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PRESS RELEASE

Fralock Improves NASA's Spacecraft Heating Capabilities

Goddard adds new specification in response to company's superior thermofoil heaters

Greenbelt, Md. (March 8, 2016) — NASA's Goddard Space Flight Center has augmented its already top-notch toolbox by adding custom manufacturer Fralock's all-polyimide thermofoil heaters to its Qualified Parts List Directory.

In February, following rigorous testing, the field center where the space agency builds and manages most of its satellites published a new specification based on the devices' superior capabilities to previous alternatives, making Fralock's the first and only of their kind to be pre-approved for Goddard's space applications.

Thermofoil heaters are flat strips or sheets consisting of a metallic heating element etched between two layers of polymer insulation. While adhesives that hold together many such devices break down at extreme temperatures or under radiation, Fralock's proprietary Adhesiveless Laminate Technology bonds the outer polyimide layers to each other, essentially making them one. The heating element is fully encapsulated with no need for adhesives, hence the "all-polyimide" classification. With their etched metal tracings held firmly in place, the heaters can be folded or even crumpled with no damage.

Goddard required previous thermofoil heaters to operate at temperatures between -65 and 200 degrees Celsius (-85 to 392 degrees Fahrenheit), while Fralock's devices can tolerate temperatures from -269 to 265 degrees Celsius (-452 to 509 degrees Fahrenheit). The higher heat tolerance also allowed the NASA field center to raise its power-rating requirement by 29 percent, from 3.5 to 4.5 watts per square inch.

Additionally, adhesives break down when exposed to solar ultraviolet and charged-particle radiation that is a constant in low-Earth orbit. Fralock's all-polyimide heaters are virtually indifferent to radiation.

Without adhesives, the heaters are also thinner and lighter than alternatives, and the problem of lines "swimming" is virtually eliminated — advantages for any space application. The technique can also

reduce the devices' size and allow for thinner insulation, which increases heating efficiency. Fralock's thermofoil heaters are superior to legacy technology in every way.

The new Goddard specification is [S-311-P-841](#), titled General Specification for Thermofoil Heater, All-Polyimide, Space Applications.

NASA uses thermofoil heaters for purposes such as warming electronics boxes on spacecraft, but they have a wide range of applications, from computer chip production to medical devices. Fralock's Adhesiveless Laminate Technology, meanwhile, can also produce robust solar array back panels, circuits, shields and reflectors of all sizes, which can be rigid, flexible, or a combination thereof.

About Fralock:

Located in Valencia, Calif., Fralock started out as a supplier to the aerospace industry almost 50 years ago and continues to provide heaters, flex circuits, solar array components, antennas, shields, reflectors and other components for space applications. Fralock has also become a go-to custom designer and manufacturer for other technically advanced original equipment manufacturers in industries that require the highest reliability and performance predictability, especially in the semiconductor and medical fields. The company's ability to combine "seemingly incompatible materials" draws industry leaders who rely on the company to develop solutions using polymers, foils, adhesives and adhesiveless materials and processes.