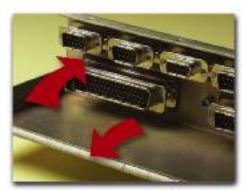
Quietshield™ Gaskets & Shielding

flexible, conformable and lightweight QuietshieldTM products deliver effective EMI shielding across seams or gaps within an enclosure





Fabric-Over-Foam Gaskets are low cost, soft and easy to apply. These gaskets are available in a variety of materials and profiles, including rectangular, "D" shaped, FL shaped and DD shaped... FC72-FC73

Waved Metal and Fabric-Over-Foam I/O Gaskets are flat products used to provide a ground contact between a metal connector and the electronic enclosure or mating connector... FC74

Shielding Tapes and Fabrics are flexible, lightweight, and easy-to-install shielding materials offering high conductivity with a low electrical resistance and are available in a variety of fabric styles... FC75

Wire Mesh Gaskets are available as all mesh or elastomer core mesh gaskets. They provide excellent heat and corrosion resistance and are used between two surfaces to maintain electrical continuity while shielding electromagnetic waves... FC76

Conductive Silicone is used for its heat resistant properties and can be produced in many different forms such as sheets, molded parts, die-cuts or strips. These conductive elastomers are water resistant, can eliminate static electricity, and act as an absorber at high frequencies... FC77







Shielding Theory and Introduction

Shielding Theory

Electromagnetic shielding is used to prevent electromagnetic signals such as radio signals from leaving or entering a box or enclosure. Signals inadvertently emitted by an electronic device can cause distortion or interruption in normal radio communications in a localized area. This is the basis of most laws and regulations concerning electromagnetic interference. In addition, normal radio signals can cause unprotected electronic devices to malfunction. Depending on the device's function, a malfunction in the device could be a minor inconvenience such as static on a radio, or life threatening such as the malfunction of a life support system at a hospital.

Introduction

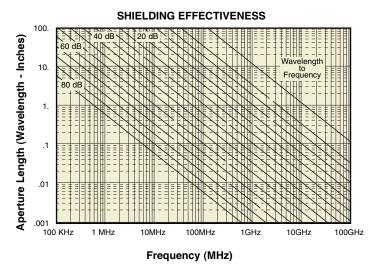
The electromagnetic shield in most cases is the electronic housing itself. The housing/shield forms a metal cage around the electronic circuits in a device. Most of the electromagnetic signal is absorbed with a small portion (3 to 10 dB) of the signal reflected off the metal housing. Most of the absorbed signal creates alternating currents at radio frequencies which travels on the surface of metal. This allows the electromagnetic shield to keep signals from outside the enclosure on the outside of the shield and signals from inside signals on the inside of the shield.

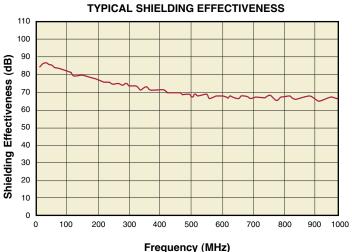
The shield will continue to function as long as there are no holes in the electromagnetic shield which would allow the currents to flow from one side of the shield to the other. Holes are a necessity in an electronic enclosure. Connectors, wires, and cables are needed to transmit information to and from electronic devices. Doors and covers are needed to get access to components to maintenance, service, and keypads may also be required. The problem is that all of these items cause openings in the shield which reduce the performance of the shield.

Special devices such as shielding gaskets, shielding ventilation panels, shielded filtered connectors, and shielded switches minimize the effect of a hole in the shield.

The length of the hole and wavelength of the signal that needs to be shielded are the major factors determining the shielding effectiveness of an electronic enclosure. The distance between spotwelds, or screws which hold a metal housing together count as long narrow holes. Higher frequencies (lower wavelengths) flow more easily through smaller holes, and so the highest frequency needed to be shielded is the frequency of concern when designing shielding.

Aperture versus frequency charts can give a rough estimate of the shielding effectiveness of a metallic electronic housing.





