# SLOVENSKI STANDARD
# SIST EN 13480-3:2002/kFprA5:2011

**01-september-2011**

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**Kovinski industrijski cevovodi - 3. del: Konstruiranje in izračun**

Metallic industrial piping - Part 3: Design and calculation

Industrielle metallische Rohrleitungen - Teil 3: Konstruktion und Berechnung

Tuyauteries industrielles métalliques - Partie 3: Conception et calcul

**Ta slovenski standard je istoveten z:** **EN 13480-3:2002/FprA5**

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**ICS:**

| | | |
|---|---|---|
| 77.140.75 | Jeklene cevi in cevni profili za posebne namene | Steel pipes and tubes for specific use |

**SIST EN 13480-3:2002/kFprA5:2011** **en,fr,de**

EUROPEAN STANDARD

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# FINAL DRAFT
# EN 13480-3:2002

## FprA5

June 2011

ICS 23.040.01

English Version

# Metallic industrial piping - Part 3: Design and calculation

Tuyauteries industrielles métalliques - Partie 3: Conception et calcul

Industrielle metallische Rohrleitungen - Teil 3: Konstruktion und Berechnung

This draft amendment is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 267.

This draft amendment A5, if approved, will modify the European Standard EN 13480-3:2002. 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.

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.

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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.

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

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

# Contents

Page

# Foreword

This document (EN 13480-3:2002/FprA5:2011) has been prepared by Technical Committee CEN/TC 267 “Industrial piping and pipelines”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Unique Acceptance Procedure.

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.

## 1 Modification to Clause 2

*Add the following normative references:*

EN 1515-2:2001, *Flanges and their joints - Bolting - Part 2: Classification of bolt materials for steel flanges, PN designated*

EN 1515-3:2005, *Flanges and their joints - Bolting - Part 3: Classification of bolt materials for steel flanges, class designated*

EN 1515-4:2010, *Flanges and their joints - Bolting - Part 4: Selection of bolting for equipment subject to the Pressure Equipment Directive 97/23/EC*

## 2 Modification to 3.2

*Add the following line in the Table 3.2-1 "General symbols and units" between the symbols $f_{cr}$ and $p_c$:*

| | | |
|---|---|---|
| $f_f$ | Design stress for flexibility analysis | MPa (N/mm²) |

## 3 Modification to 4.1

*In sub-clause 4.1, in the first sentence, replace "cold spring" by "cold pull". The sentence shall read as follows:*

The calculation rules in this document shall apply for operating and testing conditions as well as preset, cold pull conditions, flushing and cleaning conditions.

## 4 Modification to 4.2.3.3

*The sub-clause 4.2.3.3 shall read as follows:*

The set ($p_o$, $t_o$) to be considered for the dimensioning of the elements of a piping system shall correspond to the most severe conditions of pressure and temperature which prevail simultaneously over a long time in the piping section under consideration. Thus for the thickness calculation of a component, the simultaneous conditions of pressure and temperature to be considered are the conditions which lead to the greatest thickness.

For all piping system elements, an allowable maximum pressure, based on

a) specified material (mechanical properties),

b) a given temperature,

can be easily determined by taking into account the applicable safety factors.

Temporary deviations e.g. due to pressure surge or operation of control release valve (safety valve) shall not be taken into account if the calculated stresses from such variations do not exceed the allowable stress by more than 10 % for less than 10 % of any 24 h operating period.

## 5 Modification to 4.2.3.4

*The sub-clause 4.2.3.4 shall read as follows:*

For all pressure temperature conditions ($p_o$, $t_o$) specified in 4.2.3.3 calculation pressures $p_c$ shall be determined.

The calculation pressure $p_c$ shall be not less than the associated operating pressure $p_o$, taking into account the adjustments of the safety devices. The conditions ($p_o$, $t_o$) resulting in the greatest wall thickness shall be considered with both of the following minimum conditions:

1) $p_c = p_o = PS$ with the associated $t_c$ as defined in 4.2.3.5;

2) $t_c$ as defined in 4.2.3.5 for $t_o = TS$ with the associated $p_c = p_o$.

