REVISIONS

SYMBOL	DESCRIPTION	DATE	APPROVAL
A	RN number A074 Incorporated	8/17/95	
B	RN number A113 Incorporated	7/29/97	

SHEET REVISION STATUS

SH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
REV	A	A	A	A	A	A	A	A	A	B	B	A	A	A	A	A	A	A	A	
SH	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
REV																				

ORIGINATOR: **T. R. Duffy/Unisys**	**DATE** **11/13/90**	**FSC: 5935**
APPROVED: **S. Archer-Davis/Unisys**	**11/30/90**	**Connectors, Electric, Miniature Polarized Shell, Rack and Panel, Pin, Electromagnetic Interference Filter Contact, Nonmagnetic, Solder Type**
CODE 311 APPROVAL: **S. A. Naus/GSFC**	**12/3/90**	
CODE 311 SUPERVISORY APPROVAL: **G. P. Kramer, Jr./GSFC**	**12/3/90**	
ADDITIONAL APPROVAL:		**S-311-P-626**

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

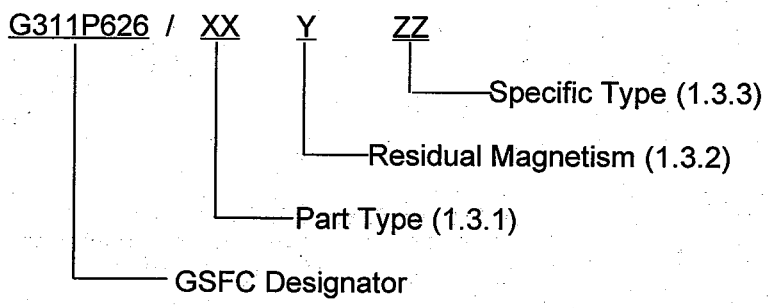
CAGE CODE: 25306

1. SCOPE

1.1 Purpose. This specification covers the general requirements for non-removable multi-contact filter connectors for use in space flight hardware and critical ground support equipment (GSE) applications.

1.2 Detail Specifications. The detail specifications, which are referenced in this document, are a part of this specification.

1.3 Connector Type Designation. The connector type designation shall be as follows:



1.3.1 Part Type. A two digit number referencing the detail specification which covers the requirements for each style of connector.

1.3.2 Residual Magnetism. A single letter indicating the maximum level of residual magnetism from the following tabulation:

Level	Residual Magnetism (gamma)
A	Not Specified
B	2000
C	200
D	20

1.3.3 Specific Type. A two digit number which refers to a specific part listed in the detail specification.

2. APPLICABLE DOCUMENTS

2.1 Documents. The following documents, of issue in effect on the date of invitation for bids or request for proposal, form part of this specification to the extent specified herein.

SPECIFICATIONS

Federal

QQ-S-571 Solder, Tin Alloy, Tin-lead Alloy and Lead Alloy.

Military

MIL-C-24308 Connectors, Electric, Rectangular, Miniature, Polarized Shell, Rack and Panel, General Specification For

MIL-C-39029	Contacts, Electrical Connector, General Specification for.
MIL-F-14256	Flux, Soldering, Liquid (Rosin Base).
MIL-G-45204	Gold Plating, Electrodeposited, TYPE II, CLASS I
MIL-I-17214	Indicator, Permeability, Low-mu (Go, No-Go)

NASA

GSFC-S-311-P-4	Connectors, Electrical, Polarized Shell for Space Flight use, Detailed Specification

STANDARDS

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts.
MIL-STD-220	Method of Insertion Loss Measurement.
MIL-STD-889	Dissimilar Metals
MIL-STD-1344	Test Methods for Electrical Connectors
MIL-STD-1285	Marking of Electrical and Electronic Parts.
MIL-STD-45662	Calibration Systems Requirements.
MS 18281	Contacts, Pin and Socket, Classes G, N, and H, Solder Type, Non-removable.

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Other Publications

ASTM

E595	Material from Outgassing in a Vacuum Environment, Total Mass Loss and Collected Volatile Condensable, Standard Test Method for.

(Application for copies should be addressed to American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103)

2.3 Order of Precedence. For purposes of interpretation, the following order to document precedence shall apply:

(a) Detail specification
(b) General specification
(c) Applicable documents

3. REQUIREMENTS

3.1 Detail Specifications. The individual part requirements shall be as specified herein and in the applicable detail specification. In the event of any conflict between any requirement of this document and the detail specification, the latter shall have precedence.

3.2 Qualification. Connectors furnished under this specification shall be products which are qualified to the requirements of this specification, the detail specification, and shall be based on the following:

3.2.1 Design and Source Approval. Before qualification under this specification, the manufacturer's facilities shall be subject to survey (at the option of GSFC) by the Office of Flight Assurance, GSFC. Compliance with quality assurance provisions in accordance with this specification is required. In addition, the history and detailed engineering of the specific connector design will be reviewed, as well as the documented manufacturing and quality control procedures. Only those sources approved in the design and source approval phase shall be eligible for qualification or award of contract under this specification. Source approval and design approval do not constitute part qualification or an equivalent thereof.

3.2.2 Part Qualification. Qualified connectors shall be products which have passed the qualification inspection requirements of this specification.

3.2.3 Loss of Qualification and Applying for Requalification.

3.2.3.1 Loss of Qualification. Qualification shall be withdrawn following any change in the design, processing, materials, or quality control procedures which, in the opinion of GSFC Parts Branch, significantly departs from those used to qualify the part. In addition, qualification may be withdrawn as a result of discrepancies noted by GSFC, the procuring activity, or for failures experienced in equipment which are attributable to the manufacturer.