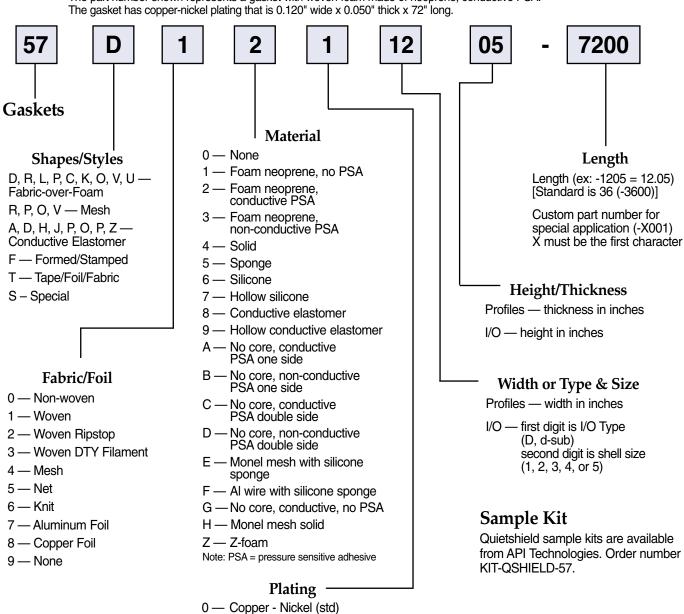
Test Methods: ASTM D-4935-89
Test Fixture: Flanged coaxial transmission line



Quietshield™ Part Number System

Example: 57D1211205 - 7200

The part number shown represents a gasket with woven foam made of neoprene, conductive PSA.



2 — Copper - Nickel - Gold 4 — Copper - Nickel - Resin 5 — Copper - Nickel - P.S. Coating

6 - Iron - Copper - Nickel 7 — Copper - Nickel - Carbon

9 — Ni - Graphite



Quietshield™ Fabric-over-Foam <u>Gaskets</u>

Features

- Maintain shielding effectiveness across seams or gaps
- Shielding Effectiveness (SE) of 70 100 dB between 1 MHz to 18 GHz
- Flexible and conformable
- No creasing or tearing
- Lightweight material

Profile Gaskets

Quietshield™ EMI/RFI Gaskets maintain shielding effectiveness (SE) across a seam or gap in the electronic equipment's shielding material.

Quietshield gaskets provide unique solutions to your most stringent shielding, grounding, ESD and packaging requirements. It's the cost-effective avenue for creativity in design. These gaskets consist of polyurethane foam combined with highly conductive fabrics. Specially designed polyurethane foam is soft, resilient and provides the perfect fit. Our gaskets are made with seven different types of fabric plating and two types of thermal adhesive, standard or flame retardant. Our flame retardant adhesive complies with UL94VTM-1 and VTM-0. If necessary, the polyurethane foam core can also be plated with Cu and Ni to provide additional conductivity.

Fabric-over-Foam Gaskets, unlike elastomer or finger strip gaskets, provide softness for easy application with a variety of materials and designs at low cost. The best quality with high conductivity, low electrical resistance and minimum oxidation can be achieved by using gold gaskets with additional gold plating to provide superior shielding.

Profile gaskets are currently available in a variety of shapes and lengths. API's Spectrum Control line of gaskets provide a variety of applications with lightweight and flexible solutions. Various thicknesses and shapes are available. These range from commonly used ones such as rectangular and "D" shape, to uncommon ones such as FL-shape (folding leaf) and DD-shape (Double DD-shape). We are able to produce gaskets with different shapes and sizes, based upon the customer's requests.

The mounting style available for most profile gaskets is pressure sensitive adhesive. These adhesives allow simple place and press mounting on smooth and clean metal surfaces. The parts can be cut to the desired length with common scissors or ordered to the exact length required. The adhesive provides high strength with aggressive initial tack, which increases in strength over time or after exposure to elevated temperatures.



I/O Gaskets

API offers a complete line of standard and custom I/O connector Electromagnetic Shielding Gaskets. I/O gaskets are flat gaskets used to provide a ground contact between a metal connector and the electronic enclosure or mating connector. They ensure that the shield remains continuous from the input/output cable to the electronic enclosure.

I/O Gaskets are available in the same materials as the fabric-over-foam profile gaskets, or as all-metal waved gaskets.

API's line of metal waved gaskets is designed to minimize the gaps between a D-Sub connector and the panel it is mounted to. These gaskets ensure the maximum "gap length" will not exceed the wave pitch, 0.200" (5.08 MM), even on surfaces with poor flatness. This ensures maximum filter performance to 1GHz and beyond.

