Titre / Title

HIGH RELIABILITY

SEMI-RIGID COAXIAL

CABLE ASSEMBLIES

Rédigé par / Written by	**Responsabilité / Responsibility**	**Date**	**Signature**
S. POIZAT	Space Project Manager	24/04/2019	
Vérifié par / Verified by			
V EUDELINE	Space B. U. Manager	24/04/2019	
Approuvée par / Approved by			
C. DASPRES	Space Quality Manager	24/04/2019	

DOCUMENTATION CHANGE NOTICE

REVISION OR ISSUE	DATE	CHANGE
1 -	21/09/04	Creation
1 A	24/03/06	Updated with change of the reference of PAQ-A 010 by PAQP-A 020 in §2 Applicable Documents
2 -	06/07/07	Updated cable assembly part number paragraph 18
3 -	10/06/14	-Updated with new Radiall codification (§18): added two digits at the end
3 A	19/08/15	Updated with new level of vibration (random and sine in §14.5) to be compliant with ESCC specification - Random: 38.5grms instead of 15grms - Sine: 30grms instead of 15grms
4 -	25/10/2016	Marking change: The Serial number configuration is modified (see §6.3)
4 A	27/02/2018	Corrected document: PAQP A 0020 (PID for SR cable assemblies manufactured at Radiall IDA) replaced by PAQ CHR 0064 (PID for SR cable assemblies manufactured by Radiall CHR) Updated of ECSS-Q-ST-7018 to cancel the issue
5 -	16/11/2018	Updated with: -Change of the qualification & LAT flow chart (identical at ESCC3408)
5 A	11/02/2019	Updated with minor corrections: - Added RF measurement between sine & Random vibration - Added number of microsection in §16.12
5 B	24/04/2019	Updated with minor corrections: - §16.11 & 16.14: Added comments: Connect the connectors of the cable assemblies under test with complementary savers or connectors during thermal cycling - §16.18.2: Sine vibration: correction for typing error: 5Hz instead of 10Hz - §16.12: Microsection: add of the number of sample to do - §16.9: RF measurement in temperature: correction of VSWR variation for cable with solid PTFE (SR .085” and SR.141”)

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LIST OF FIGURES

1. SCOPE

This specification covers the general requirements for procurement, including final production, lot acceptance and qualification testing, and delivery of semi-rigid coaxial cable assemblies to be used in « HI-REL » applications.

This specification contains the appropriate inspection and test schedules and also specifies the data documentation requirements.
Cable assemblies are delivered under RADIALL Quality Assurance Label.

2. APPLICABLE AND REFERENCE DOCUMENTS

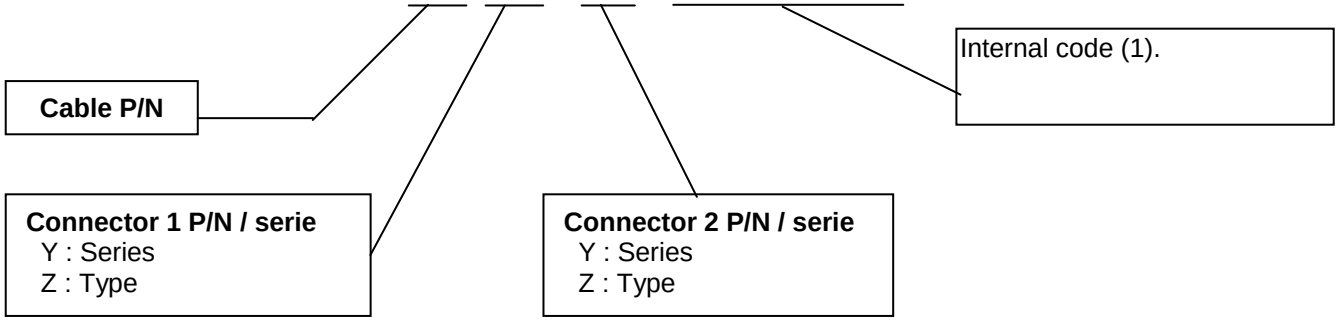
The latest issue for these documents is applicable:

APPLICABLE DOCUMENT	
RQM	RADIALL Quality manual
PAQ CHR 0016	PID for SR cable assemblies
IEC Publication No 410	Sampling plans and procedures for inspection by attributes
REFERENCE DOCUMENT	
ESCC 20600	Preservation, packaging and despatch of SCC Electronic Components
ESCC 3402	General specification for RF Coaxial connectors
ESCC 3408	General specification for RF Cables Assemblies
MIL-PRF 39012	Military Specification General Specification for Connectors, Coaxial, Radio-frequency
MIL DTL 17	General specification for Cables, Radio frequency, Flexible and semi-rigid,
MIL-STD-348	Radio Frequency connector - Interfaces

3. CABLE ASSEMBLY PART NUMBERS

First part

R 2 9 4-X X Y Z Y Z –B B B B B



(1): One Radiall P/N correspond at one cable assembly configuration including the type of cable, the type of each connectors, the length and 3D design of the cable assembly, the angle between the connectors, frequency range.

Cables P/N (2) - XX
08 : SR cable UT85 C M17
09 : SR cable UT85 C LL
14 : SR cable UT141 HA M17
15 : SR cable UT141 C LL
17 : SR cable UT141 HA M17 (Haverhill manufacturer)
25 : SR cable UT250A M17

(2) As described in RADIALL technical specification for SR cables: RAD-DET-CABL-001

Connector P/N – Series - Y	
0 : Not used	6 : ESCC TNC DC-18GHz**
1 : Not used	7 : Radiall High power TNC
2 : Not used	8 : Not used
3 : Not used	9 : Not used
4 : ESCC SMA	
5 : ESCC SMA 2.9	

Connector P/N – Type - Z	
0 : Straight plug	
1 : Right angle plug	
2 : Swept plug	Not used
3 : Straight jack	

4. PIECE PART TECHNICAL DESIGN

4.1. Coaxial Connector

All the technical requirements and dimensions are described in Detail specification of ESCC3402.

