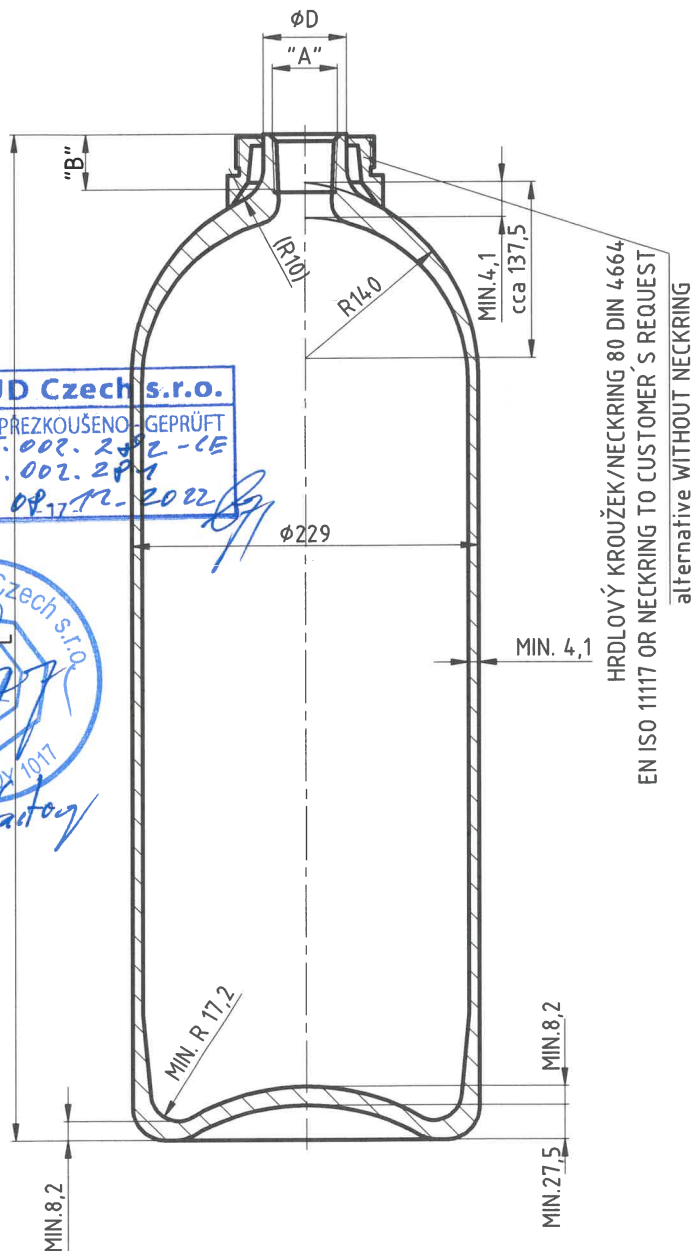


" A "	" φD "	" B "
25E EN ISO 11363-1	φ41h11	min.22
OR THREAD TO CUSTOMER'S REQUEST		



TÜV SÜD Czech s.r.o.
 APPROVED - PŘEZKOUŠENO - GEPRÜFT
 Ev. č.: 15.002.2812-CE
 Date: 09.12.2022



These steel cylinders are ultrasonic tested after heat treatment
 We guarantee $\sum V, Nb, B, Ti, Zr \leq 0,15\%$

MATERIAL : 34CrMo4
 CHROME MOLY EN 10 083
 R_m = 1138-1258 MPa
 R_e ≥ 970 MPa
 A₅ ≥ 12% (rectangular specimen)
 A₅ ≥ 14% (round specimen)
 KCV = J/cm² (-50°C)
 příčná/trans. ≥ A- 30 B- 40

CHEMICKÉ SLOŽENÍ/CHEMICAL ANALYSIS(%)		
	CHEM. AN. no. 1	CHEM. AN. no. 2
C	0,34-0,37	0,33-0,37
Si	0,20-0,35	0,20-0,35
Mn	0,70-0,90	0,70-0,90
Cr	0,97-1,17	0,95-1,15
Mo	0,20-0,30	0,18-0,28
Ni	0,00-0,30	0,00-0,30
P	max. 0,015	max. 0,015
S	max. 0,005	max. 0,005
P+S	max. 0,020	max. 0,020

KONSTRUKCE A PROVEDENÍ DLE
 DESIGN AND WORKMANSHIP IN ACC TO.
 EN ISO 9809-2:2010 and ISO 9809-2:2010
 EN ISO 9809-2:2019 and ISO 9809-2:2019

Rev.3
(5159)

Rodina lahví/Cylinders family

Objem/Volume +5%(l) -0	"L" ca (mm)	Hmotnost/Weight ca (kg)	
V min.	15	520	21,5
V max.	55	1575	48,5
příklady zásupců/ typical representants			
Objem/Volume +5%(l) -0	"L" ca (mm)	Hmotnost/Weight ca (kg)	
	16	545	22,5
	30	920	30
	40	1175	37,5
Ref. cylinder	50	1440	45

PRACOVNÍ TLAK DO:
 WORKING PRESSURE UP TO: **200 bar**

ZKUSEBNÍ TLAK DO:
 TEST PRESSURE UP TO: **300 bar**

MIN. DESTRUKČNÍ TLAK :
 MIN. BURST TEST PRESSURE: **480 bar**

TEPELNÉ ZPRACOVÁNÍ/HEAT TREATMENT:
 KALENÍ/QUENCHING
 POPOUSTĚNÍ/TEMPERING



Název/Name

Seamless steel cylinder for compressed gases
 except embrittling gases

Značka změny /mark of change	Popis změny /description of change	Datum /date	Vypracoval /designed by	Kontroloval /checked by	Schválil /approved by
		9.2.04	PIJANOWSKI		
(2851) rev.1	rozšíření o ISO 9809-2:2010	29.11.11	PIJANOWSKI	ing.Hofřík	ing.Pawlas
(3308) rev.2	change of heat treatment change of chem. analysis	17.6.13	PIJANOWSKI	ing.Hofřík	ing.Pawlas
Rev.3 (5159)	standards added ISO 9809-2:2019; EN ISO 9809-2:2019	15.3.22	HUEBER	MORAVEC	HOFŘÍK

