

# VACUUM EVAPORATION EQUIPMENT & SUPPLIES

*Vacuum Pumps, Grease, Oil, Hose, Fittings, Valves, Filaments, Boats & Wire*



Vacuum Pump Oils, Fluids & Cleaning Supplies



Heavy Duty & Compact Rotary Vane Pumps



Dry Scroll Vacuum Pumps



Foreline Traps & Exhaust Filters



OC® (Oxygen Compatible) Pastes, Greases & Sealers



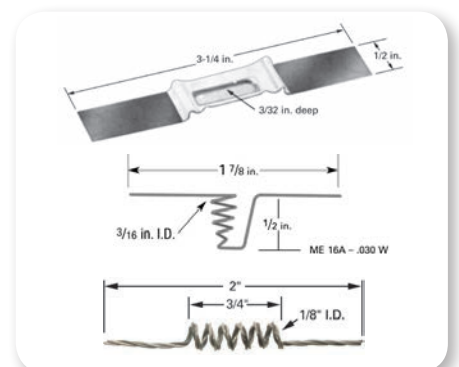
Apiezon® Greases, Sealing Compounds & Waxes



NW/KF Wing Nut Clamps, Connectors & Centering Rings



PELCO® NW/KF Ball Valves, Hoses & Adapters



Tungsten Boats, Baskets & Filaments

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 **TED PELLA, INC.**  
Microscopy Products for Science and Industry

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## VACUUM SUPPLIES

Dual Stage, Rotary Vane, Vacuum Pumps



Model 100-3.5  
(92080)



Model 200-7.0  
(92081)



Model 400-14  
(92082 / 92082-220)

### RVP SERIES DUAL STAGE, ROTARY VANE, VACUUM PUMPS

The RVP Series line of quality rotary vane pumps will meet your demands for high pumping speed combined with high ultimate vacuum. These dual stage rotary vane pumps are reliable, efficient and competitively priced. High quality engineering has resulted in corrosive-resistant pumps with a compact design coupled to quiet and low vibration operation.

These pumps are ideally suited for many applications in labs and small production systems such as analytical instruments, electron microscopes, sputter coaters, carbon coaters, vacuum deposition systems, freeze drying, vacuum ovens and furnaces, or as backing pumps for high vacuum turbo or diffusion pumps.

### Features Overview

- 6m<sup>3</sup>, 12m<sup>3</sup> and 24m<sup>3</sup> pumping capacity
- Extremely quiet operation
- Virtually vibration free
- Compact design
- Corrosion resistant
- Anti suck-back design
- Multiple voltage motors

### SPECIFICATIONS

Model	RVP 100-3.5	RVP 200-7.0	RVP 400-14
Product Number	92080	92081	92080 / 92082-220
Pumping Speed @60Hz	100 ltr/min, 3.5cfm, 6m <sup>3</sup> /hr	200 ltr/min, 7.1cfm, 12m <sup>3</sup> /hr	400 ltr/min, 14.1cfm, 24m <sup>3</sup> /hr
Noise Level, dB	50	50	52
Ultimate Pressure	≤1 x 10 <sup>-3</sup> Torr (1.3 x 10 <sup>-1</sup> Pa)		
Ultimate Pressure w/gas ballast	5 x 10 <sup>-2</sup> Torr (6.7 Pa)		
Intake and Exhaust Connection	Tee/Handle: NW25 Hose Nipple: ø12, ø16, ø26 OD for NW25 / ø36 OD for NW40 PT Nipple: 1/4", 3/8", 1/2", 1" for NW25		
Oil Capacity	500cc	600cc	1500cc
Oil Type	PELCO® Ultra 19	PELCO® Ultra 19	PELCO® Ultra 19
Full Load Power (kw)	0.4 (0.5HP)		0.75 (1HP)
Power Rating, kw	115VAC 1ø 50/60Hz 230VAC 1ø 50/60Hz		230/380VAC 1ø 50/60Hz
Weight, net	23 kg (51 lb)	23 kg (51 lb)	>35 kg (77 lb)
Ambient Operating Temperature	7° to 40° C (45° to 104° F)		

92080	Rotary Vane Pump RVP 100-3.5, 6m <sup>3</sup> /hr, 115volts, 50/60Hz.....	each
92080-220	Rotary Vane Pump RVP 100-3.5, 6m <sup>3</sup> /hr, 230volts, 50/60Hz.....	each
92081	Rotary Vane Pump RVP 200-7.1, 12m <sup>3</sup> /hr, 115volts, 50/60Hz.....	each
92081-220	Rotary Vane Pump RVP 200-7.1, 12m <sup>3</sup> /hr, 230volts, 50/60Hz.....	each
92092	Rotary Vane Pump RVP 400-14.1, 24m <sup>3</sup> /hr, 115volts, 50/60Hz.....	each
92092-220	Rotary Vane Pump RVP 400-14.1, 24m <sup>3</sup> /hr, 230/380volts, 50/60Hz.....	each
12938-3	Polypropylene Funnels, set of three with 2, 4 and 8 oz.....	each
808-16	Cotton Shop Cleaning Towels, Blue, 14" x 14".....	10/pk



Model VRP-16  
(92079 / 92079-230)

Model VRP-8  
(92078 / 92078-230)

Model VRP-4  
(92074 / 92074-230)

## VRP SERIES HEAVY DUTY ROTARY VACUUM PUMPS

The VRP series line of dual stage rotary vacuum pumps combine high performance with excellent value. These reliable, heavy duty vacuum pumps include an integrated cylinder structure design, an innovative forced oil circulation system, automatic oil anti suck-back valve and adjustable gas ballast. Suitable for a wide variety of application in research, science and industry. These pumps can be used for analytical systems, backing pumps, vacuum ovens, crystal vacuum coating, sputtering systems, plasma cleaning, freeze drying, electron microscopes and backing pumps for turbo pumps, diffusion pumps and roots pumps. Due to excellent build quality, the VRP pumps exhibit low vibration and quiet operation. Available with 4, 8 and 16m<sup>3</sup>/hr pumping capacity.

### Features Overview

- 4m<sup>3</sup>, 8m<sup>3</sup> and 16m<sup>3</sup> pumping capacity
- Reliable, robust pumps
- Quiet operation
- Low vibration
- Anti suck-back design
- Excellent value

## SPECIFICATIONS

Model	VRP-4	VRP-8	VRP-16
Product Number	92074 / 92074-230	92078 / 92078-230	92079 / 92079-230
Pumping Speed @60Hz	80 ltr/min, 2.8cfm, 4.8m <sup>3</sup> /hr	160 ltr/min, 5.6cfm, 12m <sup>3</sup> /hr	320 ltr/min, 11.3cfm, 24m <sup>3</sup> /hr
Pumping Speed @50Hz	66.7 ltr/min, 2.35cfm, 4.1m <sup>3</sup> /hr	133.3 ltr/min, 4.7cfm, 10m <sup>3</sup> /hr	266.7 ltr/min, 9.4cfm, 20m <sup>3</sup> /hr
Ultimate Part. Pressure	5 x 10 <sup>-4</sup> mbar	5 x 10 <sup>-4</sup> mbar	4 x 10 <sup>-4</sup> mbar
Ultimate Total Pressure	5 x 10 <sup>-3</sup> mbar	5 x 10 <sup>-3</sup> mbar	4 x 10 <sup>-3</sup> mbar
Intake and Exhaust Connection	KF16 / KF16	KF25 / KF25	KF25 / KF25
Oil Type	PELCO® Ultra 19	PELCO® Ultra 19	PELCO® Ultra 19
Oil Capacity	0.6 - 1.0 liters	0.6 - 1.0 liters	0.9 - 1.5 liters
Power Supply	Single Phase 115V or 230V	Single Phase 115V or 230V	Single Phase 115V or 230V
Power Rating	0.40kW	0.40kW	0.75kW
Motor Speed @ 60Hz	1720 rpm	1720 rpm	1720 rpm
Motor Speed @ 50Hz	1440 rpm	1440 rpm	1440 rpm
Ambient Operating Temperature	5° to 40°C (41° to 104°F)	5° to 40°C (41° to 104°F)	5° to 40°C (41° to 104°F)
Noise Level	≤56dB	≤56dB	≤58dB
Weight	19kg (41.8lb)	21kg (46.2lb)	30kg (66lb)
Dimensions (L x W x H)	460 x 144 x 230mm (18.1 x 5.7 x 9.1")	460 x 144 x 230mm (18.1 x 5.7 x 9.1")	520 x 188 x 272mm (20.5 x 7.4 x 10.7")

92074	VRP-4 Dual Stage Rotary Vacuum , 4.8 m <sup>3</sup> /h, 115V .....	each
92074-230	VRP-4 Dual Stage Rotary Vacuum , 4.0 m <sup>3</sup> /h, 230V .....	each
92078	VRP-8 Dual Stage Rotary Vacuum , 9.6 m <sup>3</sup> /h, 115V .....	each
92078-230	VRP-8 Dual Stage Rotary Vacuum , 8.0 m <sup>3</sup> /h, 230V .....	each
92079	VRP-16 Dual Stage Rotary Vacuum , 19.2 m <sup>3</sup> /h, 115V .....	each
92079-230	VRP-16 Dual Stage Rotary Vacuum , 16 m <sup>3</sup> /h, 230V .....	each

## VACUUM EQUIPMENT

### Value Series VRI Compact Rotary Pumps



Model VRI-2  
(92092 / 92092-230)



Model VRI-4  
(92089 / 92089-230)



Model VRI-8  
(92098 / 92098-230)

## VALUE VRI SERIES COMPACT ROTARY VACUUM PUMPS

The Value VRI series dual stage rotary vacuum pumps are compact, lightweight, and cost efficient. Ideally suited for a variety of light duty laboratory, research and production vacuum applications. They are equipped with an active solenoid valve to prevent oil suck-back. Available with pumping speeds of 2, 4 or 8m<sup>3</sup>/hr with an ultimate pressure of 10<sup>-2</sup> mbar. Applications include laboratory vacuum equipment, air-out systems, vacuum desiccator, backing pump, coating systems, small freeze drying/vacuum food packaging and vacuum molding systems. Excellent specifications, good quality with a low cost. Low weight for easy handling.

