



DETAIL SPECIFICATION		
REF. : RAD-DET-CABL-002		
<b>Date:</b> August 31th, 16	<b>ED/REV:</b> 3/-	<b>PAGE :</b> 1/18

# RADIALL DETAIL SPECIFICATION FOR SHF COAXIAL CABLE

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## DOCUMENTATION CHANGE NOTICE

REVISION OR ISSUE	DATE	CHANGE
1 -	12/03/03	Creation – Replacement of specification R23SHFS-CABL Issue A Dated 20/02/02
1-A	12/05/04	SHF 5MS LW and SHF 8MS LW added
1-B	15/12/04	Characteristics of SHF 2.4MS & SHF3 MS changed, comments of Power handling table added
2 -	20/06/06	SHF4MS & SHF13MS cancelled, updated of SHF2.4MS. Table of power handling cancelled
2 A	03/07/09	Updated with replacement of SHF5MS LW by SHF5MS LW2 Modification of SHF2.4MS manufacturer
2 B	25/09/09	Updated to correct some value of the electrical characteristics for SHF5MS.
2 C	17/06/10	Updated to add the thickness of silver plated on inner conductor.
2 D	12/12/12	Updated to add SHF4.8MS ULL32 to replace SHF5MS LW2
2 E	12/09/14	Updated to correct the outer diameters for SHF3MS, SHF5MS to be in accordance with the TDS.
3 -	31/08/16	Added SHF3MS ETFE and SHF8MS ETFE

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1. **SCOPE**

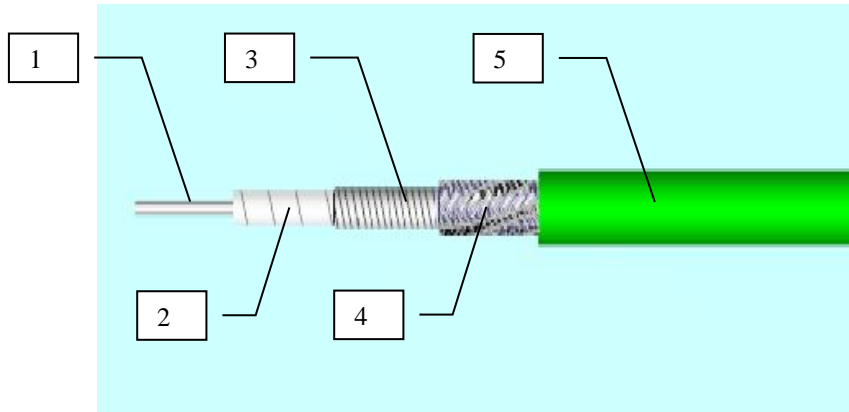
This specification must be considered as a detail specification for RADIALL specification RAD-GEN-CSHF-001

This technical specification describes all the Electrical and mechanical parameters of coaxial cables used for the manufacturing of coaxial cable assemblies for SPACE market.

These cables are specific and cannot be sold separately, they are considered as part of coaxial cable assemblies

## 2. CABLE CHARACTERISTICS

### 2.1. SHF 2.4 MS (P/N C291 187 692)




#### 2.1.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPC (Silver Plated Copper) with 2µm of Silver plated min	
2- Dielectric	PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Geen PFA (PerFluoroAlkoxy)	2.45

#### 2.1.2. Electrical characteristics

Frequency Range	DC-40	GHz
Cutt off frequency	70	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	87	pF/m
Relative propagation speed	77	%
Propagation time	4.3	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (at 18 GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1560	°/m/GHz
Phase stability with temperature	<3	°/m/GHz (-55/+100°C)
Phase stability with bending*	<0.4	°/360/GHz
Corona extinction voltage	-	KV

\* according to IEC 966-2-1

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### 2.1.3. Mechanical characteristics

Maximum mass	18	g/m
Static bend radius	15	mm
Dynamic bend radius	20	mm
Cable connector retention	> 80	N
Crush resistance	> 400	N/100mm
Flexing endurance	> 1000	Cycles ( $\pm 90^\circ$ )

