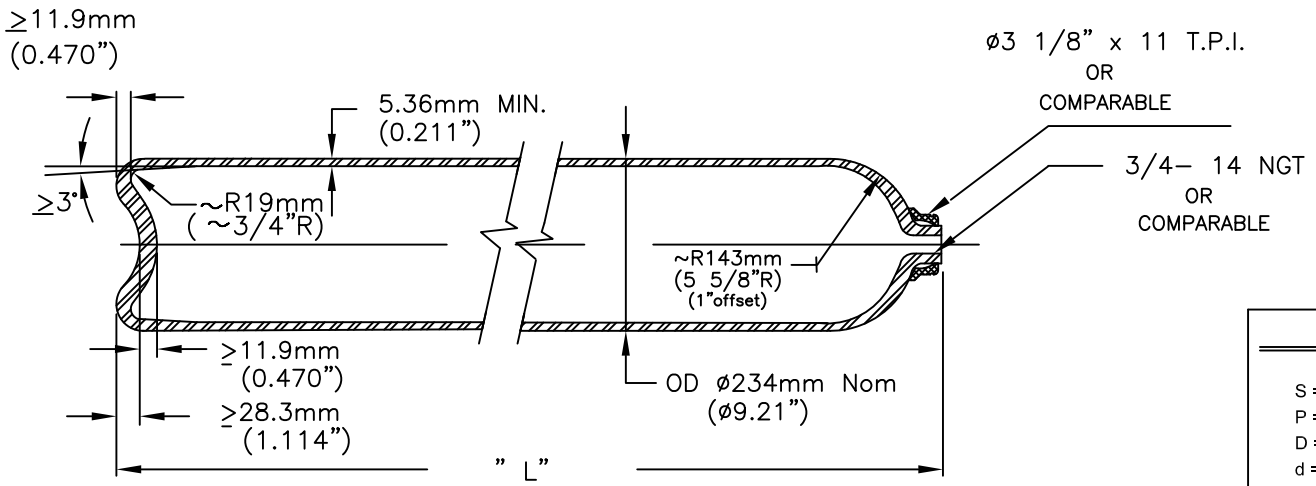
REV.	ECN – DESCRIP.	DATE	DRWN.	CHKD.
01	3384	04/29/15	LJI	



DRAWING FOR REFERENCE ONLY

D.O.T. Wall Stress Calculations: $S = P(1.3D^2 + 0.4d^2)/(D^2 - d^2)$

S = Maximum wall stress, psi
P = Test pressure, psi
D = Outside diameter, inch
d = Inside diameter, inch

$$s = \frac{3775\,[1.3\,(9.157)^2 + 0.4\,(8.735)^2]}{(9.157)^2 - (8.735)^2}$$

s = 69,759psi (481 MPa)

Required Minimum tensile: $= \frac{69{,}759}{0.67} = 104{,}118$ psi (717.9 MPa)

Note that the DOT Wall Stress Calculation is a theoretical based on Norris Drawing 901A-B-9105 - Model 8BC250.

SPECIFICATION: ISO 9809/1: 1999
DOT 3AA 2265

1. Service Conditions:
- –DOT rated service pressure: 156 bar (2265 psi)
- –ISO rated working pressure: 173 bar (2516 psi)
- –Hydraulic test pressure: 260 bar (3775 psi.)

2. Material:
Cr–Mo–Steel, Fully killed and made to fine grain practice by basic oxygen or electric furnace process.

Chemical Composition (%)

	C	Si	Mn	P	S	Cr	Mo
Min.	0.28	0.15	0.40	--	--	0.80	0.15
Max.	0.33	0.30	0.60	0.020	0.020	1.10	0.25

Note: S+P < 0.030

3. Manufacture:
Hot billet extrusion followed by hot drawing

4. Heat Treatment: Quenched and Tempered
- –Austenitize: ~899°C (1650°F)
- –Quenchant: Water based polymer: (temperature ≤ 60°C(140°F))
- –Temper: ~627°C(1160°F) (Min. 30 minutes at temp.)

5. Mechanical Properties: (at room temperature)
- – Tensile (Rg): 775 – 930 MPa (112.4 – 134.8 ksi)
- – Yield (Re): ≥ 604.5 MPa (87.675 ksi)
- – Elong (A): ≥ 14% (ON 5.65 $\sqrt{S_o}$) ≥ 20% on 2" G.L. for DOT
- – Hardness: 225–270 BHN
- – Flattening test: Flatten to ø6 x t without cracks
- – Charpy test (–50°C, Trans): ≥ 35 J/cm² (avg.)
- – UT flaw detection: Each cyld. per ISO 9809–1
- – Batch burst test: Pb ≥ 416 bar (6040psi)

6(a). Thickness Calculations: (ISO 9809/1: 1999)

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

Where:
Ph= Test Pressure (bar) = 260 bar (3775psi)
D = External diameter of container =ø233 mm
F = Lesser of 0.65/(Re/Rg) or 0.85; Re/Rg ≤0.9
= Lesser of 0.65/0.78 or 0.85 = 0.833 (for Re/Rg = 0.78)

$$a = 0.5x234\left(1-\sqrt{\frac{(10x0.833x604.5-\sqrt{3}x260)}{(10x0.833x604.5)}}\right) \quad \boxed{=5.35mm\ (0.2106")}$$

NOTE: a', the guaranteed min thickness = 5.36mm (0.211") exceeds calculated min thickness, a.

MODEL	LENGTH 'L'		Min WATER CAPACITY		APPROX. WGT. W/O FITTINGS	
	MM	IN	LITERS	IN³	KG	LBS
8BC250P	1295	51	43.2	2640	52.2	115
*Vmin	708	27.9	21.7	1325	32	71
*Vmax	1727	68	TBD	TBD	TBD	TBD

*Note: Model 8BC250P is the design qualification test cylinder. Vmin and Vmax represent the range covered by the same design family.

NORRIS CYLINDER COMPANY
P.O. BOX 7486 LONGVIEW, TEXAS 75607

REFILLABLE SEAMLESS STEEL CYLINDER FOR PERMANENT GASES PER ISO 11114–1

SCALE	NOT TO SCALE		DRAWING NO.	REV.
DWN. BY	R.S.	6/10/04	901A–A–9644	01
CHK'D BY				
APP'D BY	R.S.	7/15/04	SHEET NO. 1 OF 1 SHEETS	