



DPC: 24/30495472 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 26 September 2024

Origin: European

Latest date for receipt of comments: 19 November 2024

Project No. 2024/01857

Responsible committee: GSE/42 Gas fittings and connections including metal hose and hose assemblies

Interested committees:

Title: Draft BS EN 14917 BS :2021/A1 Metal bellows expansion joints for pressure applications.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 19 November 2024

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

English Version

Metal bellows expansion joints for pressure applications

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.

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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye 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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword.....	4
1 Modification to the European foreword	5
2 Modification to Clause 2, “Normative references”	5
3 Modification to 6.1.1, “Symbols”	5
4 Modification to 6.1.2.1, “General”	5
5 Modification to 6.1.3.5, “Design on PS basis”	5
6 Modifications to 6.2.2.5.1, “General intermediate factors”	5
7 Modification to 6.2.3.3.2.2, “In-plane instability”	6
8 Modification to 6.2.4.4.1, “Stresses due to equivalent axial displacement”	6
9 Modification to 6.2.5.2, “Limitations”	6
10 Modification to 6.2.5.3.2, “Additional factors”	6
11 Modifications to 6.2.5.3.2, “Additional factors”	6
12 Modification to 6.2.6.1, “General”	6
13 Modification to 6.2.8.2, “Total equivalent axial expansion and compression”	6
14 Modification to 6.2.8.4.2, “Increasing factors for single bellows”	7
15 Modifications to 6.2.9.2.2, “Working forces and moments”	7
16 Modification to 6.2.9.3, “Type of expansion joint”	7
17 Modification to 6.2.10, “Torsion acting on bellows (unreinforced or reinforced)”	7
18 Modification to 7.4.1.2, “Limitations of the cold forming process”	7
19 Modifications to 8.4.4, “Non-destructive testing of welds”	8
20 Modification to Annex K (normative), “Hardware calculation”	8
21 Modification to K.4.1, “General”	9
22 Modification to K.5, “Pin”	9
23 Modification to K.7.3.2, “Instability”	9
24 Modification to K.7.3, “Square type gimbal”	9
25 Modification to K.7.4, “Round type gimbal”	11
26 Modification to K.8.1.1, “General”	11
27 Modification to K.8.1.2, “Stress in plate for section 3”	11
28 Modification to K.8.1.3, “Stress in sections for form-lock connection (lugs for hinge/gimbal)”	11
29 Modification to K.8.1.4, “Stress in sections for welded buttonhole connection (lugs for hinge/gimbal)”	13
30 Modification to K.8.1.6, “Stress in the weld plate/pipe”	13

31	Modification to K.8.2.2, "Stress in the plate"	13
32	Modification to K.9.2.1, "General"	13
33	Modification to K.9.2.3, "Stresses in Section 2"	14
34	Modification to K.9.3.2, "Weld between lug plate and attachment plate"	15
35	Modification to K.10.1.1, "Stress in flange with 2 tie bars or lugs"	15
36	Modification to K.10.1.2, "Stress in flange with more than 2 tie bars"	15
37	Modification to K.10.2.1, "Stress in plate welded on flange with 2 tie bars"	15
38	Modification to K.12, "Gusset with reinforcing rings"	15
39	Modification to K.12.2, "Basic definitions"	15
40	Modification to K.12.3, "Stresses in the gussets"	15
41	Addition of Annex L (informative), "Benchmarks for calculation"	15

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:

"

$$\sigma_{m,b}(\Delta q) = \frac{3 \cdot E_{B,20} \cdot e_p^*}{2 \cdot (1 - \vartheta^2) \cdot (w - C_r \cdot r_m)^2 \cdot c_{c(d)}^2 \cdot C_d} \cdot \Delta q$$

".

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:

"

$\Delta q_{e,alw}$

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

".

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:

"

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

with κ according to Formula (48)."

Replace Formula 209 with the following formula and definition:

"

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

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))".