NEOGRAF™ SOLUTIONS

eGRAF®

SPREADERSHIELD-FLX™ Heat Spreaders

TECHNICAL DATA SHEET 486

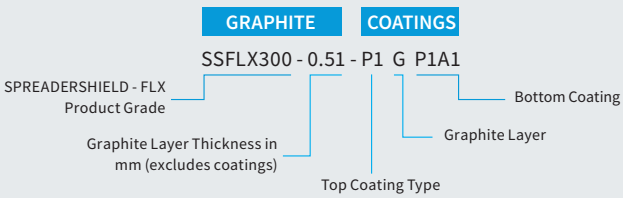
Product Overview

eGRAF SPREADERSHIELD-FLX heat spreaders provide enhanced formability to the thermal conductivity of the SPREADERSHIELD™ product line. SPREADERSHIELD-FLX functions as both a passive heat spreader and heat shield. The material can be die-cut, press-formed or laminated with plastics, metals, adhesives and other materials. The superior thermal performance of SPREADERSHIELD-FLX materials delivers dramatic benefits, such as:

- Thermally activated part surfaces
- Design flexibility allowing curved shapes from various materials
- More efficient, lighter weight systems
- Enabling familiar and established manufacturing methods

Part Designation

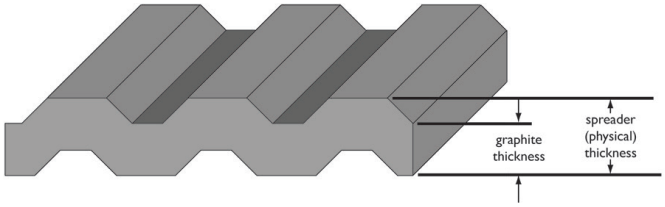
Every SPREADERSHIELD-FLX part number defines the grade and coating options of the material and is constructed in the following example:



Product Characteristics*

CHARACTERISTIC	SSFLX300-0.51-P1GP1A1	SSFLX300-0.94-P1GP1A1
Nominal Thermal Conductivity** In-Plane • Through-Plane (W/m-K)	300 • 3.4	300 • 4.2
Thickness (See Thickness Diagram) Graphite • Spreader Thickness (mm)	0.51 • 0.71	0.94 • 1.25
Coatings (Thickness) Top Coating Bottom Coating	PET Film Coating (0.025 mm) PET Film Adhesive*** (0.080 mm)	
Maximum Width (mm)	419	
Minimum Bend Radius (mm)	6.4	
Thermal Contact Impedance Per Side (°C cm^2/W)	8.1	7.0
Tensile Strength**** (MPa)	8	
Dielectric Strength (V)	2500	3500
CTE (Coefficient of Thermal Expansion) In-Plane • Through-Plane (m/m-°C)	-0.4×10^{-6} • 27×10^{-6}	
Operating Temperature (°C)	–40 to +150	
Flammability Rating (UL)	94V-0	
Specific Heat @ 25°C (J/kg-°C)	710	
RoHS Compliance	Yes	

Thickness Diagram



Application Guidelines

General:

- Use SPREADERSHIELD-FLX flexible graphite to increase the effective surface area of the heat source.
- Use SPREADERSHIELD-FLX flexible graphite to move heat from a heat source to a heat sink. The design will be more thermally effective if the heat sink is able to shed heat to the environment.
- Graphite is not a structural material. It will not stand up to lateral, shearing, or torque forces. The graphite will experience negligible thickness reduction due to compression.
- SPREADERSHIELD-FLX flexible graphite must be mechanically secured to a structure -- either within a structure (i.e. between rigid layers in a luminaire) or via a fastener such as adhesive, spring, clamp, sponge, or pad. The application must be environmentally evaluated for vibration and temperature to determine the proper mechanical fastening to ensure the heat spreader maintains contact for the life of the product.
- Graphite thickness is to be used as the input to any thermal model. Spreader thickness (graphite thickness plus coating thicknesses) is to be used as the input to any mechanical model.
- Plastic coatings are utilized for mechanical protection and as an electrical insulator to prevent an electrical path from being established via the graphite material.
- **CAUTION:** If an electrical path is established, there is potential for increased risk of device short circuit and fire. Do not use the part if the plastic coating is or becomes damaged.

Enclosure Guidelines:

- When using SPREADERSHIELD-FLX to heat the interior of a structural surface, such as a luminaire, it is not necessary to have 100% of the structural surface in contact with the heat spreader. Sharp corners should be avoided in order not to exceed the minimum bending radius of the flexible graphite. Coverage “gaps”, up to about 1 cm, over the interior of the structural surface will negligible impact thermal performance.
- If a thermal image of a device operating at steady state shows a large temperature gradient in the heat spreader, then the heat source is generating more heat than the SPREADERSHIELD-FLX flexible graphite can conduct. In this case adding layers of SPREADERSHIELD graphite will enable additional heat transfer.
- For additional information regarding the specifications and guidelines provided in this document, please contact the NeoGraf team.

Notes:
* Properties listed are typical and cannot be used as acceptance or rejection criteria. Product characteristics exclude coatings and adhesives.
** In-plane conductivity at ambient temperature determined using Angstrom’s method; through-plane determined using ASTM D5470 Modified method.
*** Adhesive strength of “P1A1” = 3.47 N/cm per 90° peel adhesion test ASTM D3330 on a glass plate.
**** ASTM D149-09 Method A

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