SIST

SLOVENSKI STANDARD
SIST EN 14359:2007/kFprA1:2010

01-september-2010

Hidropnevmatski zalogovniki za hidravlične razvode - Dopolnilo A1

Gas-loaded accumulators for fluid power applications

Hydrospeicher für Hydraulikanwendungen

Accumulateurs hydropneumatiques pour transmissions hydrauliques

Ta slovenski standard je istoveten z: **EN 14359:2006/FprA1**

ICS:

23.100.99	Drugi sestavni deli hidravličnih sistemov	Other fluid power system components

SIST EN 14359:2007/kFprA1:2010 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

FINAL DRAFT
EN 14359:2006

FprA1

July 2010

ICS 17.040.30

English Version

Gas-loaded accumulators for fluid power applications

Accumulateurs hydropneumatiques pour transmissions hydrauliques

Hydrospeicher für Hydraulikanwendungen

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

This draft amendment A1, if approved, will modify the European Standard EN 14359:2006. 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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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 14359:2006/FprA1:2010: E

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Foreword

This document (EN 14359:2006/FprA1:2010) 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 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 Deletion of Annex E

Delete the existing Annex E and replace it with the following:

"

Annex E
(informative)

Example of application of the method of evaluating and interpreting fatigue test results carried out on complete accumulators

E. 1 General

E.1.1 General

This annex provides an example of the fatigue assessment of gas-loaded accumulators using the 'Guarantee factor method' as described in 7.6.7.

E.1.2 Consider a population of accumulators with the following characteristics:

— D_i = 100 mm

— Minimal thickness = 4,2 mm

— *PS* = 320 bar

— P_0 = 100 bar

— k_1 ⇔ material = Steel (carbon plain) ; $Rp_{0,2\%}$ = 880 MPa , R_m = 1 100 MPa

— k_2 ⇔ surface finish Ra = 1,6 µm

— k_3 ⇔ stress concentration coefficient κ_t = 2,5, (typical for a threaded tube)

E.1.3 Calculation of *CVM*

For further information, see Annexes H and I.

— *CVm* = 0,08.

— k_1 : material properties well defined ⇒ k_1 = 1

— k_2 : Ra = 1,6 µm is the minimum acceptable value ⇒ k_2 = 0,37

— k_3 : has two boundaries with a generally acceptable range: $1,5 \le \kappa_t \le 3$. For values of $\kappa_t \le 2,25$ (mid point of 1,5 and 3) then k_3 = 1. For higher values, k_3 is reduced. The stress concentration coefficient of this accumulator, κ_t = 2,5 is slightly above 2,25 hence : ⇒ k_3 = 0,8

Hence, $k = (1 \times 0{,}37 \times 0{,}8)^{-1/3}$ = 1,5 (reference formula 7.6-23)

And CVM = 0,08 x 1,5 = 0,12 (reference formula 7.6-22)

E.1.4 Calculation of *M*

For a tube, $\sigma_m = \dfrac{P_m (D_i + e)}{20 \cdot e}$

For a mean pressure of 210 bar, then σ_m = 210 x (100 + 4,2) / (20 x 4,2) = 260 MPa

Manufacturer parameter, k (= 1,5) is taken into account in the Haigh diagram. A value for σ_m = 260 MPa on the abscissa corresponds to σ_{am} = 249 MPa on the ordinate.

For σ_{am} = 249 MPa, P_{am} = 249 x 20 x 4,2 / (100 + 4,2) = 201 bar.

Hence, M ≈ 200 bar.

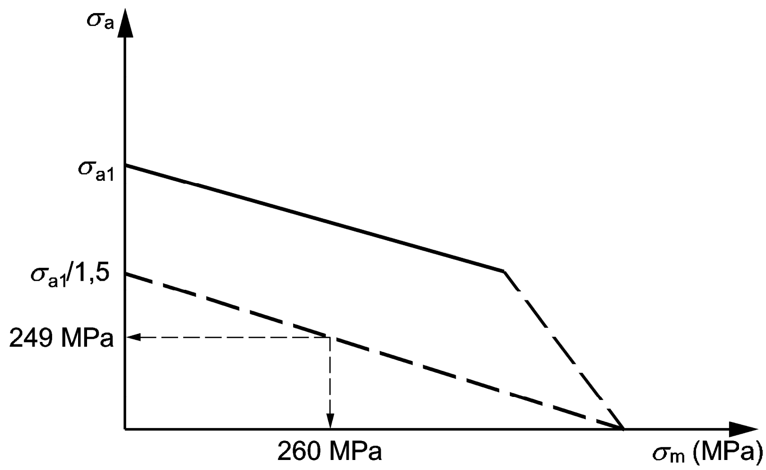

Figure E-1 — Haigh Diagram

E.1.5 Calculation of *CVE*

For further information, see Annex I.