NOTE If there is a condition where $p_o = PS$ and $t_o = TS$ only this condition has to be calculated.

When the calculation temperature $t_c$ is such that the creep rupture strength characteristics are relevant for the determination of the nominal design stress, the calculation pressure shall be considered equal to the operating pressure ($p_o$) which is associated with the corresponding temperature ($t_o$).

## 6 Modification to 4.2.5

*In sub-clauses 4.2.5.1, 4.2.5.2.3 and 4.2.5.4, the indent "cold spring" shall read as follows:*

— cold pull.

## 7 Modification to 4.6

*In the first paragraph, a second sentence shall be added and shall read as follows:*

This may be completed or replaced by a "design by analysis" as described in EN 13445-3, Annex B and Annex C.

Clauses 6, 7, 8, 9, 10 and 11 describe the "design by rules" of piping components under static and cyclic loadings. The « design by rule » can be completed or replaced by a « design by analysis » as described in EN 13445-3, Annex B and Annex C, where applicable.

## 8 Modification to 5.2.2.1

*In this sub-clause, the first indent shall read as follows:*

— for $A \geq 35$ %

*and the second indent shall read as follows:*

— for 35 % > $A \geq 30$ %

## 9 Modification to 5.3.2.1

*After the Table 5.3.2-1, the text shall read as follows:*

If the design lifetime is not specified, the mean creep rupture strength at 200 000 h shall be used.

In cases where the 200 000 h values are not specified in the material Standards, the mean creep rupture strength at 150 000 h or 100 000 h shall be used.

If a design lifetime between 100 000 h and 200 000 h is specified, and a lifetime monitoring system is provided, divergent from Table 5.3.2-1, a safety factor $SF_{CR}$ = 1,25 may be used.

In cases where design lifetimes shorter than 100 000 h are specified, one of the following methods shall be used:

a) If a lifetime monitoring System is not provided, the safety factor $SF_{CR}$ shall be equal to 1,5 and shall be applied to the mean creep rupture strength at the relevant lifetime of at least 10 000 h;

b) If a lifetime monitoring system is provided, a safety factor of $SF_{CR}$ = 1,25 may be specified with regard to the mean creep rupture strength at the relevant lifetime of at least 10 000 h. In no case shall the 1 % creep strain limit (mean value) at 100 000 h be exceeded.

The creep rupture strength associated to the specified lifetime shall be interpolated based on a logarithmic time axis as well as a logarithmic stress axis (double logarithmic interpolation scheme).