4.2. Semi-Rigid Coaxial Cable

All the technical requirements, dimensions, electrical and mechanical parameters are described in RADIALL Technical Specification for SR coaxial cable RAD-DET-CABL-001

5. PIECE PART PROCUREMENT

5.1. Connector

Piece part	Inspection and control	Document reference
Connector	Visual Conformity of plating Dimensions Electrical tests	PID for all cable assemblies Refer to PID of connectors for ESCC3402 detail specification for coaxial connectors

5.2. Semi Rigid Coaxial cable

Piece part	Inspection and control	Document reference
Semi-Rigid Cable	Visual Dimensions Inspection tests	RADIALL specif. RAD-APP-CABL-001

6. INSPECTION & RIGHTS

RADIALL shall be responsible of inspections performed during the complete manufacturing, the Final Production Tests and Lot Acceptance Tests.

7. REQUIREMENTS

The test requirements for procurement of qualified components shall only comprise Final Production Tests.
Connectors and cables could be also provided from different identified batches of previous manufacturing lots.
For LAT test (shall be specified in the order), the applicable tests shall included Final Production Test and LAT Tests.
For Qualification (shall be specified in the order), the applicable tests shall included Final Production Tests and Qualification tests.

7.1. Specifications

Procurement and delivery of components shall be in conformity with this specification which shall apply in total unless otherwise specified in Detail Specification.

7.1.1. Conditions and Methods of Test

The conditions and methods of test shall be in accordance with the Product Quality Plan.

7.1.2. Manufacturer's responsibility for performance of tests and inspections

RADIALL shall be responsible for the performance of tests and inspections. These tests and inspections shall be performed in house. For qualification and Lot acceptance tests, tests could be performed by agreed external facilities.

7.2. Deliverable components

Cable assemblies delivered to this specification shall be processed in accordance with the relevant Product Quality Plan. Each delivered coaxial cable shall be traceable to its production lot. Coaxial cables delivered to this specification shall have completed satisfactorily all tests with the relevant testing level. If required in the order, Lot Acceptance Testing shall be performed after the complete manufacturing (assembly and final production tests).

7.3. Marking

Unless otherwise specified by the customer, the cable assemblies shall be marked with the following data:

- Radiall P/N: RXXXXXXXXXXXXX or Customer Part Number if existing
-The lot number: year + week (4 digits) followed by Serial number (7 to 9 digits)

Example: R29408404000019
1643 7830368

The serial number corresponds at the reference of Radiall order production. For each Radiall order production, there is ONLY one cable assembly. In this case, this number is unique.
The number of the Radiall order production is incremented automatically by the Radiall ERP for each cable assembly to be manufactured.

Note 1:
For cable diameter .141" the marking is made on space qualified heat shrink tubes at the middle of the cable.
For cable diameter.085" the marking is made on a label attached by a wire

8. PRODUCTION CONTROL

The minimum requirements for production control are defined in the Product Quality Plan.

9. FINAL PRODUCTION TESTS

9.1. General

All cable assemblies used for delivery and those submitted to Lot Acceptance Test, shall be subjected to tests and inspections in accordance with the paragraph dedicated in this specification.

9.2. Test Methods and Conditions

Test methods and conditions are completely specified in the Product Quality Plan. Compiled test conditions are specified and performed in the order shown in the paragraph referenced in Final Production Test chart.

9.3. Documentation

Documentation of Final Production Test data shall be in accordance with the requirements of paragraph dedicated of this specification.

10. FAILURES

A component shall be counted as a failure in any of the following cases:
- Mechanical failure,
- Handling failure,
- Lost components
- Electrical failure

10.1. Lot Failure for Final Production Tests:

In case of lot failure, the manufacturer shall alert the Orderer. A lot shall be considered as failed if the allowable number defined in the paragraph dedicated has been exceeded.

10.2. Lot Failure during 100 % testing for Final Production Tests

If the number of components failed on the basis of the failure criteria exceeds:
- 6 % of a lot larger than 50 components,
- 3 devices of a lot between 20 and 50 components,
- 2 devices of a lot smaller than 20 components,

then the lot shall be considered as failed.
If a lot is composed of groups of components of one family defined in one Technical Data Sheet of the detail specification, but separately identifiable for any reason, then the lot failure criteria shall apply separately to each identifiable group.

10.3. Lot Failure during Sample Testing for Qualification and Lot Acceptance Tests:

A lot shall be considered as failed if the number of allowable failures during sample testing in accordance with General Inspection Level II of IEC Publication No. 410 is exceeded.

If lot failure occurs, a 100 % testing may be performed with the relevant lot failure criteria.

10.4. Failed Components

A component shall be considered as failed if one or more parameters exceed the limit shown in the Detail specification or Detail specification

10.5. Failure Criteria

The following criteria shall apply to qualification testing and to Lot acceptance tests

- Environmental and Mechanical Test Failures:

Components which fail during tests for which the pass/fail criteria are inherent in the test method, e.g.; vibration, etc.

- Electrical Failures:

The following shall be counted as component failures: Components which are subjected to electrical measurement on completion of environmental and endurance tests in accordance with the Detail Specification.

11. QUALIFICATION TESTS

The tests conditions are specified and performed in the order shown in Paragraph. Qualification Test Flow chart.

11.1. Qualification Testing

11.1.1. Sample Size

The sample sizes of the qualification and the applicable test requirements are specified in the paragraph Qualification test Flow CHART.

11.1.2. Distribution within the Sample Lot for Qualification Testing

Cable assemblies from a same manufacturing batch, with a same coaxial cable part number as defined in paragraph 3 and same connector's interchangeability are considered as similar and belonging to a same family of cable assemblies.
Sampling must be considered for each family

11.2. Documentation

In the case of Qualification testing, the data shall be documented in accordance with the requirements of paragraph dedicated.