## SPECIFICATIONS

Model	VRI-2	VRI-4	VRI-8
Product Number	92092 / 92092-230	92089 / 92089-230	92098 / 92098-230
Pumping Speed @60Hz	35 ltr/min, 1.25cfm, 2.1m <sup>3</sup> /hr	72 ltr/min, 2.5cfm, 4.3m <sup>3</sup> /hr	143 ltr/min, 5.0cfm, 8.6m <sup>3</sup> /hr
Pumping Speed @50Hz	30 ltr/min, 1.05cfm, 1.8m <sup>3</sup> /hr	60 ltr/min, 2.1cfm, 3.6m <sup>3</sup> /hr	120 ltr/min, 4.2cfm, 7.2m <sup>3</sup> /hr
Ultimate Part. Pressure	1 x 10 <sup>-3</sup> mbar	1 x 10 <sup>-3</sup> mbar	1 x 10 <sup>-3</sup> mbar
Ultimate Total Pressure	1 x 10 <sup>-2</sup> mbar	1 x 10 <sup>-2</sup> mbar	1 x 10 <sup>-2</sup> mbar
Intake and Exhaust Connection	KF16 / KF16	KF16 / KF16	KF16 / KF16
Oil Type	PELCO® Ultra 19 (Prod. No. 891-31)	PELCO® Ultra 19 (Prod. No. 891-31)	PELCO® Ultra 19 (Prod. No. 891-31)
Oil Capacity	0.2 liters	0.3 liters	0.5 liters
Power Supply	Single Phase 115V or 230V	Single Phase 115V or 230V	Single Phase 115V or 230V
Power Rating	0.25kW	0.37kW	0.55kW
Motor Speed @ 60Hz	1720 rpm	1720 rpm	1720 rpm
Motor Speed @ 50Hz	1440 rpm	1440 rpm	1440 rpm
Ambient Operating Temperature	5° to 40°C (41° to 104°F)	5° to 40°C (41° to 104°F)	5° to 40°C (41° to 104°F)
Noise Level	≤62dB	≤62dB	≤65dB
Weight	9kg (19.8lb)	11kg (24.2lb)	17kg (37.4lb)
Dimensions (L x W x H)	318 x 124 x 234mm (12.5 x 4.9 x 9.2")	337 x 138 x 244mm (13.3 x 5.4 x 9.6")	395 x 145 x 257mm (15.6 x 5.7 x 10.1")

92092	VRI-2 Dual Stage Rotary Vacuum , 2.1 m <sup>3</sup> /h, 115V .....	each
92092-230	VRI-2 Dual Stage Rotary Vacuum , 1.8 m <sup>3</sup> /h, 230V .....	each
92089	VRI-4 Dual Stage Rotary Vacuum , 4.3 m <sup>3</sup> /h, 115V .....	each
92089-230	VRI-4 Dual Stage Rotary Vacuum , 3.6 m <sup>3</sup> /h, 230V .....	each
92098	VRI-8 Dual Stage Rotary Vacuum , 8.6 m <sup>3</sup> /h, 115V .....	each
92098-230	VRI-8 Dual Stage Rotary Vacuum , 7.2 m <sup>3</sup> /h, 230V .....	each



IDP-3  
(92085/92085-220)



SH-110  
(92086/92086-220)

## DRY SCROLL VACUUM PUMPS

The oil-free technology of dry scroll pumps eliminates the possibility of oil contamination in the vacuum system or in the environment around the rotary pump. No need to check oil, change oil and/or oil mist filters thus decreasing operation costs. Compared to diaphragm pumps, dry scroll pumps provide a vacuum around a magnitude providing much better compatibility with turbo pumps. Both the IDP-3 and SH-110 are affordable, compact high-performance pumps, which are relatively quiet and very suitable for laboratory type applications.

See next page for product details.

## IDP-3 DRY SCROLL VACUUM PUMP

The IDP-3 Dry Scroll Pump is an innovative, compact, high-performance, oil-free vacuum pump that is suitable for a wide variety of applications. It is one of the smallest scroll pumps made for general vacuum applications and can be easily integrated in existing systems. With a pumping speed of 60 ltr/min (3.6m<sup>3</sup>/hr, 2.1 cfm), low base pressure of 250 millitor (3.3 x 10<sup>-1</sup>mbar) and a weight of only 21 lb (9.5kg), it is a high performance pump with impressive specifications. The IDP-3 can be used to back small turbo pumps with drag stages or other vacuum lab equipment. Inlet connection is a standard NW16 KF flange. Ideal to upgrade system with a small oil-filled rotary pump to dry pumping systems (such as the Cressington 208HR). Available in 115 and 230 VAC versions.

92085	IDP-3 Dry Scroll Pump 60ltr/min, 3.6m <sup>3</sup> /hr, 1.8cfm, 115VAC/60Hz .....	each
92085-220	IDP-3 Dry Scroll Pump 60ltr/min, 3.6m <sup>3</sup> /hr, 1.8cfm, 230VAC/60Hz .....	each
92085-30	Tip Seal Kit for IDP-3 Pump.....	each

## SH-110 DRY SCROLL VACUUM PUMP

The SH-110 is a dry, hermetic scroll pump that combines a high pumping speed with a low ultimate vacuum in an impressive package. The SH-110 has a universal motor for 100-230 VAC for easy installation in existing systems. Pumping speed is 110 ltr/min (6.6m<sup>3</sup>/hr, 4 cfm) with an ultimate pressure of 50 millitor (6.6 x 10<sup>-2</sup> mbar) and can be used to back up turbo pumps compatible with that pumping speed. Inlet connection is standard NW25 KF flange.

92086	SH-100 Dry Scroll Vacuum Pump 110ltr/min, 6.6m <sup>3</sup> /hr, 4cfm, 60Hz.....	each
92086-30	Tip Seal Kit for SH-100 Pump .....	each

## SPECIFICATIONS

Model	IDP-3	SH-110
Product Number	92085 / 92085-220	92086
Peak Pumping Speed (60Hz)	60L/m, 3.6m <sup>3</sup> /hr, 2.1cfm	110L/m, 6.6m <sup>3</sup> /hr, 4cfm
Peak Pumping Speed (50Hz)	50L/m, 3.0m <sup>3</sup> /hr, 1.8cfm	90L/m, 5.4m <sup>3</sup> /hr, 3.3cfm
Ultimate Pressure	2.5 x 10 <sup>-1</sup> torr (3.3 x 10 <sup>-1</sup> mbar)	5.0 x 10 <sup>-2</sup> torr (6.6 x 10 <sup>-2</sup> mbar)
Maximum Inlet Pressure	1 atmosphere (0 psig)	1 atmosphere (0 psig)
Maximum Outlet Pressure	1.4 atmosphere (6.5 psig)	1.5 atmosphere (7.5 psig)
Inlet Connection	NW16 KF flange	NW25 KF flange
Exhaust Connection	1/4" female nat'l pipe thread (10mm hose barb provided)	1/4" female nat'l pipe thread
Exhaust Connection Adapter	NW16 KF adapter provided	NW16 KF adapter provided
Gas Ballast Connection	1/8" female nat'l pipe thread	1/8" female nat'l pipe thread
Ambient Operation Temperature	5 to 45°C (41 to 113°F)	5 to 45°C (41 to 113°F)
Storage Temperature	-20 to 60°C (-4 to 140°F)	-20 to 60°C (-4 to 140°F)
Motor Rating	0.16 horsepower (0.12 kW)	0.25 horsepower (0.19 kW)
Supply Power	1 phase, 50-60 Hz, 100-115/200-240 VAC	1 phase, 50-60 Hz, 100-115/200-230 VAC
Motor Thermal Protection	Automatic	Automatic
Rotation Speed	3200 RPM at 60 Hz / 2600 RPM at 50 Hz	1725 RPM at 60 Hz / 1425 RPM at 50 Hz
Cooling	Air-cooled	Air-cooled
Weight	9.5 kg (21 lb)	19.5 kg (43 lb)
Size	384 x 140 x 181mm (LxWxH) 15.12" x 5.51 x 7.13"	384 x 258 x 258mm (LxWxH) 15.12" x 10.16 x 10.16"
Shipping Weight	10.5 kg (23 lb)	19.5 kg (43 lb)
Restrictions	No corrosive, explosive, or particulate-forming gases	No corrosive, explosive, or particulate-forming gases
Leak Rate (exhaust sealed)	<1 x 10 <sup>-6</sup> std-cc/sec helium	<1 x 10 <sup>-7</sup> std-cc/sec helium
Compliances	Conforms with CE, CSA, CSA/CUS, Semi S2-703, and RoHS	Conforms with CE, CSA, and Semi S2-2000

## VACUUM SUPPLIES

Foreline Traps; Exhaust Filters; PELCO® Activated Alumina Sorbent; Compact Oil Mist Eliminator



### FORELINE TRAPS

Highly recommended to prevent oil backstreaming from rotary vane pumps. Keeps your vacuum system clean in applications where pumps are running constantly such as mass spectrometer, electron microscope, and vacuum drying systems. Protect vacuum gauges

when mounted in front of the gauges. Includes a 150ml Activated Alumina charge (renew the charge every 3 months with Prod. No. 92090-50). These compact, reliable and efficient foreline traps offer maximum mounting flexibility.

#### Features Overview

- Orientation in any direction - spring-loaded sorbent basket
- Positive creep-proof design with O-ring seal
- Suitable for pumps up to 34m<sup>3</sup>/hr, 20cfm, 550 ltr/min
- Leak tested to better than 2 x 10<sup>-9</sup> scc/sec
- Available in both right angle and inline design
- Available with both NW/KF 16 and NW/KF 25 flanges
- No tools needed for easy sorbent replacement
- Aluminum body and sorbent basket, 316 SS spring

92090-10	Inline Style Foreline Trap NW16.....	each
92090-20	Inline Style Foreline Trap NW25.....	each
92090-30	Right Angle Foreline Trap NW16.....	each
92090-40	Right Angle Foreline Trap NW25.....	each



### PELCO® ACTIVATED ALUMINA SORBENT FOR FORELINE TRAPS

The activated alumina sorbent is used in foreline traps to prevent backstreaming from rotary pumps or to shield vacuum gauges from contamination. PELCO® Activated Alumina Sorbent can be used in foreline traps from VRL, BOC-Edwards, Alcatel/Adixen, Varian, Leybold, Sargent-Welch, Ulvac and other brands. The

small pores (2-50nm) and the non-uniform pore distribution in the PELCO® Activated Alumina Sorbent provide the large surface area of 350m<sup>2</sup>/gram.

With this large internal surface area, the activated alumina sorbent attracts and holds gas molecules to which it is exposed. PELCO® Activated Alumina Sorbent is activated at 350°C (662°F) to less than 1% water and it is capable of holding 43% water (by weight) or in the foreline trap application, oil. The relatively uniform 1/4" diameter size makes it ideally suited for charging perforated mesh canisters as used in foreline traps.

Also recommended for drying gases and refrigerants and for applications where extremely low dew points are desirable.

Packed in a 450ml metal can with sealed lid.

92090-50	PELCO® Activated Alumina Sorbent, 450ml.....	each
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### EXHAUST FILTER ADAPTER

NW/KF 25 to 1/2" NPT, stainless steel. For use with pump model 100-3.5 (Product No. 92080).

92466-25	Exhaust Filter Adapter, NW/KF 25 to 1/2" NPT .....	each
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### COMPACT OIL MIST ELIMINATOR

Compact Oil Mist Eliminator with KF25 connection and 1/8" drain plug. Max flow rate 10 CFM (5 ltr/sec or 16m<sup>3</sup>/hr (suitable for #92078, 92879, 92080, 92081, 92082, 92035 and 92035-220). Baked enamel steel housing, Ø89 x 127mm H (Ø3.5" x 5" H). Use replacement filter #92066-10.

