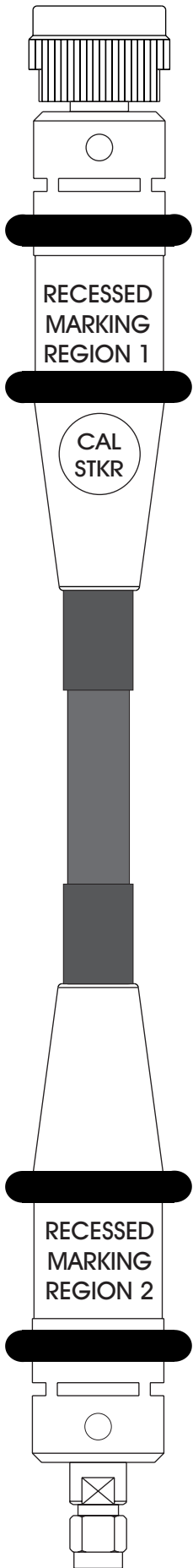


CONTINUUM ASSEMBLY ORDER OPTIONS



SERIES	CONNECTOR 1		GENDER 1	CONNECTOR 2		GENDER 2	LENGTH
FR	24NMD	29NMD	M	24NMD	29NMD	M	28 IN. (711mm)
	24	29		24	29		39 IN. (991mm)
		35PEI	F		35PEI	F	CUSTOM
		35AL			35AL		
		N		N			

LEGEND NMD

24NMD	2.4mm ruggedized connector	50 GHz
29NMD	2.92mm ruggedized connector	40 GHz

LEGEND NON-NMD

24	2.4mm subminiature	50 GHz
29	2.92mm subminiature	40 GHz
35PEI	3.5mm subminiature PEI* core	33 GHz
35AL	3.5mm subminiature airline core	33 GHz
N	Type N connector	20 GHz

*PEI: Polyetherimide thermally stable plastic

NOTES

Cable shall have an aluminum plate of approximate thickness 0.003 inches applied to the test port end and it shall wrap the recessed area of the type III anodized hand grip. The label shall be serialized with a permanent stamping and it shall be applied with 3M-468 adhesive as pictured below.

PRECISION - MODULAR **Vp**
TEST PORT EXTENSION ASSEMBLY 84~87
 2.92mm, NMD, HYBRID 3.5mm, TYPE N - WARP SERIES
 PATENT PENDING - SERIAL No. **STAMPED SERIAL #**
VELOCITY MICROWAVE ~ div. ATX Labs
www.velocitymicrowave.com

Cable shall have one of five applied vinyl labels indicating per IEEE color code the species of connector at the DUT end as pictured below.



NOTE: FEMALE APPLIED ART NOT SHOWN

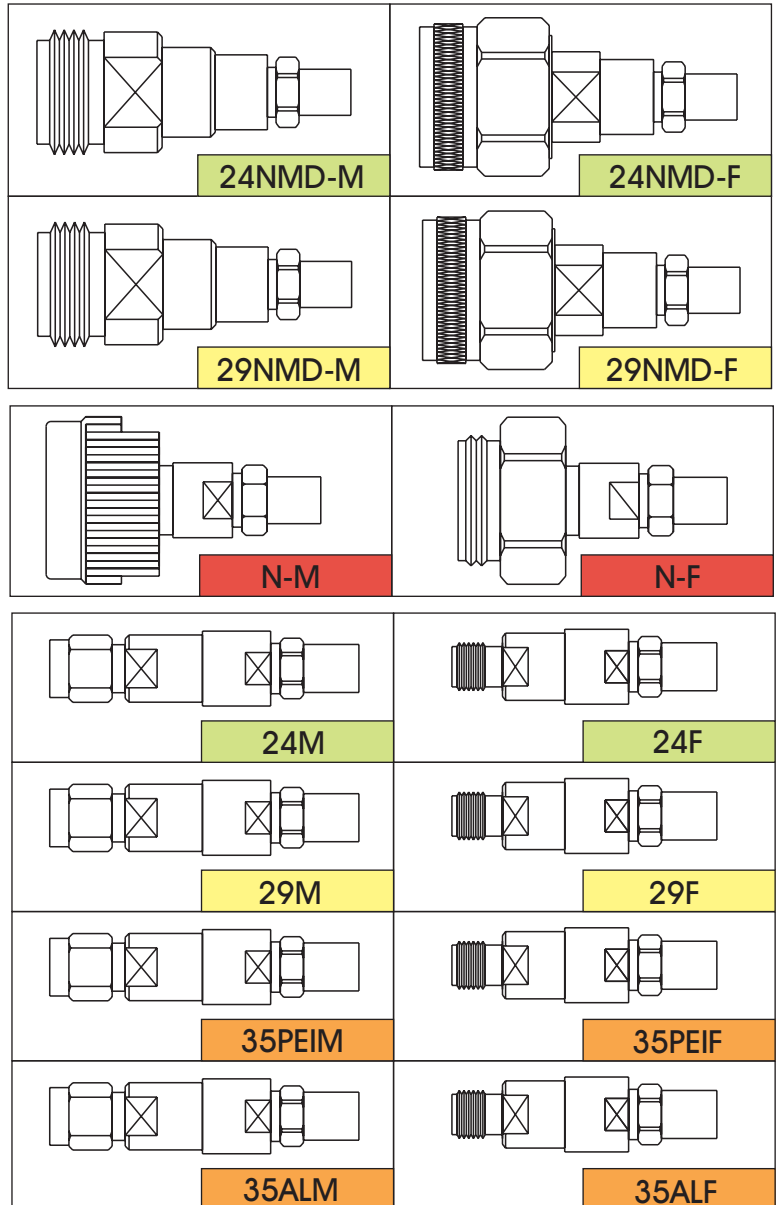
ORDER TEMPLATE

EXAMPLE [HOST]