Test	Performance
Shielding Effectiveness*	68 dB - 88 dB
Composition (STD)	Woven
Plating (STD)	Copper and Nickel
Temperature Limit	200°C
Abrasion Resistance	Good
Electric Resistance	<0.08 Ohm
Flamibility Rating**	94VTM-1, V0 Grade
Shelf Life***	20 years

^{*} Provides shielding effectiveness of 68 dB min. between 30 MHz to 1 GHz, this will vary slightly depending on fabric type.

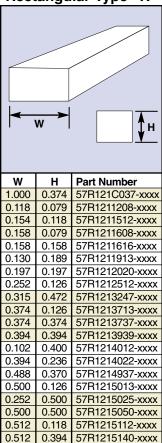
^{**} Rubber rating only.

^{***} Fabric-over-foam gaskets.



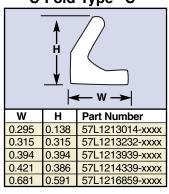
Quietshield™ Fabric-over-Foam **Profile Gaskets**



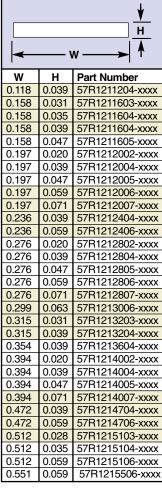


C-Fold Type "C"

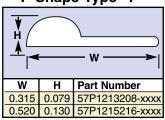
0.394 57R1219839-xxxx



Flat Type "R"



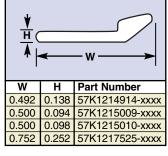
P-Shape Type "P"



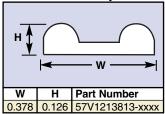
L-Shape Type "L"

H W →					
W	Н	Part Number			
0.430	0.395	57L1214339-7200			
0.433					
0.551	0.591	57L1215559-7200			
0.578	0.673	57L1215767-7200			

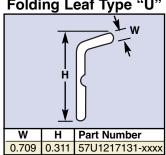
Knife Edge Type "K"



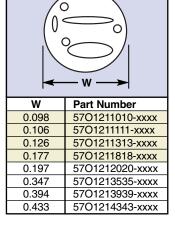
Double D-Shape "V"



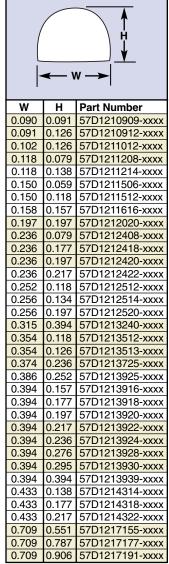
Folding Leaf Type "U"

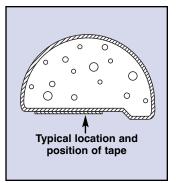


Round Type "O"



D-Shape "D"





NOTE: All dimensions in inches

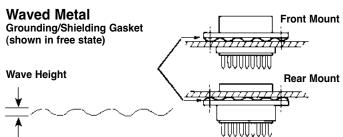


Quietshield[™] Fabric-over-Foam I/O & Waved Metal Gaskets

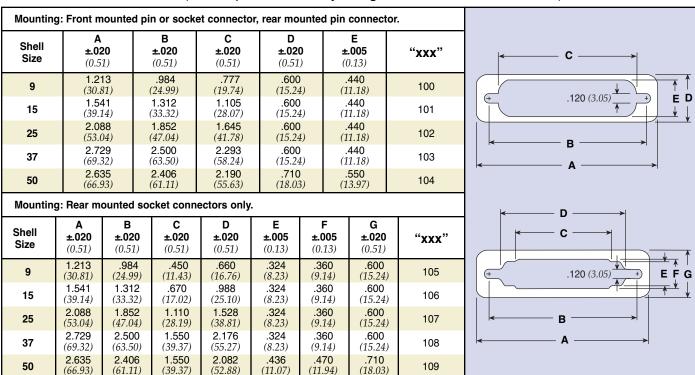
Specifications

when flattened 0.008" (.20mm) per inch





Waved Metal Gaskets (Select part number by filling in "xxx": 572019-00xxx-70)