3.2.3.2 Applying for Requalification. The manufacturer may apply for requalification after demonstrating that satisfactory measures have been taken to correct the conditions leading to the loss of qualification. The manufacturer must comply with all standard qualification prerequisites as defined by the GSFC Parts Branch.

3.3 Identification.

3.3.1 Connector Identification. The connector item identification consists of the connector type designation (1.3), the date-lot identification, and serial numbers (3.3.2).

3.3.2 Date-Lot Identification. The manufacturer shall be responsible for the assignment of a date and lot identification code per MIL-STD-1285, which will reflect the year and week of production. A serial number shall also be assigned by the manufacturer, so as to uniquely identify a specific connector.

3.4 Materials. Materials meeting the connector's performance requirements shall be as specified herein, and in the detail specifications. However, when a definite material is not specified, a material shall be used which will enable the connectors to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty for acceptance of the finished product.

3.4.1 Dissimilar Metals. Dissimilar metals shall not be used in intimate contact unless suitable protection against electrolytic corrosion is provided as specified in Requirement 16 of MIL-STD-889.

3.4.2 Nonmagnetic Materials. When required by the detail specification, all materials used in connectors supplied under this specification shall be nonmagnetic in so far as the state-of-the-art permits. In no case a material which prevents the finished product from meeting the residual magnetism requirements shall be used.

3.4.3 Contact Materials and Plating. The contacts shall be made of a copper base alloy. The plating shall be as specified in the detail specification.

3.4.4 Shell Material and Plating. The shell material shall be as specified in the detail specification .

3.4.5 Dielectric Materials. Dielectric materials shall be as specified in the detail specification and meet the outgassing requirements of paragraph 3.6.8. Nylon shall not be used.

3.4.6 Filter Components. Filter components shall be as specified in the detail specification.

3.4.7 Metal Components. Metal components shall be of high grade corrosion resistant material or treated non corrosive material which will allow the complete connector assembly to meet the requirements of this specification.

3.5 Design, Construction and Physical Dimensions. Connectors shall be of the design, construction and physical dimensions specified herein and in the detail specification. Connectors shall be so designed that the contacts will not be damaged during normal mating of counterpart connectors.

3.5.1 Contact Design. Contacts shall be of the type specified in the detail specification.

3.5.2 Insert Design and Construction. Inserts shall be designed with suitable sections and radii such that they will not readily chip, crack, or break in assembly or in normal service. Inserts shall be molded or bonded one piece construction.

3.5.3 Insert Arrangement. The insert arrangement shall be as specified in the detail specification.

3.5.4 Contact Alignment and Stability. With all contacts in place, the alignment of contacts shall always permit an.engagement that is stable, irrespective of buildup of allowable tolerances on hole locations and insert location in the shell.

3.5.5 Shell Design. The shell shall be designed to positively retain the insert and shall be so constructed that no movement of the insert is allowed.

3.5.5.1 Shell Polarization. Polarization shall be as specified in the detail specification.

3.5.5.2 Mounting. Mounting requirements, if applicable, shall be as specified in the detail specification.

3.5.6 Interchangability. All connectors of a given type designation shall be capable of being mated with the associated receptacle manufactured by any other source. Connectors under this specification having the same type designation shall be completely interchangeable.

3.6 Performance.

3.6.1 Capacitance. Capacitance, when measured in accordance with 4.8.3 of this specification, shall be within the parameters as specified in the detail specification.

3.6.2 Dissipation Factor. The dissipation factor, when measured in accordance with 4.8.4 of this specification, shall be as specified in the detail specification sheet.

3.6.3 Dielectric Withstanding Voltage. When tested in accordance with 4.8.5 of this specification, the dielectric withstanding voltage shall meet or exceed twice the rated voltage specified in the detail specification sheet. The maximum leakage current shall not exceed 500 microamperes. Connectors shall show no evidence of damage, arcing, breakdown, flashover, or impairment of any characteristic qualities sufficient to cause failure of the connector or filter components.

3.6.4 Insulation Resistance. When tested in accordance with 4.8.6 of this specification, the insulation resistance shall not be less than the values specified in the applicable detail specification (see 3.1). The ambient temperature insulation resistance test may be combined with the dielectric withstanding voltage test by measuring the insulation resistance at the dielectric withstanding voltage level. If combined with the dielectric withstanding voltage test, there shall be no evidence of breakdown or flashover. The maximum electrification time is to be two minutes.

3.6.5 Radio Frequency (RF) Current Rating. When tested in accordance with 4.8.7 of this specification, the RF current rating shall be 0.25 amps, maximum. Upon completion of the test, the filter contacts shall show no evidence of damage.

3.6.6 Contact Resistance. When connectors are measured in accordance with 4.8.8 of this specification, the connector resistance shall be 20 milliohms maximum unless otherwise specified in the applicable detail specification.

3.6.7 Attenuation. When connectors are tested in accordance with 4.8.9 of this specification, the attenuation shall be not less than the values specified in the applicable detail specification.

3.6.8 Thermal Vacuum Outgassing. The entire connector assembly, when tested in accordance with 4.8.18, shall not exceed a total mass loss (TML) of 1.0 percent of the original specimen mass and shall have a maximum volatile condensable material (VCM) content of 0.1 percent of the original specimen mass.

3.6.9 Solderability. When tested in accordance with 4.8.10 of this specification, the finished solder fill shall be smooth and slightly concave with clear wetting and adhesion to all internal surfaces of the solder cup. There shall be no physical damage to the connector.

3.6.10 Salt Spray (corrosion). Connectors shall be tested in accordance with 4.8.11 of this specification. The connectors shall show no visible evidence of exposure of base metal due to corrosion which will affect performance as specified in accordance with 3.6.6 and 3.6.7 of this specification. All marking shall remain legible.

