INSULATED WIRE
INCORPORATED

IW MICROWAVE RE-FLEX PRODUCTS 2025

Innovative specialists in manufacture of microwave cable & cable assemblies

www.insulatedwire.com

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INSULATED WIRE INCORPORATED

WELCOME

INSULATED WIRE TODAY

Founded in 1970, IW developed a unique PTFE lamination process and applied it to manufacturing wire and cable. This process allowed IW to manufacture products of unprecedented reliability along with smaller diameters. Combining the new lamination process along with a patented shield design allowed IW to become one of the leaders in low loss microwave transmission lines, utilizing both solid and expanded PTFE dielectrics. In 1988, IW expanded its operations and created a Microwave Products Division.

Today, IW Bayport designs and manufactures a wide range of cables to support demanding customer application specific requirements for high performance cable assemblies operating at frequencies up to 110GHz, across a range of diameters from 0.034" to 0.750" diameter. IW also offers a broad selection of connectors in order to provide our customers the proper cable assembly for specific applications.

IW operates in two facilities. Headquarters and cable manufacturing are located in Bayport, NY, with the cable assembly facility located close by in Ronkonkoma, NY. Both factories are AS9100 and ISO9001.

RE-FLEX™ PRODUCTS

Developed as a true hand-formable replacement for semi-rigid assemblies and to provide improved electrical and mechanical performance over traditional hand-formable designs, Insulated Wire presents Re-Flex™. Available in 0.085", 0.141" and 0.235" diameters (identified as RF085, RF141 and RF250), IW's RF cable series offers the advantages of the same lamination process used on our Low Loss/Phase Stable coaxial cable products. Combined with the same double shield construction plus a solder-free tin/alloy plated outer braid, the Re-Flex design provides a hand formable cable that will not develop micro-fractures with repeated flexing, and avoids solder cracks experienced at the connector/cable transition on semi-rigid assemblies, thus eliminating manufacturability issues typically associated with those types of cables.

In addition, Re-Flex cables hold their shape once formed which simplifies cable routing, and also design, as preset bend dimensions which require tolerances and physical inspection are now eliminated.

Both RF085 and RF141 are industry standard line sizes, consequently a wide range of connector types and styles can be used with these cables, including: SMA, TNC, N, GPO™, GPPO™, 2.92mm/K™, 2.4mm and 1.85mm/V™, with performance up to 60GHz. RF250 is commonly used for higher power applications with SMA, TNC, N, SC and HN connectors available. Re-Flex assemblies can be employed wherever a semi-rigid or conformable cable type is currently used, and with FEP™ jacket available as a standard option, Re-Flex provides greater versatility.

INSULATED WIRE
INCORPORATED

MARKETS SERVED

IW serves a broad range of both military and commercial markets. These include telecommunications, data links, satellite systems, airborne electronic warfare and counter measures, missile systems, UAV applications, avionics and instrumentation, fire control systems, medical electronics, and geophysical exploration.

The design of the Re-Flex cable range makes it suitable for use in a wide variety of applications, where manufacturability, in service signal integrity, and RF performance are considerations. Re-Flex has a proven legacy in defense systems, providing signal routing in 'black boxes' used in land, sea and airborne systems, yet is equally effective in test and measurement applications as bench top test cables, probe stations and automatic test systems.

RE-FLEX CABLE SERIES

Re-Flex is available in three line sizes, 0.085", 0.141" and 0.250" to provide hand-formable cables to replace traditional RG405, RG402 and RG401 respectively.

General cable specifications are included below, detailed electrical specifications are provided in the following pages for each cable part number. Re-Flex is supplied unjacketed as standard, however an FEP jacket option is also available

CABLE SPECIFICATIONS

P/N	Cut Off Frequency (GHz)	Attenuation (max) @ cut off (dB/ft.)	RF power (max) @ cut off (W)	VP (%)	Static Bend Radius (Inches)	Dynamic Bend Radius (Inches)	Weight (lb/100 ft)	Capacitance (pF/ft)	Time Delay (nS/ft)
RF085	62.0	1.99	8.0	71	0.250	0.375	1.20	28.6	1.43
RF141	34.0	0.91	38.0	71	0.375	0.750	2.60	28.6	1.43
RF250	19.5	0.44	161.0	70	0.750	1.500	6.50	29.0	1.45

RE-FLEX CABLE - KEY PERFORMANCE PARAMETERS

Cable Type	Attenuation (dB/ft., max)				Replaces
	10 GHz	18 GHz	32 GHz	60 GHz	
RF085	0.60	0.91	1.28	2.01	RG405
RF141	0.41	0.60	0.88	-	RG402
RF250	0.29	0.44	-	-	RG401

CABLE CONSTRUCTION

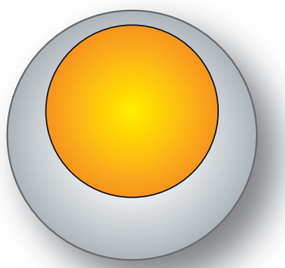
TAILORED TO YOUR SPECIFICATIONS

IW is ready to work with you to provide the exact cable specifications you need for your extreme condition application. We start at square one, from initial specifications and requirements analysis; through the design phase using CAD, working with your systems and applications personnel; then through development, manufacturing and delivery; right up to hands on guidance for installation andmaintenance.

The needs of each of our microwave customers are diverse and demanding and can change on a moment's notice. That's why we never rest on our laurels.

We are constantly working to develop the next new innovative machine, or to design the newest process for delivering state of the art microwave cables and assemblies.

1



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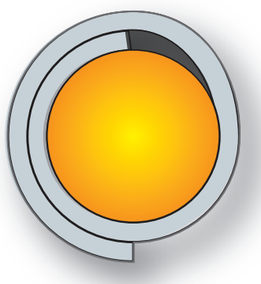


3

These scale drawings (approximately 50X actual size) illustrate IW's unique Multi-Ply Laminate insulation that eliminates the problems which occur with other forms of construction.

1 **Extruded Insulation** requires a thicker insulating wall to compensate for the possibility of conductor eccentricity within the insulation.

2 **Lap Wrap Tape Insulation** creates an irregular surface which precludes use with "O" ring seals at high pressures; contamination on the tape surface creates a low resistance path; and a corona site forms in the triangular voids created where the tape overlaps.

3 **IW's Multi-Ply Laminate Insulation**, by contrast, delivers greater reliability with maximum space and weight savings.