FR28-28; (ALT2) FR28-39; (ALT3) FR39-39

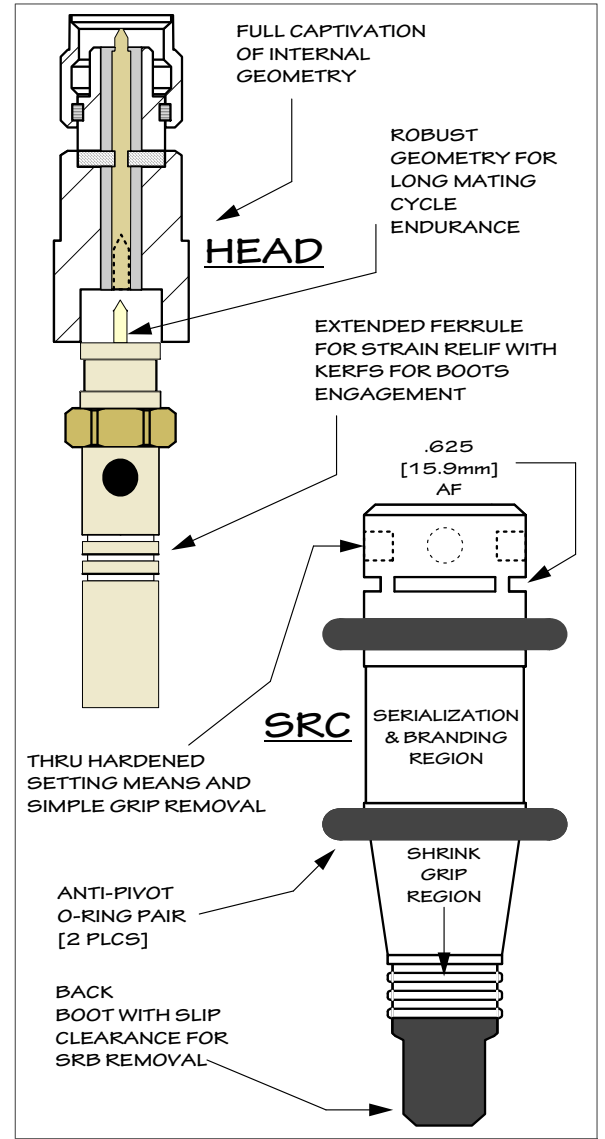
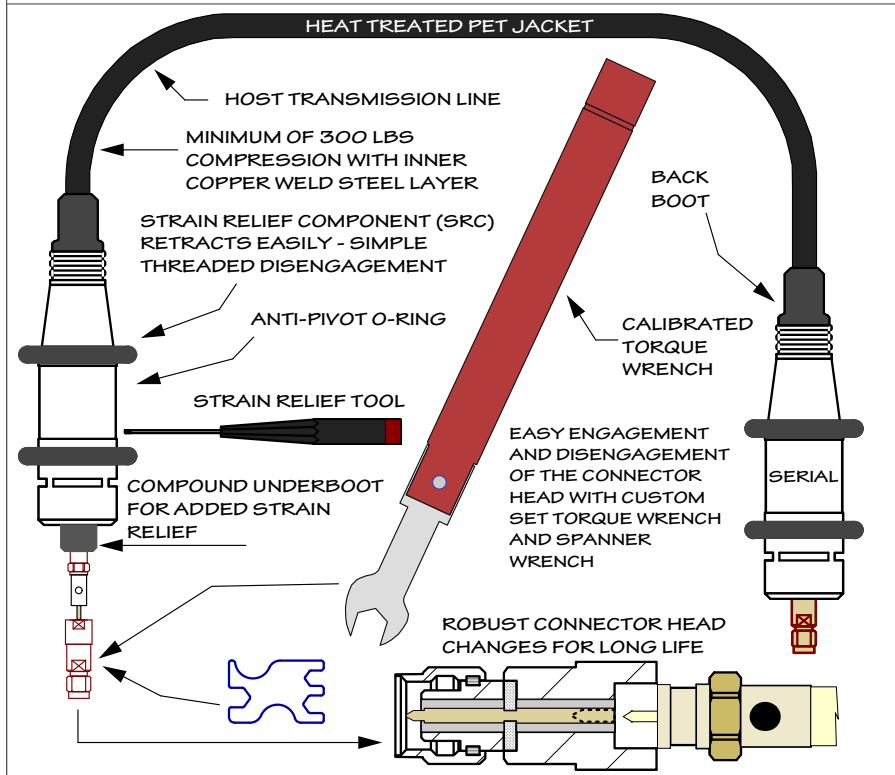
EXAMPLE [CONNECTORS, NOTE: 4 TO BE SPECIFIED]

FR29M-29F-NMD29F-NMD29F (OR ANY COMB.)



THE FORTIS FR IS A FIELD RECONFIGURABLE KIT THAT ALLOWS THE USER TO CHANGE CONNECTORS IN THE FIELD BETWEEN THE ABOVE CITED SPECIES AND GENDERS. TO COMPLETE A BASIC KIT TWO HOST CABLES AND FOUR CONNECTORS SHALL BE SPECIFIED IN ANY COMBINATION.

PLUG FEATURE	MATERIAL	FINISH	ELECTRICAL PERFORMANCE	
CENTER CONTACT	BERYLLIUM CU ASTM B-196	GOLD	SWR	1.25 TYP. / 1.45 MAX
OUTER CONTACT	STAINLESS STEEL ASTM A-582	PASSIVATED	ATTENUATION	SEE CHART
COUPLING NUT	STAINLESS STEEL ASTM A-582	PASSIVATED	MAX LOSS [dB] VS TEMP [C]	$(2\alpha[.0038(T-20) + 1])^{1/2}$ *
SOLDER FERRULE	BRASS MIL-G-45204 PLATED	GOLD	PHASE Δ: IEC-60966-8.6.2.1	MAX 18 DEGREES P-P
DIELECTRIC	POLYETHER IMIDE (PEI)	-----	MAX PHASE DELTA TEMP	SEE CHART
RETAINING RING	BERYLLIUM CU ASTM B-196	NICKEL	MAX FREQUENCY 3.5MM-PEI	27 GHZ [MAX OPERATING]
GASKET	MVQ [SILICONE RUBBER]	-----	MAX FREQUENCY 2.92mm	40 GHZ [MAX OPERATING]
MECHANICAL CHARACTERISTICS			MAX FREQUENCY TYPE N	18 GHZ [MAX OPERATING]
COMPRESSION (COSMETIC DEFECT, SWR IMPAIRMENT)	300LBS. PER 2 IN. STEP PLATE MIN.	COMPRESSION PER MIL-T-81490 SEC. 4.7.18 CONCENTRATED LOAD 7-9 IN. FROM CONNECTOR; FLEXURE	NOMINAL IMPEDANCE	50 OHMS
FLEXURE (CYCLES)	25,000 MIN	ENDURANCE PER IEC60966 SEC. 9.3	PROPAGATION VELOCITY	84%
			* $(2\alpha [dB])$ IS LOSS AT 20C, T IS TEMP OF INTEREST	



