TUFFAK[®]

TUFFAK TG 236 polycarbonate sheet

RAIL GLAZING

TUFFAK TG 236 sheet is a hard-coated polycarbonate product designed for high optical quality and exceptional durability. When incorporated in a dual glazed window, this 0.236" thick product meets stringent U.S. Federal Railroad Administration requirements for impact, ballistic, and flammability performance. State-ofthe-art manufacturing and inspection processes provide low optical distortion and the advanced hard coat technology provides excellent abrasion resistance, chemical resistance, and long lasting outdoor weathering performance. This product is available in clear and a variety of standard and custom tints. TUFFAK TG 236 is offered with a seven (7) year Limited Product Warranty against breakage for flat vertical applications. The terms of the warranty are available upon request.

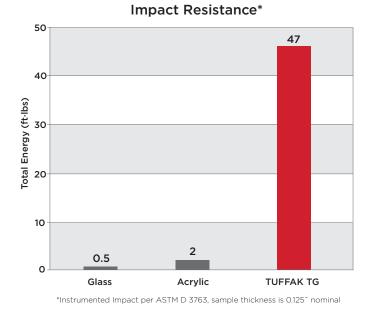
APPLICATIONS

Passenger rail car windows and other transportation glazing

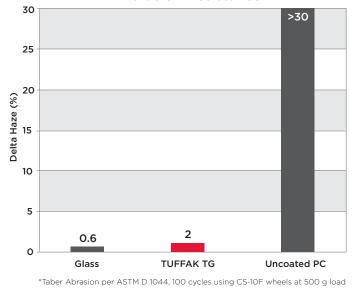
PropertyTest MethodUnitsValuesPhysicalSpecific GravityASTM D 792-12Light Transmission, Clear @ 0.236"ASTM D 1003%84Chemical ResistanceANSI Z26.1-PassTaber Abrasion @ 100 Cycles, Delta HazeASTM D 1044%2CS-10F Wheel @ 500 g loadTensile Strength, UltimateASTM D 638psi9.500Modulus of ElasticityASTM D 638psi340,000Flexural Strength, UltimateASTM D 790psi135,00Compressive Strength, Notched @ 0.125"ASTM D 256ft lbs/in16Izod Impact Strength, Notched @ 0.125"ASTM D 256ft lbs/inNo BreakInstrumented Impact @ 0.125"ASTM D 256ft lbs/inNo BreakPoisson's RatioASTM D 7363ft lbs47Poisson's RatioASTM D 696invin/"F325 x 10-5Heat Deflection Temperature @ 264 psiASTM D 696invin/"F200Heat Deflection Temperature @ 264 psiASTM D 150-3.77Volume ResistivityASTM D 150-3.07301Dielectric Constant @ 01 HzASTM D 150-0.001Dissipation Factor @ 1 MHzASTM D 150-0.001D	Typical Properties*					
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Dissipation Factor @ 1 MHzASTM D 150-0.01Arc ResistanceStainless Steel Strip ElectrodesASTM D 495Seconds10Tungsten ElectrodesASTM D 495Seconds120Dielectric Strength, in air, 125 milsASTM D 149V/mil380	Volume Resistivity	ASTM D 257	Ohm∙cm	8.2 x 1016		
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Tungsten ElectrodesASTM D 495Seconds120Dielectric Strength, in air, 125 milsASTM D 149V/mil380	Arc Resistance	-	-	-		
Dielectric Strength, in air, 125 mils ASTM D 149 V/mil 380	Stainless Steel Strip Electrodes	ASTM D 495	Seconds	10		
	Tungsten Electrodes	ASTM D 495	Seconds	120		
FLAMMABILITY/BALLISTIC/IMPACT	Dielectric Strength, in air, 125 mils	ASTM D 149	V/mil	380		
	FLAMMABILITY/BALLISTIC/IMPACT					
Federal Railroad Administration	Federal Railroad Administration					
49 CFR Part 238, Appendix B ASTM E 162 Is <100	49 CFR Part 238, Appendix B	ASTM E 162	ls	<100		
49 CFR Part 238, Appendix B ASTM E 662 Ds (1.5 min) <100 Ds (4.0 min) <200	49 CFR Part 238, Appendix B	ASTM E 662				
49 CFR Part 223 Ballistic - Pass	49 CFR Part 223	Ballistic	-	Pass		
49 CFR Part 223 Impact Type I & II - Pass	49 CFR Part 223	Impact Type I & II	-	Pass		
Bombardier Toxic Gas Generation SMP 800-C - Pass	Bombardier Toxic Gas Generation	SMP 800-C	-	Pass		

*Typical properties are not intended for specification purposes

TUFFAK TG 236 polycarbonate sheet



Abrasion Resistance*



Chemical Resistance*

Chemical Tested	Resistance Time
Acetone	>24 hrs
Ammonia (10% concentration)	>24 hrs
Antifreeze (50/50)	>24 hrs
Benzene	>24 hrs
Bleach (Clorox concentrated)	>24 hrs
Chloroform	>24 hrs
Denatured Alcohol	>24 hrs
Di (2-ethylhexyl) phthalate	>24 hrs
Diesel Oil	>24 hrs
Isopropyl Alcohol (IPA)	>24 hrs
Kerosene	>24 hrs
Methyl Alcohol	>24 hrs
Methyl Butyl Ketone	>24 hrs
Methyl Ethyl Ketone	>24 hrs
Methylene Chloride	>24 hrs
Naphthalene, 1-bromo-	>24 hrs
Potassium Hydroxide - Lye (10%)	>24 hrs
Sodium Hydroxide (10%)	>24 hrs
Toluene	>24 hrs
Turpentine	>24 hrs
Unleaded Gasoline (87 Octane)	>24 hrs
Vinegar	>24 hrs
Xylene	>24 hrs
Acids:	
Hydrochloric Acid (20%)	>24 hrs
Nitric Acid (20%)	>24 hrs
Sulfuric Acid (20%)	>24 hrs

*Tested in accordance to ASTM D 1308-02

Always keep hazardous chemicals away from uncoated edge of Tuffak Polycarbonate Sheet

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale. 2218 Enterprise Jackson, MI 49203 800.877.2576 • Fax: 517.787.6380 plastics@alro.com www.alro.com/plastics