Fabric-over-Foam I/O Gaskets

Shell	Thickness	Dimensions					Fabric	Part	
Size	Α	В	С	D	E	F	Туре	Number	
1	0.012 0.040 0.070	0.746 (18.95)	1.213 (30.81)	0.984 (24.99)	0.400 (10.16)	0.750 (19.05)	nonwoven woven woven	57F01-D112-1275 57F11-D140-1275 57F11-D170-1275	$R \longrightarrow \begin{pmatrix} (1.52) \\ 2 \text{ Pl C} \end{pmatrix}$
2	0.012 0.040 0.070	1.074 (27.28)	1.541 (39.14)	1.312 (33.32)	0.400 (10.16)	0.750 (19.05)	nonwoven woven woven	57F01-D212-1575 57F11-D240-1575 57F11-D270-1575	
3	0.012 0.040 0.070	1.614 (41.00)	2.088 (53.04)	1.852 (47.04)	0.400 (10.16)	0.750 (19.05)	nonwoven woven woven	57F01-D312-2075 57F11-D340-2075 57F11-D370-2075	
4	0.012 0.040 0.070	2.266 (57.56)	2.720 (69.09)	2.500 (63.50)	0.400 (10.16)	0.750 (19.05)	nonwoven woven woven	57F01-D412-2775 57F11-D440-2775 57F11-D470-2775	2 PLC
5	0.012 0.040 0.070	2.158 (54.81)	2.63 (66.80)	2.406 (61.11)	0.500 (12.70)	0.850 (21.59)	nonwoven woven woven	57F01-D512-2685 57F11-D540-2685 57F11-D570-2685	

Dimensions in inches (mm)



Shielding Tapes & Fabric

Flexible and lightweight tapes provide easy installation and high conductivity and low electrical resistance provide a good shielding effect. Our products use stronger pressure sensitive adhesive to provide better adhesion. Standard widths are 1", 2", 3" and 42". Standard roll lengths are 200'.

API Technologies' Spectrum Control brand of conductive tapes consist of conductive fabric and adhesive which can be either conductive or non-conductive. Conductive tapes come in various types: conductive fabric tapes, Cu/Al foil tapes and double side conductive adhesive tapes. Anticorrosion coating is done on foil tapes and flame retardant coating is available, which complies with UL94VTM-1 and VTM-0.



- · Nonwoven polyester taffeta
- Conductive woven polyester taffeta
- Woven ripstop
- Woven DTY filament
- Mesh
- Aluminum foil
- Copper foil



Material	Plating	Weight (lb/sf)	Weight (g/sm)	Thickness (mm)	Tensile Strength (Kgf)	Surface Resistance (ohm/sq)	Shielding Effectiveness (min dB)	Part Number
Conductive Woven	Cu/Ni	0.015566	76.0	0.08	38.0	0.20	58	57T1A14200-XXXX
Conductive Woven	Cu/Ni/Au	0.005325	26.0	0.10	29.0	0.06	72	57T1A24200-XXXX
Conductive Woven	Cu/Ni/Fe	0.016385	80.0	0.10	32.0	0.06	63	57T1A64200-XXXX
Conductive Woven	Cu/Ni/Ag	0.015975	78.0	0.10	32.0	0.06	67	57T1A34200-XXXX
Conductive Woven	Cu/Ni/Resin	0.016385	80.0	0.11	32.0	0.06	78	57T1A44200-XXXX
Conductive Rip-Stop	Cu/Ni	0.014951	73.0	0.09	39.0	0.08	62	57T2A14200-XXXX
Conductive Rip-Stop	Cu/Ni/Ag	0.015566	76.0	0.10	34.0	0.06	78	57T2A34200-XXXX
Conductive Rip-Stop	Cu/Ni/Fe	0.014951	73.0	0.09	33.0	0.06	63	57T2A64200-XXXX
Conductive Rip-Stop	Cu/Ni/Resin	0.014951	73.0	0.09	34.0	0.06	68	57T2A44200-XXXX
Conductive Non-Woven	Cu/Ni	0.013927	68.0	0.16	10.0	0.08	72	57T0A14206-XXXX
Conductive Non-Woven	Cu/Ni	0.024372	119.0	0.32	21.0	0.06	80	57T0A14201-XXXX
Conductive Non-Woven	Cu/Ni	0.024577	120.0	0.43	30.0	0.06	83	57T0A14202-XXXX
Conductive Mesh	Cu/Ni	0.005120	25.0	0.08	18.0	0.20	52	57T4014200-XXXX
Conductive Mesh	Cu/Ni/Resin	0.005523	27.0	0.08	19.0	0.10	53	57T4044200-XXXX
Conductive Mesh	Cu/Ni/Au	0.003072	15.0	0.08	17.0	0.10	57	57T4034200-XXXX
Aluminum				0.08		0.05		57T7A-4200-XXXX
Aluminum				0.08		0.07		57T7C-4200-XXXX
Copper				0.80		0.02		57T8A-4200-XXXX



Wire Mesh Gaskets

API's Spectrum Control brand mesh gaskets include all mesh gaskets and elastomer core mesh gaskets.