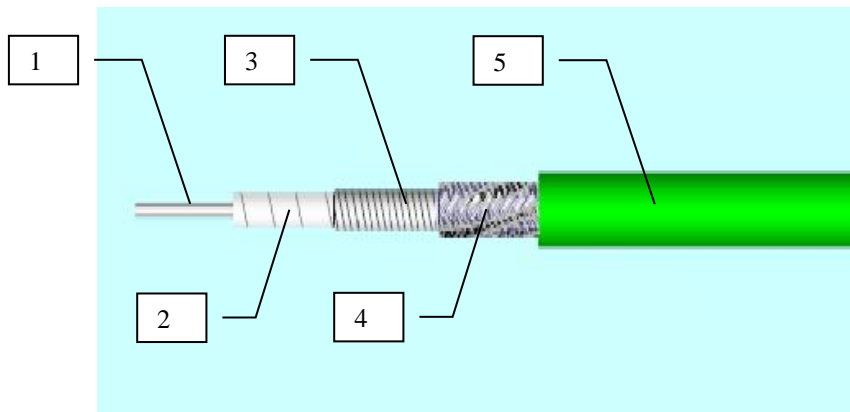
### 2.1.4. Environmental characteristics

Operating temperature	-60/+150	°C
Storage temperature	-65/+165	°C
Thermal shock	-60/+150	°C
Moisture at 94%	+25/+65	°C

### 2.1.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m
1	0.62
2	0.89
4	1.28
6	1.59
8	1.86
12.4	2.36
18	2.91
26.5	3.62
40	4.59

### 2.2. SHF 3 MS (P/N C291 217 692)



#### 2.2.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPC (Silver Plated Copper) with 2µm of Silver plated min	
2- Dielectric	PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Geen PFA (PerFluoroAlkoxy)	3.60

#### 2.2.2. Electrical characteristics

Frequency Range	DC-40	GHz
Cutt off frequency	44	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	88	pF/m
Relative propagation speed	76	%
Propagation time	4.4	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (18 GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1590	°/m/GHz
Phase stability with temperature	<3	°/m/GHz (-55/+100°C)
Phase stability with bending*	<0.4	°/360/GHz
Corona extinction voltage	-	KV

\*According to IEC966-2-1

2.2.3. Mechanical characteristics

Maximum mass	35	g/m
Static bend radius	15	mm
Dynamic bend radius	25	mm
Cable connector retention	> 100	N
Crush resistance	> 400	N/100mm
Flexing endurance	TBD	Cycles ( $\pm 90^\circ$ )

2.2.4. Environmental characteristics

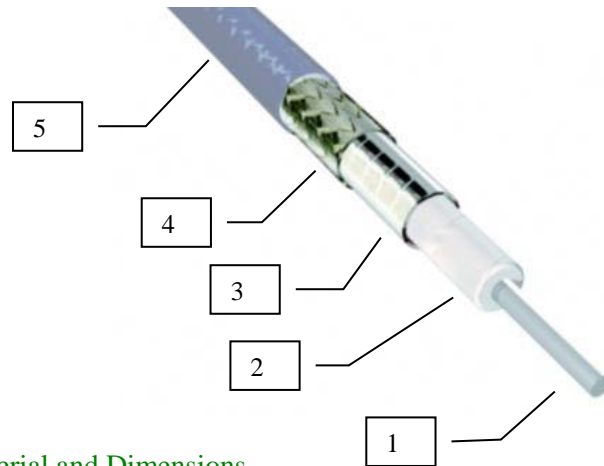
Operating temperature	-60/+150	°C
Storage temperature	-65/+165	°C
Thermal shock	-60/+150	°C
Moisture at 94%	+25/+65	°C

2.2.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m	Maximum attenuation dB/m
1	0.39	0.42
2	0.56	0.61
4	0.81	0.89
6	1.01	1.12
8	1.19	1.31
12.4	1.53	1.69
18	1.91	2.1
26.5	2.41	2.65
40	3.11	3.42



### 2.3. SHF 3 MS ETFE (P/N F1303253)



#### 2.3.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPC (Silver Plated Copper) with 2µm of Silver plated min	
2- Dielectric	PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Grey ETFE (Ethylene TetraFluoroEthylene)	3.64