CONSTRUCTION / DIMENSIONS	
CENTER CONDUCTOR	SP-OFHC COPPER PER ASTM B298
DIELECTRIC	MULTI-PLY EPTFE TYPE F6 MIL-C-17
INNER BRAID/SHIELD	HELICALLY WRAPPED SILVER
OUTER BRAID	38 AWG SPC PER ASTM B-298
INNER JACKET	FEP PER ASTM D-2116
CRUSH PROTECTION	COPPER WELD STEEL 300 LB MIN.
OUTER ASSEMBLY	FEP JACKET WITH SERIALIZATION
OUTER JACKET	POLYETHYLENE TEREPHTHALATE (PET)
STRAIN RELIEF	6061T6 MIL-A-8625 Type III HARD COAT
SOLDER	PB-FREE, ROHS COMPLIANT

GENERAL SPECIFICATION	
CABLE DIAMETER [NOM]	0.20 +/- 0.01
MINIMUM BEND RADIUS	.5 INCHES
CONNECTOR RETENTION	50 LBS
TEMPERATURE RANGE	-55 / + 135 DEGREES C
MATING TORQUE	7 - 12 IN-LBS
CONNECTOR INTERFACES	MIL-STD-348A; MIL-C-39012
CAPACITANCE NOMINAL	24 pF/FT
PROPAGATION VELOCITY NOM.	84%
RF LEAKAGE	>100 dB->18 GHZ [MIL-T-81490]
INSULATION RESISTANCE	>3X10E5 MOhm/m
RF POWER	SEE CHART
FLAMMABILITY	UL94
ABRAISION RESISTANCE	CALIBRASE H-18/500G/800CYC
WEIGHT	3.6 oz

NOTE: [i] THE CONTINUUM SERIES WAS DESIGNED AS A LONG TERM SERVICE SOLUTION FOR TEST CABLE DEPLOYMENT WHERE THE ROBUST SWAPPING OF CONNECTORS IS A BENCH OR FIELD REQUIREMENT; [ii] INDUSTRY LEADING 2 YEAR WARRANTY WITH GUARANTEED SUSTAINABILITY BY VIRTUE OF MODULAR PLATFORM AND GEOMETRY.

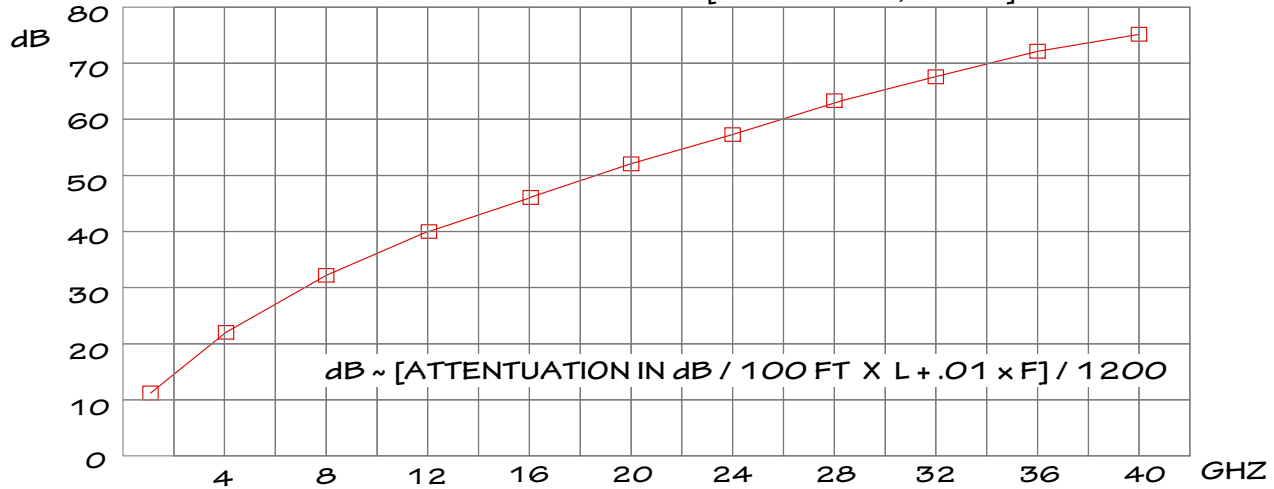
CONTINUUM
—SERIES—

FORTIS MODULAR TEST CABLE KITS WITH FIELD REPLACEABLE COMPONENTS

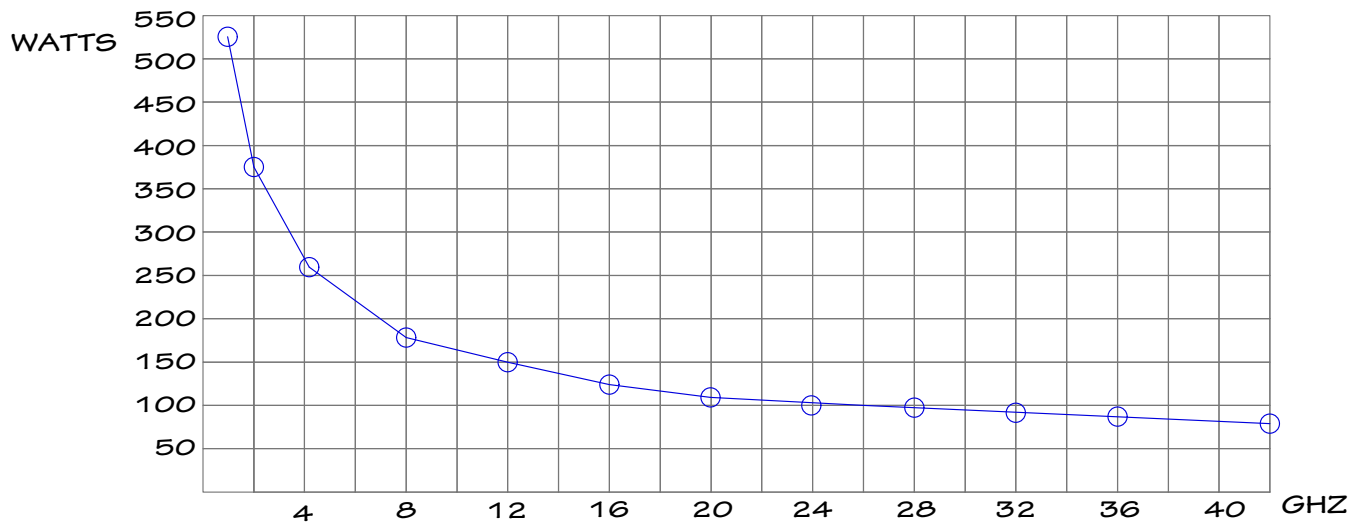
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Velocity Microwave ~ div. ATX Labs
www.velocitymicrowave.com PAT.PEND.