CENTER CONDUCTOR
Silver plated per ASTM B-298

DIELECTRIC
Multi-ply laminate
Per Mil-C-17
Solid PTFE Type F-2
All materials per ASTM D 4894

SHIELD
Helically wrapped silver or silver plated copper foil ASTM-B-298

BRAID
Tin alloy plated copper per ASTM B-298.
Braid coverage is greater than 98%
*Reflex per ASTM-B-33

RE-FLEX PRODUCTS

To provide improved electrical and mechanical performance over traditional hand-formable designs, Insulated Wire presents Re-Flex.

To provide greater flexibility in using Re-Flex, the range of cables are available as:

- **Bulk cable** (with or without connectors)
- **Custom configuration cable assemblies**
- **Standard length SMA male/SMA male assemblies** (085/141 only)
- **Re-Flex Starter Kits** (085/141 only)

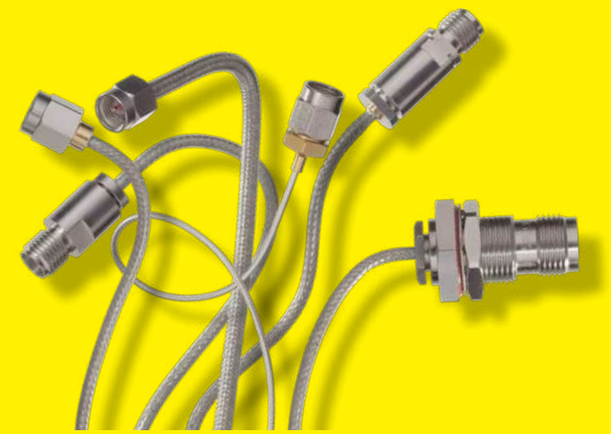
The following pages provide more detail and specifications, together with outlines for common connector types used with Re-Flex cables.

Both RF085 and RF141 are industry standard line sizes, consequently a wide range of connector types and styles can be used with these cables, including: SMA, TNC, N, SMP, SMPM, 2.92mm/K™, 2.4mm and 1.85mm/V™, with performance up to 60GHz. RF250 is commonly used for higher power applications with SMA, TNC, N, SC and HN connectors available.

Re-Flex assemblies can be employed wherever a semi-rigid or conformable cable type is currently used, and with FEP™ jacket available as a standard option, Re-Flex provides greater versatility. Cable part numbers are TPRFEP085, TPRFEP141 and TPRFEP250.

RE-FLEX CABLE - AVAILABILITY

Cable Type	AMS-DTL-23053 Jacket Available	FEP Jacket Available	Distribution Stock
RF085	Yes	Yes	SMA (m) to SMA (m) direct solder, 3” and up
RF141	Yes	Yes	SMA (m) to SMA (m) direct solder, 3” and up SMA (m) to SMA (m) shell style, 2” and up
RF250	Yes	Yes	



RE-FLEX STARTER KITS

RE-FORMABLE CABLE ASSEMBLY SOLUTIONS STRAIGHT OUT OF THE BOX!

For customers who know the advantages of Re-Flex over traditional hand-formable and semi-rigid, and to make cable selection easier for those new to our product, IW is pleased to announce our new range of Re-Flex Starter Kits!

Three kits are currently available:

CT-1879 (SPSD-TPRF085-XXX-SPSD) direct solder SMA male/male using TPRF085 (RG405 line size)

CT-1880 (SPSD-TPRF141-XXX-SPSD) direct solder SMA male/male using TPRF141 (RG402 line size)

CT-1881 (SPSH-TPRF141-XXX-SPSH) shell style SMA male/male using TPRF141 (RG402 line size)

Each kit comprises seven different assembly lengths **3”, 4”, 5”, 6”, 8”, 9”** and **12”**, 5 pcs of each, providing the design engineer with a convenient aid for performing cable routing in prototype system builds

The ability to **continually re-form Re-Flex** without the need for custom tooling to shape the cable, and the elimination of debris caused by micro fracturing is a key feature of the **Re-Flex** cable design, and enables the designer to make signal path/layout changes without having to throw product away after using it once.

Center Conductor
Silver Plated Copper

Dielectric
PTFE

Foil
Silver Plated Copper

Braid
Tin Plated Copper
RF085 - (0.085", 2.15 mm)

CABLE SPECIFICATIONS

	RF085
ELECTRICAL CHARACTERISTICS	
Impedance	50 +/– 2Ω
Cut Off Frequency (cable only, max)	62 GHz
Capacitance	28.6 pF/ft.
Velocity of Propagation	71%
Time Delay	1.43 ns/ft.
Shielding Effectiveness up to 18GHz	>90 dB
Cable Attenuation Factors (K1, K2) *	18.8, 0.86
Power Handling	See Chart
MECHANICAL CHARACTERISTICS	
Weight	0.19 oz/ft (17.86 g/m)
Static Bend Radius	0.25" (6.35 mm)
Dynamic Bend Radius	0.375" (95.25mm)

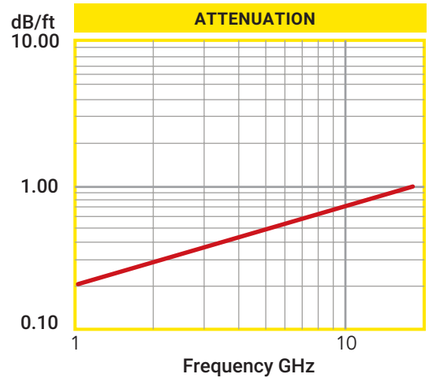
FEP Jacket available upon request

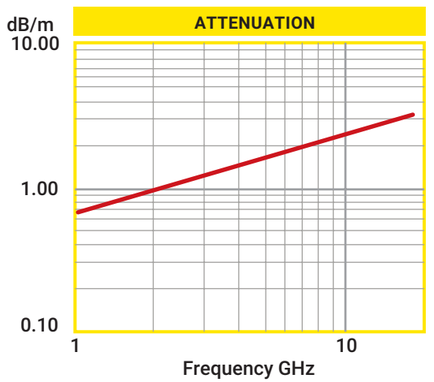
*Attenuation = $K1\sqrt{f} + K2f$ (cable only)