#### 2.3.2. Electrical characteristics

Frequency Range	DC-40	GHz
Cutt off frequency	44	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	88	pF/m
Relative propagation speed	76	%
Propagation time	4.4	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (18 GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1590	°/m/GHz
Phase stability with temperature	<3	°/m/GHz (-55/+100°C)
Phase stability with bending*	<0.4	°/360/GHz
Corona extinction voltage	-	KV

\*According to IEC966-2-1

2.3.3. Mechanical characteristics

Maximum mass	35	g/m
Static bend radius	15	mm
Dynamic bend radius	25	mm
Cable connector retention	> 100	N
Crush resistance	> 400	N/100mm
Flexing endurance	TBD	Cycles ( $\pm 90^\circ$ )

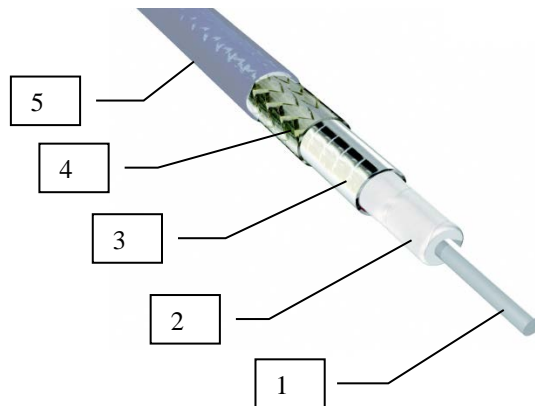
2.3.4. Environmental characteristics

Operating temperature	-60/+150	°C
Storage temperature	-65/+165	°C
Thermal shock	-60/+150	°C
Moisture at 94%	+25/+65	°C

2.3.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m	Maximum attenuation dB/m
1	0.39	0.42
2	0.56	0.61
4	0.81	0.89
6	1.01	1.12
8	1.19	1.31
12.4	1.53	1.69
18	1.91	2.1
26.5	2.41	2.65
40	3.11	3.42

## 2.4. SHF 4.8MS ULL 32 ETFE (P/N C291 289 095)



### 2.4.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPCCA (Silver Plated Copper Clad Aluminium) with 2µm of Silver plated min	
2- Dielectric	Low density PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Grey ETFE (Ethylene TetraFluoroEthylene)	4.8

### 2.4.2. Electrical characteristics

Frequency Range	DC-32.3	GHz
Cutt off frequency	33.1	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	80	pF/m
Relative propagation speed	84	%
Propagation time	4	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (18 GHz) >75 (32.3GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1440	°/m/GHz
Phase stability with temperature	<2	°/m/GHz (-55/+100°C)
Phase stability with bending*	<1	°/360/GHz
Corona extinction voltage	➤ 1.9	KV

\*According to IEC966-2-1

2.4.3. Mechanical characteristics

Maximum mass	41	g/m
Static bend radius	25	mm
Dynamic bend radius	50	mm
Cable connector retention	> 100	N
Crush resistance	> 300	N/100mm
Flexing endurance	TBD	Cycles ( $\pm 90^\circ$ )

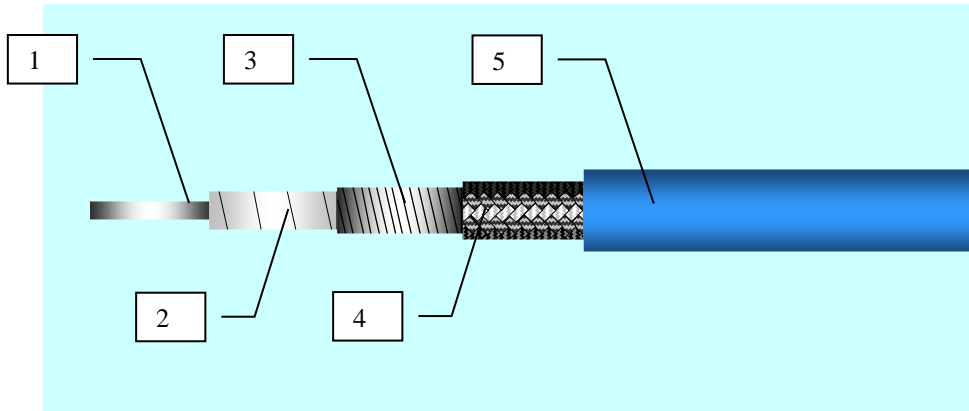
2.4.4. Environmental characteristics

Operating temperature	-100/+150	°C
Storage temperature	-100/+200	°C
Thermal shock	-100/+150	°C

