GRAFTech International | eGRAF®

SPREADERSHIELD™ Heat Spreaders

Technical Data Sheet 321

Product Overview

eGRAF SPREADERSHIELD products function as both a passive heat spreader and heat shield, and are offered in a variety of in-plane thermal conductivities. The flexible graphite materials can be die-cut, press-formed, or laminated with plastics, metals, adhesives and other materials.

Part Designation

Every SPREADERSHIELD part number defines the grade and coating options of the material and is constructed based on the following example:

Heat Spreader			Coatings		
SS400	**0.25**	—	**P1**	**GP1A1**	**— EN**
Product Grade	Graphite Layer Thickness in mm (excludes coatings)		Top Coating Type	Bottom Coating Type (Preface bottom coating with "G" to delineate from top layer)	Die Cut Edge Designation

Product Grade Characteristics[1]

	SS300	SS400	SS500	SS600	SS1500
Typical Thermal Conductivity[2] In-Plane • Through-Plane (W/m-K)	300 • 4.5	400 • 3.7	500 • 2.8	600 • 3.5	1500 • 3.4
Available Thickness Range (mm)	0.94 / 0.25	0.94 / 0.051	0.76 / 0.127	0.127 / 0.102	0.025
Standard Thickness (mm) • Standard Width (mm) *Width of graphite material only, finished width will vary with coating and adhesive options*	0.94 • 610 0.51 • 914	0.94 • 610 0.51 • 584 0.25 • 584 0.127 • 610 0.076 • 559 0.051 • 355	0.76 • 305 0.127 • 457	0.127 • 182 0.102 • 182	0.025 • 248[3]
Thermal Contact Impedance Per Side (°C cm²/W) @ specified thickness (mm)	0.30 @ 0.51	0.38 @ 0.51	0.90 @ 0.102	0.44 @ 0.102	0.10 @ 0.025
Tensil Strength (MPa)	-	9.7	7.7	9.7	37
Electrical Resistivity In-Plane (µΩm)	6.5	5.2	4.2	3.4	0.5
Electrical Conductivity In-Plane • Through-Plane (S/cm)	1,600 • 28	1,900 • 18	2,400 • 15	2,900 • 10	19,000 • 5
CTE (Coefficient of Thermal Expansion) In-Plane • Through-Plane (m/m-°C)	–0.4 • 28				
Flammability Rating (UL)	94V-0				
Operating Temperature (°C)	–40 to +400				
Specific Heat @ 25°C (J/kg-°C)	710				
RoHS Compliant	Yes				

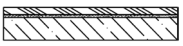
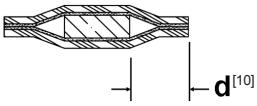
Coatings and Adhesives

SPREADERSHIELD products are available with or without coatings (dielectric or metal) and adhesives. The table below contains typical coating and adhesive options and their properties.

	Coating Options					Adhesive Options		
	C1	P1	P2	P7	M3	A1	P1A1	P8A8
Description	Acrylic Coating	PET Film Coating	PET Film Coating	Temporary Liner[5]	Aluminum Foil Coating	Acrylic Adhesive[6]	PET Film Adhesive[6]	PET Film Adhesive[6]
Coating Thickness[4] (mm)	0.013	0.025	0.010	N/A	0.152	0.013	0.038	0.010
Release Liner Thickness (mm) Type	N/A	N/A	N/A	0.05 PET	N/A	0.08 Paper	0.08 Paper	0.08 Paper
Dielectric Strength[7] (V)	N/A	2,800	210	N/A	0	-	2,800	900
Operating Temperature (°C)	-40 to +150							-40 to +100
Thermal Contact Impedance[8] (°C•cm²/W) per side	-	1.6	0.32	N/A	-	0.16	-	0.42
Thermal Conductivity Through-Thickness (W/m-K)	-	0.16	0.16	N/A	210	-	0.16	0.16

Die-Cut Edge Options[9]

In addition to the coating and adhesive options, SPREADERSHIELD products are also available with die-cut edge options, as shown in the table below. Available edge options are dependant upon the coatings selected and may not be available for all material configurations. Please contact GrafTech for additional information.

	{Blank}	— EN
Description	Flush Edge Cut	Envelope Seal
Diagram		

Notes:
[1] Properties listed are typical and cannot be used as acceptance or rejection criteria. Product characteristics exclude coatings and adhesives.
[2] In-plane conductivity at ambient temperature determined using Angstrom's method; through-plane determined using ASTM D5470 Modified method.
[3] SS1500 is only available as 248mm (W) x 498mm (L) sheets on a continuous P7 liner.
[4] Coating thickness specified includes adhesive thickness used to bond coatings to graphite.
[5] P7 is a temporary liner used exclusively to package sheets of SS1500 into a continuous roll and must be defined as the bottom coating type ("GP7") for SS1500 if no other coating is specified.
[6] Adhesive strength of "A1" and "P1A1" are 700 g/cm2 and 1100 g/cm2 respectively based upon lap shear test ASTM D3163 on a glass plate. Adhesive strength of "P8A8" = 2.64 N/cm per 90° based upon peel adhesion test ASTM D3330 on a glass plate.
[7] ASTM D149-09 Method A
[8] ASTM D5470 Modified (at 110kPa/16 psi/1.1 bar). Total thermal impedance = impedance of graphite + impedance of coating.
[9] Overlay seal (-OV) is no longer an available sealing option.
[10] Availability and specified thickness "d" will vary depending upon graphite thickness and coating selected. Please contact GrafTech for additional information.

+1 (800) 253-8003 (Toll-Free in USA)
+1 (216) 529-3777 (International)

www.graftech.com | www.egraf.com
egraf@graftech.com

Redefining limits

© 2012 GrafTech International Holdings Inc. This information is based on data believed to be reliable but GrafTech makes no warranties, express or implied, as to its accuracy and assumes no liability arising out of its use. The data listed falls within the normal range of product properties but should not be used to establish specification limits or used alone as the basis of design. GrafTech's liability to purchasers is expressly limited to the terms and conditions of sale. eGRAF®, SPREADERSHIELD™ and HITHERM™ are trademarks of GrafTech International Holdings Inc. eGRAF® thermal management products, materials, and processes are covered by several US patents. For patent information visit www.egraf.com/patents.

2.22.12