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Unfired pressure vessels - Part 5: Inspection and testing

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English version

Unfired pressure vessels - Part 5: Inspection and testing

Réceptifs sous pression non soumis à la flamme - Partie 5
: Inspection et contrôles

Unbefeuerte Druckbehälter - Teil 5: Inspektion und Prüfung

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 A1, if approved, will modify the European Standard EN 13445-5:2002. 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.

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Foreword

This document (EN 13445-5:2002/prA1:2004) 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).

1 Scope

Add a third paragraph:

Special provisions for vessels or vessel parts working in the creep range are given in Clause 5, Clause 6 and Annex H of this Part.

5.2.1 General description of the pressure vessel

Add 6)

- 6) If the vessel is working in the creep range, the following additional information shall be provided:
- the design life (e.g. 100000 hours) and expected life for each load case
 - the parts of the vessel which are subjected to creep
 - the value of the weld creep strength reduction factor which has been used for each weld joint subjected to creep
 - the extent to which the vessel is monitored

6 Inspection and testing during fabrication

6.6 Non-destructive testing of welded joints

6.6.1 Extent of non-destructive testing

Delete NOTE and include:

For serially produced pressure vessels an alternative route is given in Annex A. This annex is not applicable for vessels or vessel parts working in the creep range.

6.6.1.3 Use of testing groups

6.6.1.3.1 General

Delete the second paragraph of the NOTE

Add a new second and third paragraph as follows:

Testing groups 1, 2, 3 are subdivided into sub-groups 1a, 2a, 2b, 3b, in order to reflect crack sensitivity of the material as indicated in Table 6.6.1-1.

For vessels (or vessel parts) working in the creep range only testing group 1 is permitted. For these vessels, testing groups 2 and 3 are permissible for welded joint not subjected to creep. Testing group 4 is not permitted.

10.2.3.3 Standard hydrostatic test

Replace d) of 10.2.3.3.1 of the text of the pressure test amendment by:

d) For vessels working in the creep range:

— f_{t_s} is replaced by $f_{\text{non - creep}, t_s}$

— f_{tc} is replaced by $f_{\text{non - creep}, tc}$

where $f_{\text{non - creep}}$ is the nominal design stress outside the creep range defined in Clause 6 of Part 3.

Annex H (normative)

Inspection and testing of pressure vessels or parts subject to creep

H.1 General

For vessels or part subject to creep, Quality Level B of EN ISO 5817 is the reference quality level for maximum allowable imperfection in these areas. The absence of surface imperfections (no undercut, no root concavity, no lack of penetration) and the necessity of smooth transitions are essential. Similarly, imperfections such as peaking are absolutely critical and the maximum peaking of Part 4 or the value permitted by the analysis of Annex B of Part 3 shall not be exceeded.

Testing requirements of this Annex are in addition to the general testing requirements based on the vessel testing group 1A.

H.2 Extent of inspection and testing

In addition to the requirements of 6.6.2 all areas subject to creep shall be inspected by NDT, according to the following Table H.2-1.

Table H.2-1 — Extent of NDT for vessels or parts subject to creep

Type of weld			Testing	Extent %
Full penetration butt weld	1	Longitudinal joints	RT or UT MT or PT	100 % 25 %
	2a	Circumferential joints on a shell	RT or UT MT or PT	100 % 25 %
	3a	Circumferential joints on a nozzle $d_i > 150$ mm or $e > 16$ mm	RT or UT MT or PT	100 % 25 %
	4	Circumferential joints on a nozzle $d_i \leq 150$ mm or $e \leq 16$ mm	RT or UT MT or PT	25 % 100 %
	5	All welds in spheres, heads and hemispherical heads to shells	RT or UT MT or PT	100 % 25 %
	6	Assembly of a conical shell with a cylindrical shell angle $\leq 30^\circ$	RT or UT MT or PT	100 % 10 %
	7	Assembly of a conical shell with a cylindrical shell angle $> 30^\circ$	RT or UT MT or PT	100 % 25 %
Assembly of a flat head or a tubesheet, with a cylindrical shell. Assembly of a flange or a collar with a shell	9	With full penetration	RT or UT MT or PT	100 % 100 %
Assembly of a flange or a collar with a nozzle	12	With full penetration	RT or UT MT or PT	100 % 25 %
Nozzle or branch	15	With full penetration $d_i > 150$ mm or $e > 16$ mm	RT or UT MT or PT	100 % 100 %
	16	With full penetration $d_i \leq 150$ mm or $e \leq 16$ mm	RT or UT MT or PT	100 % 100 %

H.3 Additional tests during fabrication

In addition to conventional NDT, for creep designed vessels or parts it is necessary to perform metallographic replicas and hardness tests. It is also suggested to execute high precision diameter measurements.