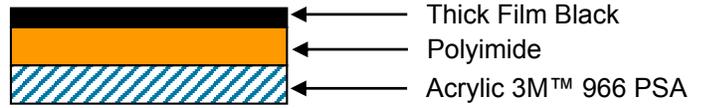


PRODUCT BULLETIN



Thick Film Black Coated Polyimide with Acrylic 966™ Adhesive

Sheldahl® Brand Materials Thick Film Black provides a high emittance, high solar absorptance surface with an extremely matte finish. In addition, the Thick Film Black coating is electrically conductive to help dissipate electrostatic charge. The Thick Film Black is coated onto polyimide to form a stable, high temperature product that makes an excellent radiator. We add acrylic 3M™ 966 pressure sensitive adhesive to facilitate bonding to your structure to maximize the heat transfer rate. In addition, the matte finish makes this an excellent product to minimize stray light reflections into optical instruments.

This product may be ordered with 0.5, 1, or 2 mil thick polyimide that conforms to the requirements of ASTM D-5213. Although the standard widths for this tape are 1, 2, 3, and 4 inches, it may be ordered in any width needed. Each roll is 108 feet (33 m) long.

PRODUCT CHARACTERISTICS

Parameter (independent of film thickness)	Specified Value
Adhesion to stainless steel	≥ 20 oz./inch of width
Solar Absorptance (α)	≥0.85
Normal emittance (ϵ_N)	≥0.80
Hemispherical emittance (ϵ_H)	≥0.78
Intermittent temperature range	-185° C to 150° C (-300° F to 300° F) ^A
Continuous temperature range	-60° C to 105° C (-75° F to 225° F) ^A

^A Zero peel strength of acrylic pressure sensitive adhesive is at about -45°C (-50°F).

Standard Item Number	Thickness mil (μ m)	Typical Weight (g/m^2)	Perforation Item Number
146541	0.5 (12.5)	122	146542
146539	1.0 (25)	140	146540
TBD	2.0 (51)	175	TBD



A Multek Brand

POST PROCESSING - PERFORATION

This product may be processed after metalizing to enhance its functionality. To facilitate air passage during launch, the laminate may be Perforated. Standard perforation patterns are on pages 14 - 22.

WARRANTY INFORMATION

Multek warrants that our thermal control materials will meet all acceptance testing criteria for one year from the date of shipment (except Germanium, see product bulletin) if the materials have been stored indoors at standard conditions in their original packaging.

SHELF LIFE

This product shall meet specified values for a minimum of 12 months after the date of shipment provided that the material is stored in its original unopened container at normal interior temperatures (10° C to 27° C/50° F to 80° F).

The shelf life of the material should be much longer than the warranty period. We recommend retesting any material that is more than one year old (or more than one year since most recent testing) prior to use. This will verify that the material has not been accidentally damaged. Multek offers retest services for a nominal fee.

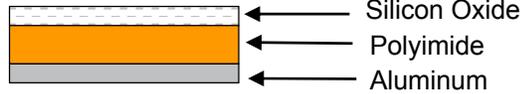
SPECIFICATION AND ITEM NUMBERS

STANDARD NUMBERS		Thickness	PERFORATION NUMBERS	
Multek Specification	Item Number		Multek Specification	Item Number
G409360	146541	0.5 mil	G409361	146542
G409310	146539	1.0 mil	G409311	146540
G409320	174363	2.0 mil	G409321	TBD

Multek manufactures a broad range of vacuum deposited films, laminates and tapes. Ask for additional product bulletins describing other Sheldahl® Brand Materials.