3.6.11 Temperature Cycling. When tested in accordance with 4.8.12 of this specification, connectors shall meet the following requirements:

Dielectric Withstanding Voltage	- As specified in 3.6.3.
Insulation Resistance	- As specified in 3.6.4.
Attenuation	- As specified in 3.6.7.
Visual examination	- As specified in 4.8.1.

3.6.12 Mating and Unmating Force. When tested as specified in 4.8.13, the force for mating and unmating counterpart connectors shall meet the requirements specified in MIL-C-24308 for Class D connectors.

3.6.13 Resistance to Soldering Heat. When tested in accordance with 4.8.14 of this specification, there shall be no physical damage to the connector or filter components. Following the tests, the connectors shall meet the capacitance, dissipation factor, dielectric withstanding voltage, insulation resistance and DC resistance requirements of this specification.

3.6.14 Shock. When tested in accordance with 4.8.15 and 4.8.15.1 of this specification, connectors shall not be damaged and there shall be no loosening of parts caused by shock. Mated connectors shall be retained in full engagement and there shall be no interruption of electrical continuity longer than 10 microseconds.

3.6.15 Vibration. When tested in accordance with 4.8.15 and 4.8.15.2 of this specification connectors shall not be damaged and there shall be no loosening of parts caused by vibration. Counterpart connectors shall be retained in full engagement and there shall be no interruption of electrical continuity longer than 10 microseconds.

3.6.16 Moisture Resistance. Connectors shall meet the applicable dielectric withstanding voltage and insulation resistance requirements (see 3.6.3 and 3.6.4) when tested as specified in 4.8.16.

3.6.17 Residual Magnetism. (when specified, see 3.1) When tested in accordance with 4.8.17 the relative permeability of connectors, with contacts installed but unwired, shall not exceed the requirements as specified in the detail specification.

3.6.18 Life. When tested in accordance with 4.8.19 of this specification, connectors shall meet the requirements specified in 3.6.11. There shall be no evidence of physical damage that would affect reliability.

3.6.19 Voltage Conditioning. When tested in accordance with 4.8.20 of this specification, the tested contacts meet the attenuation, insulation resistance, and dielectric withstanding voltage requirements.

3.7 Marking. Connectors shall be marked in accordance with Method 1 of MIL-STD-1285, and shall include the connector type designation (1.3), the manufacturer's name or code symbol, date code and serial number (3.3.2). Connectors which fail to meet all of the requirements of this specification shall not have the connector identification established unless otherwise authorized by GSFC.

3.7.1 Insert Marking. Raised or depressed characters may be used. Markings are shown in the applicable detail specification.

3.8 Workmanship. Connectors shall be processed in such a manner as to be uniform in quality and shall be free from burrs, crazing, cracks, voids, chips, blisters, pin holes, sharp cutting edges, and any other defects that will adversely affect, serviceability or appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection. Unless otherwise specified in the contract, the manufacturer is responsible for the performance for all inspection requirements as specified herein.

4.1.1 Test Equipment and Inspection Facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the manufacturer. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with MIL-STD-45662.

4.2 Classification of Inspections. The inspections specified herein are classified as follows:

a. Materials Inspection.(4.3)

b. Qualification inspection.(4.5)

c. Quality conformance inspection. (4.7)

4.3 Materials Inspection. Materials inspection shall consist of certification supported by verifying data that the materials, as specified herein and in the detail specification (see 3.4), used in fabricating the connectors, are in accordance with the applicable specifications including quality assurance provisions and referenced inspections and requirements prior to such fabrication.

4.4 Inspection Conditions. Unless otherwise specified herein, all inspections shall be performed under normal room ambient conditions which include the following:

a. Temperature: 20°C to 30°C

b. Relative Humidity: 10 to 60 percent

c. Barometric Pressure: 650 to 800 mm Hg

4.5 Qualification Inspection. Qualification inspection shall be performed by the manufacturer on sample units produced with equipment, processes and procedures normally used in production. At the option of the qualifying activity, data from an established reliability program subjecting the same or similar parts to equivalent or more stringent testing may be substituted for a part or all of the qualification.

4.5.1 Sample. Unless otherwise specified in the detail specification, the number of samples subjected to qualification inspection shall be two.

4.5.2 Inspection Routine. Sample units shall be subjected to the inspection routine specified in Table I.

4.5.3 Qualification Rejection. There shall be no failures in any examination or test of the connectors submitted for qualification inspection. After any failure, the activity responsible for qualification shall be notified by the manufacturer of all details related to changes made in the connector, or components of the connector, before initiating any further tests deemed necessary to assure compliance with the connector or contract requirements of this specification and applicable detail specification sheets.

4.5.4 Qualification of Additional Connectors. Qualification may be granted, on the basis of similarity, to connectors which differ only in minor details from those submitted for qualification testing. Qualification is contingent on the degree of similarity and the successful evaluation of test data submitted to validate the difference.

4.5.5 Disposition of Qualification Sample Units. Connectors subjected to qualification inspection shall not be delivered on a contract or order.

4.5.6 Qualification Report Submission. Two copies of the qualification test shall be sent to the attention of the Parts Branch, Code 311, Goddard Space Flight Center, Greenbelt, Maryland 20771. The report shall summarize the results of the tests performed and the test results, and shall include copies of the detail test data.

4.6 Preparation of Samples. Connectors shall be serialized and, when applicable, paired with a suitable receptacle. Connector-pairing shall be maintained throughout the tests and examinations as necessary. The quantity of samples, wire types and sizes, and other pertinent details shall be specified in the detail specification. The samples shall be taken from a production run and shall be produced with equipment and procedures normally used in production.

