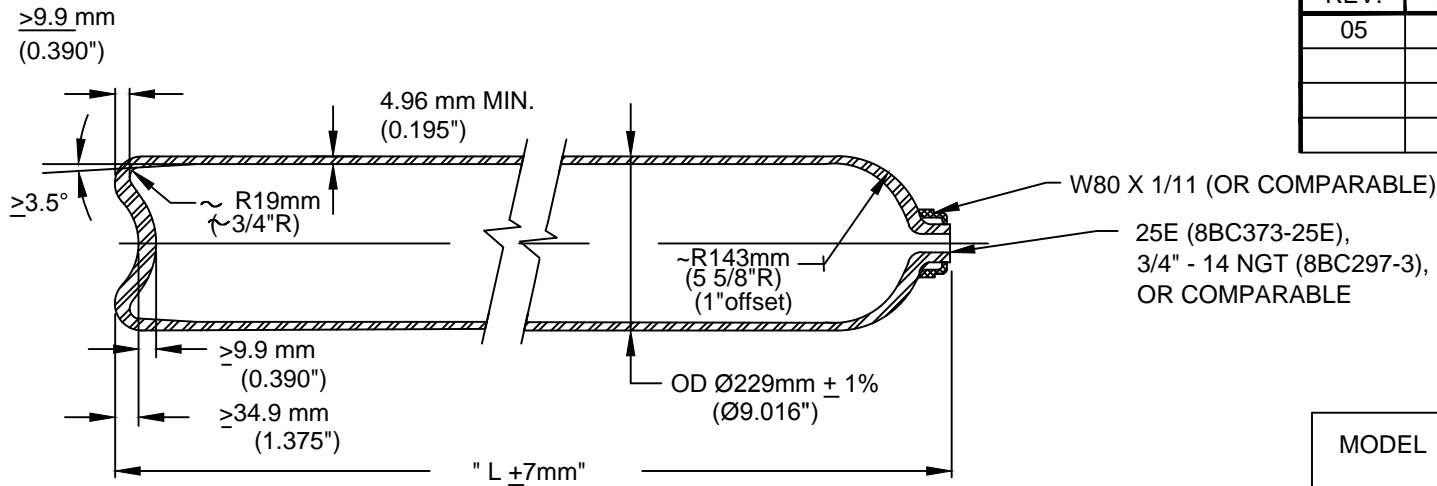


DRAWING FOR REFERENCE ONLY



REV.	ECN - DESCIP.	DATE	DRWN.	CHKD.	APP.
05	3130	8/31/12	JJM		

MODEL	LENGTH 'L'		Min WATER CAPACITY		APPROX. WGT. W/O FITTINGS	
	MM	IN	LITERS	IN ³	KG	LBS
8BC373	1463	57.6	50.0	3051	54.7	120.5
8BC353	1387	54.6	47.2	2880	51.5	113.5
8BC297	1196	47.1	40.0	2441	45.6	100.5
8BC262	1070	42.1	35.0	2136	41.5	91.5
8BC218	917	36.1	30.0	1831	35.6	78.5
*Vmin	698	27.5	20.8	1269	29.5	65
*Vmax	2197	86.5	77	4699	81.6	180

*Note: Model 8BC373 is the design qualification test cylinder. Vmin and Vmax represent the range covered by the same design family.

SPECIFICATION: ISO 9809-1: 1999 and ISO 9809-1: 2010

1. Service Conditions:

- Working pressure: 200 bar (2900 psi)
- Hydraulic test pressure: 300 bar (4351 psi)
(14.5 psi = 1 bar)

2. Material:

Cr-Mo-steel complying with the requirements of clause 6.2 of ISO 9809-1. Norris' 4137 per Norris Specification EO-A2 is a currently qualified steel.

3. Manufacture:

Hot billet extrusion followed by hot drawing

4. Heat Treatment: Quenched and Tempered

- Austenitize: $\sim 899^\circ\text{C}$ (1650°F)
- Quenchant: Water based polymer: $\sim 4\%$ concentration (temperature $\leq 60^\circ\text{C}$ (140°F))
- Temper: $\sim 601^\circ\text{C}$ (1115°F) (Min. 30 minutes at temp.)

5. Mechanical Properties: (at room temperature)

- Tensile (Rg): 945 - 1075 MPa (137 - 156 ksi)
- Yield (Re): $\geq 803 \text{ MPa}$ (116 ksi)
- Elong (A): $\geq 14\%$ (ON $5.65 \sqrt{S_0}$)

5. Mechanical Properties: (continued)

- Out-of-roundness per ISO 9809-1, 8.5 - $< 2\%$
- Straightness per ISO 9809-1, 8.7- 3 mm per m
- Verticality per ISO 9809-1, 8.8 -10 mm per m
- Hydraulic and volumetric expansion test per 11.2
- Hardness test: Each end of every cylinder
HB range: 283 - 322 BHN
- Flattening test: Flatten to $8 \times t_m$ without cracks
- Charpy test (-50°C , Trans): $\geq 35 \text{ J/cm}^2$ (avg.)
 $\geq 28 \text{ J/cm}^2$ (ind.)
- UT flaw detection: Each cyld. per ISO 9809-1
- Batch burst test: $P_b \geq 480 \text{ bar}$ (6962psi)

6(a). Thickness Calculations: (ISO 9809-1)

$$a = 0.5 \times D \left(1 - \sqrt{\frac{(10FRe - \sqrt{3}Ph)}{(10FRe)}} \right)$$

Where:

Ph= Test Pressure (bar) = 300 bar (4351psi)

D = External diameter of container = $\varnothing 229 \text{ mm}$ Nom

F = Lesser of $0.65/(Re/Rg)$ or 0.85; $Re/Rg \leq 0.9$

= Lesser of $0.65/0.85$ or $0.85 = 0.765$ (for $Re/Rg = 0.85$)

$$a = 0.5 \times 229.0 \left(1 - \sqrt{\frac{(10 \times 0.765 \times 803 - 3 \times 300)}{(10 \times 0.765 \times 803)}} \right) = 4.95 \text{ mm} (0.1948")$$

NOTE: a', the guaranteed min thickness = 4.96mm (0.1953") equals or exceeds the calculated min thickness, a.



NORRIS CYLINDER COMPANY
4818 WEST LOOP 281 LONGVIEW, TEXAS 75603 USA

REFILLABLE SEAMLESS STEEL CYLINDER FOR COMPRESSED GASES PER ISO 11114-1

SCALE	NOT TO SCALE	DRAWING NO.		REV.
DWN. BY	R.S.	7/5/06	901A-A-9687	05
CHK'D BY	F.G.	8/22/06		
APP'D BY	R.S.	8/22/06	SHEET NO. 1	OF 1 SHEETS