12. LOT ACCEPTANCE TESTS

12.1. Lot Acceptance Testing

The test conditions are specified and performed in the order shown in Para. : Lot Acceptance Test Flow chart.

12.1.1. Sample Size

The sample size of the Lot Acceptance and the applicable test requirements are specified in the paragraph: Lot Acceptance Flow CHART.

12.1.2. Distribution within the Sample Lot for Lot Acceptance Testing

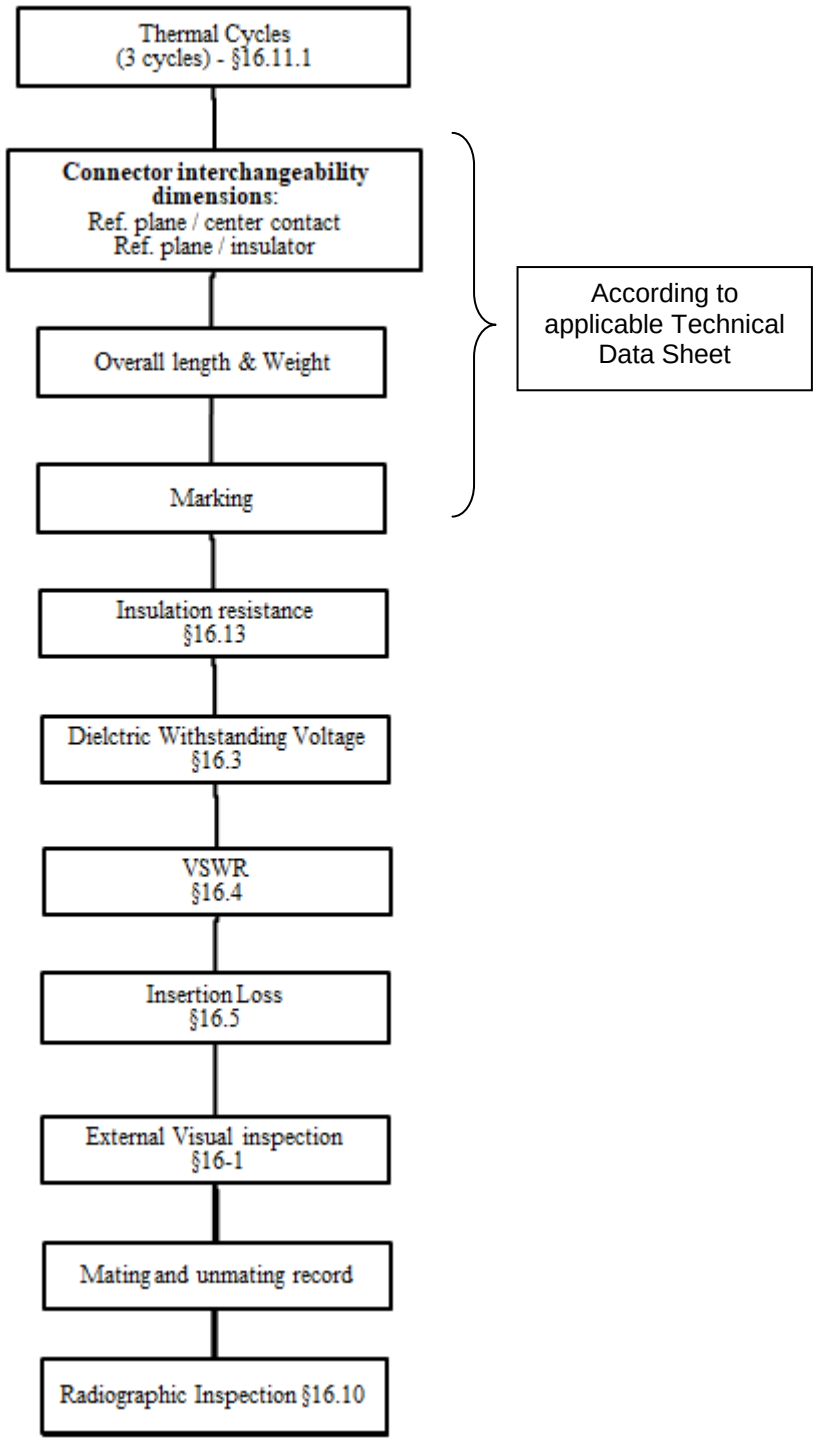
Cable assemblies from a same manufacturing batch, with a same coaxial cable part number as defined in paragraph 3 and same connector's interchangeability are considered as similar and belonging to a same family of cable assemblies.
Sampling must be considered for each family.