Table I. Qualification Inspection.

Inspection	Paragraph	
	Requirement	Method
Group I (All Samples)		
Visual and mechanical inspection	3.7, 3.8	4.8.1 4.8.2
Capacitance	3.6.1	4.8.3
Dissipation factor	3.6.2	4.8.4
Insulation resistance (ambient)	3.6.4.1	4.8.6.1
Dielectric withstanding voltage	3.6.3	4.8.5
Attenuation	3.6.7	4.8.9
Ambient temperature		4.8.9.1
Feed through current		4.8.9.2
High temperature		4.8.9.3
Low temperature		4.8.9.4
Contact resistance	3.6.6	4.8.8
Moisture resistance	3.6.16	4.8.16
Insulation resistance (ambient)	3.6.4.1	4.8.6.1
Dielectric withstanding voltage	3.6.3	4.8.5
RF current	3.6.5	4.8.7
Resistance to soldering heat	3.6.13	4.8.14
Visual inspection	3.7	4.8.1
Group II (1 Sample)		
Residual magnetism	3.6.17	4.8.17
Shock	3.6.14	4.8.15.1
Vibration	3.6.15	4.8.15
Group III (1 Sample)		
Solderability	3.6.9	4.8.10
Mating and Unmating Force	3.6.12	4.8.13
Group IV (All Samples)		
Temperature cycling	3.6.11	4.8.12
Capacitance	3.6.1	4.8.3
Insulation resistance (ambient)	3.6.4.1	4.8.6.1
Dielectric withstanding voltage	3.6.3	4.8.5
Life	3.6.18	4.8.19
Insulation resistance 125°C	3.6.4.2	4.8.6.2
Attenuation at ambient (sweep)	3.6.7	4.8.9
Dielectric withstanding voltage	3.6.3	4.8.5
Thermal vacuum outgassing	3.6.8	4.8.18

4.7 Quality Conformance Inspection.

4.7.1 Inspection of Product for Delivery. Unless otherwise specified in the detail specification, inspection of product for delivery shall consist of the examinations and tests specified in Table II (Quality Conformance Inspection), in the order shown. Defective devices found as a result of these tests shall be eliminated from the lot and not delivered to the purchaser.4.7.1.1 Inspection Lot. An inspection lot shall consist of all connectors of a specific type, covered by one specification sheet, produced under essentially the same conditions, and offered for inspection at one time.

4.7.1.2 Lot Rejection. Lots shall be rejected where the number of failures in the lot is five percent or greater. Lots consisting of less than eighteen connectors shall be rejected if any failure occurs. At the option of the manufacturer, and with the approval of the purchaser, the rejected lot may be resubmitted for inspection.

Table II. Quality Conformance Inspection.

Inspection	Paragraph	
	Requirement	Method
Temperature Cycling	3.6.11	4.8.12
Voltage conditioning	3.6.19	4.8.20
Dielectric withstanding voltage	3.6.3	4.8.5
Insulation resistance	3.6.4	4.8.6.1
Capacitance	3.6.1	4.8.3
Attenuation at ambient	3.6.7	4.8.9.1
Visual and mechanical inspection	3.7, 3.8	4.8.1

4.7.1.3 Resubmitted Lots. A lot shall be resubmitted for inspection only once. The lot acceptance criterion for the resubmitted lot shall be reduced from five percent to one percent. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots. Any failures occurring in resubmitted lots consisting of fewer than 100 connectors shall be cause for rejection of the resubmitted lot.

4.7.1.4 Quality Conformance Inspection Data. Two copies of the quality conformance inspection test data shall be furnished with each shipment of parts. The data shall include a summary of the inspection results, as well as the detailed data.

4.8 Methods of Examination and Test.

4.8.1 Visual and Mechanical Inspection. Connectors and contacts shall be examined to verify that the dimensions, materials, design, construction, marking and workmanship are in accordance with the applicable requirements of this specification and the detail specification. Inspection shall include, but is not limited to, the following:

4.8.1.1 Marking. Connectors shall be examined in accordance with MIL-STD-1285, Method I. Connectors shall be marked in accordance with this specification and include the requirements of the detail specification (3.1). All identification shall be completely legible.

4.8.1.2 Design and Construction. The final assembly shall be in accordance with this specification and the requirements specified in the detail specification (3.6).

4.8.1.3 Materials. The materials used in connectors manufactured to this specification shall be in accordance with this specification and the detail specification (3.4).

4.8.1.4 Plating. When examined at a magnification of 10X , all plating shall have a smooth and fine grained surface consistent with the surface of the base metal. All plating shall be free from blisters, cracks, scale, peeling, pits, nodules, porosity, underplate, excessive edge buildup or other defects which, due to their degree, nature or extent, detrimentally affect the suitability of the plating for its intended use. Either bright or matte finishes are acceptable unless a bright finish is specified.

4.8.1.5 Insulators. When examined at a magnification of 10X, insulators shall be free from damage such as chips, cracks, voids or inclusions.

4.8.1.6 Contacts. When examined at a magnification of 10X, the engaging end of the contacts shall be free from burrs or roughness. The contacts shall not have corroded or black solder pots which would be detrimental to the solderability of the contacts. The contacts shall not be bent, misaligned or otherwise damaged.

4.8.1.7 Insert. The insert arrangement, contacts, polarization, seals, and contact alignment shall be as specified in the detail specification.

4.8.1.8 Workmanship. Connectors shall be examined for uniformity of shapes and dimensions. There shall be no cracks, breaks, chips, bends, burrs, loose parts, loose electrical connections, or any other evidence of poor workmanship such that the connector is unsuitable for the purpose intended. The connector shall be clean and free of foreign material.