92066	Compact Oil Mist Eliminator and Cartridge, NW/KF 25..each
92066-10	Replacement Filter Cartridge for Oil Mist Eliminator.....each



### EXHAUST FILTER FOR SMALL ROTARY VACUUM PUMPS, 1/4" NPT

*Mist Eliminators*

Filter for removing oil mist from vacuum pump exhaust in Prod. No. 7010, 7010-220, 91020 and 91020-230 Rotary Pumps or other rotary vane pumps with NW/KF 16 output flange, such as the Pfeiffer Duo 2.5 and Uno 5.0 vacuum pumps. Creates a cleaner work environment for operators and surrounding equipment. Connection: 1/4" NPT thread. With 92465-16, fits VRI-2, VRI-4 & VRI-8.

9609	Exhaust Filter for Rotary Pumps.....	each
92465-16	NW/KF 16 Adaptor to 1/4" Female NPT, 304 Stainless Steel, A=16mm, B=19mm .....	each



### EXHAUST FILTER FOR VACUUM ROTARY VANE PUMPS, 1/2" NPT

*Mist Eliminators*

Permits discharge into clean work areas. Return collected oil to sump or discard. Rugged construction, simple installation. For non-hazardous, non-corrosive applications. For RVP 100-3.5, VRP-8, Edwards RV5 or similar. Connection: 1/2" NPT.

92060	Exhaust Filter, Max Flow Rate 3cfm, 1/2" NPT (e.g., Edwards E2M2 or RV5 #92033/92033-220), Including Adapter. 1/2" Female NPT to 3/4" BSPT with 1/4" NPT Plug .....	each
92061	Exhaust Filter, Max Flow Rate 3cfm (e.g., RVP 100-3.5 #92080; Edwards E2M2 or RV5 #92033/92033-220), without adapter, 1/2" NPT thread .....	each

### TWO-STAGE VACUUM PUMP EXHAUST FILTER KIT

For rotary vacuum pumps it is recommended that they should be vented outside the room or to a laboratory exhaust hood to prevent indoor air contamination. This two-stage vacuum pump exhaust filter kit enables venting rotary pumps in rooms where an outside line is either not practical or possible. The two stage filters contain a replaceable oil mist eliminator element to trap vacuum oil and a replaceable activated charcoal element for the lighter hydrocarbon fractions.

#### Features Overview

- Provides a safe lab environment
- Purifies vacuum exhaust gases
- Separate replaceable elements for oil mist and lighter fractions
- Only 6¼" tall with standard NW/KF connection
- Low cost solution

It is recommended that both filters are replaced on a regular basis. For applications such as electron microscopes and mass spectrometers, the oil mist filter (Product No. 92066-10) needs to be replaced every 4 – 6 months and the final activated charcoal filter (Product No. 92068-20) once a month. Rated for vacuum pumps up to 10cfm (5ltr/sec or 16m³/hr). Suitable for #92081, 92082, 92035, 92035-220.



92068	Two-Stage Vacuum Pump Exhaust Filter Kit, NW/KF 25 .....	each
92068-20	Replacement Activated Charcoal Filter Element for #92068 .....	each
92066-10	Replacement Oil Mist Eliminator Cartridge for #92068 .....	each

### ULTRAGRADE 19 VACUUM PUMP OIL

Mineral oil derivative ideally suited for mechanical rotary vacuum pumps. Light end fractions are removed through molecular distillation resulting in lower vapor pressures and reduced backstreaming compared to undistilled refinery products. Offers reduced maintenance costs, longer fluid life and cooler running. Suitable for single and dual rotary vane pumps from VRL, Edwards, Alcatel, Adixen, Varian, Agilent, Leybold, Oerlikon, Sargent-Welch, Ulvac, Ilmvac and other brands. Indefinite shelf life when stored in unopened container at ambient temperatures out of direct sunlight.



891-35	Ultragrade 19 Rotary Pump Oil.....	1 liter
891-36	Ultragrade 19 Rotary Pump Oil.....	4 liters

### PELCO® ULTRA 19 VACUUM PUMP OIL

Premium quality vacuum pump oil for single and dual stage rotary pumps. Extra refined for increased lubrication, enhanced sealing and reduced backstreaming. Excellent oil for rotary backing pumps on high vacuum systems, electron microscopes and mass spectrometers. PELCO® Ultra 19 vacuum pump oil is suitable for our VRP, RVP and VRI rotary vane pumps. Compatible



with rotary vane pumps from Edwards, Adixen, Alcatel, Varian, Agilent, Leybold, Oerlikon, Ulvac, Sargent-Welch, Ilmvac and other brands. Fully comparable with Edwards Ultragrade 19 and Inland 19 rotary pump oil. Great cost savings compared to more expensive brand products. Indefinite shelf life when stored in unopened container at ambient temperatures out of direct sunlight.

891-31	PELCO® Ultra 19 Vacuum Pump Oil.....	1 liter
891-34	PELCO® Ultra 19 Vacuum Pump Oil.....	1 gallon

### PFEIFFER P3 VACUUM PUMP OIL

Clear, monograde oil that has the correct viscosity for Pfeiffer rotary vacuum pumps, excellent sealing and lubrication properties, low vapor pressure and reduced back streaming. Used also for Product No. 7010 and 7010-220 rotary pumps. Indefinite shelf life when stored in unopened container at ambient temperatures out of direct sunlight.



891-38	Pfeiffer P3 Vacuum Pump Oil.....	1 liter
891-25	Pfeiffer P3 Vacuum Pump Oil.....	20 liters

### POLYPROPYLENE FUNNELS (SET OF 3)

Polypropylene funnels; useful when filling a vacuum pump with oil or draining the oil from the pumps. Lightweight and durable. Set of three with 2, 4 and 8 oz. capacity.



12938-3	Polypropylene Funnels, Set of Three (2, 4, 8 oz.) .....	set/3
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### COTTON SHOP CLEANING TOWELS

Heavyweight cotton shop cleaning towels are highly absorbent and economical. Preferred rags for cleaning oils and grease or cleaning large areas. Ideal for cleaning up after oil changes on vacuum pumps, repairs or when oil drips out of the mist filter. 14% recycled cotton yarn blended with 86% new cotton. These blue cotton rags are pre-washed, soft, surged edges, low lint, heavyweight quality. Size is approximately 14" x 14" after washing. Sold in packs of 10.



808-16	Cotton Shop Cleaning Towels, Blue, 14" x 14" .....	pkg/10
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## VACUUM SUPPLIES

Vacuum Pumping Fluid; Diffusion Pump Oil; Flux Remover/Degreaser & Apiezon® Greases



### KRYTOX® 1525 VACUUM PUMPING FLUID

Krytox® Perfluorinated Polyether (PFPE) inert vacuum pump fluid for corrosive and oxygen applications. Chemically inert pumping fluid with excellent lubrication properties. used in chemical resistant pumps as used in plasma cleaning systems.

891-42 Krytox® 1525 Vacuum Pumping Fluid, 1kg.....each



### LION S DIFFUSION PUMP OIL

Lion S diffusion pump oil is a high quality alkyl naphthalene based diffusion pump oil, especially developed for applications such as electron microscopes, mass spectrometers and small vacuum systems. Recommended for TEMs and SEMs made by Hitachi, JEOL and ISI/ABT/Topcon equipped with a diffusion pump. No need for lower grade substitutes, this is the original LION S diffusion pump oil, manufactured by the Lion Corporation, Japan. It has been and is still used in diffusion pumps used in instruments manufactured in Japan. Lion S diffusion oil has a high resistance against oxidation and works well with small and medium size diffusion pumps.

891-55 Lion S Diffusion Pump Oil, 100ml .....each  
891-56 Lion S Diffusion Pump Oil, 1000ml .....each



### SANTOVAC® 5 DIFFUSION PUMP OIL

Operates efficiently, economically and safely in diffusion pumps in properly designed systems to produce ultra-high vacuums in the 10<sup>-10</sup> torr range. A wide liquid range, low vapor pressure and balance of properties make it an ideal working fluid in diffusion pumps.

Extremely low vapor pressure results in low ultimate pressures. The vapor pressure of Santovac® 5 at 25°C is 4 x 10<sup>-10</sup> as determined by extrapolation from higher temperature data. Together with low backstreaming characteristics, 10<sup>-10</sup> torr vacuums can be obtained in well designed systems without the use of nitrogen traps. Shelf life in sealed amber bottle 30-40 years when stored at ambient temperatures.

Can be used for electronic component manufacture, laboratory, analytical, instrument and research applications. Santovac® 5 offers unusually high thermal and oxidation stability, with isotenscope tests showing thermal stability at 465°C (870°F). Oxidation and corrosion tests, and field experience have shown that Santovac® 5 has little tendency to increase in viscosity during use.

891-50 Santovac® 5 Diffusion Pump Oil, 100ml ..... each



### 3M™ NOVEC FLUX REMOVER / DEGREASER

3M™ Novec Flux Remover uses advanced solvent technology to remove a wide variety of solder fluxes used in electronics manufacturing and repair. It also has excellent degreasing properties for cleaning O-ring seal surfaces, O-ring grooves, vacuum sealing surfaces and oils and greases from surfaces. 3M™ Novec Flux Remover is non-flammable, non-ozone depleting and does not contain HCFCs, HFCs or HAPs. Excellent alternative for other harsh chemicals or solvents. Compatible with most metals and alloys.

80947 3M™ Novec Flux Remover/Degreaser, 12 oz. Can ..... each

FOR APIEZON® TECHNICAL NOTES INCLUDING PROPERTIES, VAPOR PRESSURE, TEMPERATURE AND APPLICATION SUGGESTIONS, VISIT

**www.tedpella.com**

### APIEZON® GREASES, SEALING COMPOUND & WAX

No silicones. Excellent general purpose vacuum grease. Fully soluble in hydrocarbon and chlorinated solvents. Shelf life, in original unopened container at ambient temperatures, is 10 years from date of manufacturing.

**Apiezon® L:** ultra high vacuum grease, silicone and halogen free  
**Apiezon® M:** high vacuum grease, silicone and halogen free  
**Apiezon® N:** cryogenic high vacuum grease, silicone and halogen free  
**Apiezon® T:** medium temperature vacuum grease, silicone free  
**Apiezon® H:** high temperature vacuum grease, silicone free  
**Apiezon® AP100:** ultra high vacuum lubricating grease, silicone free  
**Apiezon® AP101:** anti-seize vacuum grease, silicone free  
**Apiezon® Q:** sealing compound for leaks in lower vacuum range  
**Apiezon® W:** wax for permanent sealed joints at room temperatures, for low to medium vacuum range

891-2 Apiezon® Type L, 25g Tube .....each  
 891-104 Apiezon® Type L, 50g Tube .....each  
 891-144 Apiezon® Type L, 4kg Bulk.....each  
 891-1 Apiezon® Type M, 25g Tube.....each  
 891-12 Apiezon® Type M, 100g Tube.....each  
 891-101 Apiezon® Type M, 4kg Bulk .....each  
 891-4 Apiezon® Type N, 25g Tube .....each  
 891-120 Apiezon® Type T, 25g Tube .....each  
 891-3 Apiezon® Type H, 25g Tube .....each  
 891-152 Apiezon® Type AP100, 50g Tube .....each  
 891-160 Apiezon® Type AP101, 50g Tube .....each  
 891-162 Apiezon® Type AP101, 4kg Bulk.....each  
 891-75 Apiezon® Q Sealing Compound, 1kg.....each  
 891-81 Apiezon® W Wax, 100g .....each  
 891-85 Apiezon® W Wax, 500g .....each





**BRAYCOTE® MICRONIC 803 & 803 VACUUM GREASE**  
*Perfluoroether Greases, Wide Temperature Range; Low Volatility; Ultra-High Vacuum Applications*

Braycote® Micronic 803 is filtered for ultimate cleanliness. It will provide the kind of purity required for use with vacuum systems employing LaB<sub>6</sub> filaments. It is stable under high vacuum and has a temperature range of -63°C to 232°C (below -80°F to >499°F). 803 Micronic was developed for applications involving long-term exposure where high temperature or hard vacuum is expected. It is acceptable for clean room applications.