12.2. Documentation

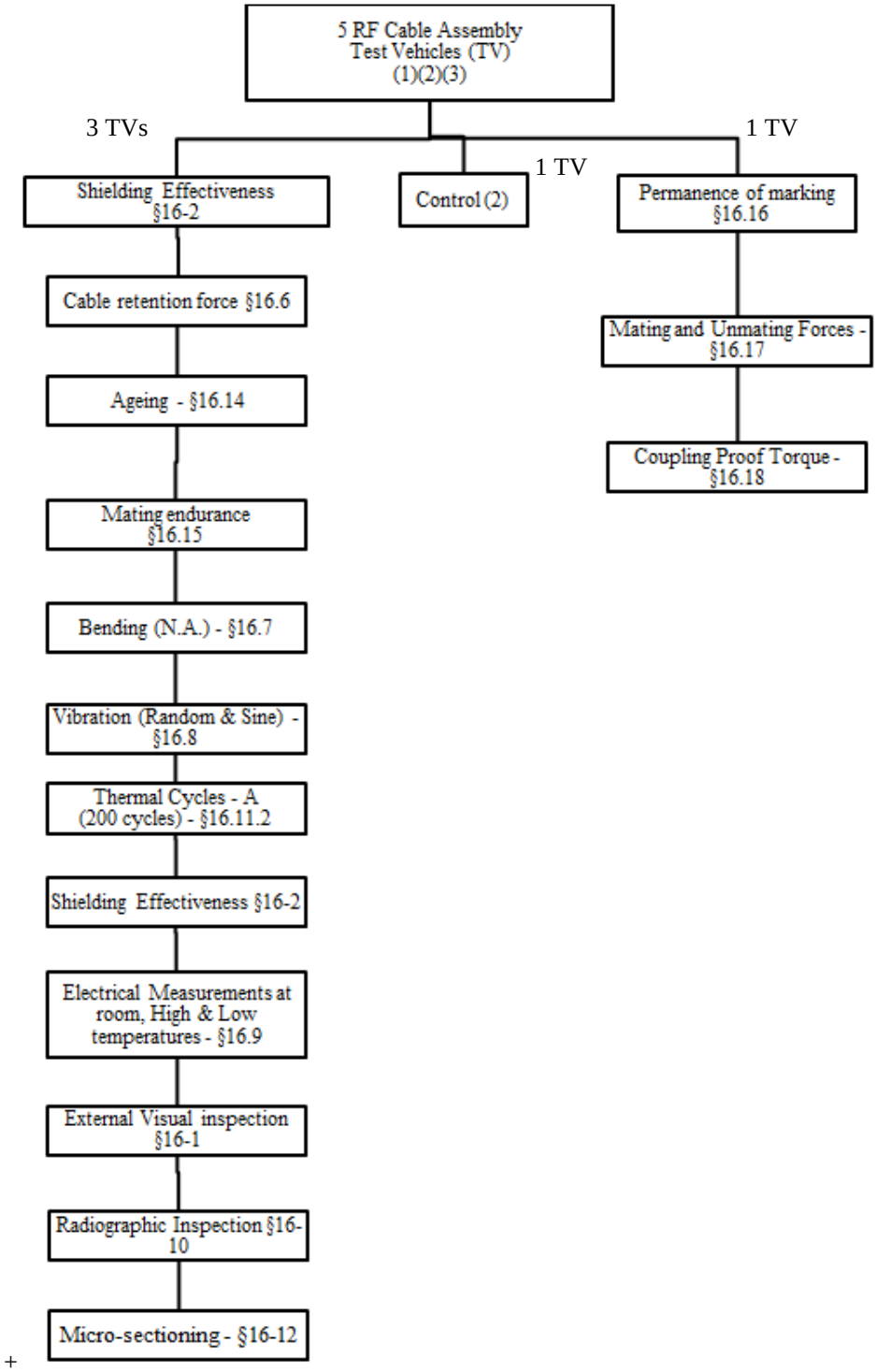
In the case of Lot Acceptance testing, the data shall be documented in accordance with the requirements of paragraph dedicated.

13. FINAL PRODUCTION TEST FLOW CHART (100% TESTING)

13.1. For Flight Model (100% testing)



14. QUALIFICATION TEST FLOW CHART

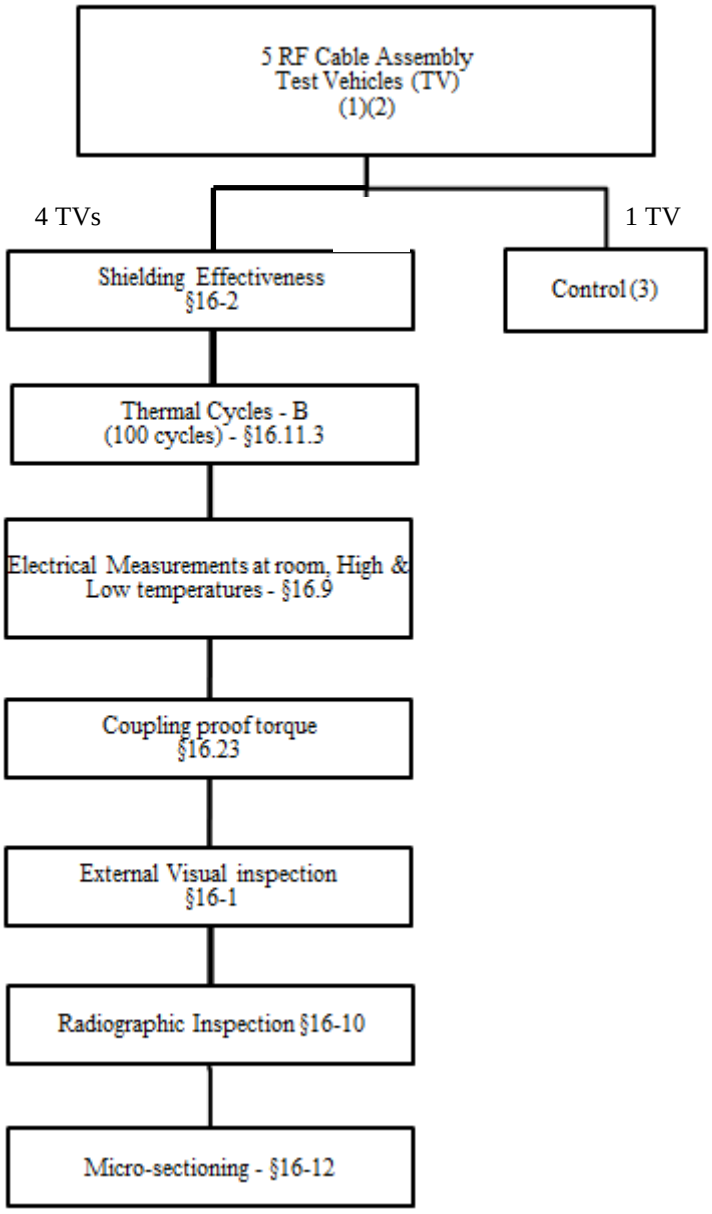


Note: **1/** Not failure is permitted

2/ A control sample shall be used for reference purposes. Whenever electrical measurements are made on any component under test, the control sample shall also be measured.

