

Thermal vacuum testing SUCOFLEX® TVAC

Edition 2013



For thermal vacuum applications



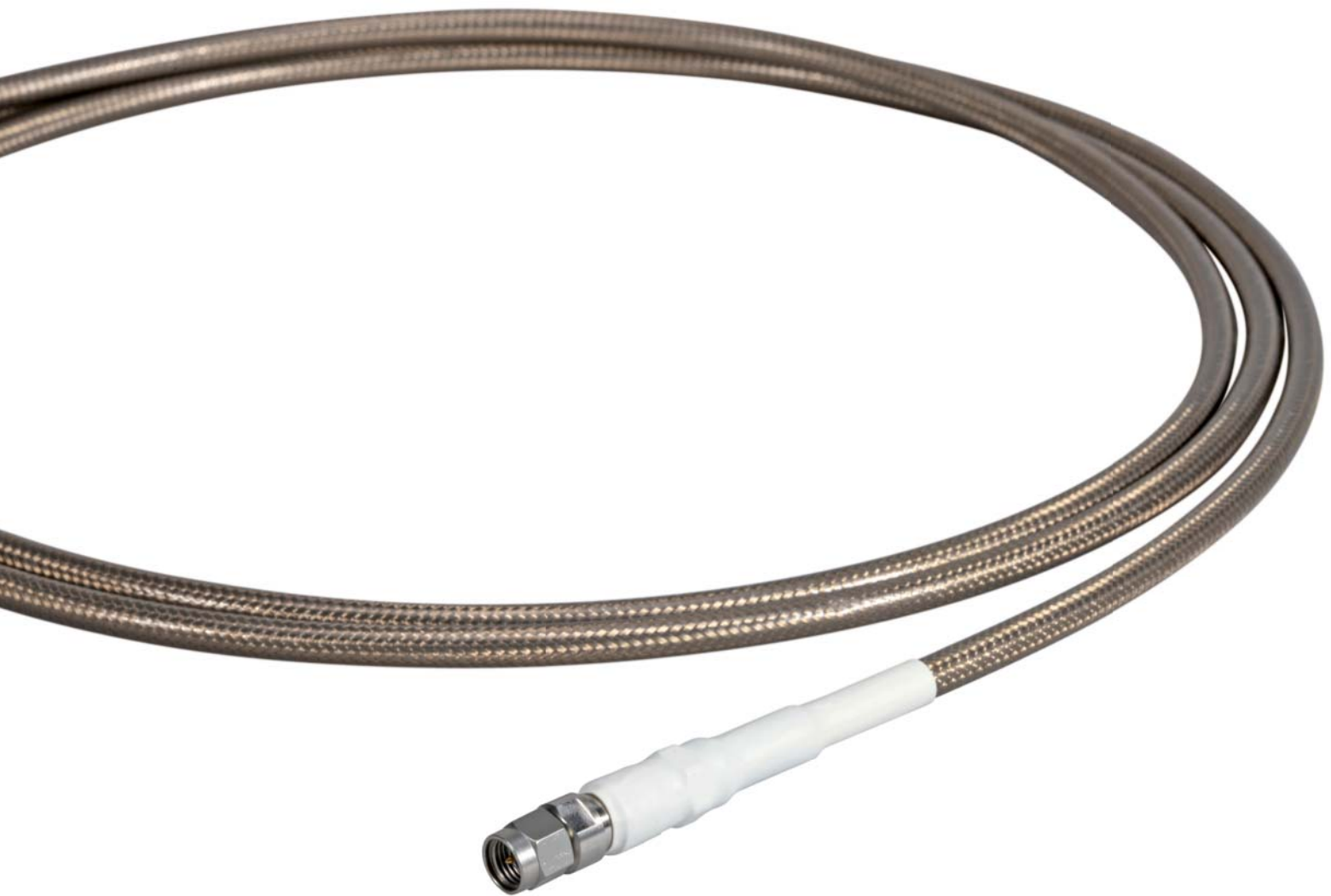


Your partner for system solutions

HUBER+SUHNER works as a partner to develop innovative solutions for specific customer needs. By combining components, our engineers can create a solution that complies with the relevant design standards and technical specifications while ensuring reliable communications and a continuous power supply, even in adverse environmental conditions.

