



CASE STUDY: Perú rail protects its passengers with LLumar®

Building

Perú Rail Train

Location

Perú

Window Film

SCL SR PS4 (Clear)

Type

Safety and Security Film



SITUATION

Perú Rail is widely recognized not only as one of the highest rail routes on Earth, but the world's most scenic railway service. This luxury train service links most of the tourist highlights of the Andes in Peru from Cuzco to Machu Picchu. The ride is spectacular, but the executives of the company had two problems: rock attacks to the train windows and fading of the interior furnishings.

SOLUTION

Our LLumar distributor in Perú, an expert in glass solutions, suggested the installation of 4 mil clear safety and security film on each of the four trains. With this product the exterior appearance of the trains would not be altered and the passengers' view would remain crystal clear. In addition to increasing the safety standards to resist rock attacks, the film provided 94% protection from the sun's ultraviolet rays, helping reduce interior fading.

RESULT

Perú Rail executives were pleased to report that the occupants of the train carriages are better protected after the installation of LLumar safety and security film, and they can still enjoy the outstanding scenery as they travel to places almost inaccessible by any other means. "It's wonderful to travel on Perú Rail and enjoy the pleasant view, especially knowing that we are protected by LLumar safety film," passengers commented.

Performance Data

	% Total Solar Transmittance	% Total Solar Reflectance	% Total Solar Absorbance	% Visible Light Transmittance	% Visible Reflectance (exterior)	% Visible Reflectance (interior)	Winter U-value	Shading Coefficient	% Ultraviolet Ray Protection (wavelengths 280-380nm)	Emissivity	Solar Heat Gain Coefficient	% Total Solar Energy Rejected	Light-to-Solar Heat Gain Ratio (LSG)	% Summer Solar Heat Gain Reduction	% Winter Heat Loss Reduction	% Glare Reduction
Clear Glass	83	8	9	90	8	8	1.03	1.00	29	0.84	0.86	14	1.05	-	-	-
Clear Series	Clear safety films can be applied over tinted glass to improve aesthetics, solar performance and glare. These thicker films meet the most stringent standards for burglary resistance, blast mitigation, wind-borne debris, and basic safety glazing.															
SCL SR PS4	82	10	8	88	10	10	1.05	0.97	94	0.86	0.84	16	1.05	2	-1	2

Physical Properties

	Film Thickness (inches)	Appearance	Film Structure	Tensile Strength (constructed)	Tensile Strength (average as reported)	Break Strength (peak load)	Break Strength (average load)	Elongation at Break	Peel Strength	Puncture Strength
SCL SR PS4	0.004	Clear	Single	34,555	32,000	135	133	>100%	>2720(>6)	70

EASTMAN

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The solar performance data reported for LLumar architectural window films was captured using the National Fenestration Rating Council's (NFRC) standard guidelines for window film solar performance measurement as measured on single pane, 1/8 inch (3 mm), clear glass. Reported values are taken from representative product samples and are subject to normal manufacturing variances. Actual performance will vary based on a number of factors, including glass type and properties. Films do not eliminate fading - they reduce it. UV rays and heat are contributing factors to fading, but other factors exist. For further information, see LLumar.com/download-library. © 2016 Eastman Chemical Company. LLumar® and the LLumar® logo are trademarks of Eastman Chemical Company or one of its wholly owned subsidiaries. As used herein, ® denotes registered trademark status in the U.S. only. (06/16) L2150