4.8.2 Dimensions. One connector, selected at random from each production lot shall be checked for dimensions as specified in the detail specification

4.8.3 Capacitance to Ground. Capacitance shall be measured at 25°C in accordance with MIL-STD-202, method 305. The test frequency shall be 1000 Hz., unless otherwise specified in the detail specification. Measurement accuracy shall be within ±2 percent. The A.C. component shall be between 0.1 to 1.0 v rms.

4.8.4 Dissipation Factor. The dissipation factor shall be combined with capacitance to ground (See 4.8.3).

4.8.5 Dielectric Withstanding Voltage. A dielectric withstanding voltage of twice the rated D.C. voltage shall be applied for five to ten seconds between each contact and the shell. Charging current shall be limited to twenty milliamperes.

4.8.6 Insulation Resistance.

4.8.6.1 Insulation Resistance at Ambient (25°C). The insulation resistance at 25°C shall be measured in accordance with MIL-STD-202, method 302, test condition A. The following details and exceptions shall apply:

a. Ambient temperature - +25°C ±3°C.

b. Test potential - 100 Vdc or rated dc voltage, whichever is less, applied for 2-minutes maximum.

c. Relative humidity - 20 to 50 %.

d. Points of measurement - Between contact and ground (shell).

4.8.6.2 Insulation Resistance at 125°C. The insulation resistance at 125°C shall be measured in accordance with MIL-STD-202, method 302, test condition A. The following details and exceptions shall apply:

a. Test temperature - +125°C ±3°C.

b. Connectors shall have been stabilized for one hour minimum at +125°C with rated voltage applied.

c. Test potential - Rated dc voltage.

4.8.7 Radio Frequency (RF) Current Rating. The RF current rating shall be tested as follows:

a. Measure attenuation

b. Mount the connector on a grounded bulkhead

c. Vary the RF generator frequency until the RF ammeter shows peak current (generator loading must be chosen to provide peak current at the filter resonance and also not exceed the generator VSWR tolerance). Adjust the RF generator output to the specified RF current and dwell for five minutes.

d. Repeat step C from the opposite end of the filter contact.

e. Measure attenuation, insulation resistance, and dielectric withstanding voltage.

4.8.8 Contact Resistance. Contacts shall be tested in accordance with method 3004 of MIL-STD-1344. A minimum of four contacts or 20 percent of the contacts, whichever is greater, shall be measured in each connector being tested. The following details apply:

a. Wire size: As specified in the detail specification.

b. Preparation: Connectors mated with counterpart copper based alloy socket contacts.

c. Test current: Maximum contact current rating (3.6.5)

4.8.9 Attenuation. The attenuation of filter contacts shall be tested in accordance with MIL-STD-220, method of insertion loss measurement, and conditions stated herein.

4.8.9.1 Attenuation at Ambient Temperature. Unless otherwise specified, all contacts shall be tested. For qualification testing, initial and final attenuation shall be measured on a

swept frequency basis across the frequency band. For intermediate test measurements during qualification, discrete measurements shall be made at 10 Mhz. or the lowest frequency indicated in the applicable detail specification and 100 MHz. For acceptance testing, discrete measurements shall be made at 100 MHz.

4.8.9.2 Attenuation with Feed Through Contact Current. The filter contact under test shall carry 5 amperes DC for a minimum of two minutes before the measurement is made and while the measurement is being made. Not less than ten contacts shall be tested. The test shall be performed at ambient temperature with only the test contact carrying the load current. Attenuation shall be measured at 10 Mhz. or the lowest frequency indicated in the applicable detail specification and 100 MHz.

4.8.9.3 Attenuation at High Temperature. The connector under test shall be exposed to 125°C for thirty minutes prior to the test and kept at 125°C during the test. Not less than ten contacts shall be tested. The contacts shall not carry load current. Attenuation shall be measured at 10 MHz. or the lowest frequency indicated in the applicable detail specification and 100 MHz.

4.8.9.4 Attenuation at Low Temperature. Connectors shall be tested using the same conditions as for attenuation at high temperature (4.8.9.3) except the temperature shall be -55°C. The same contacts measured at 125°C shall be tested.

4.8.10 Solderability. Solderability shall be tested in accordance with MIL-STD-202, method 208 (type R or RMA flux may be used). Solder cup terminations may be tested in the following manner:

a. Test samples shall not be cleaned prior to soldering.

b. Test sample connectors shall have the solder cups dipped in, or brushed with, flux just prior to the application of solder.

c. A pencil type soldering iron shall be used, with temperature regulated to 360°C ±10°C to heat the test solder cups.

d. After heating the test solder cups to a solder melt temperature, 63/37 tin-lead type solder shall be applied to fill the solder cup to a solder capacity which will result in solder wetting the entire cup surface and forming a solder fill meniscus across the open portion of the solder cup.

e. The finished solder fill shall be smooth and slightly concave with clear wetting and adhesion to all internal surfaces of the solder cup. Solder beading or flux joints are not allowed. Inspection shall be conducted using a 10X optical aid.

f. Twenty percent but not less than seven contacts of the test specimens shall be tested.

4.8.11 Salt Spray (corrosion). Connectors shall be tested as specified in MIL-STD-202, method 101, test condition B. Immediately after exposure, the connectors shall be washed with tap water and dried for 12 hours, maximum, in a circulating air oven at a temperature of 38°C ± 3°C.

4.8.12 Temperature Cycling. Connectors shall be in accordance with MIL-STD-1344, method 1003.1, test condition A. The temperature of step 1 shall be -65°C (-0, +5°C) and the temperature of step 3 shall be +125°C (+0, -5°C).