SUCOFLEX® TVAC - the right choice

HUBER+SUHNER's premium technologies and products are an ideal match for the requirements of the aerospace industry. For over ten years, HUBER+SUHNER has developed and produced RF products for spaceflight applications. By following customer-specific qualification processes, complying with ESA standards and undergoing customer audits, HUBER+SUHNER can provide an optimum cost/benefit ratio.



SUCOFLEX® TVAC – excellent assemblies for space applications

Simulating the conditions found in outer space imposes extreme requirements on all components, from the test subject inside the thermal vacuum chamber through to the measuring installations outside.

Whole satellites or space components are tested in thermal vacuum chambers under the conditions found in outer space. They are exposed to vacuum and extreme temperature variations. The devices under test are connected to the measuring instruments outside the chamber using special RF assemblies.

One important requirement is that the assemblies used within the vacuum chamber must meet the ECSS-Q-ST-70-02 C outgassing standard issued by the European Space Agency to prevent contamination of the chamber or equipment by solvents evaporating from certain materials.

To prevent the assemblies becoming stressed and to ensure an extended service life, HUBER+SUHNER TVAC connectors contain venting holes that allow an unimpeded flow of air into and out of the components during the pressurisation/depressurisation cycles.

SUCOFLEX® TVAC for thermal vacuum applications

Thanks to their good mechanical properties, HUBER+SUHNER's SUCOFLEX cables are ideally suited to such applications when combined with high-strength connectors. HUBER+SUHNER provides microwave cable assemblies and an RF adaptor specially designed for these applications.

Applications

- RF connections for components under test in thermal vacuum chambers
- RF connections for satellites under test in vacuum chambers
- Connection between the vacuum chamber and testing device

Features

- Extended temperature range
- Low outgassing in accordance with ECSS-Q-ST-70-02 C
- Assemblies:
 - Superior mechanical and electrical stability
 - Vented connectors for fast evacuation and venting
 - Different connectors, frequency ranges, electrical features available
 - Other configurations available according to customer requirements
- Adaptor:
 - Hermetically sealed
 - Superior return loss performance

Benefits

- Longer lifetime, lower costs
- Excellent performance to price ratio
- Perfectly matched cables and connectors from one manufacturer



SUCOFLEX® TVAC – technical data

Assembly: SUCOFLEX 103E with straight SK male connectors	
Frequency range	DC - 33 GHz
Connectors vented	11_SK-312_TVAC
Cable	SUCOFLEX 103E (jacket in polyurethane)
VSWR / return loss	1.18 / 21.5 dB (DC - 15 GHz) 1.25 / 19 dB (15 - 18 GHz) 1.35 / 16.5 dB (18 - 33 GHz)
Insertion loss assembly	nom. 1.34 dB/m + 0.22 dB / max. 1.47 dB/m + 0.22 dB (up to 18 GHz) nom. 1.87 dB/m + 0.29 dB / max. 2.05 dB/m + 0.29 dB (up to 33 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%
Remark:	Although SK connector is used, assembly can be used up to 33 GHz only, due to cut-off frequency of the cable. Benefit: lower insertion loss up to 33 GHz.