2.4.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m	Maximum attenuation dB/m
1	0.25	0.28
4	0.53	0.58
6	0.65	0.72
8	0.76	0.84
10	0.86	0.96
12.4	0.97	1.07
18	1.20	1.32
26.5	1.51	1.66
32	1.68	1.85

## 2.5. SHF 5 MS (P/N C291 312 693 / F1703245)



### 2.5.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPC (Silver Plated Copper) with 2µm of Silver plated min	
2- Dielectric	Low density PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Blue FEP (Fluorinated Ethylene Propylene)	5.5

### 2.5.2. Electrical characteristics

Frequency Range	DC-26.5	GHz
Cutt off frequency	31	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	82	pF/m
Relative propagation speed	84.8	%
Propagation time	4.03	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (18 GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1400	°/m/GHz
Phase stability with temperature	<1	°/m/GHz (-55/+100°C)
Phase stability with bending*	<0.4	°/360/GHz
Corona extinction voltage	>2.3	KV

\*According to IEC966-2-1

2.5.3. Mechanical characteristics

Maximum mass	53.5	g/m
Static bend radius	25	mm
Dynamic bend radius	50	mm
Cable connector retention	40	N
Crush resistance	200	N/100mm
Flexing endurance	100	Cycles ( $\pm 90^\circ$ )

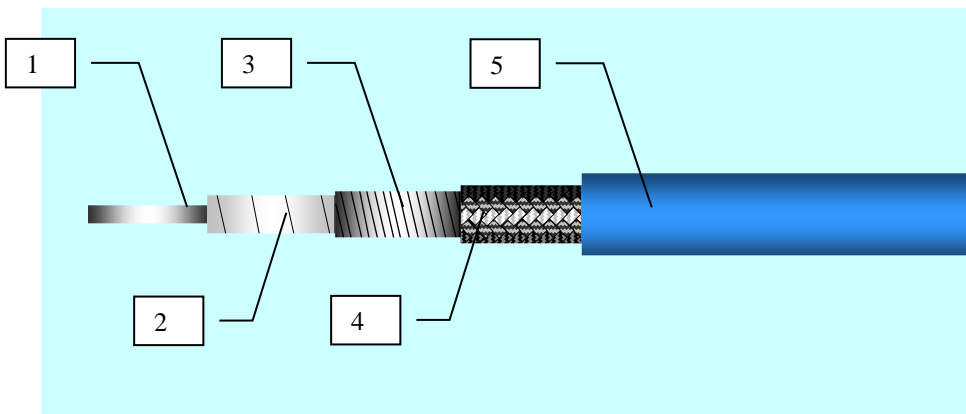
2.5.4. Environmental characteristics

Operating temperature	-60/+150	°C
Storage temperature	-65/+165	°C
Thermal shock	-60/+150	°C
Moisture at 94%	+25/+65	°C

2.5.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m	Max. attenuation dB/m
1	0.23	0.25
2	0.32	0.35
4	0.46	0.50
6	0.57	0.62
8	0.66	0.72
10	0.75	0.81
12.4	0.84	0.91
18	1.02	1.11
26.5	1.27	1.37

### 2.6. SHF 8 MS (P/N C291 461 693 / F1703248)



#### 2.6.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPC (Silver Plated Copper) with 2µm of Silver plated min	
2- Dielectric	Low density PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Blue FEP (Fluorinated Ethylene Propylene)	7.6