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PRODUCT BULLETIN



Silicon Oxide Coated Aluminized Polyimide

Sheldahl® Brand’s polyimide films that are aluminized on one side and have a Silicon Oxide coating on the other for protection against Atomic Oxygen. The clear Silicon Oxide layer has minimal effects on the optical properties of the polyimide and will cause only a minimal increase in polyimide side optical properties. The Silicon Oxide layer acts as an atomic oxygen absorber and will extend the lifetime of the polyimide film. The aluminum side of these products provides low emittance and low solar absorptance. The Silicon Oxide side of these products has moderate solar absorptance and emittance (as determined by the polyimide film thickness). This product may be produced economically in small quantities using a batch process to manufacture sheets, or in large quantities using a roll to roll coating process.

This product may be ordered with 0.5, 1, 2, 3, or 5 mil thick polyimide that conforms to the requirements of ASTM D-5213. The aluminum coating is nominally 1000 Å thick, and the most common width is 48 inches (1.22 m). Sheets are 48 inches (1.22 m) wide and 10 feet (3 m) wide.

Product Characteristics

Parameter (independent of fil thickness)	Specified Value
First surface solar absorptance(α)	≤ 0.14
First surface hemispherical emittance(ϵ_H)	≤ 0.035
First surface normal emittance(ϵ_N)	≤ 0.035
Typical first surface α/ϵ	4-5
Aluminum surface resistivity	$\leq 1 \Omega/\text{square}$
Intermittent temperature range	-185° C to 260° C (-300° F to 500° F)
Continuous temperature range	-185° C to 150° C (-300° F to 300° F)

Standard Item Number	Thickness mil (μm)	Second Surface Mirror Properties			Typical Weight (g/m^2)	Perforation Item Number
		α	ϵ_N	ϵ_H		
TBD	0.5 (12.5)	TBD	TBD	TBD	19	TBD
175295	1.0 (25)	TBD	TBD	TBD	36	TBD
180027	2.0 (51)	TBD	TBD	TBD	71	TBD
166740	3.0 (76)	TBD	TBD	TBD	109	173333
180028	5.0 *127)	TBD	TBD	TBD	181	TBD

MISC



A Multek Brand

POST PROCESSING - PERFORATION

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WARRANTY INFORMATION

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SHELF LIFE

This product shall meet specified values for a minimum of 12 months after the date of shipment provided that the material is stored in its original unopened container at normal interior temperatures (10° C to 27° C/50° F to 80° F).

The shelf life of the material should be much longer than the warranty period. We recommend retesting any material that is more than one year old (or more than one year since most recent testing) prior to use. This will verify that the material has not been accidentally damaged. Multek offers retest services for a nominal fee.

PRODUCT BULLETIN



Aluminum Coated Polyimide Film Overcoated With Silicon Oxide

Sheldahl® Brand Materials Silicon Oxide overcoated aluminized polyimide films are used when precisely tailored emittance characteristics are desired. These products maintain the low solar absorptance of aluminum coatings and allow the emittance to be controlled to a value between 0.11 and 0.26. This yields an absorptance to emittance ratio between 0.5 and 1.

The coatings can be put on any thickness of polyimide desired (0.3, 0.5, 1, 2, 3, or 5 mil). The product can be manufactured in sheets that are four feet (1.2 m) wide and ten feet long (3 m). We can also produce tapes with Silicon or acrylic adhesive that are 100 feet long and up to four inches wide. Please contact us for information on constructions (film thickness, adhesive, or silicon oxide properties) other than those described below.

PRODUCT CHARACTERISTICS

Parameter	Specified Value	
	"Low" Emittance	"High" Emittance
Product description	"Low" Emittance	"High" Emittance
Polyimide thickness	0.5 mil (12.5 μm)	0.5 mil (12.5 μm)
Intermittent temperature range	-185° C to 260° C (-300° F to 500° F)	-185° C to 260° C (-300° F to 500° F)
Continuous temperature range	-185° C to 150° C (-300° F to 300° F)	-185° C to 150° C (-300° F to 300° F)
Typical coated side solar absorptance (α)	0.12	0.13
Typical coated side emittance (ϵ)	0.11	0.26
Standard Item number	146545	TBD
Multek Specification	G410460	G410760
Item number if combined with Silicon PSA	146518	146517
Multek Specification if combined with Silicon PSA	G408760	G408660
Item number if combined with acrylic PSA	146581	175835
Multek Specification if combined with acrylic PSA	G414260	TBD