Assembly: SUCOFLEX 103EA with straight SK male connectors	
Frequency range	DC - 33 GHz
Connectors vented	11_SK-312_TVAC
Cable	SUCOFLEX 103EA (jacket and armour in polyurethane)
VSWR / return loss	1.18 / 21.5 dB (DC - 15 GHz) 1.25 / 19 dB (15 - 18 GHz) 1.35 / 16.5 dB (18 - 33 GHz)
Insertion loss assembly	nom. 1.34 dB/m + 0.22 dB / max. 1.47 dB/m + 0.22 dB (up to 18 GHz) nom. 1.87 dB/m + 0.29 dB / max. 2.05 dB/m + 0.29 dB (up to 33 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%
Remark:	Although SK connector is used, assembly can be used up to 33 GHz only, due to cut-off frequency of the cable. Benefit: lower insertion loss up to 33 GHz.



Assembly: SUCOFLEX 104 with straight SMA male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_SMA-454_TVAC
Cable	SUCOFLEX 104 (jacket in FEP)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 0.88 dB/m + 0.18 dB / max. 0.97 dB/m + 0.18 dB (up to 12 GHz) nom. 1.10 dB/m + 0.22 dB / max. 1.21 dB/m + 0.22 dB (up to 18 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



SUCOFLEX® TVAC – technical data

Assembly: SUCOFLEX 104 with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-411_TVAC
Cable	SUCOFLEX 104 (jacket in FEP)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz) 1.35 / 16.5 dB (18 - 26.5 GHz)
Insertion loss assembly	nom. 1.10 dB/m + 0.22 dB / max. 1.21 dB/m + 0.22 dB (up to 18 GHz) nom. 1.37 dB/m + 0.26 dB / max. 1.51 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104E with straight SMA male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_SMA-454_TVAC
Cable	SUCOFLEX 104E (jacket in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 0.88 dB/m + 0.18 dB / max. 0.97 dB/m + 0.18 dB (up to 12 GHz) nom. 1.10 dB/m + 0.22 dB / max. 1.21 dB/m + 0.22 dB (up to 18 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104E with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-411_TVAC
Cable	SUCOFLEX 104E (jacket in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz) 1.35 / 16.5 dB (18 - 26.5 GHz)
Insertion loss assembly	nom. 1.10 dB/m + 0.22 dB / max. 1.21 dB/m + 0.22 dB (up to 18 GHz) nom. 1.37 dB/m + 0.26 dB / max. 1.51 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



SUCOFLEX® TVAC – technical data

Assembly: SUCOFLEX 104EA with straight SMA male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_SMA-454_TVAC
Cable	SUCOFLEX 104EA (jacket and armour in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 0.88 dB/m + 0.18 dB / max. 0.97 dB/m + 0.18 dB (up to 12 GHz) nom. 1.10 dB/m + 0.22 dB / max. 1.21 dB/m + 0.22 dB (up to 18 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104EA with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-411_TVAC
Cable	SUCOFLEX 104EA (jacket and armour in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz) 1.35 / 16.5 dB (18 - 26.5 GHz)
Insertion loss assembly	nom. 1.10 dB/m + 0.22 dB / max. 1.21 dB/m + 0.22 dB (up to 18 GHz) nom. 1.37 dB/m + 0.26 dB / max. 1.51 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104P with straight SMA male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_SMA-454_TVAC
Cable	SUCOFLEX 104P (jacket in FEP)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 1.23 dB/m + 0.18 dB / max. 1.35 dB/m + 0.18 dB (up to 12 GHz) nom. 1.56 dB/m + 0.22 dB / max. 1.72 dB/m + 0.22 dB (up to 18 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



