

Forgings for pressure-containing components shall conform to an appropriate reference standard suitable for the purpose of the application, such as those specified in Table L.3.

In addition to the requirement listed in Table L.3 all components shall be heat treated in or as close to near net shape as practicable and weld repair of forgings shall not be permitted.

The Hot Isostatic Pressed (HIP) process according to ASTM A988 is an acceptable alternative to forging.