

Low Outgassing Characteristics of Rogers Laminates Approved for Spacecraft Applications

RT/duroid® composites of PTFE with inorganic fiber filler and TMM® temperature stable hydrocarbon composites, have outstanding resistance to outgassing, according to data compiled by NASA test procedure SP-R-0022A. Reinforced PTFE laminates and PTFE composites are thermally stable and have universal outgassing characteristics. Similarly, TMM temperature stable laminates are highly crosslinked hydrocarbons which do not evolve gases or by-products at elevated temperatures. Test data shown in the table (back page) were obtained on specimens etched free of copper foil.

The test procedure² consists of vacuum heating 100 to 300 mg specimens in a copper enclosure, with exit port at 125°C for 24 hours with a chrome-plated collector maintained at 25°C located 12.7 mm from the exit port. The Total Mass Loss (TML), Collected Volatile Condensable Materials (CVCM) and Water Vapor Recovered (WVR) are expressed as a % of the original specimen mass. In general, materials with TML over 1.0 or CVCM over 0.10 should be avoided in spacecraft applications.

References:

1. William A. Campbell, Jr. and Richard S. Marriott of Goddard Space Flight Center, Greenbelt, MD, "OUTGASSING DATA FOR SPACECRAFT MATERIALS", NASA Reference Publication 1124, August 1987.

Note: The database of RP1124 is updated weekly and may be accessed or downloaded from the NASA website at <http://epims.gsfc.nasa.gov/og/>.

2. ANSI/ASTM E595-84 "Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment", American Society for Testing and Materials, Annual Book of Standards.

| | | | | | | | | | |
|-----------------------------|---------------------------|--------------------------|--------------------------------------|--------------------------------------|-------------------------------------|------------------------------------|--------------------------------------|---|--------------------------|
| Material Type | RT/duroid® 5870 Laminates | RT/duroid 5880 Laminates | RT/duroid 6010 Laminates | RT/duroid 6002 Laminates | TMM® 3 Temperature Stable Laminates | TMM10 Temperature Stable Laminates | 3001 Bonding Film | RO4003C™ High Frequency Circuit Materials | ULTRALAM® 2000 Laminates |
| Composition | PTFE Glass-microfiber | PTFE Glass-microfiber | PTFE Glass-microfiber Ceramic filler | PTFE Glass-microfiber Ceramic filler | Thermoset Polymer Composite | Thermoset Polymer Composite | Thermoplastic Chlorofluoro-copolymer | Hydrocarbon Cermic Woven Glass | PTFE Woven |
| Nominal Dielectric Constant | 2.33 | 2.20 | 10.2 | 2.94 | 3.27 | 9.20 | 2.28 | 3.38 | 2.40-2.60 |
| ASTM 595-84 | | | | | | | | | |
| %TML | 0.05 | 0.03 | 0.03 | 0.02 | 0.04 | 0.06 | 0.13 | 0.06 | 0.03 |
| %CVCM | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 |
| %WVR | 0.04 | 0.02 | 0.02 | 0.01 | 0.03 | 0.04 | 0.02 | 0.02 | 0.02 |

The information in this data sheet is intended to assist you in designing with Rogers' laminates. It is not intended to and does not create any warranties express or implied, including any warranty of merchantability or fitness for a particular application. The user should determine the suitability of Rogers' laminates for each application.

These commodities, technology or software are exported from the United States in accordance with the Export Administration regulations. Diversion contrary to U.S. law prohibited.

RT/duroid® and the Rogers' logo are trademarks of Rogers Corporation or one of its subsidiaries.
 © 2015 Rogers Corporation, Printed in U.S.A.
 Revised 1155 051415 Publication #92-304