E.1.5.1 Case 1: *CVE* = 0

E.1.5.1.1 General

This case corresponds to a population always cycling with E_m values (0,9 < E_m <1).

E.1.5.1.2 Calculation of *S*

M and *E* shall be assumed to have a Normal distribution.

The required reliability = 99,9 %.

S can either be calculated with Annex G (Normal distribution) or estimated via the abacus in Annex F (Normal distribution).

S = 1,6

E.1.5.1.3 Calculation of *E*

E = (320 – 100) / 2 = 110 bar

E.1.5.1.4 Check of *S*

Calculation of *M / E.*

M / *E* = 200 / 110 = 1,8

Hence, the condition $S \leq M / E$ is verified.

E.1.5.1.5 Validation of guarantee factor *S*

For the validation of the guarantee factor, in this example fatigue testing on a sample of 3 test accumulators shall be performed by applying a cyclic test pressure range ΔP_{test} calculated by the means of the normal distribution equation given in Annex G.

Reliability of 99,9 % with a level of confidence of 0,95 is generally considered acceptable, hence from Annex G, a'=1,64

ΔP_{test} = 397 bar, hence:

- P_u = 210+199 ≈ 410 bar
- P_L = 210-199 ≈ 10 bar

If following testing for 2×10^6 cycles, there is no evidence of cracks, the guarantee factor *S* is validated and the accumulator family represented by the sample under test is considered to have an infinite lifetime for a service pressure range between P_0 and *PS*.

E.1.5.2 Case 2: CVE = 0,3

E.1.5.2.1 General

This case corresponds to a population cycling with a variable E_m value.

In this example the environmental severity conditions from Table I.1:

— E_1, pre-charging value = 0,9

— E_2, temperature = 0,55

— E_3, vibrations = 0,4

Hence, $CVE = [(1 – 0,9) \times (1 – 0,55) \times (1 – 0,4)]^{1/3} = 0,3$

E.1.5.2.2 Calculation of *S*

The required reliability = 99,9 %.

S = 2,25

E.1.5.2.3 Check of S

From E.1.5.1.4 *M / E* =1,8. Hence the condition $S \leq M / E$ is not achieved and therefore the design should be revised in accordance with the flow chart in Figure 7.7 and a test shall be performed thereafter."

2 Deletion of Annex F

Delete the existing Annex F and replace it with the following:

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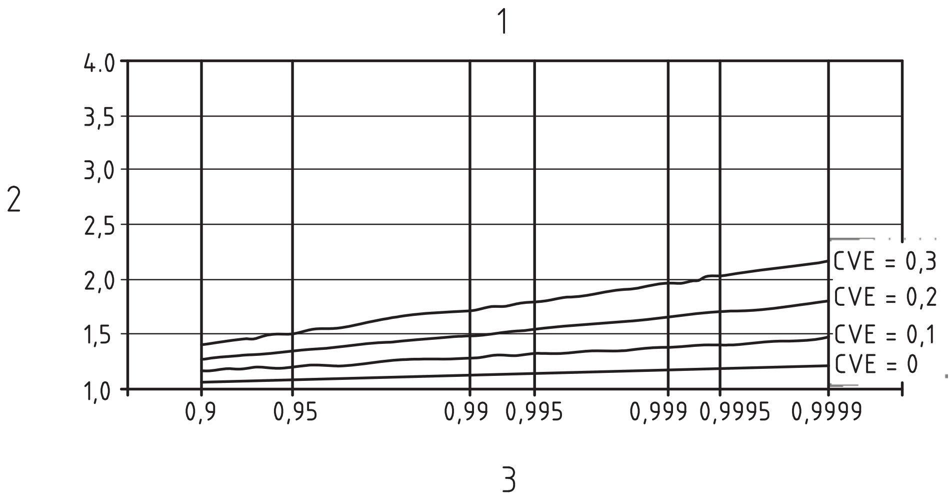
Annex F
(informative)

Abacus

Abacus guarantee factor (normal distribution)



Key

1 CVM = 0,05

2 guarantee factor *S*

3 reliability

Figure F-1 — CVM = 0,05