



SLOVENSKI STANDARD
SIST EN 13445-4:2009/oprA2:2012
01-maj-2012

Neogrevane tlačne posode - 4. del: Proizvodnja - Dopolnilo A2

Unfired pressure vessels - Part 4: Fabrication

Unbefeuerte Druckbehälter - Teil 4: Herstellung

Réceptifs sous pression non soumis à la flamme - Partie 4: Fabrication

Ta slovenski standard je istoveten z: EN 13445-4:2009/prA2

ICS:

23.020.30	Tlačne posode, plinske jeklenke	Pressure vessels, gas cylinders
-----------	------------------------------------	------------------------------------

SIST EN 13445-4:2009/oprA2:2012 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
EN 13445-4:2009

prA2

March 2012

ICS 23.020.30

English Version

Unfired pressure vessels - Part 4: Fabrication

Réceptacles sous pression non soumis à la flamme - Partie
4: Fabrication

Unbefeuerte Druckbehälter - Teil 4: Herstellung

This draft amendment is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 54.

This draft amendment A2, if approved, will modify the European Standard EN 13445-4:2009. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 New Clause 7.10.....	4
2 New Annex C.....	5

Foreword

This document (EN 13445-4:2009/prA2:2012) has been prepared by Technical Committee CEN/TC 54 "Unfired pressure vessels", the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

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.

EN 13445-4:2009/prA2:2012 (E)**1 New Clause 7.10****7.10 Permanent Joints Other than Welding****7.10.1 General**

Where non-welded joints are made between metallic materials and/or non-metallic materials, procedures shall be established in a manner similar to that used in establishing welding procedures, and these procedures shall be followed for all joints. Similarly, operators shall be qualified in such procedures, and only qualified personnel shall then carry out these procedures.

7.10.2 Scope

Specific joint procedures like brazing and mechanical roller expansion are dealt with in this chapter.

Mechanical roller expansion procedures and expansion operator approvals shall be conducted in accordance with Annex C of this standard. The other expanding procedures (hydroexpanding, explosive expanding...) are not dealt with. In case of joining combining roller expanding and welding, this Annex applies only if the mechanical strength is ensured only by the roller expanding.

For hand brazing and manual mechanical brazing, brazing procedures and brazer approvals shall be conducted in accordance with EN 13134 and prEN ISO 13585. The rules for fully automated furnace brazing shall be in accordance with EN 14276-1. Old approvals valid under the Pressure Equipment Directive already before publication of this standard retain their validity.

2 New Annex C

Annex C (normative)

Specification and approval of expansion procedures and operators

C.1 General

This annex defines general rules for the specification and approval of expansion procedures and operators using expansion by mechanical rolling.

The approval of expansion procedures is obtained by expansion procedure tests and for operators by procedure test or production.

C.1.1 Responsibility

The manufacturer of pressure equipment is responsible for the expansion performed in the organisation and shall conduct the test required in this annex to qualify the expansion procedures and the performances of the expansion operators who apply these procedures.

The manufacturer shall maintain a record of the process qualification and for expansion operators' performance qualification.

C.1.2 Specification of expansion procedures

The purpose of the Expansion Procedure Specification (EPS) is to determine that the expansion proposed is capable of providing the required properties for its intended application.

The expansion test shall be adequately planned prior to production; the planning shall provide EPS's for all expansion joints. An EPS shall be classified as a pre-EPS until approved in accordance with the rules of this annex.

The manufacturer may, in addition to the EPS, prepare detailed work instructions etc. to be used during the actual production. Work instructions are not mandatory and are the responsibility of the manufacturer.

If prepared, work instructions shall:

EN 13445-4:2009/prA2:2012 (E)

- be prepared on the basis of an EPS;
- define values for the expansion process to be used by the operators for all essential variables under control of operator.

The EPS shall give details of how the expansion operation is to be performed and shall contain all relevant information of the expansion work.

C.1.3 Technical content of expansion procedure specification (EPS)

The parameters contained inside the expansion procedure specification are classified into categories (see Table C.1):

- essential variable: a variable in which a change may affect the mechanical properties of the expanded joint and may require a requalification according to C.4;
- non-essential variable: a variable in which a change may be made without a requalification.

The recorder parameters shall be those which are monitored during the expansion of the test sample.

The EPS shall contain at least – and when applicable – the following information:

- a) identification of the manufacturer;
- b) identification of workshops or sites where the EPS is applicable;
- c) identification of EPS;
- d) reference to Expansion Procedure Approval Record or other documents as required;
- e) following material details:
 - 1) identification of material range of tube sheet and tube, preferably by reference to an appropriate standard or specification (an EPS may cover a group of material);
 - 2) any additional material complying with this standard;
- f) material dimension range
 - 1) thickness ranges of the tube sheet;
 - 2) outside diameter and thickness of the tubes;
- g) expansion process: by mechanical rolling (RE);
- h) joint design including a sketch of the joint design showing configuration, pitch and pattern of tube, hole geometry (grooves, ...), surface finish;
- i) equipment, tool and process information:
 - 1) type, form and length of the roll;
 - 2) torque;
 - 3) length of rolling zone;

- j) expansion factor T

$$\text{with } T = 100 \times \left(\frac{d_{if} - d_{ii} - d + d_e}{d_e - d_{ii}} \right)$$

where

d diameter of the hole inside the tube sheet;

d_{if} internal diameter of the tube after expansion;

d_e external diameter of the tube before expansion;

d_{ii} internal diameter of the tube before expansion.

According to the expansion process the variables are classified in accordance with Table C.1:

Table C.1 – List of variables

List of variables	RE
Material range	EV
Thickness range	EV
Expansion process	EV
Joint design	EV
Expansion factor	EV
Length of expanded joint	EV
NOTE EV: essential variable	

C.2 Test piece

The test piece shall be representative of the intended production piece. The test piece shall be of sufficient size to ensure a reasonable constraint distribution and the size or the number of test piece shall be sufficient to cover all the examinations requested by C.5.

The shear test shall be performed on one or several tubes surrounded by peripheral tubes.

C.3 Examination and testing

C.3.1 General

The tests used in the expansion procedure and performance qualifications are defined below.