SLOVENSKI STANDARD
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Kompenzatorji s kovinskimi mehovi v tlačnih cevovodih - Dopolnilo A1

Metal bellows expansion joints for pressure applications

Kompensatoren mit metallischen Bälgen für Druckanwendungen

Compensateurs de dilatation à soufflets métalliques pour appareils à pression

Ta slovenski standard je istoveten z: EN 14917:2021/prA1

ICS:

23.040.99	Drugi sestavni deli za cevovode	Other pipeline components

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English Version

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Compensateurs de dilatation à soufflets métalliques pour appareils à pression

Kompensatoren mit metallischen Bälgen für Druckanwendungen

This draft amendment is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 342.

This draft amendment A1, if approved, will modify the European Standard EN 14917:2021. 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

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European foreword

This document (EN 14971:2021/prA1:2024) has been prepared by Technical Committee CEN/TC 342 “Metal hoses, hose assemblies, bellow and expansion joints”, the secretariat of which is held by SNV.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of EN 14971:2021.

1 Modification to the European foreword

Replace paragraphs 5 and 6 with the following:

“This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.”

2 Modification to Clause 2, “Normative references”

In Clause 2 and throughout the document replace:

"EN 13445-2:2014" *with* "EN 13445-2:2024".

"EN 13445-3:2014" *with* "EN 13445-3:2021".

3 Modification to 6.1.1, “Symbols”

Insert the following new symbols in Table 4 in the appropriate order in the table:

“

l_R	the length of the tie rod measured between the centre points of the bearing spheres*”.*
r_m	mean radius of crest and root knuckle of U-shaped corrugations (see formula 26) and all mean radius of torus (see Figure 16)".

4 Modification to 6.1.2.1, “General”

Add the following paragraphs before the NOTE:

"For material properties, Clause 5 applies.

If material properties are used to calculate expansion joints in this standard that are not available, like values in the creep range, special considerations should be taken into account. Examples are advanced non-linear calculations and component tests. The safety philosophy of the PED and the latest state-of-the-art knowledge apply.

For the allowable stresses, see 6.1.3.3.".

5 Modification to 6.1.3.5, “Design on PS basis”

Below Formula (3), add the following:

“where

$k_{p,t} = \frac{R_{pT}}{R_{pRT}}$ ".

6 Modifications to 6.2.2.5.1, “General intermediate factors”

Delete the outside brackets in Formula (22).

Replace "L_c" *with* "L_c ; L_t " *in Formula (33).*

7 Modification to 6.2.3.3.2.2, “In-plane instability”

Replace "min" *with* "max" *in the whole clause.*

8 Modification to 6.2.4.4.1, “Stresses due to equivalent axial displacement”

Replace Formula (144) with:

“

$$\sigma_{\mathrm{m,b}}(\Delta \mathrm{q}) = \frac{3 \cdot E_{\mathrm{B},20} \cdot {e_{\mathrm{p}}}^{*}}{2 \cdot (1-\vartheta^2) \cdot (w - C_{\mathrm{r}} \cdot r_m)^2 \cdot {c_{\mathrm{c(d)}}}^2 \cdot C_{\mathrm{d}}} \cdot \Delta \mathrm{q}$$

”.

9 Modification to 6.2.5.2, “Limitations”

In Formula (146) and (147), replace "r" *with* "r_i".

10 Modification to 6.2.5.3.2, “Additional factors”

In Formula (152), replace "r" *with* "r_m".

11 Modifications to 6.2.5.3.2, “Additional factors”

In Table 11, line D_{iC}, *replace* “Formula (148)” *with* “Formula (150)”.

12 Modification to 6.2.6.1, “General”

Add the following sentence:

“This clause is relevant for all types of described bellows in 6.2.3, 6.2.4 and 6.2.5.”.

13 Modification to 6.2.8.2, “Total equivalent axial expansion and compression”

Replace Formula (197) with the following:

“

$$\Delta q_{e,alw} \leq \begin{cases} 0{,}1336 \cdot \left(\frac{w}{2 \cdot r_m}\right)^{0{,}67} \cdot \left\{ r_m \cdot \left(D_i + 2 \cdot w + e \right) \cdot c \cdot (s_d)^m \cdot \frac{R_{p1,0,t}}{R_{p1,0}} \right\}^{0{,}5} \cdot (q - \Delta L - 4 \cdot r_m) \; with\ cold\ work \\ 0{,}1336 \left(\frac{w}{2 \cdot r_m}\right) \left\{ r_m \cdot \left(D_i + 2 \cdot w + e \right) \cdot \frac{R_{p1,0,t}}{R_{p1,0}} \right\}^{0{,}5} \cdot (q - \Delta L - 4 \cdot r_m) \; for\ bellows\ annealed\ acc.to\ Table\ 8\ (without\ cold\ work) \end{cases}$$

”.

