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These developments have been carried out at Ariel Industries Pty Ltd Applied Polymers Division laboratories in Cheltenham, Victoria, Australia, and by working with major insulation contractors specialising in cryogenic insulation for the LNG industry.

Sample test foam blocks were produced by Ariel Industries and independently tested by Holometrix Micromet Bedford MA, USA.

The original Report Ref. ARE-1 is available for viewing at Ariel Industries' offices in Melbourne.

The results of the testing are shown below:

APTANE™ S012/B900 - 45kg/m³

Low halides fire retarded spray foam for pre-insulated pipe production.

APTANE™ P114/B900 - 45kg/m³

Low halides fire retarded pour-in-place foam for insulation of valve boxes, flanges and pipe work.

APTANE™ High Density Pipe Support Foam to produce 160, 224 and 320kg/m³ moulded pipe supports.

This Aptane™ foam system is fire retarded with a non-halide containing fire retardant.

URESTRUCT™ HD-160

DENSITY	(ASTM D1622)	:	160	kg/m ³
COMPRESSIVE STRENGTH	(ASTM D1621)			
At 22°C		:	2,222	kPa
At -165°C		:	3,742	kPa
THERMAL CONTRACTION/EXPANSION		:	65.1 x 10 ⁻⁶	
CLOSED CELL CONTENT	(ASTM D2856)	:	94	%
TENSILE STRENGTH	(ASTM D1623)			
At 22°C		:	2,301	kPa
At -165°C		:	2,986	kPa
TENSILE MODULUS				
At 22°C		:	15,620	kPa
At -165°C		:	31,041	kPa
THERMAL CONDUCTIVITY	(ASTM C177)			
At 22°C		:	0.0320	W/mk
At -165°C		:	0.0205	W/mk
CTSR		:	4.79	

URESTRUCT™ HD-224

DENSITY	(ASTM D1622)	:	224	kg/m ³
COMPRESSIVE STRENGTH	(ASTM D1621)			
At 22°C		:	4,443	kPa
At -165°C		:	7,397	kPa
THERMAL CONTRACTION/EXPANSION		:	64.8 x 10 ⁻⁶	
CLOSED CELL CONTENT	(ASTM D2856)	:	94	%
TENSILE STRENGTH	(ASTM D1623)			
At 22°C		:	3,532	kPa
At -165°C		:	3,703	kPa
TENSILE MODULUS				
At 22°C		:	24,427	kPa
At -165°C		:	42,859	kPa
THERMAL CONDUCTIVITY	(ASTM C177)			
At 22°C		:	0.0350	W/mk
At -165°C		:	0.0267	W/mk
CTSR		:	4.32	

URESTRUCT™ HD-320

DENSITY	(ASTM D1622)	:	320	kg/m ³
COMPRESSIVE STRENGTH	(ASTM D1621)			
At 22°C		:	7,336	kPa
At -165°C		:	17,042	kPa
THERMAL CONTRACTION/EXPANSION		:	64.7 x 10 ⁻⁶	
CLOSED CELL CONTENT	(ASTM D2856)	:	94	%
TENSILE STRENGTH	(ASTM D1623)			
At 22°C		:	5,099	kPa
At -165°C		:	4,862	kPa
TENSILE MODULUS				
At 22°C		:	39,767	kPa
At -165°C		:	60,490	kPa
THERMAL CONDUCTIVITY	(ASTM C177)			
At 22°C		:	0.0410	W/mk
At -165°C		:	0.0338	W/mk
CTSR		:	3.88	

SHELL DEP SPECIFICATION SUMMARY

DENSITY:	45 kg/m ³
COMPRESSIVE STRENGTH:	250 kPa
EXPANSION/CONTRACTION:	<70 x 10 ⁻⁶
FRESH FOAM:	<0.020 W/mk
AGED 180 DAYS:	<0.023 W/mk
CTSR:	>1.5
CLOSED CELLS:	>90 %

HIGH DENSITY PIPE SUPPORT FOAM:

DENSITY:	160 kg/m ³
	224 kg/m ³
	320 kg/m ³

COMPRESSIVE STRENGTH:

160	-	2000 kPa
224	-	4000 kPa
320	-	7000 kPa

THERMAL CONDUCTIVITY AT -160°C:

160	-	0.022 W/mk
224	-	0.025 W/Mk
320	-	0.035 W/mk

All URESTRUCT™ Foam Systems meet the requirements of the Shell DEP Specification.