Standard Braycote® 803 has nearly the same specifications, withstands high temperatures and is used for hard vacuum. Both types exhibit excellent shelf life because of their inertness. They are white colored and odorless. Lubricity for both types is retained under these adverse conditions.

- 891-18 Braycote® 803 Vacuum Grease, 56g..... each
- 891-19 Braycote® Micronic 803 Vacuum Grease, 56g..... each
- 891-17 Braycote® Micronic 803 Vacuum Grease, 1 lb..... each



**CONDUCTIVE SILVER GREASE**

This conductive silver grease provides antistatic conductivity paired with excellent thermal conductivity between sliding surfaces. At the same time it provides protection from corrosion and moisture and reduces mechanical wear. Exhibits excellent lubrication properties and superb chemical resistance. Typical applications include lubrication of vacuum transfer rods (airlock on SEM), static grounding on seals or O-rings, heat dissipation and lubrication of switches and circuit breakers. Paste like consistency. Service temperature range is -50°C to 200°C (-58°F to 392°F). Packaging size is 7 grams in a syringe for easy application.

- 16052 Conductive Silver Grease, 7g..... each



**DOW CORNING® HIGH VACUUM GREASE**  
*High Vacuum Grease; General Lab Lubricant Use*

Dow Corning® High Vacuum Grease is a stiff, non-melting silicone lubricating material which has temperature range of -40°C to 200°C. Although it has a good stability at the higher end of the temperature range than most hydrocarbon greases, it shows a higher outgassing rate at room temperature. It can be used for high vacuum systems up to the 1x10<sup>-6</sup> mbar (1x10<sup>-6</sup> torr) range. Due to its initial outgassing, it is recommended to condition vacuum system before use. Not for use in electron microscopes. Also not recommended for use in evaporators which need to be Si free. Other applications include lubricant for glass stopcocks, glass joints, glass rubber connections and O-rings on binoculars. Shelf life is 60 months from date of manufacture for unopened containers and stored at normal warehouse conditions.

- 891-7 Dow Corning® High Vacuum Grease, 150g Tube ..... each



**PELCO BELL JAR KLEEN™**

A non-scratching polishing and cleaning compound specially formulated for glass and porcelain surfaces. Ideally suited for cleaning glass bell jars used on vacuum evaporators, vacuum chambers from sputter and carbon coaters and glass windows in large coating systems. Can be used on Corning®, Schott or Pyrex® glass. Also suitable to clean metal surfaces like stainless steel, aluminum and copper parts, but will scratch surfaces on soft metals. Main ingredient of this environmentally friendly product is calcium carbonate. Does not contain phosphorus, chlorines or dyes. Sold in 14 oz. container (395gram).

- 896 PELCO Bell Jar Kleen™, 14 oz. .... each



**CELVASEAL™ VACUUM LEAK SEALANT**

A specially engineered compound for sealing leaks in high vacuum systems that can repair leaks as large as 2 micro liters/second, even with the system under vacuum. Larger leaks can be repaired when the vacuum system is at atmosphere.

Available in two forms: spray (ozone safe) and fluid in a brush-on bottle. It has a low vapor pressure which makes it suitable for use in ultra high vacuum systems and withstands repeated temperature cycling from -200°C to 400°C (-328°F to 752°F). Steady weight loss of 1.6 x 10<sup>-8</sup> gr/cm<sup>2</sup>/hr, which is lower than most epoxy based systems. Can be used

at temperatures up to 300°C (572°F) continuously, and up to 400°C (752°F) for short periods. It has good adhesion to cryogenic temperatures and excellent electrical resistivity. Can be stored longer than 1 year at 25°C (77°F). Density is 1.14 gr/cm<sup>3</sup> and viscosity is 250-1000 cPs.

**Typical Applications for Celvaseal™ include:**

- Glass to metal seals, such as sensor pin feedthroughs
- Glass-Kovar joints
- UHV systems with small leaks on metal gaskets or high penetration welds
- Small leaks in glass vacuum systems
- Temporary repairs of small cracks in exposed gaskets
- Sealing hairline cracks in welds and brazed joints
- Thread sealant of fine pipe threads for mounting sensors and components to vacuum systems

**Average Curing Temperature Time**

- 400°C (752°F) 20-30 minutes
- 250°C (482°F) 60-70 minutes
- 230°C (446°F) 75-90 minutes
- Room temperature - Days

- 891-62 Celvaseal™ Aerosol Spray Can, 6 oz. .... each
- 891-63 Celvaseal™ Brush-on Bottle, 2 oz. .... each

## VACUUM SUPPLIES

Vacuum Sealant; Paste; Grease; Lubricant & PELCO® NW/KF Vacuum Connection Parts



### HYSOL® VACUUM SEALANT KIT

Hysol® Low Vapor-pressure Epoxy Resin Sealant seals small leaks on any type of vacuum system or component quickly and conveniently. It is a two component system resin, free of any solvents. It can be used at pressures of  $10^{-9}$  or below and at temperatures between

-45°C (-49°F) and +120°C (248°F) (baking temperature). It bonds well with many materials such as metals, ceramics and glass. Equivalent to Torr Seal® resin sealant. Kit contains tube of resin, tube of hardener, 10 mixing cups and 10 wooden stirring sticks.

891-60 Hysol® Vacuum Sealant Kit (79.3g Resin / 34g Hardener) ..each



### OXYGEN COMPATIBLE (OC®) THREAD SEALER & PASTE

The OC® Three PTFE Paste Joint and Thread Sealer is an oxygen-safe, aqueous based PTFE formulation. It is a homogenous white paste that penetrates thread convolutions more effectively than PTFE tape. Excellent anti-galling and anti-seize properties. Especially capable of sealing oxygen and acetylene cylinder valves.

Excellent vacuum grease for low and mid vacuum range (up to  $10^{-3}$  Torr /  $10^{-3}$  mbar range). Fully compatible with cryogenic applications; thermally stable from -240°C to +260°C (-400°F to +500°F). Very useful thread sealer / vacuum grease for laboratory applications. Supplied in practical 4 oz (113g) squeeze tube. Not suitable for wet conditions; for wet conditions use OC® Five (Product No. 890-5).

890-3 OC® Three Sealer and Grease, 4 oz..... each



### OXYGEN COMPATIBLE (OC®) PASTE & GREASE

The OC® Five paste and the OC® Seven grease are both blended, oxygen safe formulations consisting of fine PTFE particles and Halocarbon® oil, producing a superior sealant that is chemically inert and environmentally safe. OC® Five comes in the form of a (thicker paste), whereas OC® Seven comes in the form of a grease. They are both suitable for lubrication and sealing applications in high vacuum ( $10^{-7}$  Torr /  $10^{-7}$  mbar range).

Excellent thread and joint sealant in applications where exposure to oxygen, corrosive gases or harsh chemicals is probable.

Superior lubricant for O-rings, gaskets, bearings, stop cocks, cryo-application, gas valves, etc. Off-white, homogeneous formulation which is thermally stable from -240°C to +232°C (-400°F to +450°F). It is non-flammable, waterproof, odorless, non-toxic, non-migrating as well as anti-corrosive, anti-galling and anti-seize. Supplied in 2 oz (57g) container. Not recommended for aluminum to aluminum applications. Do not use with concentrated alkalis, fluorine or chlorine trifluorine.

890-5 OC® Five Paste, 2 oz..... each  
890-7 OC® Seven Grease, 2 oz..... each

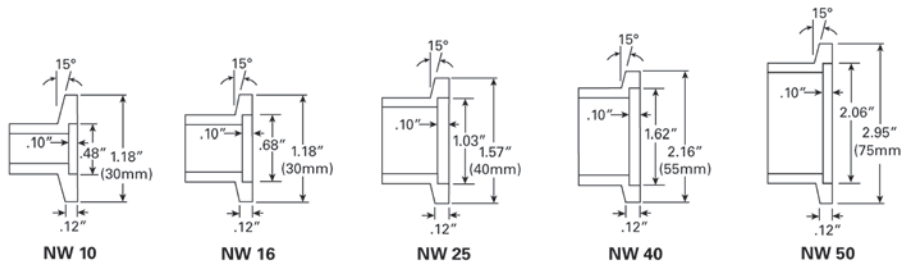


### MOLYDAG LUBRICANT 210

Molydag 210 is a colloidal dispersion of molybdenum disulfide in alcohol. It offers excellent lubrication properties, even under extreme pressures. The material is easily applied by brush, dip or spray methods to surfaces which are not affected by alcohol. It exhibits good adhesion to most substrates

and usually air dries in 5 - 10 minutes. Excess amounts should be avoided. Applications are sliders, rotary shafts, notches, locks and anti-seize thread lubricant. Can be used in small amounts for moving parts in vacuum (after drying). Sold in 30g brush bottle and 20g squeeze bottle.

16061 Molydag Lubricant 210 in Brush Bottle, 30g ..... each  
16061-20 Molydag Lubricant 210 in Squeeze Bottle, 20g..... each



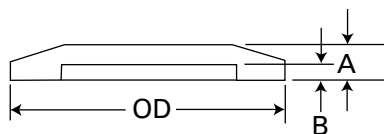
The NW/KF System Refers to the Internal Bore in mm	
	Internal Diameter
NW10	10mm
NW16	16mm
NW25	25mm
NW40	40mm
NW50	50mm
The terms NW, KF or QF all refer to the same standard quick release vacuum couplings.	

### PELCO® NW/KF STYLE VACUUM CONNECTION PARTS, FITTINGS, HOSES & FILTERS

The NW/KF style, quick release vacuum connections are the industry standard for vacuum components in the low and medium vacuum range and can be found on a variety of laboratory, production and test equipment. All PELCO® NW/KF style vacuum connections conform to the international ISO 2861/I standard. Many pumps and vacuum gauges use the standard NW/KF flanges for easy integration. Test systems can be readily and quickly built utilizing the large selection of NW/KF type components and can be easily modified for new tasks and applications. The PELCO® NW/KF style vacuum components are available in the standard NW16 to NW50, with some components available in the smaller NW10.