4.8.13 Mating and Unmating Force. Mated connectors shall be tested in accordance with Method 2013 of MIL-STD-1344. The rate of mating and unmating shall be 1 to 10 inches per minute.

4.8.14 Resistance to Solder Heat. Seven contacts or twenty percent of the contacts, whichever is greater, shall be tested as follows:

a. The test specimens shall be fluxed with flux liquid or other techniques. Type R or RMA flux conforming to MIL-F-14256 may be used.

b. The appropriate copper wire size, 2 to 4 inches in length, properly prepared for the applicable solder cup size shall be inserted into the contact termination.

c. Unless otherwise specified, a pencil type soldering iron rated for 25 watts shall be used. The soldering iron shall be heated to a temperature of 360°C ±10°C. It shall be applied to the termination for a period necessary to hold the solder in a liquid state for 4 to 5 seconds. The solder type to be used is SN-63 in accordance with QQ-S-571.

d. After application, the soldering iron shall be removed and a visual and mechanical inspection shall be performed, the visual inspection shall be at 10X.

e. The connector shall show no evidence of distortion or damage to any area of the connector housing.

4.8.15 Shock and Vibration Testing. Connectors shall be tested as specified in 4.8.15.1 and 4.8.15.2 with the following exception. Monitoring for discontinuities between mating contacts and filter contacts and the grounding system shall be accomplished as follows:

a. Prepare special contacts with the gap in the ceramic shorted by conductive paint or a similar method. This effectively shorts out the filter capacitors.

b. Assemble these contacts in the connector to be tested.

c. Wire a sample set of positions of the mating connector. The return wire should connect to the shell of the connector under test.

d. Insert a detector in each wire of the mating connector.

e. Mount the test connector with the mating connector on the test fixture for the specified test.

f. Perform the vibration and shock tests.

g. At the end of the tests, visually examine the test connector for physical damage, e.g., cracks in contacts or inserts, bonding breaks etc.

4.8.15.1 Shock. The shock testing device and method shall be as specified in MIL-STD 202, method 213, test condition G except the connector shall be prepared as specified in 4.8.15. The connectors shall be subjected to 10 blows in each of three mutually perpendicular axes. Receptacles shall be mounted on the shock device or carriage. The connectors shall be engaged with the receptacles and held together with a suitable clamping arrangement. A current of 100 milliamperes shall pass through the receptacle contacts and the connector under test. Contacts shall be monitored to determine if the continuity requirement of 3.6.14 is met. The leads shall be secured to a clamping point that moves with the connector at a minimum distance of 12 inches from the connectors.

4.8.15.2 Vibration. Connectors shall be prepared as specified in 4.8.15. A suitable clamping arrangement shall hold the connectors during the test. The connectors shall be subjected to the test as specified in MIL-STD 202, method 204, test condition D except the sweep shall be performed three times in each of three mutually perpendicular directions (a total of 9 times). A current of 100 milliamperes shall pass through the mating connector contacts and the connector under test. Contacts shall be monitored to determine if the continuity requirement of 3.6.15 is met. The wires shall be clamped to a non-vibrating point, 12 inches minimum from the connectors.

4.8.16 Moisture Resistance. Connectors shall be submitted to the moisture resistance test in accordance with MIL-STD-202, method 106, with the following exceptions and details:

a. Step 7b, vibration, is not required.

b. There shall be no drip loops in the wires.

c. Wires shall be brought out of the chamber through vapor tight seals.

d. There shall be no wire splices in the chamber.

e. After completion of the sixth step of the final cycle, before removal from the chamber, the insulation resistance shall be measured in accordance with 4.8.6. The limit of 3.6.4 shall be observed.

4.8.17 Residual Magnetism. Connectors shall be fully assembled before testing. The residual-magnetism test shall be performed in a magnetically quiet area, i.e, machines, electronic equipment, vehicles, and personnel traffic are restricted. Permeability shall be checked with an instrument conforming to MIL-I-17214.

4.8.18 Thermal Vacuum Outgassing. All nonmetallic materials used in the manufacture of these connectors shall be tested in accordance with ASTM E 595 to determine the maximum TML of the original specimen mass and the VCM content of the original specimen mass. For the purpose of determining TML and VCM of connectors, the original specimen mass shall be the assembled connector mass excluding metallic parts. The TMC and VCM for the connectors may be determined by testing the specific materials of the connector and calculating the loss for the connector.

EQUIPMENT
1 — Hewlett-Packard model 4288 milliammeter
1 — Hewlett-Packard model 3529A magnetometer probe
1 — Nonmagnetic stand and probe holder