SUCOFLEX® TVAC – technical data

Assembly: SUCOFLEX 104P with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-411_TVAC
Cable	SUCOFLEX 104P (jacket in FEP)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz) 1.35 / 16.5 dB (18 - 26.5 GHz)
Insertion loss assembly	nom. 1.56 dB/m + 0.22 dB / max. 1.72 dB/m + 0.22 dB (up to 18 GHz) nom. 1.98 dB/m + 0.26 dB / max. 2.17 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104P with straight TNC male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_TNC-476_TVAC
Cable	SUCOFLEX 104P (jacket in FEP)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 1.23 dB/m + 0.18 dB / max. 1.35 dB/m + 0.18 dB (up to 12 GHz) nom. 1.56 dB/m + 0.22 dB / max. 1.72 dB/m + 0.22 dB (up to 18 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104PEA with straight SMA male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_SMA-454_TVAC
Cable	SUCOFLEX 104PEA (jacket and armour in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 1.23 dB/m + 0.18 dB / max. 1.35 dB/m + 0.18 dB (up to 12 GHz) nom. 1.56 dB/m + 0.22 dB / max. 1.72 dB/m + 0.22 dB (up to 18 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



SUCOFLEX® TVAC – technical data

Assembly: SUCOFLEX 104PEA with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-411_TVAC
Cable	SUCOFLEX 104PEA (jacket and armour in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz) 1.35 / 16.5 dB (18 - 26.5 GHz)
Insertion loss assembly	nom. 1.56 dB/m + 0.22 dB / max. 1.72 dB/m + 0.22 dB (up to 18 GHz) nom. 1.98 dB/m + 0.26 dB / max. 2.17 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 104PEA with straight TNC male connectors	
Frequency range	DC - 18 GHz
Connectors vented	11_TNC-476_TVAC
Cable	SUCOFLEX 104PEA (jacket and armour in polyurethane)
VSWR / return loss	1.25 / 19 dB (DC - 18 GHz)
Insertion loss assembly	nom. 1.23 dB/m + 0.18 dB / max. 1.35 dB/m + 0.18 dB (up to 12 GHz) nom. 1.56 dB/m + 0.22 dB / max. 1.72 dB/m + 0.22 dB (up to 18 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 106 with straight TNC male connectors	
Frequency range	DC - 8 GHz
Connectors vented	11_TNC-682 (TVAC)
Cable	SUCOFLEX 106 (jacket in FEP)
VSWR / return loss	1.33 / 17 dB (DC - 8 GHz)
Insertion loss assembly	nom. 0.49 dB/m + 0.15 dB / max. 0.53 dB/m + 0.15 dB (up to 8 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	Acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



SUCOFLEX® TVAC – technical data

Assembly: SUCOFLEX 404 with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-409_TVAC
Cable	SUCOFLEX 404 (jacket in FEP)
VSWR / return loss	1.22 / 20 dB (DC - 18 GHz) 1.28 / 18 dB (18 - 26.5GHz)
Insertion loss assembly	nom. 0.92 dB/m + 0.22 dB / max. 0.98 dB/m + 0.22 dB (up to 18 GHz) nom. 1.14 dB/m + 0.26 dB / max. 1.21 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	no
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Assembly: SUCOFLEX 404A with straight PC35 male connectors	
Frequency range	DC - 26.5 GHz
Connectors vented	11_PC35-409_TVAC
Cable	SUCOFLEX 404A (armour in polyurethane)
VSWR / return loss	1.22 / 20 dB (DC - 18 GHz) 1.28 / 18 dB (18 - 26.5GHz)
Insertion loss assembly	nom. 0.92 dB/m + 0.22 dB / max. 0.98 dB/m + 0.22 dB (up to 18 GHz) nom. 1.14 dB/m + 0.26 dB / max. 1.21 dB/m + 0.26 dB (up to 26.5 GHz)
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-30°C ... +80°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



Adaptor: 34_SK-50-0-54/199_NE	
Frequency range	DC - 40 GHz
Connectors vented	2 x SK female
VSWR / return loss	1.173 / 22 dB (DC - 26 GHz) 1.222 / 20 dB (26 - 40 GHz)
Leakage rate	Max. 10 ⁻⁷ Torr * litre / sec
Armour	type A (steel spring, steel braid, polyurethane jacket)
Temperature range	-65° ... +90°C
Outgassing	acc. ECSS-Q-ST-70-02 C: RML < 1.0%, CVCM < 0.1%



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