3/ The tests shown in this chart are considered to be destructive and therefore components so tested **shall not be used as flight model**

15. LOT ACCEPTANCE TEST FLOW CHART



Note: **1**/ The quantity of test vehicles (TV) to be subjected to each test or subgroup test sequence is indicated in Chart LAT
2/ Not failure is permitted
3/ A control sample shall be used for reference purposes. Whenever electrical measurements are made on any component under test, the control sample shall also be measured.

16. TESTS, METHODS AND PROCEDURES

16.1. Visual Inspection

This inspection shall be done by naked eyes (NE):

- Aspect of cable shall be free of any visual defect like stripes, pleats, notches that could impact the good working of the cable assembly.
- The marking on the thermal sleeves shall meet the requirements.
- Aspect of connectors shall meet the criteria required in ESCC3402 Specification (visual inspection of connector interfaces for plating damage, contamination and excessive wear should be carried out).
- All parts of cable assembly shall be cleaned, particularly in the connector interface areas.
- Connector orientation in accordance with customer requirements.

16.2. Screening Effectiveness (in reverberation chamber)

The method consists of placing the component under test in a quasi-homogeneous and isotropic electromagnetic field, so that the orientation and polarisation of the incident field do not influence the measurement.
These conditions are achieved using an over sized cavity, called reverberation chamber, coupled to a generator through a matched antenna. A mode stirrer (rotating reflector) which incessantly provides modifications of the geometrical structure of the cage, is used in order to get an homogeneous field.
Frequency range of the reverberant chamber: 500Mhz to 40 GHz
Number of measurement points: 100 pts/decade.

The screening effectiveness (SE) is done by the formula:

$$SE\ (dB) = (Pi/Pt)_{dB} - Xc$$

Where Pi is the incident Power (from the generator)

Pt is the transmitted Power to the component

Xc is the cage Loss (dB).

Xc measured with an additional matched antenna in the chamber.

Test fixture and method according to IEC Technical Report: IEC 61726 - Issue 2 1999-11.

16.3. Dielectric Withstanding Voltage

Method
- Test according to MIL C 17 -
- Test voltage :AC 50 Hz, according to cable assembly Detail Specification.

Requirement
No breakdown after 1mn.

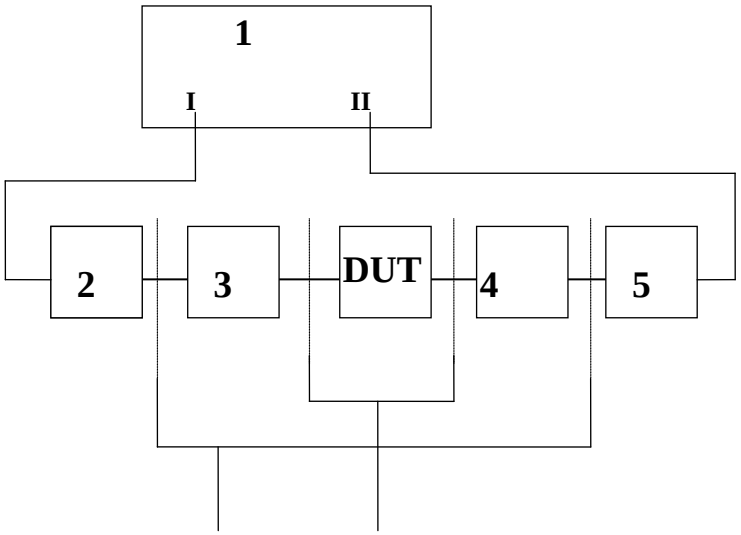
16.4. VSWR Measurement

The reflection coefficient or VSWR shall be measured in accordance with one of the following methods:

- Vector method (test set-up shown in Figure I(a) or I (b),

Across the full frequency range by the swept frequency technique or, alternatively, at fixed frequencies, equally spaced points (7 minimum) across the frequency range. The measured values shall not exceed those given in the Detail Specification.
The cable assembly must be connected to the standard precision adapter No. 3 (see figure I (a) or I (b)).

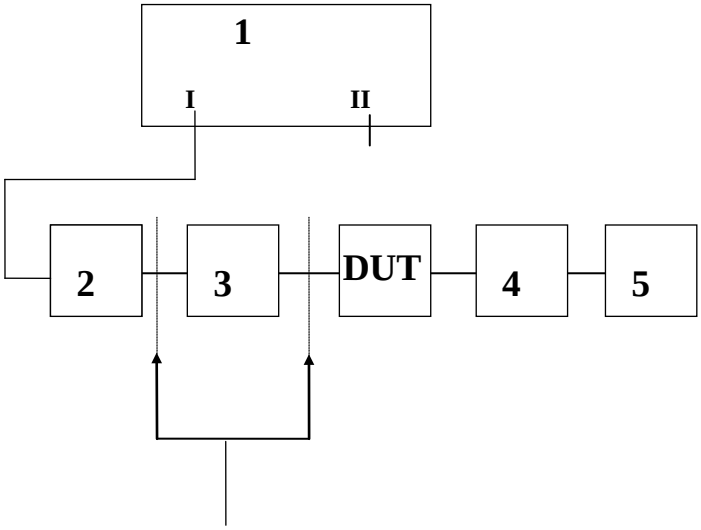
Figure I (a) - SWEPT FREQUENCY TEST SET-UP – VECTORIAL METHOD (2 PORTS)



1 : Vector network analyser with RF generator and S parameter test set.
2-5 : Cable assemblies.
3-4 : Standard precision adapters

POSSIBLE CALIBRATION PLANES OF FULL TWO PORTS CALIBRATION

Figure I (b) - SWEPT FREQUENCY TEST SET-UP - VECTORIAL METHOD (1 PORT)



1 : Vector network analyser with RF generator and S parameter test set.
2: Cable assembly
3-4 : Standard precision adapters
5 : Precision termination (reflection coefficient <0.017 (-35 dB) in the test frequency range

POSSIBLE CALIBRATION PLANES OF S11 CALIBRATION (REFLECTION)

REQUIREMENT: According to Detail Specification of cable assemblies.