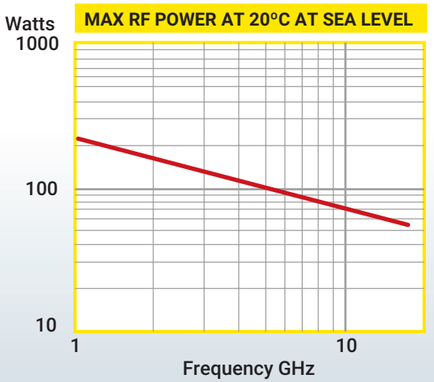
CABLE ATTENUATION

ATTENUATION (MAX)

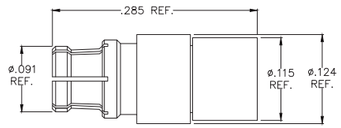
	RF085					
GHz	dB/ft.	dB/m	Power(W) @ 20°C @ Sea Level	dB/ft.	dB/m	Power(W) @ 20°C @ Sea Level
0.5	0.14	0.46	357	0.17	0.55	310
1	0.20	0.67	220	0.24	0.78	196
2	0.29	0.96	200	0.34	1.12	170
4	0.42	1.39	120	0.49	1.62	107
6	0.53	1.73	85	0.62	2.02	76
8	0.62	2.03	75	0.72	2.36	67
10	0.70	2.30	70	0.81	2.67	63
12	0.78	2.56	65	0.90	2.96	58
14	0.85	2.79	60	0.98	3.22	54
16	0.92	3.01	55	1.06	3.48	49
18	0.98	3.23	50	1.13	3.72	45
20	1.04	3.42	45	1.19	3.89	40
22	1.10	3.62	43	1.26	4.13	38
24	1.17	3.82	42	1.33	4.36	38
26	1.23	4.02	40	1.40	4.58	36
28	1.28	4.21	39	1.46	4.80	35
30	1.34	4.40	38	1.53	5.01	34
32	1.40	4.58	37	1.59	5.22	33
34	1.45	4.76	36	1.65	5.43	32
36	1.51	4.94	35	1.72	5.63	31
38	1.56	5.11	32	1.78	5.83	29
40	1.61	5.28	30	1.84	6.02	27
42	1.66	5.45	29	1.90	6.22	26
44	1.71	5.62	28	1.95	6.41	25
46	1.76	5.79	27	2.01	6.60	24
48	1.81	5.95	26	2.07	6.78	23
50	1.86	6.11	25	2.12	6.97	22
52	1.91	6.27	25	2.18	7.15	22
54	1.96	6.43	25	2.24	7.33	22
56	2.01	6.59	23	2.29	7.51	21
58	2.06	6.74	23	2.34	7.69	21
60	2.10	6.90	22	2.40	7.86	20
62	2.15	7.05	22	2.45	8.04	20



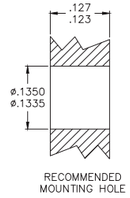


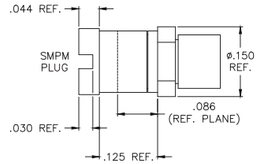


CONNECTORS FOR **RF085 SERIES**

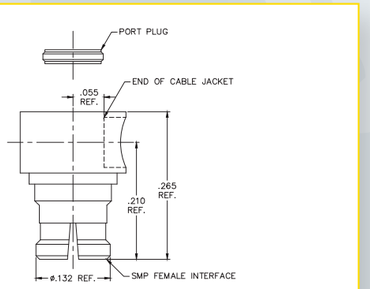


GPPO JACK/FEMALE (GGJS-TPRF085)

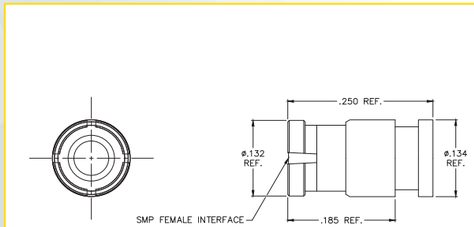




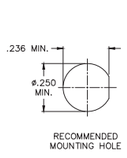
GPPO MALE BULKHEAD (GGPB-TPRF085)

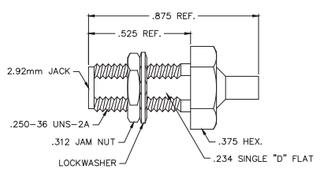


GPO FEMALE RIGHT ANGLE (GJR-TPRF085)



GPO JACK/FEMALE (GJS-TPRF085)

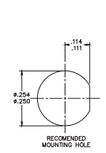


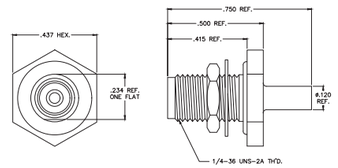


2.92MM FEMALE BULKHEAD (KJB-TPRF085)

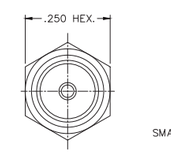
Other connector types and styles are available, please contact the factory

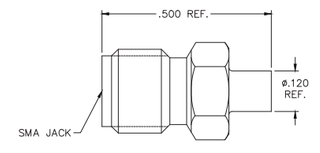
CONNECTORS FOR **RF085 SERIES**



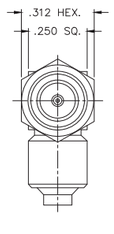


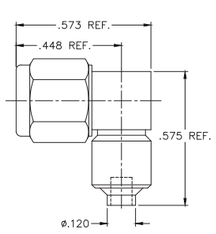
SMA FEMALE BULKHEAD (SJBD-TPRF085)



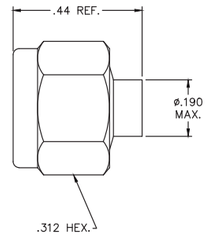


SMA FEMALE (SJSD-TPRF085)

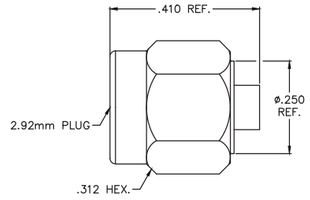




SMA MALE RIGHT ANGLE (SPRCD-TPRF085)



SMA MALE (SPSD-TPRF085)



2.92MM MALE (KPSD-TPRF085)

Other connector types and styles are available, please contact the factory

Center Conductor
Silver Plated Copper

Dielectric
PTFE

Foil
Silver Plated Copper

Braid
Tin Plated Copper
RF141 - (0.141", 3.58 mm)