Continued on next page.

Blank Caps; Protection Caps; NW/KF Wing Nut Clamps; NW/KF Wing Bolt Clamps & Centering Rings



Dimension A = 5mm; B = 2.5mm  
on all blank caps

### STAINLESS STEEL & ALUMINUM BLANK CAPS

Used to blank off vacuum ports not being used. Can also be used for troubleshooting by blanking off sections to determine possible leaks.

#### NW Blank Caps in 304 Stainless Steel

92200-10	NW/KF 10 Blank Cap, 304 SS, OD=30mm	.....	each
92200-16	NW/KF 16 Blank Cap, 304 SS, OD=30mm	.....	each
92200-25	NW/KF 25 Blank Cap, 304 SS, OD=40mm	.....	each
92200-40	NW/KF 40 Blank Cap, 304 SS, OD=55mm	.....	each
92200-50	NW/KF 50 Blank Cap, 304 SS, OD=75mm	.....	each

#### NW Blank Caps in Aluminum

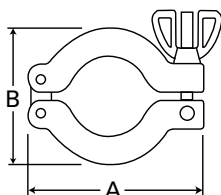
92202-10	NW/KF 10 Blank Cap, Aluminum, OD=30mm	.....	each
92202-16	NW/KF 16 Blank Cap, Aluminum, OD=30mm	.....	each
92202-25	NW/KF 25 Blank Cap, Aluminum, OD=40mm	.....	each
92202-40	NW/KF 40 Blank Cap, Aluminum, OD=55mm	.....	each



### PLASTIC PROTECTION CAPS

Used to protect NW/KF flanges from scratches and dust.

92250-16	NW/KF 16 Plastic Protection Caps	.....	pkg/10
92250-25	NW/KF 25 Plastic Protection Caps	.....	pkg/10
92250-40	NW/KF 40 Plastic Protection Caps	.....	pkg/10
92250-50	NW/KF 50 Plastic Protection Caps	.....	pkg/10

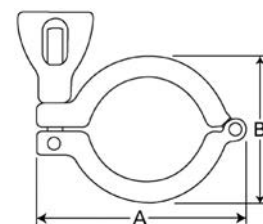


Thickness = 16.5mm on all Cast  
Aluminum Wing Nuts

### NW/KF WING NUT CLAMPS, CAST ALUMINUM

Cost efficient aluminum die cast clamp to connect standard NW/KF components. NW/KF 16 clamps can be used on NW/KF 10 flanges. This is the most popular wing nut clamp. Thread size: 10-32

92210-16	NW/KF 16 Wing Nut Clamp, A=62mm, B=42.5mm	.....	each
92210-25	NW/KF 25 Wing Nut Clamp, A=72.6mm, B=55mm	.....	each
92210-40	NW/KF 40 Wing Nut Clamp, A=89.5mm, B=69.5mm	.....	each
92210-50	NW/KF 50 Wing Nut Clamp, A=122mm, B=94mm	.....	each

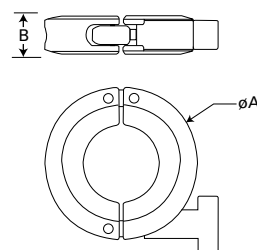


Thickness = 16.5mm on all  
Forged 304 SS Wing Nuts

### NW/KF WING NUT CLAMPS, FORGED 304 STAINLESS STEEL

Forged 304 stainless steel clamps are suitable for cleanroom environments. NW/KF 16 clamps can be used on NW/KF 10 flanges. Thread size: 5/16 x 18

92209-16	NW/KF 16 Wing Nut Clamp, A=58mm, B=34mm	.....	each
92209-25	NW/KF 25 Wing Nut Clamp, A=79mm, B=53.5mm	.....	each
92209-40	NW/KF 40 Wing Nut Clamp, A=93mm, B=66mm	.....	each
92209-50	NW/KF 50 Wing Nut Clamp, A=110mm, B=80mm	.....	each

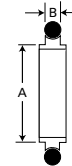


Thickness B = 16mm on all  
Machined Aluminum Wing Nuts

### NW/KF WING BOLT CLAMPS, PRECISION CNC MACHINED ALUMINUM

These clamps are precision machined from a solid bar of aluminum with stainless steel pins and stud. More compact and stronger than cast aluminum. NW/KF 16 can be used on NW/KF 10 flanges. Thread size: 1/4 x 20

92211-16	NW/KF 16 Wing Nut Clamp, A=49.5mm	.....	each
92211-25	NW/KF 25 Wing Nut Clamp, A=62.5mm	.....	each
92211-40	NW/KF 40 Wing Nut Clamp, A=75mm	.....	each
92211-50	NW/KF 50 Wing Nut Clamp, A=100mm	.....	each



Diameter B =  
5.3mm on all O-Rings

### NW/KF CENTERING RINGS, 304 STAINLESS STEEL WITH VITON® O-RING

Used to center and seal NW/KF flanges with o-ring. Viton® service temperature is 200°C max.

92220-10	NW/KF 10 Centering Ring w/Viton® O-Ring, A=10mm	.....	each
92220-16	NW/KF 16 Centering Ring w/Viton® O-Ring, A=16mm	.....	each
92220-25	NW/KF 25 Centering Ring w/Viton® O-Ring, A=25mm	.....	each
92220-40	NW/KF 40 Centering Ring w/Viton® O-Ring, A=40mm	.....	each
92220-50	NW/KF 50 Centering Ring w/Viton® O-Ring, A=50mm	.....	each

**VACUUM SUPPLIES**

**NW/KF Centering Rings & O-Rings**



**NW/KF CENTERING RINGS, 304 STAINLESS STEEL WITH 60 MESH SS SCREEN & VITON® O-RING**

Used on pumps and other applications where components need to be shielded from small particles entering.

- 92222-16M NW/KF 16 Centering Ring w/Viton® O-Ring, 60 Mesh SS Screen, 304 SS, A=16mm.....each
- 92222-25M NW/KF 25 Centering Ring w/Viton® O-Ring, 60 Mesh SS Screen, 304 SS, A=25mm.....each
- 92222-40M NW/KF 40 Centering Ring w/Viton® O-Ring, 60 Mesh SS Screen, 304 SS, A=40mm.....each
- 92222-50M NW/KF 50 Centering Ring w/Viton® O-Ring, 60 Mesh SS Screen, 304 SS, A=50mm.....each



**NW/KF CENTERING RINGS, 304 STAINLESS STEEL WITH FILTER & VITON® O-RING**

15 mesh stainless steel filter to protect pump intake.

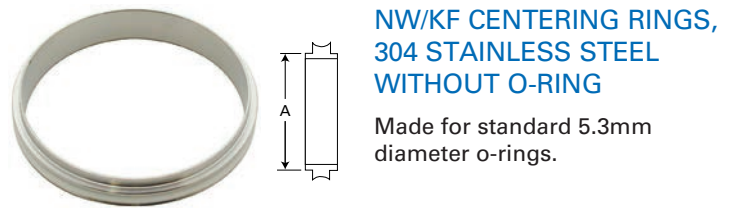
- 92224-16 NW/KF 16 Centering Ring w/15 Mesh SS Filter, 304 SS, A=16mm, C=21mm.....each
- 92224-25 NW/KF 25 Centering Ring w/15 Mesh SS Filter, 304 SS, A=25mm, C=21mm.....each



**NW/KF ADAPTIVE CENTERING RINGS, 304 STAINLESS STEEL WITH VITON® O-RING**

These adapter rings are used when less common (older) NW/KF 10, NW/KF 20 and NW/KF 32 flanges need to be connected to the standard NW/KF parts.

- 92225-1016 NW/KF 10-16 Adaptive Centering Ring w/Viton® O-Ring, 304 SS, A=17mm, B=12mm, C=10.....each
- 92225-2025 NW/KF 20-25 Adaptive Centering Ring w/Viton® O-Ring, 304 SS, A=26mm, B=22mm, C=20.....each
- 92225-3240 NW/KF 32-40 Adaptive Centering Ring w/Viton® O-Ring, 304 SS, A=41mm, B=34mm, C=32.....each



- 92223-16 NW/KF 16 Centering Ring, 304 SS, A=16mm.....each
- 92223-25 NW/KF 25 Centering Ring, 304 SS, A=25mm.....each
- 92223-40 NW/KF 40 Centering Ring, 304 SS, A=40mm.....each
- 92223-50 NW/KF 50 Centering Ring, 304 SS, A=50mm.....each



**O-RINGS FOR NW/KF CENTERING RINGS IN VITON®, SILICONE AND BUNA-N**

Depending on pressure on the O-ring, environment and service temperature, O-rings need to be renewed to ensure leak-free seals. Use the O-rings to service the NW/KF connections on your vacuum systems. O-rings are sold in packages of 10.

**Viton®** is used for high vacuum applications; max. temperature is 250°C.

**Silicone** is used for chemical applications; max. temperature is 220°C.

**Buna-N** is used for non-critical and low vacuum applications; max. temperature is 130°C.

*Viton® O-Rings*

- 92227-16V Viton® O-Ring for NW/KF 16, B=18.54..... pkg/10
- 92227-25V Viton® O-Ring for NW/KF 25, B=27.94..... pkg/10
- 92227-40V Viton® O-Ring for NW/KF 40, B=42.64..... pkg/10
- 92227-50V Viton® O-Ring for NW/KF 50, B=53.34..... pkg/10

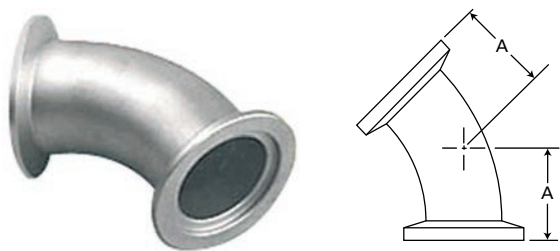
*Silicone O-Rings*

- 92228-16S Silicone O-Ring for NW/KF 16, B=18.54..... pkg/10
- 92228-25S Silicone O-Ring for NW/KF 25, B=27.94..... pkg/10
- 92228-40S Silicone O-Ring for NW/KF 40, B=42.64..... pkg/10
- 92228-50S Silicone O-Ring for NW/KF 50, B=53.34..... pkg/10

*Buna-N O-Rings*

- 92229-16B Buna-N O-Ring for NW/KF 16, B=18.54..... pkg/10
- 92229-25B Buna-N O-Ring for NW/KF 25, B=27.94..... pkg/10
- 92229-40B Buna-N O-Ring for NW/KF 40, B=42.64..... pkg/10
- 92229-50B Buna-N O-Ring for NW/KF 50, B=53.34..... pkg/10

For Product Details, Complete Selection of NW/KF Caps, Clamps & O-Rings:  
[www.tedpella.com/vacuum\\_html/NW-caps-rings.htm](http://www.tedpella.com/vacuum_html/NW-caps-rings.htm)