PLUG FEATURE		MATERIAL	FINISH	ELECTRICAL PERFORMANCE	
CENTER CONTACT		BERYLLIUM CU ASTM B-196	GOLD	SWR	1.25 TYP. / 1.45 MAX
OUTER CONTACT		STAINLESS STEEL ASTM A-582	PASSIVATED	ATTENUATION	SEE CHART
COUPLING NUT		STAINLESS STEEL ASTM A-582	PASSIVATED	MAX LOSS [dB] VS TEMP [C]	$(2\alpha[.0038(T-20) + 1])^{1/2}$ *
SOLDER FERRULE		BRASS MIL-G-45204 PLATED	GOLD	PHASE Δ: IEC-60966-8.6.2.1	MAX 18 DEGREES P-P
DIELECTRIC		POLYETHER IMIDE (PEI)	-----	MAX PHASE DELTA TEMP	SEE CHART
RETAINING RING		BERYLLIUM CU ASTM B-196	NICKEL	MAX FREQUENCY 3.5MM-PEI	27 GHZ [MAX OPERATING]
GASKET		MVQ [SILICONE RUBBER]	-----	MAX FREQUENCY 2.92mm	40 GHZ [MAX OPERATING]
MECHANICAL CHARACTERISTICS				MAX FREQUENCY TYPE N	18 GHZ [MAX OPERATING]
COMPRESSION (COSMETIC DEFECT, SWR IMPAIRMENT)	400/425# PER 2 IN. STEP PLATE	COMPRESSION PER MIL-T-81490 SEC. 4.7.18 CONCENTRATED LOAD 7-9 IN. FROM CONNECTOR; FLEXURE		NOMINAL IMPEDANCE	50 OHMS
FLEXURE (CYCLES)	25,000 MIN	ENDURANCE PER IEC60966 SEC. 9.3		PROPAGATION VELOCITY	84%
				* $(2\alpha [dB])$ IS LOSS AT 20C, T IS TEMP OF INTEREST	

ATTENUATION IN dB / 100 FT. [SERIES VP84, VP84R]



MAX RF POWER AT 20 DEGREES C & SEA LEVEL



GENERAL SPECIFICATION

CABLE DIAMETER [NOM]	0.20 +/- 0.01
MINIMUM BEND RADIUS	.5 INCHES
CONNECTOR RETENTION	150 LBS
TEMPERATURE RANGE	-55 / + 135 DEGREES C
MATING TORQUE	7 - 12 IN-LBS
CONNECTOR INTERFACES	MIL-STD-348A; MIL-C-39012
CAPACITANCE NOMINAL	24 pF/FT
PROPAGATION VELOCITY NOM.	84%
RF LEAKAGE	>100 dB->18 GHZ [MIL-T-81490]
INSULATION RESISTANCE	>3X10E5 MOhm/m
RF POWER	SEE CHART
FLAMMABILITY	UL94
ABRAISION RESISTANCE	CALIBRASE H-18/500G/800CYC
WEIGHT	3.6 oz

NOTES: [i] THE CONTINUUM SERIES WAS DESIGNED AS A LONG TERM SERVICE SOLUTION FOR TEST CABLE DEPLOYMENT WHERE THE ROBUST SWAPPING OF CONNECTORS IS A BENCH OR FIELD REQUIREMENT; [ii] INDUSTRY LEADING 2 YEAR WARRANTY WITH GUARANTEED SUSTAINABILITY BY VIRTUE OF MODULAR PLATFORM AND GEOMETRY.