CABLE SPECIFICATIONS

	RF141
ELECTRICAL CHARACTERISTICS	
Impedance	50 +/– 2Ω
Cut Off Frequency (cable only, max)	34 GHz
Capacitance	28.6 pF/ft.
Velocity of Propagation	71%
Time Delay	1.43 ns/ft.
Shielding Effectiveness up to 18GHz	>90 dB
Cable Attenuation Factors (K1, K2) *	10.6, 0.86
Power Handling	See Chart
MECHANICAL CHARACTERISTICS	
Weight	0.19 oz/ft (17.86 g/m)
Static Bend Radius	0.375" (9.53 mm)
Dynamic Bend Radius	0.75" (19.05 mm)

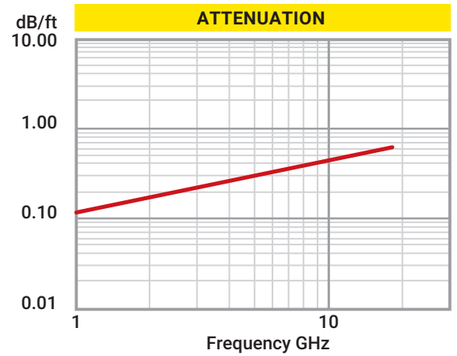
FEP Jacket available upon request

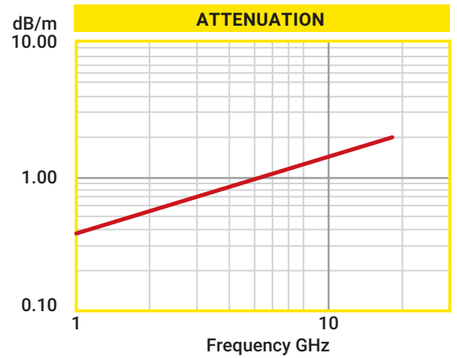
*Attenuation = $K1\sqrt{f} + K2f$ (cable only)

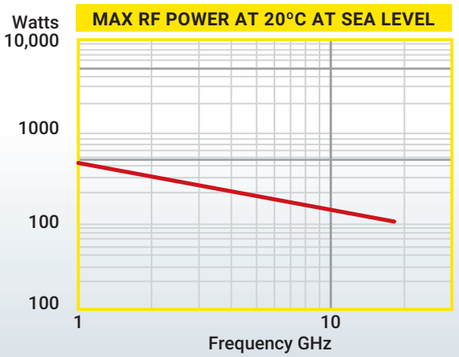
CABLE ATTENUATION

ATTENUATION (MAX)

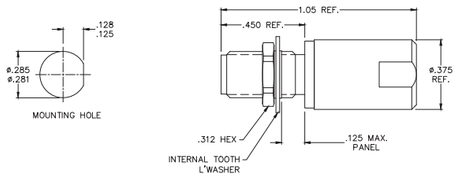
RF141			
GHz	**dB/ft.**	**dB/m**	**Power(W) @ 20°C @ Sea Level**
0.5	0.08	0.27	707
1	0.12	0.39	500
2	0.17	0.56	350
4	0.25	0.83	240
6	0.32	1.05	190
8	0.38	1.25	160
10	0.43	1.42	150
12	0.48	1.59	140
14	0.53	1.75	130
16	0.58	1.90	120
18	0.62	2.04	110
20	0.64	2.11	100
22	0.68	2.25	90
24	0.73	2.38	80
26	0.77	2.51	70
28	0.80	2.64	60
30	0.84	2.76	50
32	0.88	2.89	40



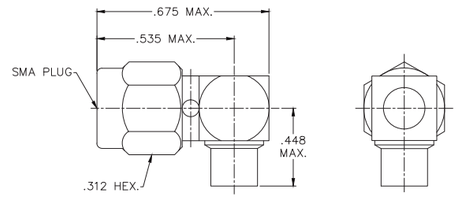




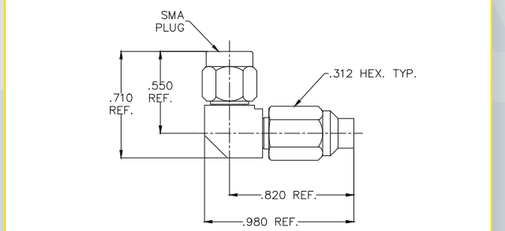
CONNECTORS FOR **RF141 SERIES**



SMA FEMALE BULKHEAD (SJB-TPRF141)



SMA MALE RIGHT ANGLE DIRECT SOLDER (SPRCD-TPRF141)



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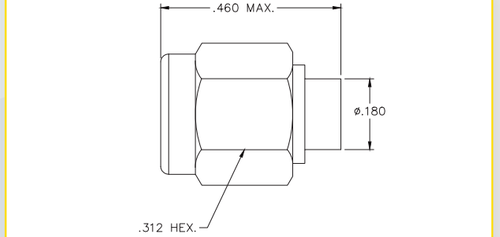
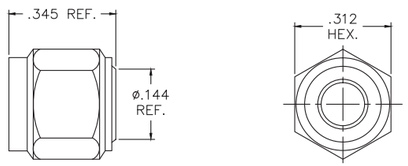
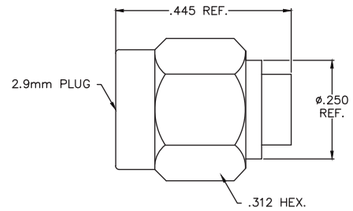


SMA MALE DIRECT SOLDER (SPSD-TPRF141)

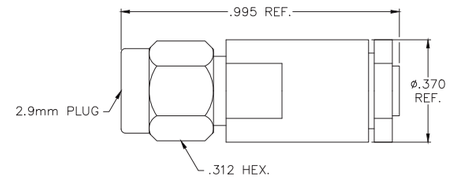


SMA MALE SHELL (SPSH-TPRF141)

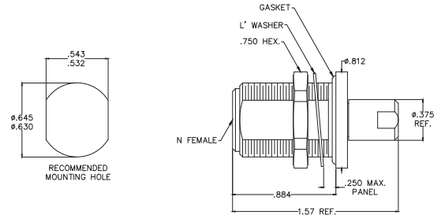
CONNECTORS FOR **RF141 SERIES**



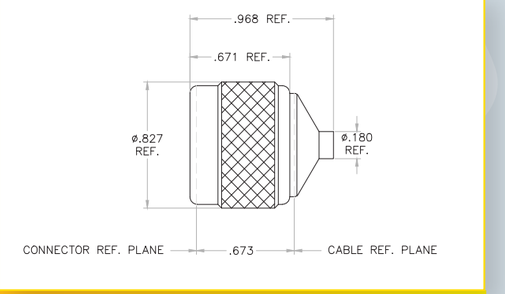
2.92MM MALE DIRECT SOLDER (KPSD-TPRF141)