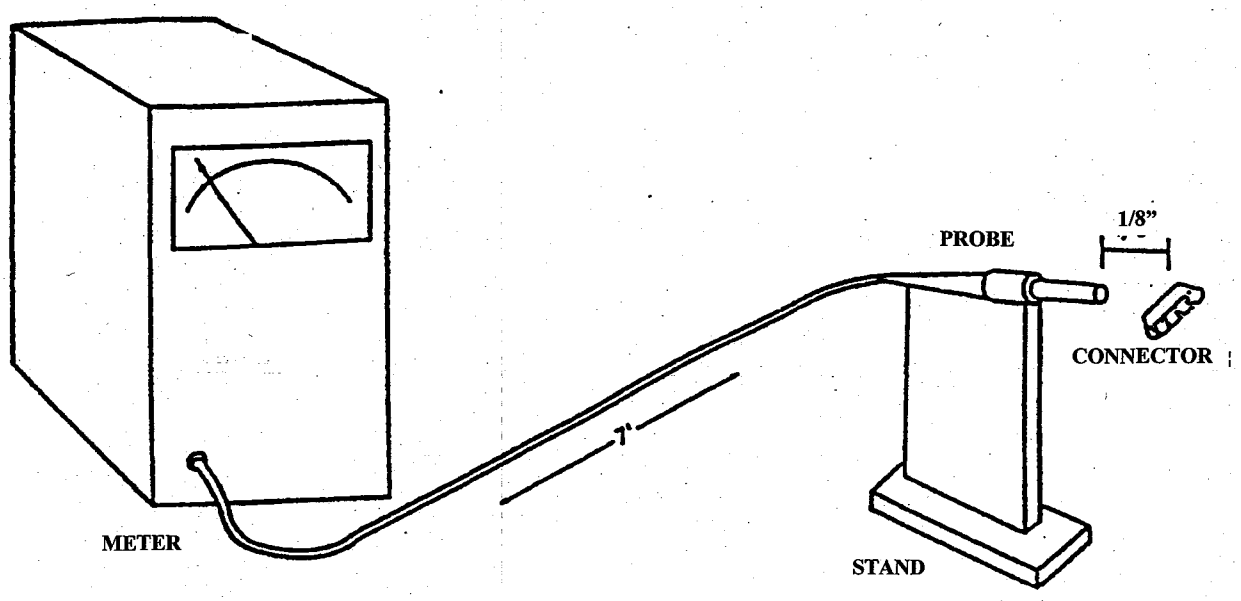


Figure 1. Residual-Magnetism Test Arrangement

4.8.19 Life. Five contacts of each connector shall be tested in accordance with MIL-STD-202, method 108. The following details and exceptions shall apply:

a. Test temperature - +125°C ±3°C.

b. Test condition letter - D (1,000 hours).

c. Five contacts of each connector under test shall carry the rated RF current at the maximum frequency.

d. At the completion of the test, contacts shall be tested for and meet the requirements for attenuation, insulation resistance, and dielectric withstanding voltage as specified in 3.6.7, 3.6.4 and 3.6.3 respectively.

4.8.20 Voltage Conditioning. All contacts of each connector shall be tested as specified in MIL-STD-202, method 108. The following details and exceptions shall apply:

a. Test temperature - 125°C ±3°C.

b. Test voltage - 2X the rated DC voltage.

c. Mounting - The method of electrically contacting the shell and one terminal of each filter contact shall be adequate to ensure that all of the filters will be properly conditioned.

d. Test circuit - Positive voltage shall be applied to the contact pin. Maximum series resistance with each filter shall be 5.00 ohms. There shall be a fuse with a maximum rating of 0.25 ampere between the shell and ground. The power supply shall be capable of supplying five times the maximum current rating of the fuse.

e. Test duration - Connectors shall be conditioned for a minimum of 168 hours and a maximum of 264 hours. The voltage conditioning may be terminated at any time during the 168 to 264 hours time interval provided that failures (blown fuses or less than 95 percent applied voltage) meet the requirements for 2.0 percent defective allowable or one connector, whichever is less, during the last fifty hours. Any connector that causes a fuse to blow shall be considered a failure, and shall be tested for insulation resistance and dielectric withstanding voltage. If the filter meets the requirements for insulation resistance and dielectric withstanding voltage, the connector shall be rejected but not count against the percent defective allowed.

f. Measurements after the test - Upon completion of voltage conditioning and while at 125°C, insulation resistance shall be measured.

5. PREPARATION FOR DELIVERY

5.1 Preservation and Packaging. Unless otherwise specified, the manufacturer shall be responsible for packaging connectors in a manner which prevents degradation, corrosion, deterioration, or physical damage, and for ensuring the packages have a safe delivery and are in good condition. The manufacturer shall be responsible for any damage to, or deterioration of connectors resulting from faulty or improper packing, preservation, or packaging, and shall replace such connectors with acceptable connectors without cost to GSFC or to the procuring activity.

5.1.1 Package. Connectors furnished shall be protected and packaged as a single-packaged unit to afford protection at all handling points between the manufacturer's final inspection and the user's final installation. The connectors shall be individually packaged in a transparent rigid plastic container with an enclosing cap or hinged cover at one end.

5.1.2 Packaging Marking. Each plastic holder containing a connector shall be permanently and legibly marked with the following:

a. Connector identification (1.3)

b. Lot-date code (3.3.2)

NOTE:
If the connector identification, as provided by other means, is visible and readable through the container, the container marking is waived.

5.2 Packing. Containers enclosing the packaged connectors to be furnished under this specification shall be packed in an exterior container using cushioning on all sides to prevent movement. Required documentation (4.7.1.4) shall be enclosed in this outer container. As a minimum, units packaged as specified shall be packed in containers of the type, size, and kind commonly used for this purpose, in a manner that will assure acceptance by common carrier and safe delivery at the destination. Shipping containers shall comply with the uniform freight classification rules or regulations of other carriers as applicable to the mode of transportation.

5.2.1 Packing Marking. Each container shall be permanently and legibly marked in accordance with the instructions contained in the purchase order.

6. NOTES

6.1 Ordering Data. Procurement documents shall specify the following:

a. Title, number, and date of this and the applicable detail specification sheet.

b. Connector type designation (1.3).

c. Additional requirements, if applicable.

6.2 Qualification Provisions. With the respect to products requiring qualification, awards will be made only for products which have been tested and approved by GSFC before the time set for opening bids. The attention of the suppliers is called to this requirement; manufacturers should arrange to have qualification tests made on products which they propose to offer to GSFC to become eligible for awards of contracts covered by this specification. The manufacturer shall bear the cost of qualification inspection to this specification. Information pertaining to qualification of products may be obtained from the activity whose address is listed in 6.3 of this specification.