CONTINUUM
SERIES

FORTIS MODULAR TEST CABLE KITS WITH FIELD REPLACEABLE COMPONENTS

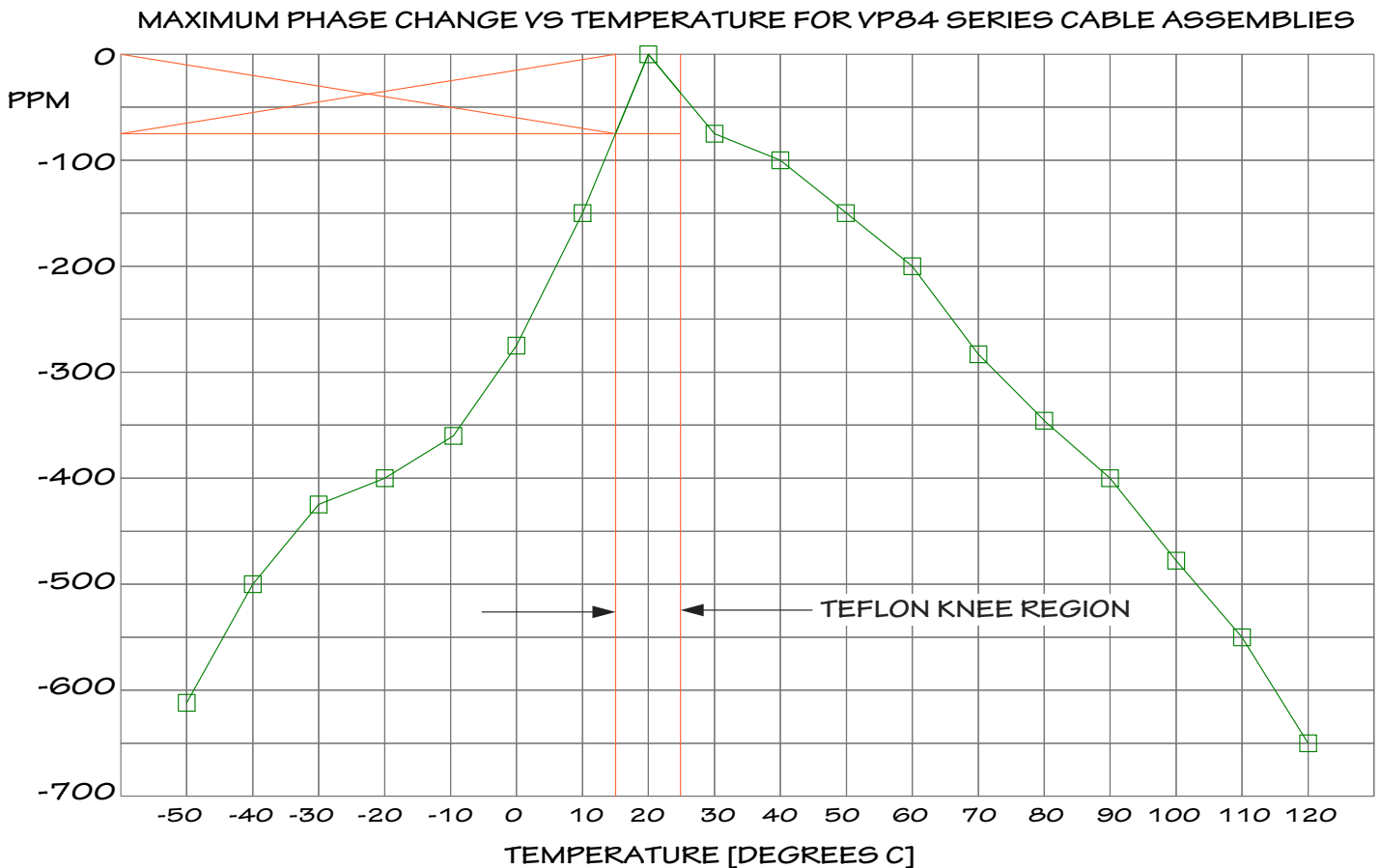
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PLUG FEATURE		MATERIAL	FINISH	ELECTRICAL PERFORMANCE	
CENTER CONTACT		BERYLLIUM CU ASTM B-196	GOLD	SWR	1.25 TYP. / 1.45 MAX
OUTER CONTACT		STAINLESS STEEL ASTM A-582	PASSIVATED	ATTENUATION	SEE CHART
COUPLING NUT		STAINLESS STEEL ASTM A-582	PASSIVATED	MAX LOSS [dB] VS TEMP [C]	$(2\alpha[.0038(T-20) + 1])^{1/2}$ *
SOLDER FERRULE		BRASS MIL-G-45204 PLATED	GOLD	PHASE Δ: IEC-60966-8.6.2.1	MAX 18 DEGREES P-P
DIELECTRIC		POLYETHER IMIDE (PEI)	-----	MAX PHASE DELTA TEMP	SEE CHART
RETAINING RING		BERYLLIUM CU ASTM B-196	NICKEL	MAX FREQUENCY 3.5MM-PEI	27 GHZ [MAX OPERATING]
GASKET		MVQ [SILICONE RUBBER]	-----	MAX FREQUENCY 2.92mm	40 GHZ [MAX OPERATING]
MECHANICAL CHARACTERISTICS				MAX FREQUENCY TYPE N	18 GHZ [MAX OPERATING]
COMPRESSION (COSMETIC DEFECT, SWR IMPAIRMENT)	400/425# PER 2 IN. STEP PLATE	COMPRESSION PER MIL-T-81490 SEC. 4.7.18 CONCENTRATED LOAD 7-9 IN. FROM CONNECTOR; FLEXURE		NOMINAL IMPEDANCE	50 OHMS
FLEXURE (CYCLES)	25,000 MIN	ENDURANCE PER IEC60966 SEC. 9.3		PROPAGATION VELOCITY	84%
				* $(\alpha_{20} [dB])$ IS LOSS AT 20C, T IS TEMP OF INTEREST	



$\Delta\Phi = 3.63E-05 \times L \times F \times PPM$, WHERE L [INCHES], F [GHZ], & PPM AS GIVEN PER CHART. FOR EXAMPLE, FOR L = 24 INCHES, F = 40 GHZ, PPM = 75, THEN $\Delta\Phi = 2.6$ DEGREES MAX PHASE VARIATION IN THE REGION OF THE TEFLON KNEE BETWEEN 15C AND 25C.

PAGE 3

GENERAL SPECIFICATION		NOTES: [i] THE CONTINUUM SERIES WAS DESIGNED AS A LONG TERM SERVICE SOLUTION FOR TEST CABLE DEPLOYMENT WHERE THE ROBUST SWAPPING OF CONNECTORS IS A BENCH OR FIELD REQUIREMENT; [ii] INDUSTRY LEADING 2 YEAR WARRANTY WITH GUARANTEED SUSTAINABILITY BY VIRTUE OF MODULAR PLATFORM AND GEOMETRY.
CABLE DIAMETER [NOM]	0.20 +/- 0.01	
MINIMUM BEND RADIUS	2 INCHES	
CONNECTOR RETENTION	50 LBS	
TEMPERATURE RANGE	-55 / + 135 DEGREES C	
MATING TORQUE	7 - 12 IN-LBS	
CONNECTOR INTERFACES	MIL-STD-348A; MIL-C-39012	
CAPACITANCE NOMINAL	24 pF/FT	
PROPAGATION VELOCITY NOM.	84%	
RF LEAKAGE	>100 dB->18 GHZ [MIL-T-81490]	
INSULATION RESISTANCE	>3X10E5 MOhm/m	
RF POWER	SEE CHART	
FLAMMABILITY	UL94	
ABRAISION RESISTANCE	CALIBRASE H-18/500G/800CYC	
WEIGHT JR84	3.6 oz	