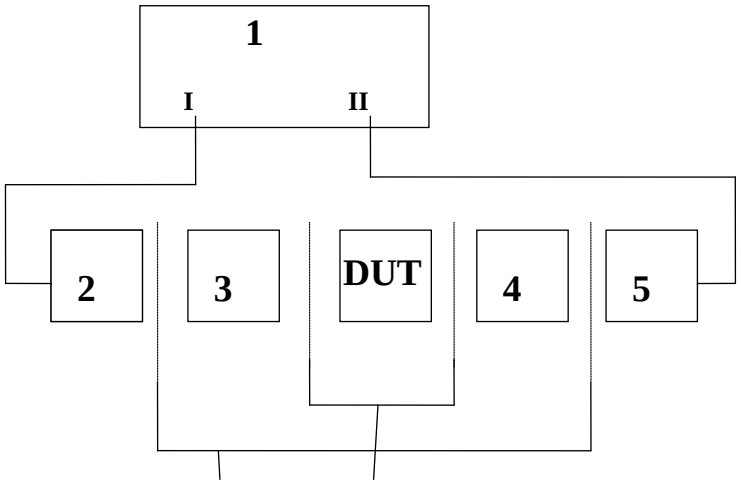
16.5. Insertion Loss Measurement

The cable assemblies shall be tested as shown in Figure II (a). This measure includes the reflection losses of the cable assembly and dissipating losses.

Procedure:
The equipment is calibrated. Insert the cable assembly between the two ports. The insertion losses of the cable assembly are measured and the values are recorded.
Measurement shall be performed across the full frequency range by the swept frequency technique or, alternatively, at fixed frequencies, equally spaced points (7 minimum) across the frequency range.

Requirement:
According to Detail Specification of cable assemblies.

Figure II (a) - VECTORIAL METHOD OF RF INSERTION LOSS MEASUREMENTOF CABLE ASSEMBLIES



1 : Vector network analyser with RF generator and S parameter test set.
2-5 : Cable assemblies.
3-4 : Standard precision adapters

POSSIBLE CALIBRATION PLANES OF FULL TWO PORTS CALIBRATION

16.6. Cable retention force

Method:
The test vehicles shall be held vertically and fixed such that the forces and torques to be applied will not cause it to move. The cable of the test vehicles shall be kept as unbent and untwisted as possible.
The connector at one end of each test vehicle shall be held while an axial force is applied to the connector at the other end, along the cable axis, by suitable means. The force shall be gradually increased until the cable retention force specified is attained. The cable retention force shall then be applied for 2 minutes.
Requirement
- VSWR according to Detail Specification of cable assemblies before and after test
- Interface dimensions.

-

16.7. Bending test (Not Applicable for Semi-Rigid cable)

Not Applicable for Semi-Rigid cable assemblies

16.8. Vibrations

According to MIL-PRF 39 012 § 4.6.15
REQUIREMENT: No discontinuity greater than 1 µs shall appear during the test. No visible damage on the cable assembly shall appear. During these tests, any continuity between the central and external conductors shall be checked, under a current of 100 mA max.

16.8.1. Random vibrations

Perpendicular & Parallel axes to the mounting plane	
Range (Hz)	PSD Level
20 – 60	+ 6 dB/oct.
60 – 400	2 g^2/Hz
400 –800	- 6 dB/oct.
800 – 1000	0.5 g^2/Hz
1000 –2000	-6 dB/oct.
Global : **38.5 g RMS**	
Duration = 180s per axis	

On completion of testing, the test vehicles shall be visually inspected. There shall be no evidence of damage or loosening of parts. VSWR and Insertion Loss shall be measured at Tamb = +22 ±3°C

16.8.2. Sine Vibrations

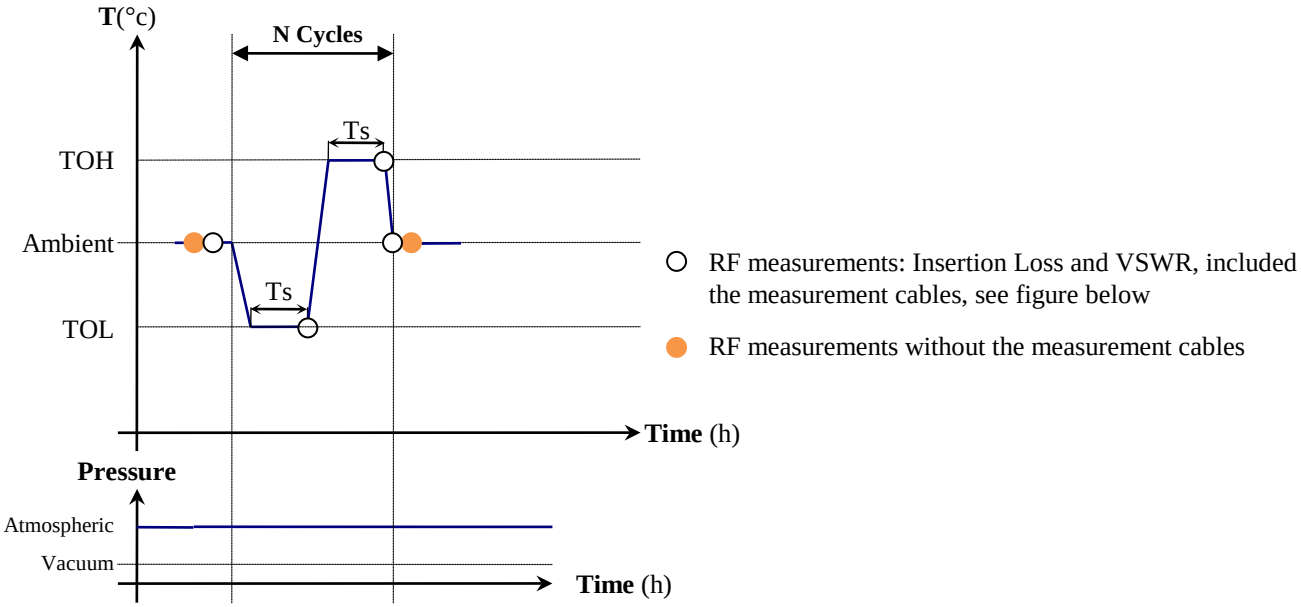
Along 3 axis:
- Frequency range and level 5 - 26 Hz : ± 11 mm
  26-100 Hz : 30 g