Add the following sentence after the formula: "For s_{d} , see Formulae (268), (269), (270).".

14 Modification to 6.2.8.4.2, “Increasing factors for single bellows”

Replace Formula (208) with the following:

"

$$\hat{c}_{P\Theta} = \begin{cases} 1 & for \;\; \kappa \cdot (l_B/2) = 0 \\ \frac{\kappa \cdot (l_B/2)}{sin[\kappa \cdot (l_B/2)]} & for\; 0 < \kappa \cdot \left(\frac{l_B}{2}\right) < \pi \end{cases}$$

with κ according to Formula (48).”

Replace Formula 209 with the following formula and definition:

"

$$\hat{c}_{Py} = \begin{cases} 1 & for \;\; \kappa \cdot l_B \leq \pi/4 \\ max\left\{1; \left[2{,}33 - \frac{3{,}5}{l^*/l_B}\right] \cdot [0{,}5 + 0{,}015 \cdot (\kappa \cdot l_B)^{4{,}8}]\right\} & for\; \pi/4 < \kappa \cdot l_B \leq \pi/\sqrt{2} \end{cases}$$

with κ according to Formula (48).".

Delete Formula (210).

15 Modifications to 6.2.9.2.2, “Working forces and moments”

In Table 14, row 2.4816, change the allocation for column n_t *from* $R_{p1,0}$ *to* $R_{p0,2}$.

16 Modification to 6.2.9.3, “Type of expansion joint”

In Formula (214), replace "$K_{\mu x}$*" with "*$K_{\mu x,t}$*".*

In Formula (219), replace "μ*" with "*$\bar{\mu}$*" (only one dash!).*

In Formula (228), replace "$\overline{\mu_p}$*" with "*$\bar{\mu}$*".*

Delete the following list item after Formulae (222) and (231):

“iii. the length of the tie rod l_R measured between the centre points of the bearing spheres”.

17 Modification to 6.2.10, “Torsion acting on bellows (unreinforced or reinforced)”

Add the following sentence after Formula (253):

"The angle of twist of more than one bellows is calculated by $M_{t,alw} * n_B$.”.

Add the following sentence after Formula (256):

“The torsional moment of more than one bellows is calculated by $M_{t,alw}/n_B$.”.

In Formula (256), replace "K_B*" with "*$K_{B,t}$*".*

In the Note after Formula (257), replace "Formula (255)" *with* "Formula (256)".

18 Modification to 7.4.1.2, “Limitations of the cold forming process”

After Formula (268), add: "(see Formulae (49) and (53))".

After Formula (269), add: "(see Formula (61) and (64)".

After Formula (270), add: "(see Formula (69), (72) and (76)".

19 Modifications to 8.4.4, "Non-destructive testing of welds"

Replace the 2nd and 3rd paragraph in 8.4.4.1 with

"For multi-ply bellows subjected to internal pressure, the outer plies shall be open to the atmosphere, e.g. by means of a venting hole. This opening is usually located in the tangent. The venting hole shall be executed in a way that all plies except the tight inner ply have a hole and are in contact with the atmosphere.

If it is not possible (e.g. for external pressure) and not practical to have an opening of the external plies to the atmosphere, a special LT shall be performed to ensure the tightness of the ply in contact with the medium under pressure.".

Replace the heading title of 8.4.4.6.2 with "Non pressure bearing welds".

20 Modification to Annex K (normative), "Hardware calculation"

In K.2, Table K.1, insert the following new symbols in the appropriate order in the table:

"

$"A_L$	resistant cross section of intermediate lug
A_{L1}	resistant cross section of external lug
F_{bolt}	force on bolt, N
g	lever arm of F_e; see Formula (K.63)
k_a	intermediate factor for reinforcing rings
k_{bo}	effect of thread; see K.10.1.1
k_{bo}	effect of thread; see K. 10.1.1
σ_L	equivalent stress in an intermediate lug
σ_{L1}	equivalent stress in an external lug
σ_{lm}	tension stress in the pipe; see Formula (K.72), N/mm²

".

In row B_S , replace "Formula (K.79)" *with "*Formula (K.76)*".*

Replace Symbol "R" with "r".

*In row F_e , replace "*K.10*" with "*K.9*".*

In row G_e, replace "N/mm³" with "N/mm²".

*In row l_{bs}, replace "*K.8*" with "*K.10*".*

Delete line "$l_{p,o}$, $l_{p,phi}$, $l_{p,90}$".

In row S_F , add "see Figures K.7 to K.15*".*

*In row W_r , replace "*see Figure K.16" *with* "see Formula (K.136)*".*

In row ε_K, replace "1/N" with "mm".