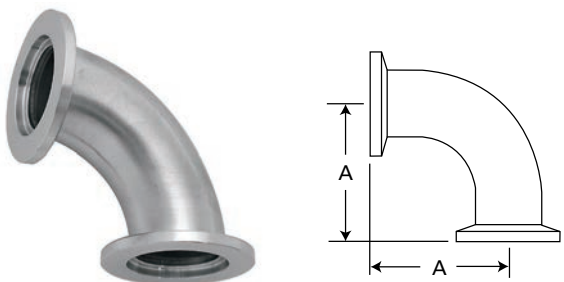
**NW/KF 45° ELBOW, 304 STAINLESS STEEL**

- 92301-16 NW/KF 16 45° Elbow, A=23mm ..... each
- 92301-25 NW/KF 25 45° Elbow, A=28.5mm ..... each
- 92301-40 NW/KF 40 45° Elbow, A=42.7mm ..... each
- 92301-50 NW/KF 50 45° Elbow, A=50.5mm ..... each



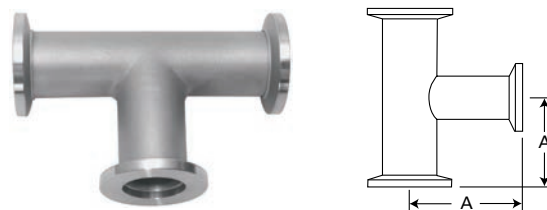
**NW/KF 90° REDUCING/ADAPTIVE ELBOW, 304 STAINLESS STEEL**

- 92306-2516 NW/KF 25-16 90° Reducing Elbow, A=40mm, B=40.4mm ..... each
- 92306-4016 NW/KF 40-16 90° Reducing Elbow, A=40mm, B=40.4mm ..... each
- 92306-4025 NW/KF 40-25 90° Reducing Elbow, A=40mm, B=40.4mm ..... each
- 92306-5016 NW/KF 50-16 90° Reducing Elbow, A=50mm, B=50.5mm ..... each
- 92306-5025 NW/KF 50-25 90° Reducing Elbow, A=50mm, B=50.5mm ..... each
- 92306-5040 NW/KF 50-40 90° Reducing Elbow, A=65mm, B=65.5mm ..... each



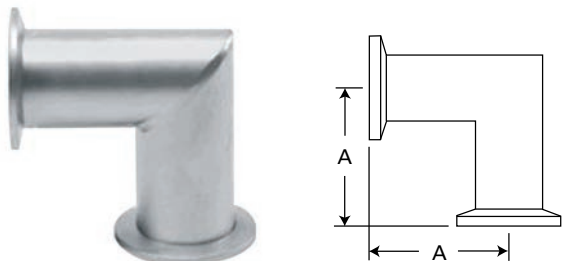
**NW/KF 90° ELBOW, 304 STAINLESS STEEL**

- 92300-16 NW/KF 16 90° Elbow, A=40.5mm ..... each
- 92300-25 NW/KF 25 90° Elbow, A=42mm ..... each
- 92300-40 NW/KF 40 90° Elbow, A=61.5mm ..... each
- 92300-50 NW/KF 50 90° Elbow, A=80mm ..... each



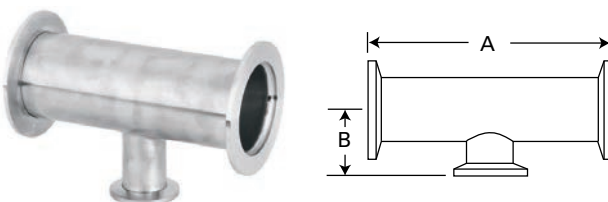
**NW/KF EQUAL TEE, 304 STAINLESS STEEL**

- 92320-16 NW/KF 16 Equal Tee, A=40mm..... each
- 92320-25 NW/KF 25 Equal Tee, A=51mm..... each
- 92320-40 NW/KF 40 Equal Tee, A=61mm..... each
- 92320-50 NW/KF 50 Equal Tee, A=80mm..... each



**NW/KF 90° MITERED ELBOW, 304 STAINLESS STEEL**

- 92302-16 NW/KF 16 90° Mitered Elbow, A=40mm ..... each
- 92302-25 NW/KF 25 90° Mitered Elbow, A=50mm ..... each
- 92302-40 NW/KF 40 90° Mitered Elbow, A=65mm ..... each
- 92302-50 NW/KF 50 90° Mitered Elbow, A=80mm ..... each



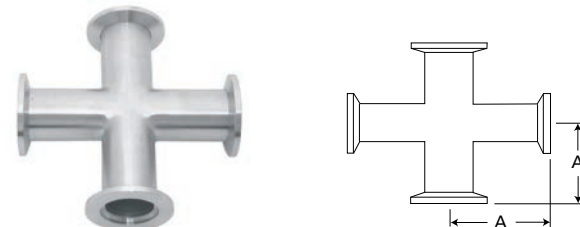
**NW/KF REDUCING TEE, 304 STAINLESS STEEL**

- 92322-2516 NW/KF 25-16 Reducing Tee, A=100mm, B=43mm ..... each
- 92322-4016 NW/KF 40-16 Reducing Tee, A=130mm, B=49.5mm ..... each
- 92322-4025 NW/KF 40-25 Reducing Tee, A=130mm, B=56.5mm ..... each
- 92322-5016 NW/KF 50-16 Reducing Tee, A=140mm, B=56mm ..... each
- 92322-5025 NW/KF 50-25 Reducing Tee, A=140mm, B=62.7mm ..... each
- 92322-5040 NW/KF 50-40 Reducing Tee, A=140mm, B=71.5mm ..... each



**NW/KF 180° RETURN ELBOW, 304 STAINLESS STEEL**

- 92305-16 NW/KF 16 90° Return Elbow, A=57mm, B=42.5mm ..... each
- 92305-25 NW/KF 25 90° Return Elbow, A=76mm, B=55mm ..... each
- 92305-40 NW/KF 40 90° Return Elbow, A=114mm, B=80.5mm ..... each
- 92305-50 NW/KF 50 90° Return Elbow, A=152mm, B=106mm ..... each

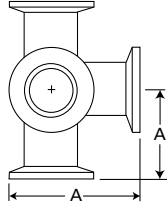


**NW/KF EQUAL 4-WAY CROSS, 304 STAINLESS STEEL**

- 92334-16 NW/KF 16 4-Way Equal Cross, A=40mm ..... each
- 92334-25 NW/KF 25 4-Way Equal Cross, A=52mm ..... each
- 92334-40 NW/KF 40 4-Way Equal Cross, A=61.5mm ..... each
- 92334-50 NW/KF 50 4-Way Equal Cross, A=80mm ..... each

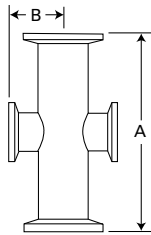
## VACUUM SUPPLIES

NW/KF Crosses; Straight Tubes & PELCO® NW/KF Ball Valves



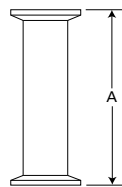
### NW/KF EQUAL 5-WAY CROSS, 304 STAINLESS STEEL

92335-16	NW/KF 16 5-Way Equal Cross, A=40mm	..... each
92335-25	NW/KF 25 5-Way Equal Cross, A=52mm	..... each
92335-40	NW/KF 40 5-Way Equal Cross, A=61.5mm	..... each
92335-50	NW/KF 50 5-Way Equal Cross, A=80mm	..... each



### NW/KF REDUCING 4-WAY CROSS, 304 STAINLESS STEEL

92332-2516	NW/KF 25-16 Reducing 4-Way Cross	..... each
92332-4016	NW/KF 40-16 Reducing 4-Way Cross	..... each
92332-4025	NW/KF 40-25 Reducing 4-Way Cross	..... each
92332-5016	NW/KF 50-16 Reducing 4-Way Cross	..... each
92332-5025	NW/KF 50-25 Reducing 4-Way Cross	..... each
92332-5040	NW/KF 50-40 Reducing 4-Way Cross	..... each



### NW/KF STRAIGHT TUBE, 304 STAINLESS STEEL

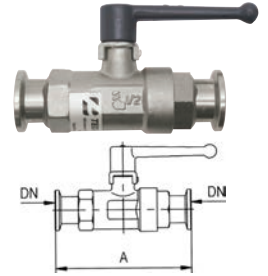
92324-16	NW/KF 16 Straight Tube, A=80mm	..... each
92324-25	NW/KF 25 Straight Tube, A=100mm	..... each
92324-40	NW/KF 40 Straight Tube, A=130mm	..... each
92324-50	NW/KF 50 Straight Tube, A=160mm	..... each

## PELCO® NW/KF BALL VALVES

PELCO® ball valves offer an elegant, easy and quick way to close/open vacuum lines. They have a relatively high conductance with NW16 having a 13mm ID and NW25 having a 20mm ID. The 3-way change-over ball valves enable the connection of two systems to one pump. They can be used up to a vacuum level of  $1 \times 10^{-6}$  mbar. Primarily used in backing lines on rotary or scroll pumps. Working temperature range -20 to 80°C (-4 to 176°F).

### Materials

- NW connections: 304 stainless steel
- Ball valve: 304 stainless steel
- Valve body: nickel plated brass
- Stem: brass
- Stem/ball seals: nitrile rubber
- Handle: zinc/diecast alloy



### NW/KF 2-WAY INLINE BALL VALVES, BRASS/NICKEL PLATED

92398-16	NW/KF 16 2-Way Inline Ball Valve, A=100mm	..... each
92398-25	NW/KF 25 2-Way Inline Ball Valve, A=130mm	..... each



### NW/KF 3-WAY BALL VALVES, BRASS/NICKEL PLATED

Change over ball valve: Handle to the left opens base connection to left connection; Handle in middle position closes both sides; Handle to the right opens base connection to right connection.

92399-16	NW/KF 16 3-Way Ball Valve, A=96mm, B=46mm	..... each
92399-25	NW/KF 25 3-Way Ball Valve, A=125mm, B=65mm	..... each



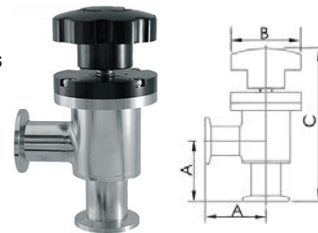
### NW/KF RIGHT ANGLE BALL VALVES, BRASS/NICKEL PLATED

92397-16	NW/KF 16 Right Angle Ball Valve, A=48mm, B=46mm	.....each
92397-25	NW/KF 25 Right Angle Ball Valve, A=63mm, B=65mm	.....each

## NEW PELCO® NW/KF BALL VALVES

PELCO® KF Manual Angle Valves are manufactured from stainless steel and feature a Viton® seal, making them ideal for high vacuum applications. Poppet design allows unimpeded, high volume air flow, Viton® seal design ensures long product life and KF fittings allow for easy mounting and un-mounting. Applications include vacuum pumping systems, semiconductor technology, research systems, or any use requiring a flange type seal.