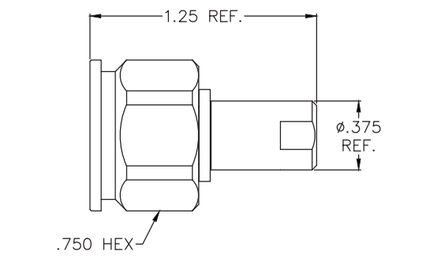
2.92MM MALE (KPS-TPRF141)



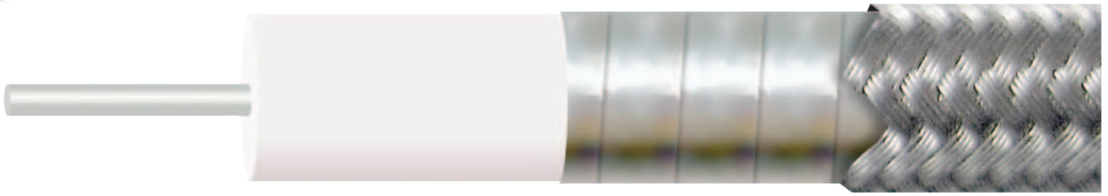
N-TYPE FEMALE BULKHEAD (NJB-TPRF141)



N-TYPE MALE DIRECT SOLDER W/KNURL COULING NUT (NPSDK-TPRF141)



N-TYPE MALE (NPS-TPRF141)



Center Conductor
Silver Plated
Copper

Dielectric
PTFE

Foil
Silver Plated
Copper

Braid
Tin Plated Copper
RF250 - (0.230", 5.84 mm)

CABLE SPECIFICATIONS

	RF250
ELECTRICAL CHARACTERISTICS	
Impedance	50 +/– 2Ω
Cut Off Frequency (cable only, max)	19.5 GHz
Capacitance	28.6 pF/ft.
Velocity of Propagation	71%
Time Delay	1.43 ns/ft.
Shielding Effectiveness up to 18GHz	>90 dB
Cable Attenuation Factors (K1, K2) *	6.4, 0.95
Power Handling	See Chart
MECHANICAL CHARACTERISTICS	
Weight	1.06 oz/ft (98.2 g/m)
Static Bend Radius	0.375" (95.25mm)
Dynamic Bend Radius	1.0" (25.4mm)

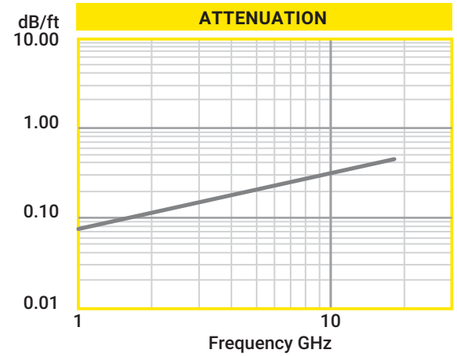
FEP Jacket available upon request

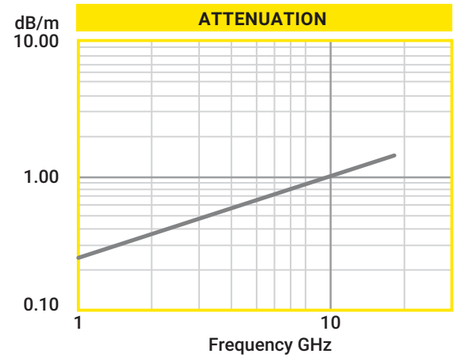
*Attenuation = $K1\sqrt{f} + K2f$ (cable only)

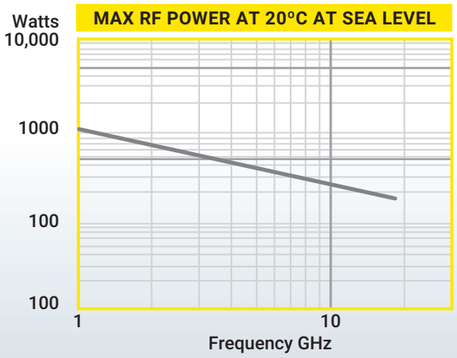
CABLE ATTENUATION

ATTENUATION (MAX)

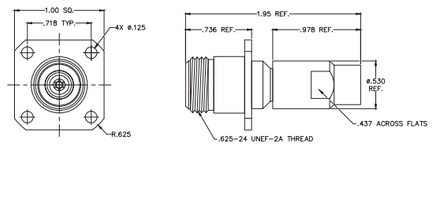
GHz	RF250 dB/ft.	RF250 dB/m	RF250 Power(W) @ 20°C @ Sea Level
0.5	0.05	0.16	1615
1	0.07	0.23	1033
2	0.11	0.36	661
4	0.17	0.56	423
6	0.22	0.72	326
8	0.26	0.85	271
10	0.29	0.95	235
12	0.34	1.12	209
14	0.37	1.21	189
16	0.41	1.35	173
18	0.44	1.44	161



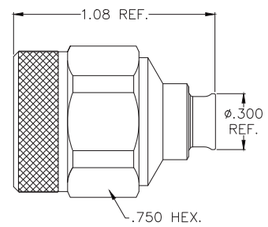




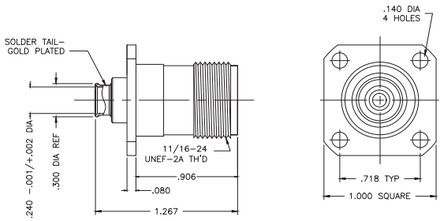
CONNECTORS FOR **RF250 SERIES**



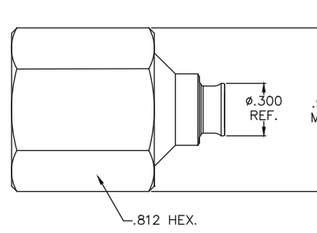
N-TYPE FEMALE 4 HOLE FLANGE MOUNT (NJP4-TPRF250)