List č./Počet listů
 Page no./of : 1/3

Polotovary/semi-product
 billet

Formát/size
 A4

LA4-0478

Rev.
 3

Rev.3
(5159)

Thickness of cylindrical shell according to ISO 9809-2:2010; EN ISO 9809-2:2010;
ISO 9809-2:2019; EN ISO 9809-2:2019

Wall stress calculation :

$$a = D/2 \left(1 - \sqrt{\frac{10.F.Reg \cdot \sqrt{3} \cdot p_h}{10.F.Reg}} \right)$$

Where :

D - outside diameter.....229(mm)

p_h - test pressure.....300(bar)

Reg - min.yield stress.....970 (MPa)

Rmg - min.tensile strenght.....1138 (MPa)

F - design stress factor.....

$$\frac{0,65}{Reg/Rmg} = \frac{0,65}{970/1138} = 0,762$$

$$a = 229/2 \left(1 - \sqrt{\frac{10 \cdot 0,762 \cdot 970 \cdot \sqrt{3} \cdot 300}{10 \cdot 0,762 \cdot 970}} \right) = 4,09 \text{ (mm)}$$

We selected min. wall thickness : 4,1 (mm)

Calculation of the concave end acc. to ISO 9809-2; item 7.5:

inside radius $r = 0,075 \cdot D$

$r \geq 0,075 \cdot 229$

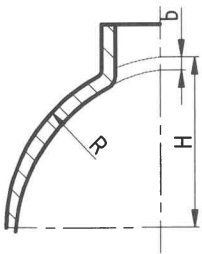
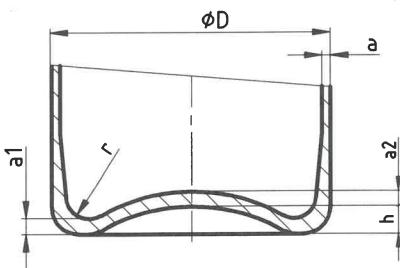
$r \geq 17,2 \text{ mm}$ selected min.R 17,2 mm

bottom thickness (concave) $a_{1,2} \geq 2,0 \cdot a$

$a_{1,2} \geq 2,0 \cdot 4,1$

$a_{1,2} \geq 8,2 \text{ mm}$

selected minimum 8,2 mm




Calculation of convex head :

$b \geq a$ for $H/D \geq 0,40$

$H/D = 137,5/229 = 0,60$

$b \geq a = 4,1 \text{ mm}$



Značka změny /mark of change	Popis změny /description of change	Datum /date	Vypracoval /designed by	Kontroloval /checked by	Schválil /approved by	 Vítkovice Cylinders Název/Name Seamless steel cylinder for compressed gases except embrittling gases
		9.2.04	PIJANOWSKI			
(2851) rev.1	rozšíření o ISO 9809-2:2010	29.11.11	PIJANOWSKI	ing.Hofřík	ing.Pawlas	
(3308) rev.2	change of heat treatment change of chem. analysis	17.6.13	PIJANOWSKI	ing.Hofřík	ing.Pawlas	
Rev.3 (5159)	standards added ISO 9809-2:2019; EN ISO 9809-2:2019	15.3.22	HUEBER	MORAVEC	HOFRIK	
List č./Počet listů Page no./of :	Polotovár/semi-product billet	Formát/size A4	LA 4-0478			Rev. 3

HEAT TREATMENT for CHEM. AN. no. 1

Quenching

Heating up to 830–890°C, delay 20 minutes, cooling in POLYDUR to max. 50°C.

Tempering

Heating up to 590±30°C, delay 46 minutes, cooling in air.

HEAT TREATMENT FOR CHEM. AN. no. 2

Quenching

Heating up to 830–890°C, delay min. 15 minutes, cooling in POLYDUR to max. 50°C.

Tempering

Heating up to 515°C±30°C, delay min. 30 minutes, cooling in air.

OTHER TOLERANCES

Out-of-roundness acc.to standard ISO 9809-2; item 8.5

Mean diameter acc.to standard ISO 9809-2; item 8.6


Straightness acc.to standard ISO 9809-2; item 8.7

Verticality acc.to standard ISO 9809-2; item 8.8

HARDNESS RANGE: 330–385 HB

Ultrasonic inspection acc.to standard ISO 9809-2; item 8.4.2 and Appendix B



Značka změny /mark of change	Popis změny /description of change	Datum /date	Vypracoval /designed by	Kontroloval /checked by	Schválil /approved by	 Vítkovice Cylinders
		9.2.04	PIJANOWSKI			
(2851) rev.1	rozšíření o ISO 9809-2:2010	29.11.11	PIJANOWSKI	ing.Hofřík	ing.Pawlas	
(3308) rev.2	change of heat treatment change of chem. analysis	17.6.13	PIJANOWSKI	ing.Hofřík	ing.Pawlas	
Rev.3 (5159)	standards added ISO 9809-2:2019; EN ISO 9809-2:2019	15.3.22	HUEBER	MORAVEC	HOFRIK	
List č./Počet listů Page no./of :	Polotovár/semi-product	Formát/size	LA 4-0478			Rev. 3
3/3	billet	A4				