## 10 Modification to 6.4.2.1

*Replace Figures 6.4.2-1 and 6.4.2-2 as follows:*

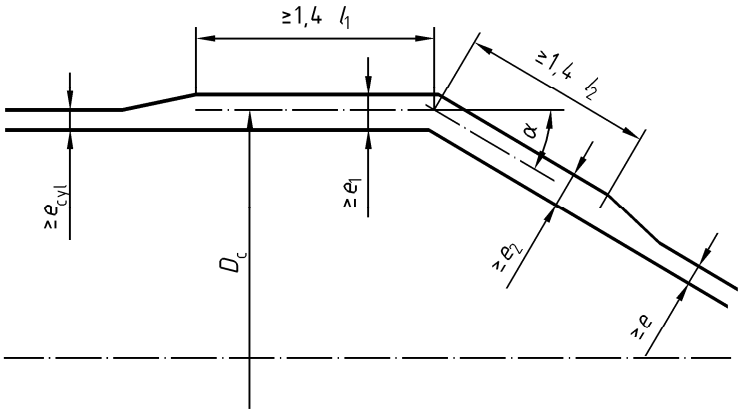


**Figure 6.4.2-1 – Geometry of cone/cylinder intersection without knuckle – Large end**

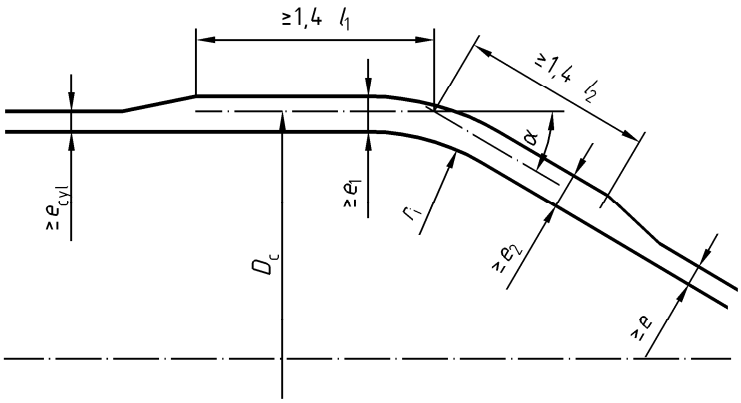


**Figure 6.4.2-2 — Geometry of cone/cylinder intersection with knuckle – Large end**

## 11 Modification to 6.4.5

*After the equation (6.4.5-2), add the following text:*

The length of the cone can be reduced to less than $2l_2$ if both of the following conditions are fulfilled:

— the wall thickness $e_2$, calculated in accordance with 6.4.6 or 6.4.7, is existent along the whole length of the cone;

— the junction at the small end of the cone is sufficiently dimensioned according to 6.4.8.

## 12 Modification to 6.4.6.1

*The indent 2) shall read as follows:*

2) the weld at the junction shall be subject to 100 % non-destructive examination, either by radiography or ultrasonic techniques, unless the design is such that the thickness at the weld exceeds 1,4$e_j$, in which case the normal rules for the relevant design shall be applied.

## 13 Modification to 6.4.7.2

*After equation (6.4.7-1), correct equation (6.4.7-2) as follows*:

$$\rho = \frac{0{,}028 r_i}{\sqrt{D_c\, e_j}} \frac{\alpha}{1 + 1/\sqrt{\cos\alpha}} \qquad (6.4.7\text{-}2)$$

## 14 Modification to 6.4.8.1

*Replace Figure 6.4.8.1-1 as follows:*

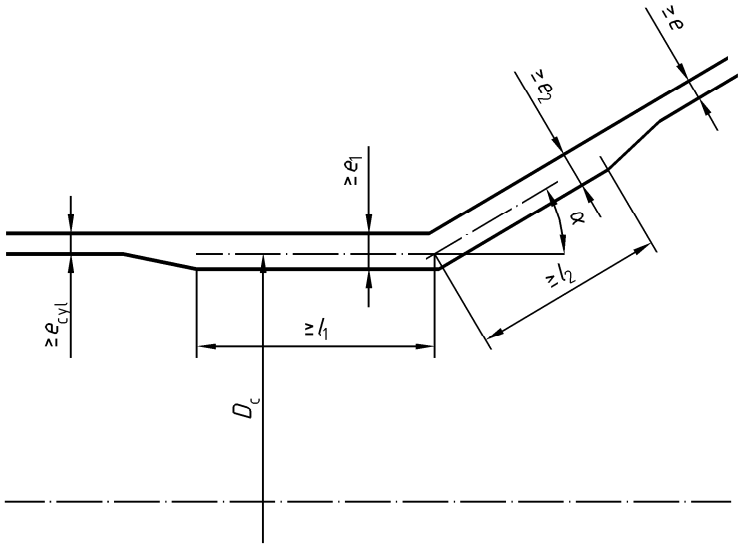


**Figure 6.4.8.1-1 — Geometry of cone/cylinder intersection: small end**

## 15 Modification to 6.4.10

*After equation (6.4.10-4), add a new equation (6.4.10-5) as follows*:

$$e_r = \max\{e_{cyl}; e_j\} \qquad (6.4.10\text{-}5)$$

With $e_{cyl}$ according to 6.1 and $e_j$ according to equation (6.4.7-4).