92396-16	NW/KF 16 Manual Angle Valve, Stainless Steel, A=51mm (2.15"), B=60mm (2.36"), C=137mm (5.47"), Weight=0.45kg (1 lb)	.....each
92396-25	NW/KF 25 Manual Angle Valve, Stainless Steel, A=52mm (2.05"), B=60mm (2.36"), C=134mm (5.27"), Weight=0.91kg (2 lb)	.....each
92396-40	NW/KF 40 Manual Angle Valve, Stainless Steel, A=65mm (2.56"), B=60mm (2.36"), C=164mm (6.45"), Weight=1.81kg (4 lb)	.....each
92396-50	NW/KF 50 Manual Angle Valve, Stainless Steel, A=76.2mm (3.00"), B=60mm (2.36"), C=198mm (7.80"), Weight=4.54kg (10 lb)	.....each



- Port size: 19mm (0.75")
- Material: 304 stainless steel
- Seal material: Viton®
- Bellows: Welded AM-350 s. steel
- Vacuum range:  $1 \times 10^{-9}$  mbar
- Leak test:  $1 \times 10^{-9}$  std cc/sec He
- Bake temperature: 120°C (248°F)



**PELCO® NW/KF FLEXIBLE METAL HOSES, 304 STAINLESS STEEL**

*A Superior Alternative to Rubber or Reinforced Plastic Hoses*

These durable, thin walled, flexible stainless steel hoses do not alter or crack like rubber or plastic hoses and do not collapse under heavy vacuum, have less connection parts and therefore less possible leaks in a vacuum system. NW/KF flexible metal hoses are made using 304 stainless steel and may be cleaned with solvents. They have a thickness of 0.006" except for the 80" lengths NW 40 and NW 50 which have a thickness of 0.010".

NW/KF 16 has a 3/4" internal hose diameter; NW/KF 25 has a 1" internal hose diameter; NW/KF 40 has a 1-1/2" internal hose diameter; NW/KF 50 has a 2" internal hose diameter.

*NW/KF 16 Flexible Hoses*

- 92340-1610 NW/KF 16 10" Flexible Metal Hose, 304 SS .....each
- 92340-1612 NW/KF 16 12" Flexible Metal Hose, 304 SS .....each
- 92340-1620 NW/KF 16 20" Flexible Metal Hose, 304 SS .....each
- 92340-1624 NW/KF 16 24" Flexible Metal Hose, 304 SS .....each
- 92340-1630 NW/KF 16 30" Flexible Metal Hose, 304 SS .....each
- 92340-1636 NW/KF 16 36" Flexible Metal Hose, 304 SS .....each
- 92340-1640 NW/KF 16 40" Flexible Metal Hose, 304 SS .....each
- 92340-1680 NW/KF 16 80" Flexible Metal Hose, 304 SS .....each

*NW/KF 25 Flexible Hoses*

- 92341-2510 NW/KF 25 10" Flexible Metal Hose, 304 SS .....each
- 92341-2512 NW/KF 25 12" Flexible Metal Hose, 304 SS .....each
- 92341-2520 NW/KF 25 20" Flexible Metal Hose, 304 SS .....each
- 92341-2524 NW/KF 25 24" Flexible Metal Hose, 304 SS .....each
- 92341-2530 NW/KF 25 30" Flexible Metal Hose, 304 SS .....each
- 92341-2540 NW/KF 25 40" Flexible Metal Hose, 304 SS .....each
- 92341-2580 NW/KF 25 80" Flexible Metal Hose, 304 SS .....each

*NW/KF 40 Flexible Hoses*

- 92342-4010 NW/KF 40 10" Flexible Metal Hose, 304 SS .....each
- 92342-4020 NW/KF 40 20" Flexible Metal Hose, 304 SS .....each
- 92342-4024 NW/KF 40 24" Flexible Metal Hose, 304 SS .....each
- 92342-4030 NW/KF 40 30" Flexible Metal Hose, 304 SS .....each
- 92342-4040 NW/KF 40 40" Flexible Metal Hose, 304 SS .....each
- 92342-4080 NW/KF 40 80" Flexible Metal Hose, 304 SS .....each

*NW/KF 50 Flexible Hoses*

- 92343-5010 NW/KF 50 10" Flexible Metal Hose, 304 SS .....each
- 92343-5020 NW/KF 50 20" Flexible Metal Hose, 304 SS .....each
- 92343-5030 NW/KF 50 30" Flexible Metal Hose, 304 SS .....each
- 92343-5040 NW/KF 50 40" Flexible Metal Hose, 304 SS .....each
- 92343-5080 NW/KF 50 80" Flexible Metal Hose, 304 SS .....each



**NW/KF COMPRESSED METAL BELLWS, 304 STAINLESS STEEL, 4" LONG**

Wall thickness: 0.006", internal diameters same as hoses above.

- 92346-1604 NW/KF 16 4" Compressed Metal Bellows ..... each
- 92346-2504 NW/KF 25 4" Compressed Metal Bellows ..... each
- 92346-4004 NW/KF 40 4" Compressed Metal Bellows ..... each
- 92346-5004 NW/KF 50 4" Compressed Metal Bellows ..... each



**NW/KF REDUCING, FLEXIBLE METAL HOSES, 304 STAINLESS STEEL**

Efficient way to connect different NW/KF sizes, save on adapters and reduce number of vacuum components.  
Wall thickness: 0.006".

*NW/KF 50 to 40 Use 1-1/2" Internal Hose Diameter*

- 92350-5410 NW/KF 50-40, 10" Reducing Flexible Metal Hose..... each
- 92350-5420 NW/KF 50-40, 20" Reducing Flexible Metal Hose..... each

*NW/KF 50 to 25 Use 1" Internal Hose Diameter*

- 92351-5210 NW/KF 50-25, 10" Reducing Flexible Metal Hose..... each
- 92351-5220 NW/KF 50-25, 20" Reducing Flexible Metal Hose..... each

*NW/KF 50 to 16 Use 5/8" Internal Hose Diameter*

- 92352-5110 NW/KF 50-16, 10" Reducing Flexible Metal Hose..... each
- 92352-5120 NW/KF 50-16, 20" Reducing Flexible Metal Hose..... each

*NW/KF 40 to 25 Use 1" Internal Hose Diameter*

- 92354-4210 NW/KF 40-25, 10" Reducing Flexible Metal Hose..... each
- 92354-4220 NW/KF 40-25, 20" Reducing Flexible Metal Hose..... each

*NW/KF 40 to 16 Use 5/8" Internal Hose Diameter*

- 92355-4110 NW/KF 40-16, 10" Reducing Flexible Metal Hose..... each
- 92355-4120 NW/KF 40-16, 20" Reducing Flexible Metal Hose..... each

*NW/KF 25 to 16 Use 5/8" Internal Hose Diameter*

- 92356-2110 NW/KF 25-16, 10" Reducing Flexible Metal Hose..... each
- 92356-2120 NW/KF 25-16, 20" Reducing Flexible Metal Hose..... each

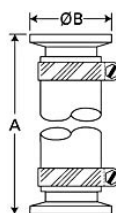


**WIRE REINFORCED THICK WALL PVC VACUUM HOSE**

Use with hose adapters and hose clamps to make custom vacuum hoses. Can be ordered per ft. with minimum length of 3 ft. and maximum length of 50 ft. Wire is embedded in PVC hose.

Permits full vacuum capabilities (29.9 in./Hg.) for all sizes without hose collapse. Constructed of corrosion-resistant PVC, can be used to transport various chemicals in areas with tight turns and sharp bends. Its bend radius is approximately four times the ID. Can be used at temperatures from +10° to +140°F (-12° to +60°C)

- 92424-25 1/4" ID, 0.447" OD, Wire Reinforced PVC Hose ..... per/ft.
- 92424-38 3/8" ID, 0.600" OD, Wire Reinforced PVC Hose ..... per/ft.
- 92424-50 1/2" ID, 0.736" OD, Wire Reinforced PVC Hose ..... per/ft.
- 92424-75 3/4" ID, 1.028" OD, Wire Reinforced PVC Hose ..... per/ft.
- 92424-100 1" ID, 1.290" OD, Wire Reinforced PVC Hose ..... per/ft.
- 92424-150 1-1/2" ID, 1.854" OD, Wire Reinforced PVC Hose ..... per/ft.
- 92424-200 2" ID, 2.394" OD, Wire Reinforced PVC Hose ..... per/ft.



**NW/KF HOSE FLANGES WITH WIRE REINFORCED PVC VACUUM HOSE**

Low cost alternative for flexible stainless vacuum hoses. Wire reinforced PVC tubing with 304 stainless steel NW/KF flanges on each end and secured with stainless steel hose clamps.

- 92422-1620 NW/KF 16 PVC Hose, A=20", B=3/4" ..... each
- 92422-1640 NW/KF 16 PVC Hose, A=40", B=3/4" ..... each
- 92422-2520 NW/KF 25 PVC Hose, A=20", B=1" ..... each
- 92422-2540 NW/KF 25 PVC Hose, A=40", B=1" ..... each
- 92422-4020 NW/KF 40 PVC Hose, A=20", B=1-1/2" ..... each
- 92422-4040 NW/KF 40 PVC Hose, A=40", B=1-1/2" ..... each
- 92422-5020 NW/KF 50 PVC Hose, A=20", B=2" ..... each
- 92422-5040 NW/KF 50 PVC Hose, A=40", B=2" ..... each

## VACUUM SUPPLIES

NW/KF Hose Adapters; Hose Clamps; Vacuum Hose & Conical Reducers



### NW/KF HOSE ADAPTERS, ALUMINUM

Machined from solid bar; no welds.

92410-1638	NW/KF 16, 3/8" Adapter, A=12mm, B=44mm .....	each
92410-1650	NW/KF 16, 1/2" or 5/8" Adapter, A=16mm, B=42mm ..	each
92410-1675	NW/KF 16, 5/8" or 3/4" Adapter, A=19mm, B=42mm ..	each
92410-2538	NW/KF 25, 3/8" Adapter, A=12mm, B=44mm .....	each
92410-2550	NW/KF 25, 1/2" or 5/8" Adapter, A=16mm, B=42mm ..	each
92410-2575	NW/KF 25, 5/8" or 3/4" Adapter, A=19mm, B=42mm ..	each
92410-2500	NW/KF 25, 3/4" or 7/8" Adapter, A=22.5mm, B=44mm..	each
92410-40	NW/KF 40, 1-1/2" or 1-5/8" Adapter, A=41.5mm, B=55mm .....	each
92410-50	NW/KF 50, 1-1/2" or 1-5/8" Adapter, A=41.5mm, B=55mm .....	each



### NW/KF MULTIPLE HOSE ADAPTER, ALUMINUM

3-step aluminum adapters for 1/4", 1/2" and 5/8" hoses.