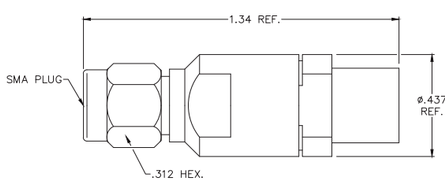
NPSDTPRF250-SPEC_A_GEN



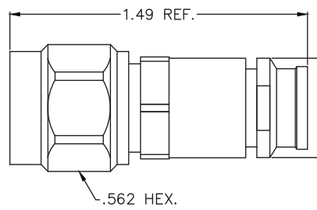
SC FEMALE DIRECT SOLDER 4 HOLE FLANGE MOUNT SCJP4-TPRF250



SC MALE DIRECT SOLDER (SCPSD-TPRF250)



SMA MALE (SPS-TPRF250)



TNC MALE (TPS-TPRF250)

Other connector types and styles are available, please contact the factory

CONNECTOR OPTIONS

MATERIALS & FINISHES

Component	Material Specifications	Finish Specifications
Bodies	Stainless Steel per AMS-5640 UNS-S30300, Type 1	Passivation per SAE-AMS-2700
Coupling Nut	Stainless Steel per AMS-5640 UNS-S30300, Type 1	Passivation per SAE-AMS-2700
Contacts	Beryllium Copper per ASTM-B-196 Brass per ASTM-B-16	Gold Plated per ASTM-B-488 Gold Plated per ASTM-B-488
Solder Ferrule	Brass per ASTM-B-16	Gold Plated per ASTM-B-488
Dielectric	PTFE (polytetrafluoroethylene) per ASTM-D-1710 Kel-F ASTM-D-1430-03 ULTEM* (Grade 1000) *Trademark General Electric Corporation	
Gasket	Silicone Rubber per A-A-59588 Viton ASTM-D-1418	

CHOOSE YOUR CONNECTOR

Cable Series	Frequency (GHz) 4	11	18	26.5	32	40	50	65	70
RF085	Industry Standard 085 SR Connectors								
RF141	Industry Standard 141 SR Connectors								
RF250	SMA, TNCA, N, SC								

Calculation of Cable Assembly Loss *Standard*

$$dB = \left(\frac{\text{Cable Attenuation in dB/ft}}{12} \times L(\text{in.})\right) + \text{Connector Loss}$$

Where L is Length in Inches

Calculation of Cable Assembly Loss *Metric*

$$dB = \left(dB/m \times L(m)\right) + \text{Connector Loss}$$

CONNECTOR INSERTION LOSS (PER CONNECTOR) (F IN GHZ)

Cable Series	Connector Type	Maximum Cable Frequency (GHz)	Straight (dB)	Right Angle (dB)
RF085	Industry Standard 085 SR Connectors	62	.012 x F	.017 x F
RF141	Industry Standard 141 SR Connectors	34	.01 x F	N/A
RF250	SMA, TNCA, N, SC	19.5	.012 x F	.017 x F

ASSEMBLY LENGTH DEFINITION

The outlines below show typical cable assembly configurations and reference points to determine overall length.

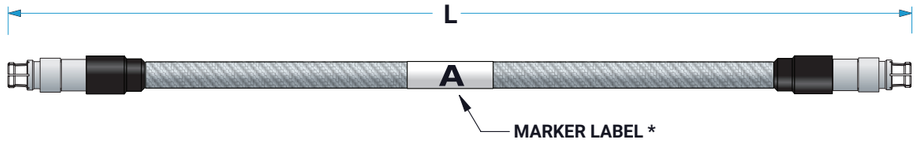


Fig. 1 – GJS-TPRF085-XXX-GJS

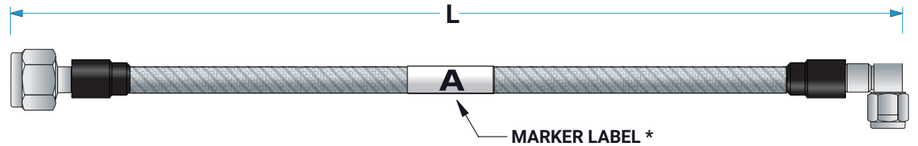


Fig. 2 – SPSD-TPRF141-XXX-SPRCD

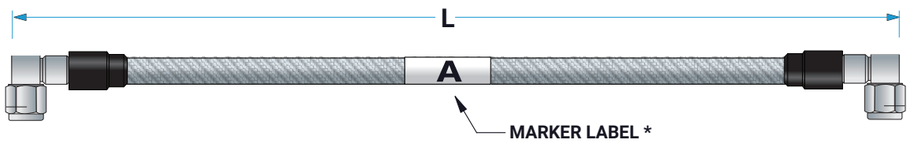


Fig. 3 – SPRCD-TPRF141-XXX-SPRCD

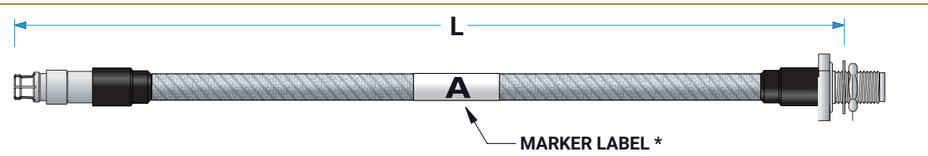


Fig. 4 – GJS-TPRF085-XXX-SJB

*** A center marker label is fitted to all assemblies over 6" in length.**

Length (in.)	Tolerance (in.)	Length (cm)	Tol (cm)
6 to < 12	+0.50/-0.00	16 to < 30	+1.5/-0.00
12 to < 72	+1.00/-0.00	30 to < 180	+3/-0.00
72 < Length	+2.00/-0.00	180 < Length	+6/-0.00

Note: For Re-Flex™ assemblies with SMA direct solder or shell style connectors, the tolerances are:

2" to < 36"	±0.100"
36" to <72"	±0.250"
72" < Length	±0.500"

INSULATED WIRE INCORPORATED

PHASE MATCH AND TIME DELAY

For applications where phase or electrical length is a critical performance parameter, IW can provide matched assembly sets, tested to customer specifications, typically up to 40 GHz, with both Low Loss Phase Stable and Re-Flex cable types.

Relative phase matching is a common requirement achieved with multiple assembly sets. Typical phase matching tolerances are shown in Table below.

