INTERNATIONAL STANDARD

ISO 16528-2

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Boilers and pressure vessels —

Part 2: Procedures for fulfilling the requirements of ISO 16528-1

Chaudières et récipients sous pression —

Partie 2: Procédure pour répondre aux exigences de l'ISO 16528-1

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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.

ISO 16528-2 was prepared by Technical Committee ISO/TC 11, *Boilers and pressure vessels*.

This first edition of ISO 16528-2, together with the first edition of ISO 16528-1, cancels and replaces the ISO/TS 16528:2002, which has been technically revised.

ISO 16528 consists of the following parts, under the general title *Boilers and pressure vessels*:

— *Part 1: Performance requirements*

— *Part 2: Procedures for fulfilling the requirements of ISO 16528-1*

Introduction

ISO 16528-1 specifies performance requirements for boilers and pressure vessels.

There are commonly used national/regional standards that have a proven history of supporting public safety and have good commercial operating experience. It is the intention of this part of ISO 16528 to provide a process to identify national/regional standards that satisfy the performance requirements of ISO 16528-1.

Boilers and pressure vessels —

Part 2:
Procedures for fulfilling the requirements of ISO 16528-1

1 Scope

This part of ISO 16528 provides a procedure and a standard format for standard-issuing bodies to demonstrate that their standards fulfil the performance requirements of ISO 16528-1.

2 Normative references

The following referenced documents are indispensable for the application 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 16528-1:2007, *Boilers and pressure vessels — Part 1: Performance requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
standard
code
document established and approved by a standard issuing body that provides for common and repeated use, mandatory requirements, guidelines or characteristics for activities or their results

NOTE The term “standard” used throughout this part of ISO 16528 shall be considered equivalent to “code” and vice versa.

3.2
standard issuing body
organization that promulgates a boiler or pressure vessel standard

4 Conformance procedure

ISO 16528-1 establishes performance requirements for the construction of boilers and pressure vessels. The intent of this part of ISO 16528 is to have these performance requirements amplified and expanded by detailed standards that satisfy two criteria.

a) The standard includes requirements that address the failure modes in accordance with Clause 6 of ISO 16528-1:2007.

b) The standard adequately addresses the requirements specified in Clauses 7 and 8 of ISO 16528-1:2007.

Clause 5 includes formatted conformance tables. A task force of experts from ISO/TC 11 is available to assist standard issuing bodies to complete these tables and the secretariat to review them.

When available, the completed conformance tables shall be published on the official website of ISO/TC 11, after the secretariat of ISO/TC 11 has reviewed the tables for completeness and comprehensibility. The publication on the ISO/TC 11 website does not imply adoption of the standard as an ISO standard, nor approval by ISO of the detailed technical requirements. Standard-issuing bodies may publish the completed tables and indicate the standard conforms with ISO 16528-1, after they have been posted on the official ISO website.

5 Conformance tables

Table 1 shall be used to express which failure modes are addressed in a standard.

The first part of Table 1 lists the principal failure modes defined in ISO 16528-1:2007, 6.3. As a minimum, these shall be completed by identifying whether a particular standard addresses the failure mode or not, or recognizes the failure mode, but does not address it in detail.

It is not required that a standard address all the failure modes listed in ISO 16528-1:2007, 6.3. If a standard does not address one or more of the failure modes listed in ISO 16528-1:2007, 6.3, an explanation shall be provided defining the limitations in the standard’s scope or application relative to the failure mode(s) not addressed.

In addition to the failure modes identified in ISO 16528-1:2007, 6.3, a standard may address one or more of the failure modes listed in ISO 16528-1:2007, 6.2. These should be listed in the second part of Table 1 using the same criteria as for the first part.

Table 2 shall be used to express which rules or requirements directly affect how the standard addresses the selected failure mode (for each failure mode identified in Table 1). The footnotes to Table 2 give guidance on the requirements of each part of the table.

Table 3 shall be used to express how the technical requirements of ISO 16528-1 are dealt with in the standard.

Table 1 — Failure mode summary

STANDARD [a]**:**	
FAILURE MODE SUMMARY [b]**:**	
Failure modes according to ISO 16528-1:2007, 6.3	**Addressed (Y / N / P)** [c]
Brittle fracture	
Ductile failure	
Excessive deformation leading to leakage or other loss of function	
Elastic or elastic-plastic instability (buckling)	
Additional failure modes according to ISO 16528-1:2007, 6.2	**Addressed (Y / N / P)** [c]

[a] Provide full title of the standard and revision or addenda level.