CONTINUUM

SERIES

FORTIS MODULAR TEST CABLE KITS WITH FIELD REPLACEABLE COMPONENTS

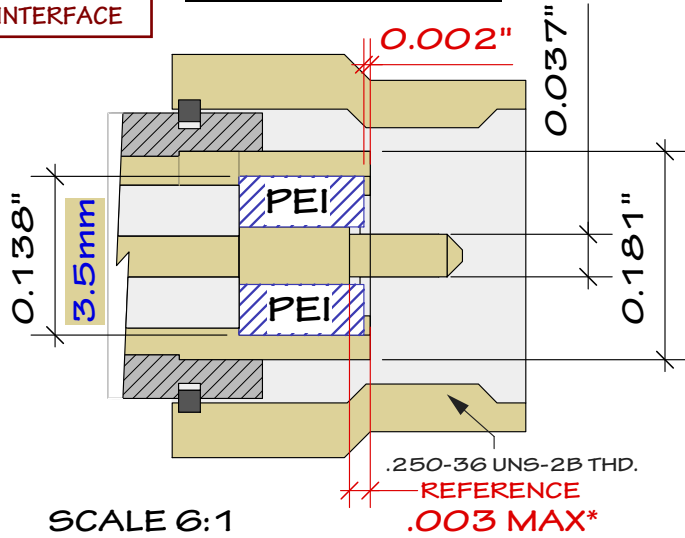
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**COMMON
SUBMINATURE
INTERFACE**

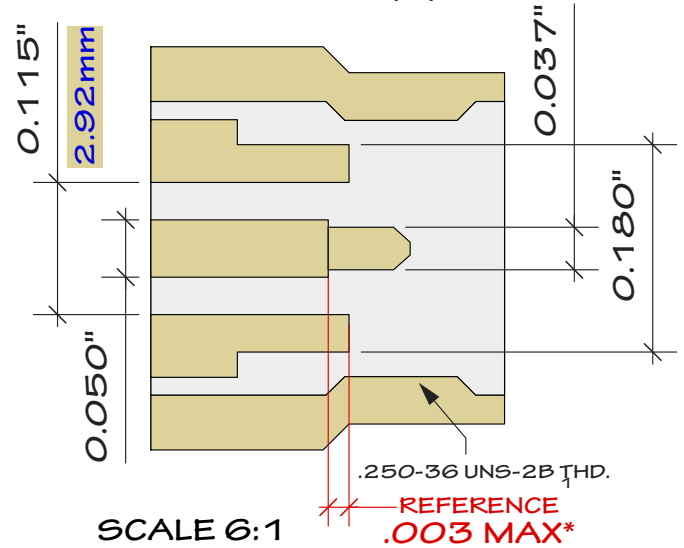
HYBRID 3.5mm



SCALE 6:1

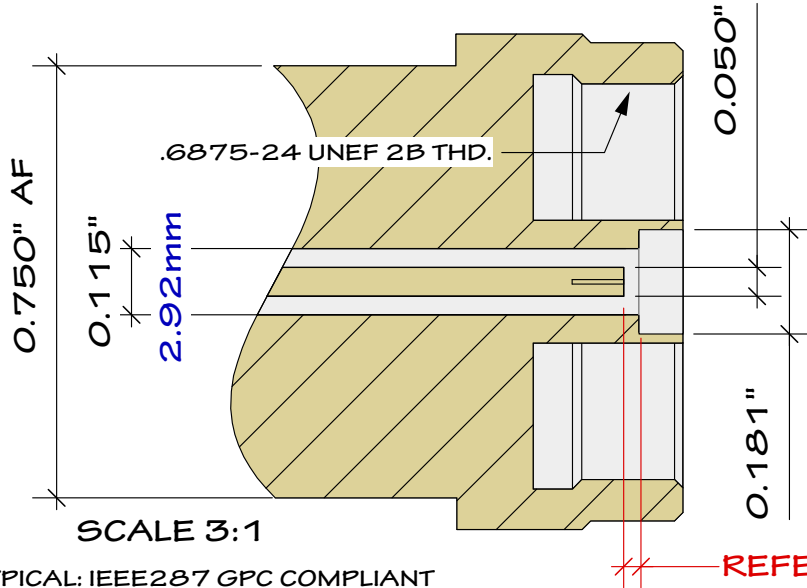
NOTE: IN THE HYBRID *THIN CORE* 3.5mm DESIGN THE DIELECTRIC IS MINIMIZED IN LENGTH AND DIAMETER WHILE THE DOWNSTREAM SIGNAL PATH IS DOMINATED BY AN AIRLINE. DESIGN OFFERS EXCEPTIONAL COMPATIBILITY WITH SMA, 2.92MM AND 3.5MM AND IS MODE FREE WITH SUPERIOR RETURN LOSS TO 32 GHZ. RATED FOR 2000 MATING CYCLES. DIELECTRIC IS POLYETHER IMIDE [PEI], A TOUGH PLASTIC WITH ABOUT HALF THE THERMAL EXPANSION OF TEFLON.

2.9mm (K)



SCALE 6:1

NOTE: THE 2.92mm OR K CONNECTOR IS DESIGNED AS GENERAL PRECISION CONNECTOR FOR TEST AND MEASUREMENT USE AND HAS THE ABILITY TO WITHSTAND MANY MORE MATING CYCLES THAN LOWER COST ALTERNATIVES. IT IS AN AIRLINE AND MODE FREE TO BEYOND 40 GHZ. RATED FOR 2000 MATING CYCLES.



SCALE 3:1

NOTE: THE RUGGEDIZED FEMALE NMD CONNECTOR IS DESIGNED FOR ROBUST MATING TO THE PORT OF A NETWORK ANALYZER AND OBTIATES THE NEED FOR A PORT ADAPTERS. IT HAS THE SAME REFERENCE RECESSON AS OTHER FEMALE 2.92MM CONNECTORS. IT CAN ONLY BE GAGED FOR RECESSON BY USING VM'S 2.92mm PRECISION GAGE KIT. OBSERVE THAT IT IS MATED ONLY TO A MALE NMD CONNECTOR. ONE OF THE ADVANTAGES OF THE NMD MATING PROCESS IS THAT IT IS MUCH EASIER TO ACHIEVE MATING WITHOUT ANY ROTATIONAL SHEAR FORCES BEING PUT ON THE FEMALE PIN. SEE PAGE 5 FOR COMPATIBILITY. RATED FOR 3000 MATING CYCLES.