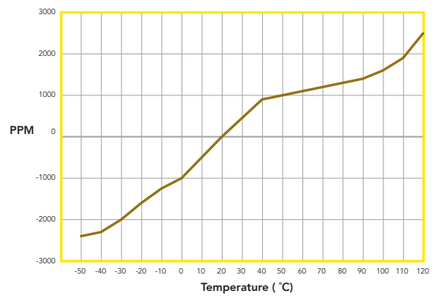
Tighter tolerances may be achievable; IW engineers review all matching requirements on a case by case basis. In addition, IW also provides time delay matched assemblies with tolerances in the order of 2pS being achievable with both Low Loss and Re-Flex cable types, and individual assemblies can also be supplied trimmed to a specific electrical length.

All matched assemblies are tested 100% for insertion loss and VSWR performance parameters in addition to phase.

FREQUENCY (GHz)	PHASE MATCH (DEGREES)
10	± 2
18	± 3.5
26.5	± 5
40	± 8

PHASE CHARACTERISTICS

TYPICAL PHASE CHANGE



Typical phase Change for the following cable series
047, 115, 125, 160, RF085, RF141 and RF250

DETERMINATION OF PHASE CHANGE OVER TEMPERATURE

The following example illustrates how to calculate the change in phase (and the tracking error) of cable assemblies over a specific temperature range. In this example, the cable is IW 2801, and the temperature range is -40˚C to +80˚C.

* determined by the charts above

** tracking error of two or more assemblies of the same type

1. CALCULATE ELECTRICAL LENGTH

2. CALCULATE CHANGE IN PHASE

3. CALCULATE TRACKING ERROR

Frequency	= 10 GHz	f
Assembly length	= 72 in	L
Start temp	= 20˚C	T
Dielectric const	= 1.4	e
Change in PPM	= -500*	PPM
PPM tracking error	= ±100 PPM tracking	
Electrical length	= TBD	Φ
Change in phase	= TBD	ΔΦ
Tracking error	= TBD**	Φ tracking

PHASE CHANGE WITH FLEXING

Phase change when flexing will be slightly different depending on the particular cable. Larger cables have more dielectric and greater internal forces, thus phase change will be greater for cables with larger diameters. When wrapped 360˚ around a 4 inch diameter mandrel, the phase change will be:

±0.30˚ • f - for cables 480, 280, 230, 180 and 170

±0.20˚ • f - for cables 157, 150 and 140

$$\Phi = \frac{L \cdot \sqrt{e} \cdot f \cdot 360}{11.808}$$

$$\Phi = \frac{72 \cdot \sqrt{1.4} \cdot 10 \cdot 360}{11.808} = 25,973^{\circ}$$

$$\Delta\Phi = \frac{\Phi \cdot PPM}{1,000,000}$$

$$\Delta\Phi = \frac{25973 \cdot (-500)}{1,000,000} = -12.93^{\circ}$$

$$\Phi_{tracking} = \frac{\Phi \cdot (PPM\ tracking)}{1,000,000}$$

$$\Phi_{tracking} = \frac{25973 \cdot (\pm 100)}{1,000,000} = \pm 2.6^{\circ}$$

CABLE ASSEMBLY PART NUMBER BUILDER

CONNECTOR CODES

B	BNC
G	GPO*/SMP
GG	GPPO*/SMPM
K	2.92 mm (K™)
MB	SMB
MC	SMC
N	N
O	OSP*/BMA
S	SMA
SC	SC
V	1.85 mm (V™)
3	3.5 mm
2	2.4 mm

TYPE CODES

J	Jack
P	Plug

STYLE CODES

B	Bulkhead mount
P4	4 hole panel mount
R	Right angle
S	Straight
SD	Straight direct solder
SH	Shell type

STYLE CODES CONTINUED

SW	Straight w/ wire holes
RC	Right angle, cube body
RCD	Right angle, cube body, direct solder
SQ	Straight “Quik-Flex™”

JACKET OPTIONS

FEP	per ASTM D-2116 F
N	black Neoprene heat shrink
ZEL	**Tefzel™ jacket** Tefzel™ is a trademark of Chemours Company FC, LLC
SP	Santoprene
LC	Low smoke/Zero Halogen PU

* OSP is a trademark of M/ACOM.
* GPO/GPPO is a trademark of Corning Gilbert
* K/V is a trademark of Anritsu

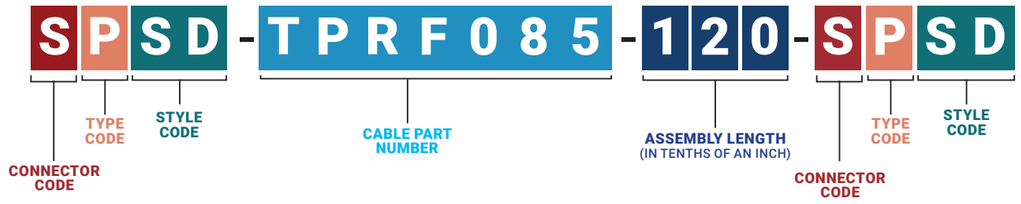
INSULATED WIRE INCORPORATED

CABLE ASSEMBLY PART NUMBER BUILDER

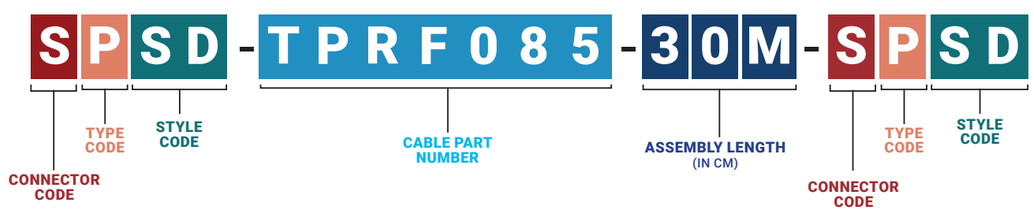
With so many variables involved in creating custom wires for multiple purposes, IW has devised an Part Number (P/N) Coding System which we use to readily identify all our microwavecables.

In the first example part number below, the cable assembly is an SMA right angle plug to a 2301 armored cable at 36” long to an SMA straight plug.