[b] Failure modes addressed by this form (see ISO 16528-1).

[c] Y – failure mode addressed by standard
N – failure mode not addressed by standard
P – failure mode recognized by standard, but complete details not addressed.

Table 2 — Detailed failure mode checklist

STANDARD:
FAILURE MODE [a]:
EXPLICIT DESIGN [d]
References [b]:
Comments [c]:
IMPLICIT DESIGN [e]
References:
Comments:
FABRICATION DETAILS [f]
References:
Comments:
MATERIAL REQUIREMENTS [g]
References:
Comments:
EXAMINATION REQUIREMENTS [h]
References:
Comments:

Table 2 *(continued)*

TESTING REQUIREMENTS [i]
References:
Comments:
USE / APPLICATION LIMITS [j]
References:
Comments:

[a] Failure mode addressed by this form (see Table 1).

[b] Provide specific clause or paragraph references (including the title, if any), indicating where relevant rules can be found. These references need not be exhaustive, but should be detailed enough to establish that the standard adequately addresses the selected failure mode.

[c] Provide explanatory comments indicating the background for the approach employed or other material that can be useful. For example, brief description of failure theory(ies) used should be provided. References to academic papers and empirical testing methods used to establish rules are encouraged.

[d] Reference(s) to rules or requirements that directly affect how the standard addresses the selected failure mode, e.g. formulas for sizing wall thickness of components for resisting ductile burst.

[e] This section may be used to provide references and comments when design tables, empirically based rules or other approaches are employed whose derivation is not obvious. It may also be used to provide general information on design margins (safety factors), on material properties, etc. Many successful standards do not provide explicit design rules for certain failure modes yet do employ combinations of material control, temperature limits or other means to provide adequate protection against failure. This section may be used to provide information on how his standard indirectly addresses certain failure modes when explicit rules are not provided.

[f] References for fabrication details relevant to the selected failure mode, e.g. control of cylinder ovality, weld profiling, control of tolerances, etc. For example, control of cylinder ovality is important for prevention of buckling of externally loaded vessels. This section should be used to describe such fabrication controls relevant for the designated failure mode.

[g] Relevant requirements for base and welding materials, e.g. control of YS/UTS ratios, provisions for addressing strain hardening, applications of heat treatment, etc. Assuring that fabrication processes have not adversely affected material properties beyond acceptable limits can be important for preventing certain types of failures. This section should be used to describe such controls.

[h] References for NDT or visual inspection relevant to the selected failure mode. (If NDT is correlated to design factors, this should be noted.)

[i] Provisions for final testing, i.e. hydrostatic or leak tests should be noted with specific information on normal test pressures and control of test lower and upper test pressures.

[j] An explanation shall be provided defining the limitations in the standard's scope or application relative to ISO 16528-1:2007, 6.2, failure mode(s).

Table 3 — Detailed technical requirements checklist

Subclause in ISO 16528-1:2007	Description	Reference standard clause(s)	Description	Comments
7.2.1	Materials — General			
7.2.2	Specification of materials			
7.2.3	Material certification			
7.3.1	Design — Loadings and other design considerations			
7.3.2	Design methods			
7.3.3	Design margins			
7.3.4	Design factors			
7.3.5	Means for examination			
7.3.6	Draining and venting			
7.3.7	Corrosion and erosion			
7.3.8.1	Overpressure protection — General			
7.3.8.2	Types of devices			
7.3.8.3	Safety accessories			
7.4.1	Manufacture — Methods			
7.4.2	Identification of materials			
7.4.3	Preparation of parts			
7.4.4	Welding			
7.4.5	Welding procedure qualifications			
7.4.6	Welder qualifications			
7.4.7	Welder identification			
7.4.8	Heat treatment			
7.4.9	Tolerances			

Table 3 *(continued)*

Subclause in ISO 16528-1:2007	Description	Reference standard clause(s)	Description	Comments
7.5.1	Inspection & examination (I&E) – General			
7.5.2	I&E methods			
7.5.3	I&E procedures			
7.5.4	I&E personnel qualification			
7.5.5	Evaluation of indications & acceptance criteria			
7.5.6	Disposition of unacceptable imperfections			
7.6.1	Final inspection			
7.6.2	Final pressure test			
7.7	Marking/labelling			
8	Conformity assessment			

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