*TYPICAL: IEEE287 GPC COMPLIANT
MALE & FEMALE SUBMINATURE
SHARE SAME RECESSON SPEC

2.92mm NMD FEMALE

PAGE 4

GENERAL SPECIFICATION

CABLE DIAMETER [NOM]	0.20 +/- 0.01
MINIMUM BEND RADIUS	.5 INCHES
CONNECTOR RETENTION	50 LBS
TEMPERATURE RANGE	-55 / + 135 DEGREES C
MATING TORQUE	7 - 12 IN-LBS
CONNECTOR INTERFACES	MIL-STD-348A; MIL-C-39012
CAPACITANCE NOMINAL	24 pF/FT
PROPAGATION VELOCITY NOM.	84%
RF LEAKAGE	>100 dB->18 GHZ [MIL-T-81490]
INSULATION RESISTANCE	>3X10E5 MOhm/m
RF POWER	SEE CHART
FLAMMABILITY	UL94
ABRAISION RESISTANCE	CALIBRASE H-18/500G/800CYC
WEIGHT JR84	3.6 oz

NOTES: [i] THE CONTINUUM SERIES WAS DESIGNED AS A LONG TERM SERVICE SOLUTION FOR TEST CABLE DEPLOYMENT WHERE THE ROBUST SWAPPING OF CONNECTORS IS A BENCH OR FIELD REQUIREMENT; [ii] INDUSTRY LEADING 2 YEAR WARRANTY WITH GUARANTEED SUSTAINABILITY BY VIRTUE OF MODULAR PLATFORM AND GEOMETRY.

CONTINUUM SERIES

FORTIS MODULAR TEST CABLE KITS WITH FIELD REPLACEABLE COMPONENTS

ULTRA TEMP & PHASE STABLE

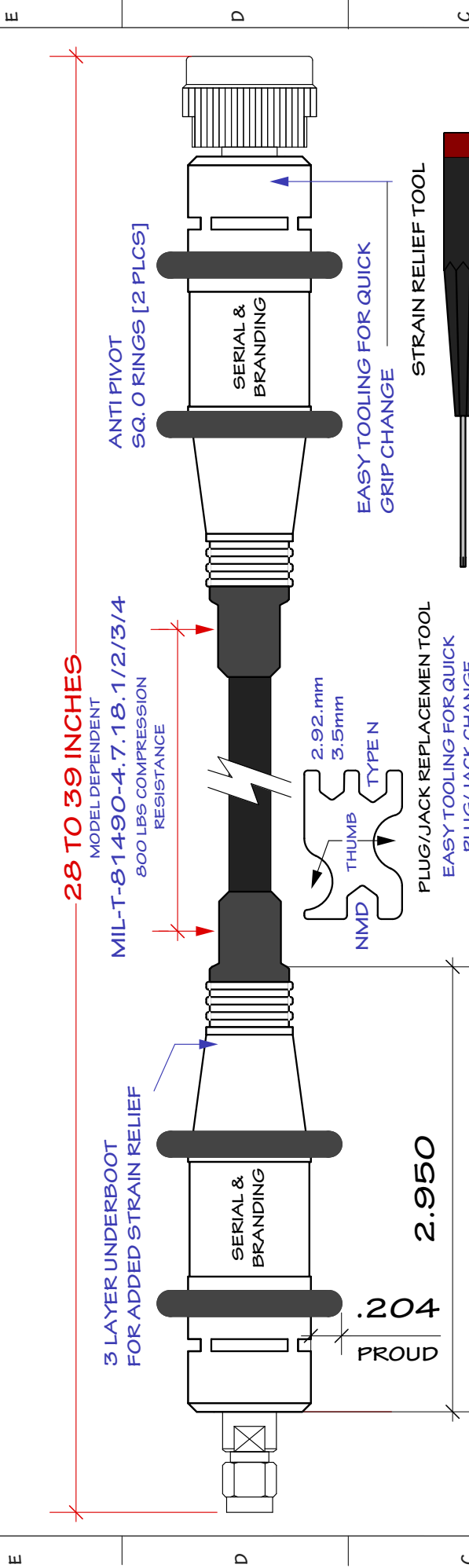
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PAT.PEND.

10	9	8	7	6	5	4	3	2	1
ZONE		REV.		DESCRIPTION		REVISIONS		DATE	APPROVED

MODULARIZED MICROWAVE TEST CABLE WITH FIELD REPLACEABLE COMPONENTS ~ PAT.PEND.



NOTES:

- STRAIN RELIEF COMPONENTS 6061-T6 FOR REDUCED WEIGHT
- COPPER WELD STEEL INNER BRAID FOR COMPRESSION NORMAL TO AXIS
- FULL VERTICAL BUILD MODULARITY FOR EXTENDED SERVICE LIFE
- STAINLESS STEEL NMD AND 2.9MM/3.5MM/TYPEN CONNECTORS
- HIGH VELOCITY INTERNAL COAXIAL LINE WITH HELICAL GEOMETRY
- THROUGH HARDENED KNURLED SETTING MEANS [4] FOR RETENTION
- ACRYLONITE BUTADLENE O RINGS [2 PLCS] PROUD OF SURFACE BY ~1.10 MILS
- COMPRESSION RESISTANCE (LOAD NORMAL) BETWEEN 300 AND 350 LBS PER MIL-T-81490-1972 STEP TEST

UNLESS OTHERWISE SPECIFIED:		DRAWN	NAME	DATE	ATX LABS Chilmark, MA 02535	
DIMENSIONS ARE IN INCHES	CHECKED	em	1-11-2014	TITLE		
TOLERANCES:	ENG APPR	vs	2-02-2014	MODULAR CABLE ASSEMBLY WITH REPLACEABLE COMPONENTS		
ANGULAR: MACH +/- .5 DEG.	MFG APPR	jm	2-15-2014	SIZE	DWG. NO.	REV
BEND: +/- 1 DEG.	Q.A.	ds	4-8-2014	A	ATX-103	3
TWO PLACE DECIMAL: +/- 0.01	COMMENTS:					
THREE PLACE DECIMAL: +/- 0.001	GOLD V3					
MATERIAL: 6061-T6 SRC/55304JKT						
FINISH: <Ra32	SCALE 1:1 SHEET: 1 OF 1					