STANDARD PART NUMBER



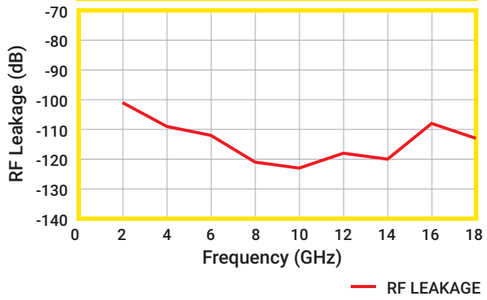
METRIC PART NUMBER



Note: Metric part number format is X.XX meters – 300M defines a 3m length assembly; a 10m assembly part number with the same connectors as shown above is SPR-2301A-1000M-SPS

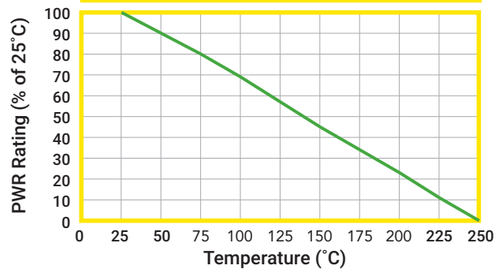
ENGINEERING DESIGN DATA

RF LEAKAGE (IW 1801)

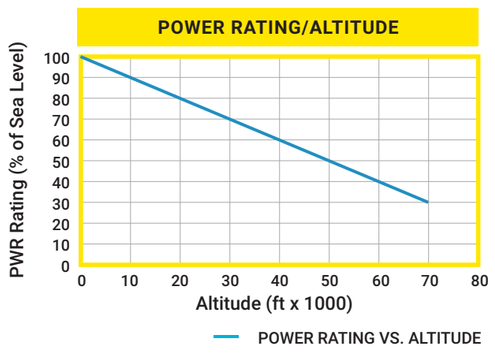


Measured values of IW 1801 cable using the test method specified in MIL-T-81490.

POWER RATING/TEMPERATURE



POWER RATING/ALTITUDE



Insertion Loss vs. Temperature

$$dB_T = \alpha 20 \sqrt{.0038\ (T-20)} + 1$$

Use this equation to determine cable loss (dBT) at any temperature (T) in degrees Celcius. $\alpha 20$ is the cable loss at 20°C

COAXIAL TRANSMISSION LINE EQUATIONS

Impedance (W)

$$Z_o = \frac{138.059}{\sqrt{\varepsilon}} \cdot \log_{10}\left(\frac{D}{d}\right)$$

Cut Off Frequency (GHz)

$$f_{co} = \frac{7.52}{\sqrt{\varepsilon} \cdot (D + d)}$$

Velocity of Propogation (%)

$$V\rho = \frac{100}{\sqrt{\varepsilon}}$$

Outer Conductor Loss (dB)

$$A_c = \frac{2.745 \cdot 10^{-4}}{Zo} \sqrt{\rho f} \left(\frac{K_o l}{D}\right)$$

Inner Conductor Loss (dB)

$$A_c = \frac{2.745 \cdot 10^{-4}}{Zo} \sqrt{\rho f} \left(\frac{K_i l}{D}\right)$$

Dielectric Loss (dB)

$$A_d = (23.15 \cdot 10^{-10}) \cdot \sqrt{\varepsilon} \cdot f \cdot \tan\delta \cdot l$$

Reflection Loss (dB)

$$A_r = 10 \log_{10}\left[\frac{(VSWR+1)^2}{4(VSWR)}\right]$$

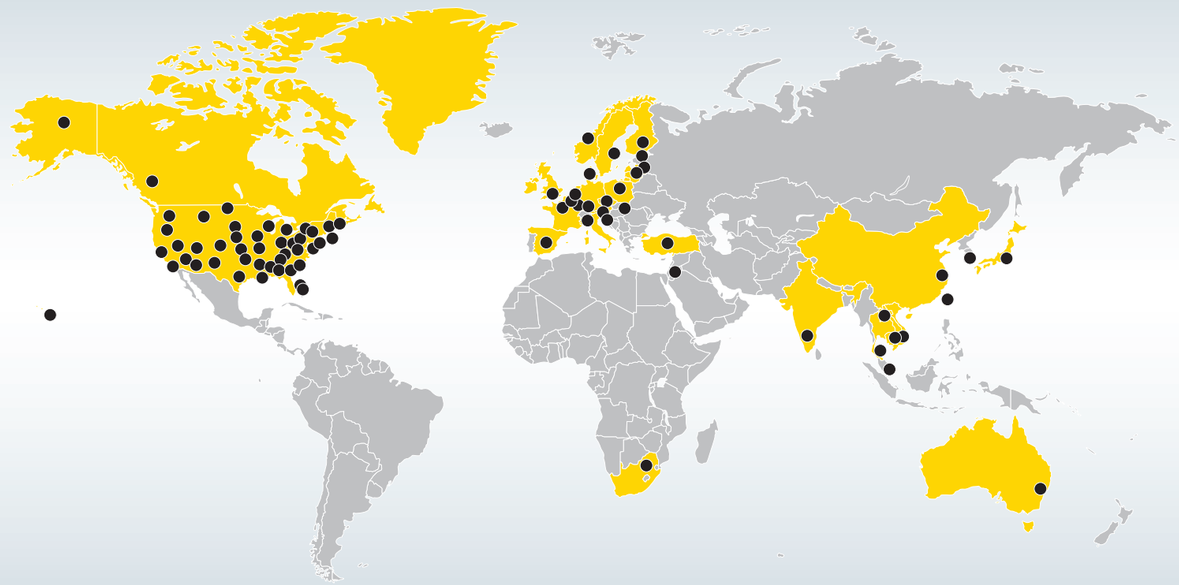
Time Delay (ns/ft)

$$TD = 1.016\sqrt{\varepsilon}$$

Capacitance (pf/ft)

$$C = \frac{1016\sqrt{\varepsilon}}{Z}$$

- D = Inner diameter of outer conductor (inches)
- d = Outer diameter of inner conductor (inches)
- ε = Dielectric constant
- ρ = Resistivity in Ohm-cm
- f = Frequency in Hertz
- l = Length in inches
- Z_o = Characteristic impedance
- K_o = Outer conductor stranding factor
- K_i = Inner conductor stranding factor
- $\tan\delta$ = Loss tangent of dielectric



Contact us to find out where your nearest local IW representative is located

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Visit our website for contact information on your local representative.

Please don't hesitate to contact IW directly if you are unable to locate a representative in your area.

AS9100 & ISO 9001 Certified