- Sweep frequency: 5-100-5Hz. For the entire frequency range of 5 to 100Hz and return to 5Hz, The slope rate shall be 2 oct/mn maximum
-Total number of cycles: 9 (3 times in each of the 3 mutually perpendicular axes)
- Clamping of cable at about 15cm of the vibrating part.

On completion of testing, the test vehicles shall be visually inspected. There shall be no evidence of damage or loosening of parts. VSWR and Insertion Loss shall be measured at Tamb = +22 ±3°C

16.9. Insertion Loss and VSWR in temperature

The cable assembly shall be submitted to the following cycles:



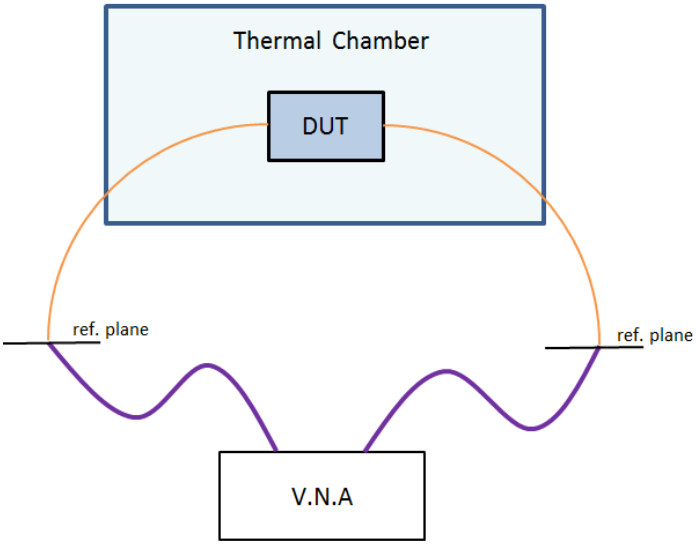
Temperature change rate $\Delta T/\Delta t$ = 5°C/mn ±2°C/mn

Test Parameters	Parameters	Tolerances
Ts: Stabilisation time (hour)	**1**	/
Cycle Number	**3**	/
TOH: Temperature Operation High (°C)	**See Detail specification**	**-0 / +3**
Ambient (°C)	**22**	**+3 / -3**
TOL: Temperature Operation Low (°C)	**See Detail specification**	**+0 / -3**

Test method:

- These RF measurements shall be performed with two cable assemblies (in orange colors in figure on next page) of 1 to 1.5m to link the VNA cable to the DUT
- The VNA shall be calibrated with their own cables (purple colors in figure on next page)
- The DUT with their two cables of 1 / 1.5m connected is placed in the thermal chamber. Only the extremities of the two cables are out of the thermal chamber, see figure on next page
- The VNA cable are connected on the two cables of the DUT
- The RF measurements include the RF performances of the two cables and the DUT.
- The RF tests results will be a comparison between the measurements at room, High and Low temperature.

Figure of this setup



COMMAND CONDITIONS	SANCTION Min Max	UNIT
RF MEASUREMENTS		
Insertion Loss See DETAIL SPECIFICATION for frequency range	**ΔILT ≤0.25%/°C**	**dB**
VSWR See DETAIL SPECIFICATION for frequency range	**For Solid PTFE cable:** **No significant variation (ΔVSWRT ≤10%)** **For Low Density PTFE (LL) cable:** **No significant variation (ΔVSWRT ≤5%**	-

16.10. Radiographic Inspection (X-Ray)

Radiographic examination shall be performed on both cable-to-connector connections for each RF cable assembly.
As a minimum, radiographs of solder joints shall be taken perpendicularly to the centreline of the connectors as follows:

- The solder joint between the outer conductor of the cable and the connector body, if one exists.
- The solder joint between the centre conductor of the cable and the centre conductor of the connector, if one exists.

The radiographs shall be examined against the following acceptance criteria:

- There shall be no evidence of solder projections, spikes, splashes or loose particles.
- Centre conductor :
  - The centre conductor of the cable shall be inserted into the contact hole for a minimum of 80% of the cavity length.
  - The centre conductor of the cable shall present a straight shape in the connector.
  - The solder in the joint between the pin and the cable centre conductor shall show a maximum of 30% voids within the solder joint.
  - The solder in the joint between the pin and the cable centre conductor shall not show a single void bigger than 25% within the solder joint

- Outer conductor :
  - The outer conductor shall be inserted into the connector body or ferrule with a minimum of 70% of dedicated length.
  - The outer conductor to connector body joint shall show a maximum of 30% voids within the solder joint
  - The outer conductor to connector body joint shall not show a single void bigger than 25% within the solder joint.

Any bend of the cable in 90° connector types shall be smooth and continuous, with uniform foil overlap and braid lay.