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1 2 3 4 5 6 7 8 9 10

ATX LABS
Chilmark, MA 02535

TITLE **FORTIS FR-SERIES FOAM AND CASE LAYOUT**

SIZE	DWG. NO.	REV
B	ATX-114	2

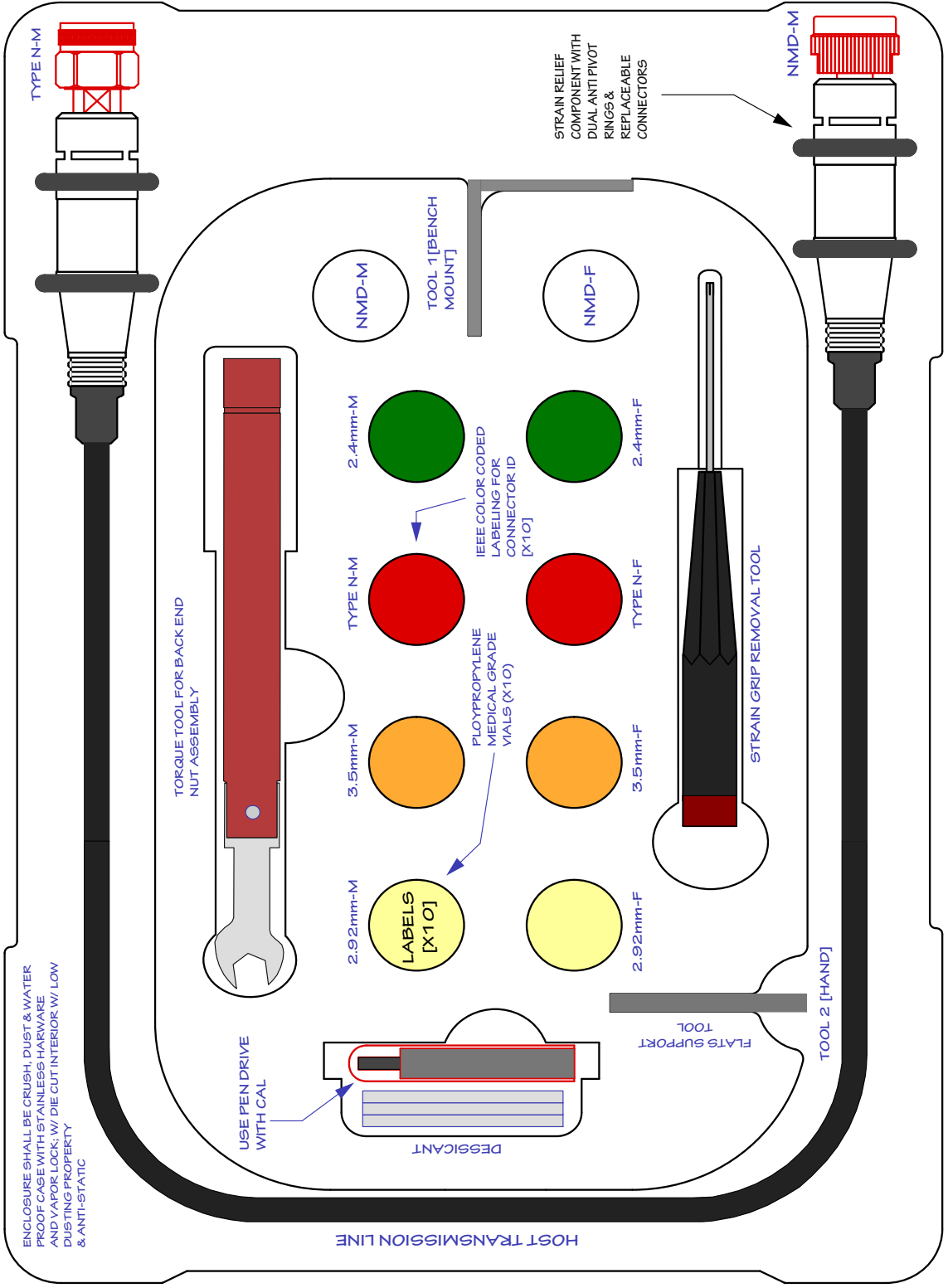
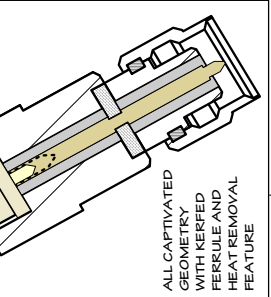
SCALE 1:1		SHEET 1 OF 2	
DRAWN	NAME	DATE	
CHECKED	em		
ENG APPR	VS		
MFG APPR			
QA			

COMMENTS:
KITS: NMD, TYPE N, 2.92mm, 3.5mmPEI / COMBINATION PER USER SPECIFICATION.
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGULAR: MACH ± 0.5 DEG.
BEND: ± 1 DEG.
THREE PLACE DECIMAL: ± 0.001
TWO PLACE DECIMAL: ± 0.001
MATERIAL: 6061-T6
FINISH: $<Ra32$
PLATING

DESCRIPTION REV.
KITS SHALL INCLUDE:
- HOST TRANSMISSION LINE DRESSED WITH STRAIN RELIEF AND COMPOUND BOOT;
- TO CONNECTOR VIALS;
- SUBMINIATURE & NMD MFR END USER REQUIREMENT;
- USB PEN DRIVE FOR CAL DATA;
- STRAIN GRIP REMOVAL TOOL;
- TORQUE WRENCH FOR CONNECTOR HEAD REPLACEMENT AT 12 INCH LBS.
24 VINYL CAPS (NOT SHOWN)

DATE 12-15-14
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ROBUST CONNECTOR HEAD CHANGES FOR LONG LIFE



1 2 3 4 5 6 7 8 9 10