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WARRANTY INFORMATION

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SHELF LIFE

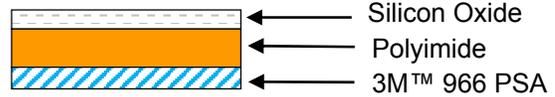
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PRODUCT BULLETIN



Silicon Oxide coated Polyimide Tape with 3M™ 966 Acrylic PSA

Sheldahl® Brands Silicon Oxide coated polyimide tape with 3M™ 966 adhesive has a variety of uses in satellite applications. The Silicon Oxide layer provides protection against Atomic Oxygen. The acrylic adhesive provides a strong bond with low outgassing and can be used over a moderate temperature range.

This product may be ordered with 0.5, 1, or 2 mil thick polyimide that conforms to the requirements of ASTM D5213. The Silicon Oxide coating is nominally 1300 Å thick. The standard widths for this tape are 1, 2, 3, and 4 in. Each roll is 108 ft. (33 m) long.

Parameter (independent of film thickness)	Specified Value
Adhesion to stainless steel	≥ 20 oz./inch of width
Intermittent temperature range	-185° C to 230° C (-300° F to 450° F) ^A
Continuous temperature range	-60° C to 120° C (-75° F to 250° F) ^A

Standard Item Number	Thickness mil(μm)	Typical Weight (g/m ²)	Perforation Item Number
TBD	0.5 (12.5)	81	TBD
180103	1.0 (25)	98	180099
TBD	2.0 (51)	133	179953



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POST PROCESSING - PERFORATION

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WARRANTY INFORMATION

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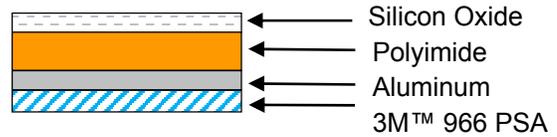
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PRODUCT BULLETIN



Silicon Oxide Coated Aluminized Polyimide Tape

Sheldahl® Brand polyimide tapes that are aluminized on one side and have a Silicon Oxide coating on the other for protection against Atomic Oxygen. The clear Silicon Oxide layer has minimal effects on the optical properties of the polyimide and will cause only a minimal increase in polyimide side optical properties. The Silicon Oxide layer acts as an atomic oxygen absorber and will extend the lifetime of the polyimide film. The Silicon Oxide side of these products has moderate solar absorptance and emittance (as determined by the polyimide film thickness). The acrylic adhesive provides a strong bond with low outgassing and can be used over a moderate temperature range.

This product may be ordered with 0.5, 1, or 2 mil thick polyimide that conforms to the requirements of ASTM D5213. The Silicon Oxide coating is nominally 1300 Å thick. The standard widths for this tape are 1, 2, 3, and 4 in. Each roll is 108 ft. (33 m) long.

Parameter (independent of fil thickness)	Specified Value
Adhesion to Stainless Steel	≥ 20 oz./inch of width
Intermittent temperature range	-185° C to 260° C (-300° F to 500° F)
Continuous temperature range	-60° C to 120° C (-75° F to 250° F) ^A

^A Zero peel strength of acrylic pressure sensitive adhesive is at about -45°C (-50°F).

Standard Item Number	Thickness mil (µm)	Second Surface Mirror Properties			Typical Weight (g/m ²)	Perforation Item Number
		α	□N	□H		
TBD	0.5 (12.5)	TBD	TBD	TBD	81	TBD
180104	1.0 (25)	TBD	TBD	TBD	98	TBD
180934	2.0 (51)	TBD	TBD	TBD	133	TBD

POST PROCESSING - PERFORATION

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MISC



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WARRANTY INFORMATION

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