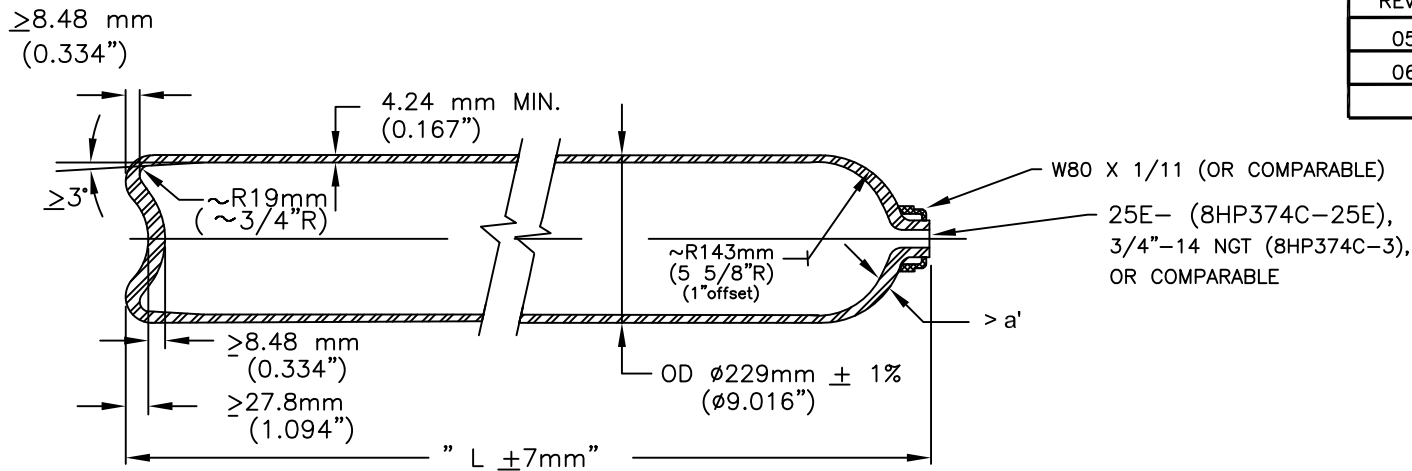


# DRAWING FOR REFERENCE ONLY



REV.	ECN - DESCRIPT.	DATE	DRWN.	APP.
05	3019	7/5/11	JJM	SAM
06	3162	05/03/13	LJI	

**SPECIFICATION:** ISO 9809/2: 2000

**1. Service Conditions:**

- Working pressure: 200 bar (2901 psi)
- Hydraulic test pressure: 300 bar (4351 psi)  
(1 bar = 14.504 psi)

**2. Material:**

Cr-Mo-steel complying with the requirements of clause 6.2 of ISO 9809-2. Norris' 4133M4 per EO-A6 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 (temperature  $\leq 60^\circ\text{C}$ (140°F))
- Temper:  $\sim 573^\circ\text{C}$  (1065°F) (Min. 30 minutes at temp.)

**5. Mechanical Properties:** (at room temperature)

- Tensile (Rg): 1100 - 1220 MPa (159.6 - 177 ksi)
- Yield (Re):  $\geq 935$  MPa (135.6 ksi)
- Elong (A):  $\geq 12\%$  (ON  $5.65\sqrt{S_0}$ )

- Out-of-roundness, Straightness, and Verticality per ISO 9809-2 sections 8.5 -  $<2\%$ , 8.7 -  $<3$  mm per m, 8.8 -  $<10$  mm per m
- Hydraulic and volumetric expansion test per 11.2
- Hardness test: Each end of every cylinder  
HB range: 313 - 368
- Flattening test: Flatten to  $10 \times t_m$  without cracks
- Charpy test ( $-50^\circ\text{C}$ , Trans):  $\geq 35$  J/cm<sup>2</sup> (avg.)  
 $\geq 50$  J/cm<sup>2</sup> (ind.)
- UT flaw detection: Each cyld. per ISO 9809-2
- Batch burst test:  $P_b \geq 480$  bar (6962psi)

**6(a). Thickness Calculations:** (ISO 9809/2: 2000)

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

Where:

- Ph = Test Pressure (bar) = 300 bar (4351psi)
- D = External diameter of container =  $\phi 229$  mm NOM
- F = Lesser of  $0.65/(Re/R_g)$  or 0.77;  $Re/R_g \leq 0.9$   
= Lesser of  $0.65/0.85$  or  $0.77 = 0.765$  (for  $Re/R_g = 0.85$ )

$$a = 0.5 \times 229 \left( 1 - \sqrt{\frac{(10 \times 0.765 \times 935 - \sqrt{3} \times 300)}{(10 \times 0.765 \times 935)}} \right) = 4.237 \text{mm} (0.1668")$$

MODEL	LENGTH 'L'		Min WATER CAPACITY		APPROX. WGT. W/O FITTINGS	
	MM	IN	LITERS	IN <sup>3</sup>	KG	LBS
8HP374C	1441	56.75	50.0	3051	44.3	97.5
8HP350C	1365	53.75	47.2	2880	42.3	93
8HP298C	1175	46.25	40	2441	36.8	81
Vmin	Contact Norris Cylinder for Availability					
Vmax	Contact Norris Cylinder for Availability					

Note: Model 8HP374C is the design qualification test cylinder. Vmin and Vmax represent the range covered by the same design family. Max ovality, max verticality deviation, and max straightness deviation can also be found on Norris Document 363-00.



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

REFILLABLE SEAMLESS STEEL CYLINDER  
FOR PERMANENT GASES EXCEPT  
EMBRITTLING GASES PER ISO 11114-1

SCALE	NOT TO SCALE		DRAWING NO.		REV.
DWN. BY	JJM	1/22/09	901A-A-9767		06
CHK'D BY	SAM	1/22/09			
APP'D BY			SHEET NO. 1	OF 1	SHEETS