16.11. Thermal Cycles

16.11.1. Thermal Cycles- Final production test

- Number of Temperature Cycles: 3 cycles with 15 minutes minimum at each storage temperature extreme as specified in the Detail specification
- Temperature transfer slope: ≤ 10°C/minute
- Connect the connectors of the cable assemblies under test with complementary savers or connectors during thermal cycling
- Data Points:
  On completion of testing and after a recovery period of 2 hours minimum at room temperature conditions, the test vehicles shall be visually examined and there shall be no evidence of damage or loosening of parts.
  VSWR and Insertion Loss shall be measured at Tamb = +22 ±3°C

16.11.2. Thermal Cycles- A

- Number of Temperature Cycles: 200 cycles with 15 minutes minimum at each storage temperature extreme as specified in the Detail specification
- Temperature transfer slope: ≤ 10°C/minute
- Connect the connectors of the cable assemblies under test with complementary savers or connectors during thermal cycling
- Data Points:
  On completion of testing and after a recovery period of 2 hours minimum at room temperature conditions, the test vehicles shall be visually examined and there shall be no evidence of damage or loosening of parts.
  VSWR and Insertion Loss shall be measured at Tamb = +22 ±3°C

16.11.3. Thermal Cycles- B

- Number of Temperature Cycles: 100 cycles with 15 minutes minimum at each storage temperature extreme as specified in the Detail specification
- Temperature transfer slope: ≤ 10°C/minute
- Connect the connectors of the cable assemblies under test with complementary savers or connectors during thermal cycling
- Data Points:
  On completion of testing and after a recovery period of 2 hours minimum at room temperature conditions, the test vehicles shall be visually examined and there shall be no evidence of damage or loosening of parts.
  VSWR and Insertion Loss shall be measured at Tamb = +22 ±3°C

16.12. Microsection

Microsection shall be performed on a longitudinal axis on one cable assembly (on each connector).
A minimum of one cable assembly will be done in microsectioning (two connectors) and/or at the minimum each type of connectors used in the configuration of the cable assemblies tested.
A visual inspection is performed and no visible damage shall appear.

16.13. Insulation Resistance

Insulation resistance shall be tested in accordance with MIL-C-17.
The insulation resistance between the inner and outer conductor of each cable assembly shall be not less than 200 MΩ under a voltage of 500Vdc.
The measurements shall be read after 1 minute of voltage application.

16.14. Ageing

MIL-STD-202, Test Method 108 (non-operating) and as follows:

- Test Temperature: maximum storage temperature specified in Maximum Ratings in the Detail Specification
- Duration: 240h
- Connect the connectors of the cable assemblies under test with complementary savers or connectors during thermal cycling
- Data Points:
  On completion of testing and after a recovery period of 2 hours minimum at room temperature conditions, VSWR and Insertion Loss shall be measured at Tamb = +22 ±3°C.

16.15. Mating endurance

Mating Endurance shall be performed in accordance with Endurance as specified in ESCC Generic Specification n° 3402, and as follows:

- Cycle Rate: ≤ 12/minute
- Number of Mating/Unmating Cycles: 50

One connector of each connector type in each test vehicle shall be tested:

16.16. Permanence of marking

In accordance with ESA/SCC Basic Specification N° 24800, not applicable to engraved parts

16.17. Mating and unmating force

This test may be performed on unassembled connectors. In which case, the connectors must originate from the same connector lot as those used in the cable assembly lot.
Mating and Unmating Forces shall be performed in accordance with Mating and Unmating Forces as specified in ESCC Generic Specification No. 3402 and the RF cable assembly Detail Specification.
Both connectors in each cable assembly shall be tested.

16.18. Coupling proof torque

Coupling Proof Torque shall be performed in accordance with Coupling Proof Torque as specified in ESCC Generic Specification No. 3402 and the RF cable assembly Detail Specification. Both connectors in each RF cable assembly shall be tested.

17. POWER HANDLING UNDER VACUUM

One or more mechanisms may limit the power capability of a coaxial cable assembly during high power operation. The most common limiting phenomenon is thermal breakdown. This is caused by heating within the cable and connectors due to power dissipation. In addition under low pressure environment like space vacuum, the power can be also limited by multipaction and ionization effects.

Thermal Breakdown:
Thermal Breakdown is due to overheating: The temperature of the cable assembly is the result of the balance between heating due to power dissipation (linked to Loss) and thermal dissipation (Thermal conduction through center conductor and insulator and outer conductor + radiant emission towards environment).
Power Limitation due to thermal breakdown decreases with frequency because insertion loss increases at high frequency. In Radiall SR cable assembly, this limit is given by cable power handling and depends on cable type. Power derating curves for each type of cable assembly are given in Detail Specification RAD-DET-CSRS-002.

Ionization and multipactor breakdown:
These phenomena are electron discharges that may occur in a 50 ohm coaxial line in the presence of a periodic RF/ Microwave field under low pressure. Both are limited by the presence of dielectric so the critical area in cable assemblies are usually air gaps between outer and inner conductors inside coaxial connectors. They are linked to the frequency-gap product to they decrease when frequency increases or/and when size of connector increases.
Multipaction requires a high vacuum condition (below 10^{-5} torr) so it is more common than ionization which requires partial pressure conditions that are unlikely to occur in space (except in case of outgassing).

In summary, the power handling of a cable assembly in space conditions is limited by multipactor effect at low frequency then by thermal and/or ionization breakdown when frequency increases. The power derating curves of different cable assemblies are given in Detail Specification RAD-DET-CSRS-002.

Power handling and multipactor testing are not included in qualification and LAT tests sequences:
The results of this kind of test depend on frequency and signal configuration (single carrier, multi carriers…) and it is impossible to verify the complete derating curve by a test.
Based on margin analysis, the customer can decide that a test in real condition of the program is necessary, cost and conditions have to be discussed with the customer.

18. PACKAGING

Each cable assembly is delivered in a waterproof bag static free, with a desiccator. Each connector shall be protected by a cap (no PVC should be used).

In addition, the static bag shall be packed in a second bag with a rigid cardboard.

19. DELIVERABLE DOCUMENTS

For each flight model deliverable unit, an End Item Data Package (EIDP) shall be compiled.
Unless otherwise specified by the customer, as minimum, the EIDP will contain:

- Record of mating and unmating
- Record of VSWR and insertion loss (numeric and/or graphic),
- Final inspection record,
- Non conformance reports, if necessary
- Radiographs
- Certificate of conformance

For LAT and Qualification model a specific test report shall be compiled.

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