

Millathane® Urethane For Fuel Bladders

Millable urethanes, especially polyester urethanes such as Millathane 5004, have good resistance to oils and fuel as seen by the immersions in JP4 and JP8 fuels, below. Polyether urethanes such as Millathane CM have less resistance to fuels but have improved water resistance and improved low temperature properties.

	<u>CM</u>	<u>5004</u>
Millathane® CM	100	-----
Millathane® 5004	-----	100
Zinc Stearate	0.5	-----
Stearic Acid	-----	0.25
N330 black	30	35
TP90B plasticizer	-----	10
MBTS	4	-----
MBT	2	-----
Thanecure® ZM	1	-----
Sulfur	2	-----
DiCup 40C	-----	5
	139.5	150.25
 Mooney Viscosity		
ML(1+4)/100°C	200	56
 MDR, 160°C		
ML, lb-in (dNm)	3.6 (4.1)	0.8 (0.9)
MH, lb-in (dNm)	41.1 (46.4)	19.3 (21.8)
ts2, min.	2.1	2.7
t90, min.	5.5	16.4
 Original Physical Properties		
Cure time at 160°C, min.	15	20
Hardness, Shore A	70	67
300% Modulus, psi (MPa)	2580 (17.8)	1370 (9.4)
Tensile Strength, psi (MPa)	3420 (23.6)	2460 (17.0)
Elongation, %	370	670
Tear Die C, lb/in (kN/m)	350 (61.3)	360 (63.0)
 Oven Aged 70 hr/125°C		
Hardness Change, Pts	+7	+11
Tensile Strength, % Change	+6	+34
Elongation, % Change	-38	-27
 Aged in JP4 Fuel, 70 hr/88°C(190°F)		
Hardness Change, Pts	-7	0
Tensile Strength, % Change	-52	+1
Elongation, % Change	-51	+15
Weight Change, %	+26	-1.7
Volume Change, %	+42	-0.2



Millathane® Urethane For Fuel Bladders, continued

Millathane grade:	CM	5004
Aged in JP8 Fuel, 70 hr/88°C (190°F)		
Hardness Change, Pts	-5	+3
Tensile Strength, % Change	-54	+4
Elongation, % Change	-49	+7
Weight Change, %	+18	-4.6
Volume Change, %	+28	-4.8
Aged in Water, 70 hr/100°C		
Hardness Change, Pts	-10	Too Soft
Tensile Strength, % Change	-56	To
Elongation, % Change	-35	Test
Weight Change, %	+12	+7
Volume Change, %	+14	+8
Compression Set		
70 hr/70°C, % set	54	-----
22 hr/100°C, % set	-----	61
Brittle Point, °C		
Unaged	-61	-57
JP4 Aged	-57	-52
JP8 Aged	-61	-57
Temperature Retraction, °C		
TR-10	-45	-38
TR-30	-39	-23
TR-50	-24	-18

Summary

Millathane 5004 (peroxide cured) had better resistance to JP4 and JP8 fuels than Millathane CM (sulfur cured), but Millathane CM had better low temperature properties and hot water resistance.

Ref: V7831-E,V7831A-J
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