*After the last sentence of clause 6.4.10, add the new Figures 6.4.10-1 and 6.4.10-2 as follows:*

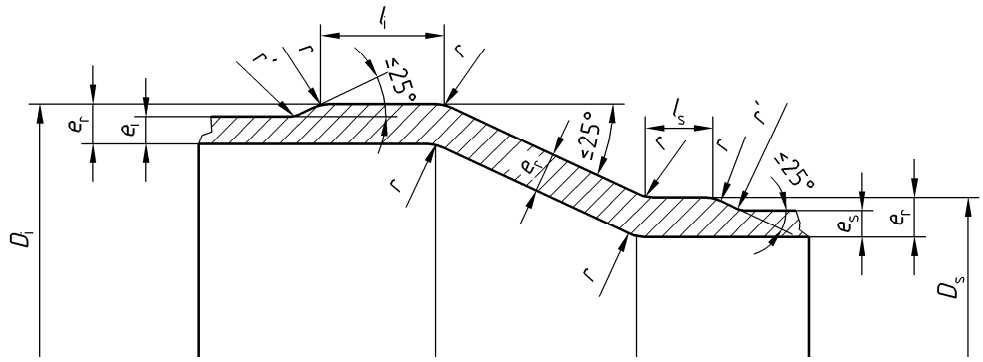


**Figure 6.4.10-1 — Special forged reducer**

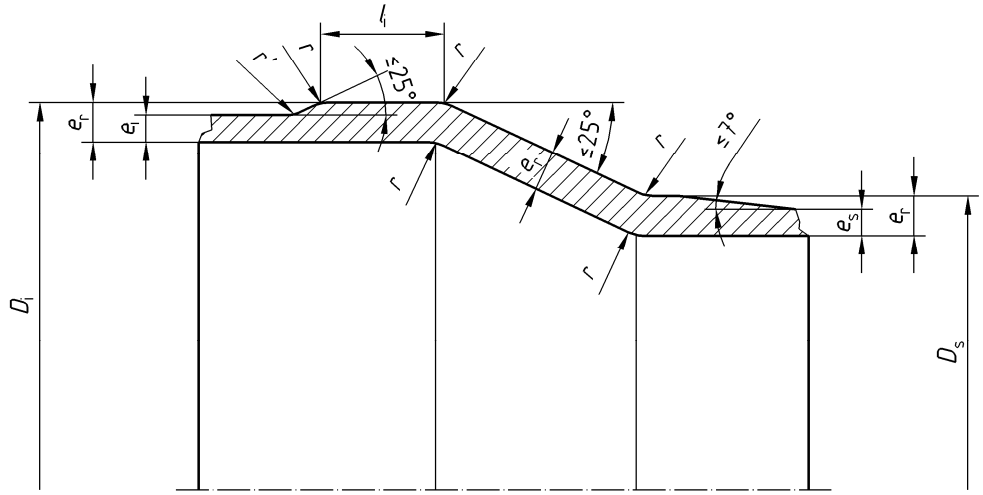


**Figure 6.4.10-2 — Special forged reducer (alternative solution)**

## 16 Modification to 6.6

*The clause 6.6 shall read as follows:*

### 6.6.1 General

The rules of this sub-clause are to check the mechanical resistance of the flange connection subjected to static loads. It is also in the responsibility of the designer to ensure the adequacy of the flange connection (gasket type and characteristics, etc) with the operating conditions, in particular with regards to any specific required tightness.

If there is a specific requirement on tightness for the flange connection, this shall be calculated in accordance with EN 1591-1, using Annex P.

The designer shall consider section loadings caused by the connected piping system.