#### 2.6.2. Electrical characteristics

Frequency Range	DC-18	GHz
Cutt off frequency	20	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	79	pF/m
Relative propagation speed	85.1	%
Propagation time	3.9	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (18 GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1400	°/m/GHz
Phase stability with temperature	<1	°/m/GHz (-55/+100°C)
Phase stability with bending*	<0.4	°/360/GHz
Corona extinction voltage	>3.3	KV

\*According to IEC966-2-1

2.6.3. Mechanical characteristics

Maximum mass	118	g/m
Static bend radius	40	mm
Dynamic bend radius	80	mm
Cable connector retention	50	N
Crush resistance	> 200	N/100mm
Flexing endurance	> 100	Cycles (± 90°)

2.6.4. Environmental characteristics

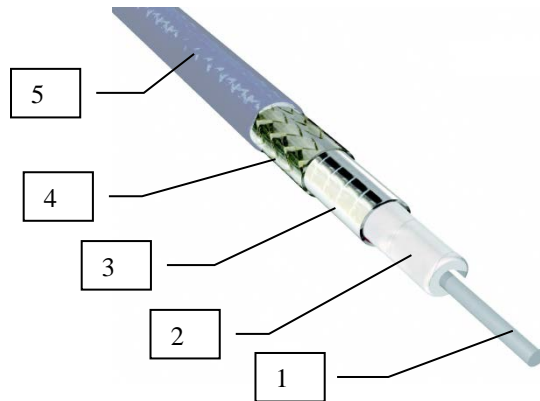
Operating temperature	-60/+150	°C
Storage temperature	-65/+165	°C
Thermal shock	-60/+150	°C
Moisture at 94%	+25/+65	°C

2.6.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m	Max. attenuation dB/m
1	0.15	0.16
2	0.21	0.23
3	0.26	0.28
4	0.30	0.33
5	0.34	0.37
6	0.37	0.41
8	0.44	0.48
10	0.49	0.54
12.4	0.55	0.61
18	0.68	0.75



## 2.7. SHF 8 MS ETFE (P/N F1703252)



### 2.7.1. Material and Dimensions

Designation	Material	mm (max)
1- Center conductor	Solid SPC (Silver Plated Copper) with 2µm of Silver plated min	
2- Dielectric	Low density PTFE tape (Poly TetraFluoroEthylene)	
3- Inner shield	SPC Tape (Silver Plated Copper)	
4- Outer shield	SPC Braid (Silver Plated Copper)	
5- Jacket	Grey ETFE (Ethylene TetraFluoroEthylene)	7.6

### 2.7.2. Electrical characteristics

Frequency Range	DC-18	GHz
Cutt off frequency	20	GHz
Characteristic impedance	50 ±1	Ohm
Capacitance at 1 GHz	79	pF/m
Relative propagation speed	85.1	%
Propagation time	3.9	ns/m
Insulation resistance	>3 x 10 <sup>5</sup>	MOhm/m
Screening Effectiveness	>90 (18 GHz)	dB
Attenuation variation with temperature	Att (at X°C) = att (at 20°C) x [1+(X-20) x 0.002]	dB
Nominal Phase	1400	°/m/GHz
Phase stability with temperature	<1	°/m/GHz (-55/+100°C)
Phase stability with bending*	<0.4	°/360/GHz
Corona extinction voltage	>3.3	KV

\*According to IEC966-2-1

2.7.3. Mechanical characteristics

Maximum mass	118	g/m
Static bend radius	40	mm
Dynamic bend radius	80	mm
Cable connector retention	50	N
Crush resistance	> 200	N/100mm
Flexing endurance	> 100	Cycles (± 90°)

2.7.4. Environmental characteristics

Operating temperature	-60/+150	°C
Storage temperature	-65/+165	°C
Thermal shock	-60/+150	°C
Moisture at 94%	+25/+65	°C

2.7.5. Attenuation at 20°C

Freq (GHz)	Typical attenuation dB/m	Max. attenuation dB/m
1	0.15	0.16
2	0.21	0.23
3	0.26	0.28
4	0.30	0.33
5	0.34	0.37
6	0.37	0.41
8	0.44	0.48
10	0.49	0.54
12.4	0.55	0.61
18	0.68	0.75