

**Compliance Testing of
PRECIDIUM™ ECS FR Fire Retardant Polyurea
to the CAN/ULC-S668-12 Standard**



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1. Material Strength Test (ASTM D751, grab tensile method)
1000N at 30 mil sprayed on to Typar 3401. Grab Tensile of Typar 3401 is 575N, so this was not considered a reinforced Sample.

Requirement 500N

2. Vapour Transmission Test ASTM D814

Chemical	Vapour Transmission	Requirement
IRM 903	0 g/m ² /h	Max 20 g/m ² /h
ASTM Fuel C	18.9 g/m ² /h	Max 20g/m ² /h
ASTM Fuel H	17.6 g/m ² /h	Max 20 g/m ² /h
Methanol	16.7 g/m ² /hr	Max 20 g/m ² /h
Ethanol	11.1 g/m ² /h	Max 20 g/m ² /h

Test was conducted on 30 mil samples with no geotextile backing.

3. Compatibility Test (ASTM D751 used for strength test)

Immersion were done for 30 days.

Volume change was very difficult to determine as the samples vary in thickness from one area to another. The dimensions of the samples were determined after a two-hour drying period and thickness was measured roughly but varied greatly across the sample.

Chemical	Weight Change	Volume Change	Strength Retained
IRM 903	0%	Less than 20%	112%
ASTM Fuel C	0.28%	Less than 20%	80 %
ASTM Fuel H	-6.6%	Less than 20%	83%
Methanol	- 9.0%	Less than 20%	94%
Ethanol	-.30%	Less than 20%	126%
Sodium carb/bicarb	3.4%	Less than 20%	89.5%
NaCl	0.50%	Less than 20%	98%
Sulfuric Acid Dilute	3.10%	Less Than 20%	110%

Samples were nominal 30 to 40 mil, sprayed on Typar 3401. Actual thickness in small areas varied from 25 to 50 mil prior to immersion.

4. Seam Strength

Not applicable as there are no seams in a spray-applied system.

5. Burst Strength (ASTM D751, Mullen Burst)

Samples sprayed on LP 10 non-woven geotextile.

Average of 5 samples 3541 kPa (Requirement 2600 kPa)

6. Cold Temperature Crack Resistance (ASTM D751 modified)

Samples began to pass when sprayed on 10 oz. non-woven geotextile; 14 oz. non-woven geotextile is specified to ensure compliance.

7. Accelerated Weathering Test (ASTM D7238)

Samples were exposed to rougher conditions than specified where UVB bulbs were used rather than UVA; this was done to complete the test while other tests were underway.

30 mil sample strength retained 92% after 500 hours

60 mil sample strength retained 106% after 500 hours.

30 mil sample retained 108% of tensile strength after 3000 hours

60 mil sample retained 90% of tensile strength after 3000 hours.

The requirement for exposed use is 50% retained strength after 3000 hours so in combination, passing the Fire Retardant Test, PRECIDIUM™ ECS FR is qualified for exposed use.

8. Heat Aging Test (ASTM D751)

Sample of 50 mil was tested, sprayed on Typar 3401. Strength retained 170%.

9. Soil Burial Test (ASTM G160)

Thin sample nominal 30 mil strength retained 127%

Thick sample nominal 60 mil strength retained 114%

10. Tear Strength Test (ASTM D4533)

Samples were sprayed on Typar 3401 and were not considered supported, as the coating is stronger than the Typar.

Control Sample 188.5 N

Exposed Sample 197.4 N

Tear Strength retained 105%

11. Flammability Test

The PRECIDIUM™ ECS FR was tested according to requirements of this standard. It was not possible to get this material to ignite so it passed the test.