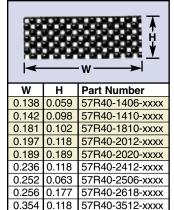
Layers of knitted wire are covered over the wire core in API's all mesh gaskets. Using its electrical conductivity, they are used between two surfaces to maintain electrical continuity while shielding electromagnetic waves. They offer good resilience and excellent heat and corrosion resistance. Any types of metal can be used to produce mesh gaskets but common materials used are aluminum, stainless steel and monel.



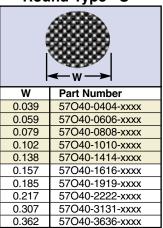
API's elastomer core mesh gaskets are composed of wire mesh over elastomer core. Both these materials provide excellent shielding effects creating the maximum outcome. Both all-mesh gaskets and Elastomer-core mesh gaskets can be produced with different types of materials and also in many different forms.

All Mesh Gaskets - Structure

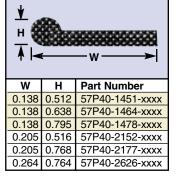
Rectangular Type "R"



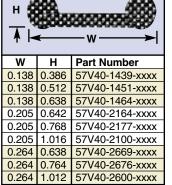
Round Type "O"



P-Type "P"



Double P-Type "V"

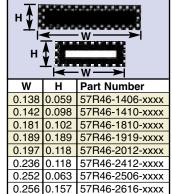


Elastomer Core Mesh Gaskets

P-Type "P"

H					
W	Н	Part Number			
0.138	0.512	57P46-1451-xxxx			
0.138	0.138 0.638 57P46-1464-xxxx				
0.138	0.795	57P46-1480-xxxx			
0.205	0.516	57P46-2152-xxxx			
0.205	0.768	57P46-2177-xxxx			
0.264	0.764	57P46-2676-xxxx			

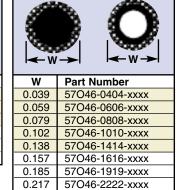
Rectangular Type "R"



0.256 0.177 57R46-2618-xxxx

0.354 0.118 57R46-3512-xxxx

Round Type "O"



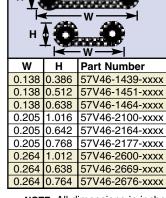
Double P-Type "V"

57O46-3131-xxxx

57O46-3636-xxxx

0.307

0.362



NOTE: All dimensions in inches



Conductive Elastomers

API's Spectrum Control line of conductive elastomers are composed of silicon rubber using its heat resistant property. Unique features of conductive elastomers include water resistance and elimination of static electricity, which is different from general foam gaskets. It also acts as an absorber at high frequency showing 60dB shielding at 30MHz ~ 10GHz.

Excellent electrical conductivity, grounding and shielding are provided. Due to its superior properties conductive elastomers are often used in military equipment. They can be produced in many forms such as sheets, molded parts, die-cuts or strips.

Typical Properties of Silicone Gaskets

Material	Conductive Silicone (Rubber) Gasket
Hardness Shore Micro	97-5
Volume Resistivity ohms	5-10
Elongation %	240
Tensile Strength Mpa	4.43
Tear Resistance KN/m	10.4
Texture and Color	Black or Beige
Specific Gravity	1.39
Temperature Range	-55 to +200

Part Number	ID Size	OD Size	Туре	Profile
57A99-0606-xxxx	0.019	0.059	Hollow	Α
57A99-0909-xxxx	0.039	0.091	Hollow	Α
57A99-2828-xxxx	0.196	0.276	Hollow	Α
57D98-2525-xxxx	W:0.250	H:0.250	D-Tubing	D
57H98-3022-xxxx	W:0.295	H:0.217	Channel	Н
57O98-1414-xxxx		0.138	O-Profile	0
57P98-9830-xxxx	W:0.984	H:0.295	P-Shape	Р

NOTE: All dimensions in inches