6.3 Data Address. When supplemental data, reports, or information requests are to be transmitted to GSFC, the following address shall be used unless otherwise specified:

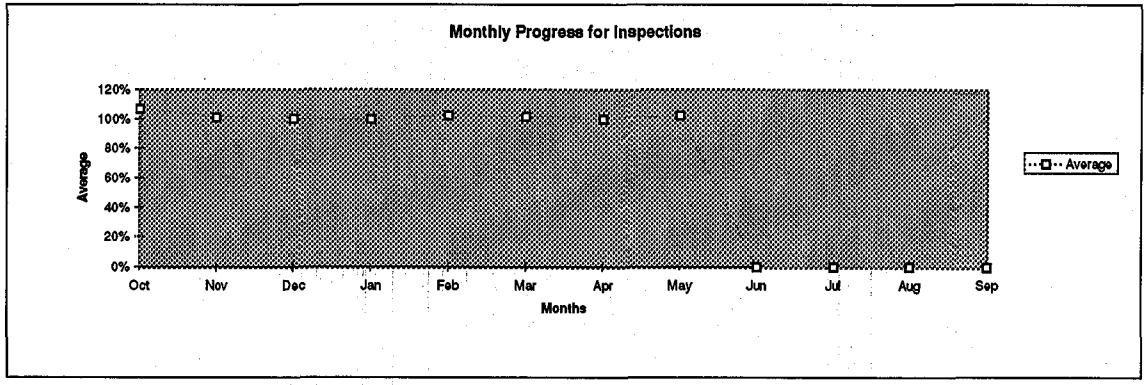
Parts Branch, Code 311
Attention: Applications Section
Goddard Space Flight Center
Greenbelt, Maryland 20771

6.4 Notice. When GSFC drawings, specifications, or other data are used for any purpose other than in connection with a definitely related GSFC procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; the fact that GSFC might have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise in any manner licensing the holder or any person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:
Code 311
Goddard Space Flight Center
Greenbelt, Maryland 20771

4.0 Inspections
FY98
Months

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	*Average*
1	ACE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	CAPL3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	Code 521	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	Code 540	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5	EDOS	100%	109%	100%	104%	100%	100%	100%	n/a	n/a	n/a	n/a	n/a	102%
6	EOS AM	100%	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	100%
7	EOS CHEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8	EOS PM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
9	EOS PM SQA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10	EOS DIS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
11	GDS-FP	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
12	Glass-LAM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
13	GOES/TOMS	100%	100%	100%	94%	100%	100%	n/a	n/a	n/a	n/a	n/a	n/a	99%
14	HPL 2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15	HST HW	100%	100%	100%	100%	121%	113%	100%	113%	n/a	n/a	n/a	n/a	106%
16	HST SW	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
17	IRAC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
18	Landsat 7 HW	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
19	Landsat 7 SW	n/a	n/a	n/a	n/a	100%	100%	n/a	n/a	n/a	n/a	n/a	n/a	100%
20	MECH_IN	167%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	167%
21	MedLite	100%	100%	100%	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
22	MELVS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
23	POES	n/a	100%	100%	n/a	n/a	100%	n/a	n/a	n/a	n/a	n/a	n/a	100%
24	SELVS	100%	n/a	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
25	SMEX	100%	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	100%
26	SPARTAN	100%	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	100%
27	SSPP	100%	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	100%
28	TDRS	n/a	n/a	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
29	Tecr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
30	TEEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
31	TRMM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
32	UltraLite	n/a	n/a	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
33	XDS	n/a	n/a	100%	n/a	100%	n/a	100%	n/a	n/a	n/a	n/a	n/a	100%
34	ZEPHYR	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Average	107%	101%	100%	100%	102%	101%	100%	103%	n/a	n/a	n/a	n/a	



5.0 Data Entry
FY98
Months

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	*Average*
1	ACE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	CAPL3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	Code 521	100%	n/a	100%	n/a	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
4	Code 540	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
5	EDOS	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	n/a	100%
6	EOS AM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7	EOS CHEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8	EOS PM	n/a	125%	125%	135%	133%	133%	125%	127%	n/a	n/a	n/a	n/a	129%
9	EOS PM SQA	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10	EOS DIS	117%	120%	117%	117%	117%	125%	n/a	n/a	n/a	n/a	n/a	n/a	119%
11	GDS-FP	133%	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	104%
12	Glass-LAM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
13	GOES/TOMS	125%	113%	113%	80%	113%	133%	100%	100%	n/a	n/a	n/a	n/a	109%
14	HPL 2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
15	HST SW	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
16	HST HW	100%	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	100%
17	IRAC	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
18	Landsat 7 HW	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
19	Landsat 7 SW	n/a	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
20	MECH_IN	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
21	MedLite	n/a	100%	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
22	MELVS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
23	POES	n/a	n/a	100%	n/a	n/a	n/a	100%	100%	n/a	n/a	n/a	n/a	100%
24	SELVS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
25	SMEX	100%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100%
26	SPARTAN	100%	100%	100%	100%	n/a	n/a	100%	100%	n/a	n/a	n/a	n/a	100%
27	SSPP	100%	100%	100%	n/a	n/a	100%	100%	100%	n/a	n/a	n/a	n/a	100%
28	TDRS	n/a	100%	100%	100%	100%	n/a	n/a	50%	n/a	n/a	n/a	n/a	90%
29	Tecr	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
30	TEEM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
31	TRMM	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
32	UltraLite	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
33	XDS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
34	ZEPHYR	100%	100%	100%	100%	100%	100%	100%	n/a	n/a	n/a	n/a	n/a	100%
	Average	107%	104%	104%	103%	106%	111%	103%	97%	n/a	n/a	n/a	n/a