92400-16	NW/KF 16 Multi Hose Adapter, 5mm ID .....	each
92400-25	NW/KF 25 Multi Hose Adapter, 5mm ID .....	each
92400-40	NW/KF 40 Multi Hose Adapter, 5mm ID .....	each
92400-50	NW/KF 50 Multi Hose Adapter, 5mm ID .....	each



### HOSE CLAMPS FOR VACUUM HOSE, STAINLESS STEEL

These clamps are compatible with the wire reinforced, thick wall PVC vacuum hose we offer. They are quick, economical and reusable. Bands are 0.023" thick x 5/16" wide (1/4") and 1/2" wide (all other sizes) with temperature range of -50° to +250° F. Not recommended for use with silicone hose. Clamps tighten with a wrench, slotted screwdriver or hex nutdriver. Made from type 301 stainless steel with type 410 stainless steel screw.

92426-25	1/4" Vacuum Hose Clamp, SS .....	each
92426-38	3/8" Vacuum Hose Clamp, SS .....	each
92426-50	1/2" Vacuum Hose Clamp, SS .....	each
92426-75	3/4" Vacuum Hose Clamp, SS .....	each
92426-100	1" Vacuum Hose Clamp, SS .....	each
92426-150	1-1/2" Vacuum Hose Clamp, SS .....	each
92426-200	2" Vacuum Hose Clamp, SS .....	each



### NW/KF HOSE ADAPTERS, 304 STAINLESS STEEL

Machined from solid bar; no welds.

92420-16	NW/KF 16, 3/4" Hose Adapter, A=18.3mm, B=32mm, C=20mm .....	each
92420-25	NW/KF 25, 1" HoseAdapter, A=25.4mm, B=38mm, C=26mm .....	each
92420-40	NW/KF 40, 1-1/2" HoseAdapter, A=38.1mm, B=50mm, C=38mm .....	each
92420-50	NW/KF 50, 2" HoseAdapter, A=50.8mm, B=55mm, C=40mm .....	each



### 1/2" & 3/4" ID VACUUM HOSE

Heavy wall, versatile and resilient natural, pure gum rubber tubes. These cost effective vacuum hoses have a good oxidation resistance, are vibration

resistant and have excellent rebound characteristics. Durometer 45±5. Meets or exceeds standard ZZ-T831C, minimum tensile strength 3000PSI.

894-5	1/2" ID, Rubber Vacuum Hose .....	per/ft.
894-7	3/4" ID, Rubber Vacuum Hose .....	per/ft.



### 1/4" ID SILICONE VACUUM HOSE

Thick walled silicone vacuum hose with 1/4" (6.35mm) inside diameter and 1/2" (12.7mm) outside diameter. Sturdy, yet flexible material with wall thickness of 1/8" (3.2mm), will not collapse under vacuum. Can be used with NW/KF Multiple Hose Adapter to KF-16. Sold in lengths of 3 and 9 ft.

92490-253	1/4" ID, Silicone Vacuum Hose .....	3 ft.
92490-256	1/4" ID, Silicone Vacuum Hose .....	9 ft.

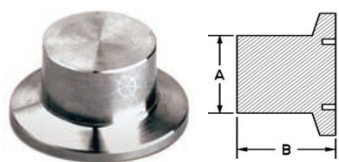


Diameter A = 40mm

### NW/KF COMPACT CONICAL REDUCERS, 304 SS

92450-2516	NW/KF 25-16 Compact Conical Reducer.....	each
92450-4016	NW/KF 40-16 Compact Conical Reducer.....	each
92450-4025	NW/KF 40-25 Compact Conical Reducer.....	each
92450-5016	NW/KF 50-16 Compact Conical Reducer.....	each
92450-5025	NW/KF 50-25 Compact Conical Reducer.....	each
92450-5040	NW/KF 50-40 Compact Conical Reducer.....	each





**NW/KF STUB FLANGES  
IN 304 STAINLESS STEEL  
& ALUMINUM, UNBORED**

Used to blank off ports not being used. Can be used to modify

for specific applications. The stub offers extra material to modify and connect non-standard vacuum connections.

*Unbored, NW/KF Stub Flanges in 304 Stainless Steel*

- 92470-16 NW/KF 16 Stub Flange, A=19mm, B=19mm ..... each
- 92470-25 NW/KF 25 Stub Flange, A=25mm, B=19mm ..... each
- 92470-40 NW/KF 40 Stub Flange, A=38mm, B=25mm ..... each
- 92470-50 NW/KF 50 Stub Flange, A=50mm, B=25mm ..... each

*Unbored, NW/KF Stub Flanges in Aluminum*

- 92472-16 NW/KF 16 Stub Flange, A=19mm, B=19mm ..... each
- 92472-25 NW/KF 25 Stub Flange, A=25mm, B=19mm ..... each
- 92472-40 NW/KF 40 Stub Flange, A=38mm, B=25mm ..... each
- 92472-50 NW/KF 50 Stub Flange, A=50mm, B=25mm ..... each



**NW/KF FLANGE ADAPTERS TO FEMALE NPT THREAD**

Used to connect pipes, systems and thermocouples (1/8") with NPT thread to NW/KF flange system. Commonly used to connect filters with NPT thread on adaptors on the exhaust port of rotary vane pumps. Use OC® Three (Product No. 890-3) as a sealant and to prevent seizing. Please note that NPT (National Pipe Thread) does not refer to the outside diameter of the thread.

*NW/KF Flange Adapters to 1/8" Female NPT - Stainless Steel*

- 92464-16 NW/KF 16 Adapter to 1/8", A=16mm, B=19mm..... each
- 92464-25 NW/KF 25 Adapter to 1/8", A=23mm, B=19mm..... each
- 92464-40 NW/KF 40 Adapter to 1/8", A=32mm, B=25mm..... each
- 92464-50 NW/KF 50 Adapter to 1/8", A=45mm, B=25mm..... each

*NW/KF Flange Adapters to 1/4" Female NPT - Stainless Steel*

- 92465-16 NW/KF 16 Adapter to 1/4", A=16mm, B=19mm..... each
- 92465-25 NW/KF 25 Adapter to 1/4", A=23mm, B=19mm..... each
- 92465-40 NW/KF 40 Adapter to 1/4", A=32mm, B=25mm..... each
- 92465-50 NW/KF 50 Adapter to 1/4", A=45mm, B=25mm..... each

*NW/KF Flange Adapters to 1/2" Female NPT - Stainless Steel*

- 92466-25 NW/KF 25 Adapter to 1/2", A=23mm, B=19mm..... each
- 92466-40 NW/KF 40 Adapter to 1/2", A=32mm, B=25mm..... each
- 92466-50 NW/KF 50 Adapter to 1/2", A=45mm, B=25mm..... each

*NW/KF Flange Adapters to 3/4" Female NPT - Stainless Steel*

- 92467-40 NW/KF 40 Adapter to 3/4", A=32mm, B=25mm..... each
- 92467-50 NW/KF 50 Adapter to 3/4", A=45mm, B=25mm..... each

*NW/KF Flange Adapters to 1/8" Female NPT - Aluminum*

- 92468-16 NW/KF 16 Adapter to 1/8", A=16mm, B=19mm..... each
- 92468-25 NW/KF 25 Adapter to 1/8", A=23mm, B=19mm..... each
- 92468-40 NW/KF 40 Adapter to 1/8", A=32mm, B=25mm..... each
- 92468-50 NW/KF 50 Adapter to 1/8", A=45mm, B=25mm..... each

*NW/KF Flange Adapters to 1/4" Female NPT - Aluminum*

- 92469-16 NW/KF 16 Adapter to 1/4", A=16mm, B=19mm..... each
- 92469-25 NW/KF 25 Adapter to 1/4", A=23mm, B=19mm..... each
- 92469-40 NW/KF 40 Adapter to 1/4", A=32mm, B=25mm..... each
- 92469-50 NW/KF 50 Adapter to 1/4", A=45mm, B=25mm..... each



**NW/KF FLANGE ADAPTERS TO MALE NPT THREAD**

Used to connect pipes and systems with NPT thread to NW/KF flange system. Stainless steel adapters are welded and helium leak tested. Aluminum adapters are made from one piece (more cost effective alternative). Use OC® Three (Product No. 890-3) as a sealant and to prevent seizing.

*NW/KF Flange Adapters to 1/8" Male NPT - Stainless Steel*

- 92474-16 NW/KF 16 Adapter to 1/8", A=26mm ..... each
- 92474-25 NW/KF 25 Adapter to 1/8", A=26mm ..... each
- 92474-40 NW/KF 40 Adapter to 1/8", A=26mm ..... each
- 92474-50 NW/KF 50 Adapter to 1/8", A=26mm ..... each

*NW/KF Flange Adapters to 1/4" Male NPT - Stainless Steel*

- 92475-16 NW/KF 16 Adapter to 1/4", A=32mm ..... each
- 92475-25 NW/KF 25 Adapter to 1/4", A=50mm ..... each
- 92475-40 NW/KF 40 Adapter to 1/4", A=32mm ..... each
- 92475-50 NW/KF 50 Adapter to 1/4", A=32mm ..... each

*NW/KF Flange Adapters to 1/2" Male NPT - Stainless Steel*

- 92476-25 NW/KF 25 Adapter to 1/2", A=47mm ..... each
- 92476-40 NW/KF 40 Adapter to 1/2", A=47mm ..... each
- 92476-50 NW/KF 50 Adapter to 1/2", A=47mm ..... each

*NW/KF Flange Adapters to 3/4" Male NPT - Stainless Steel*

- 92477-25 NW/KF 25 Adaptor to 3/4", A=47mm ..... each
- 92477-40 NW/KF 40 Adapter to 3/4", A=47mm ..... each
- 92477-50 NW/KF 50 Adapter to 3/4", A=47mm ..... each

*NW/KF Flange Adapters to 1", 1-1/4" & 1-1/2"*

- Male NPT - Stainless Steel*
- 92478-5000 NW/KF 50 Adapter to 1", A=55mm ..... each
- 92478-5025 NW/KF 50 Adapter to 1-1/4", A=80mm ..... each
- 92478-5050 NW 50 Adapter to 1-1/2", A=80mm ..... each

*NW/KF Flange Adapters to 1/8" Male NPT - Aluminum*

- 92484-16 NW 16 Adapter to 1/8", A=32mm..... each
- 92484-25 NW 25 Adapter to 1/8", A=32mm..... each
- 92484-40 NW 40 Adapter to 1/8", A=32mm..... each
- 92484-50 NW 50 Adapter to 1/8", A=32mm..... each

*NW/KF Flange Adapters to 1/4" Male NPT - Aluminum*

- 92485-16 NW 16 Adapter to 1/4", A=32mm..... each
- 92485-25 NW 25 Adapter to 1/4", A=32mm..... each
- 92485-40 NW 40 Adapter to 1/4", A=32mm..... each
- 92485-50 NW 50 Adapter to 1/4", A=32mm..... each

*NW/KF Flange Adapters to 1/2" Male NPT - Aluminum*

- 92486-25 NW 25 Adapter to 1/2", A=38mm..... each
- 92486-40 NW 40 Adapter to 1/2", A=38mm..... each
- 92486-50 NW 50 Adapter to 1/2", A=38mm..... each

*NW/KF Flange Adapters to 3/4" Male NPT - Aluminum*

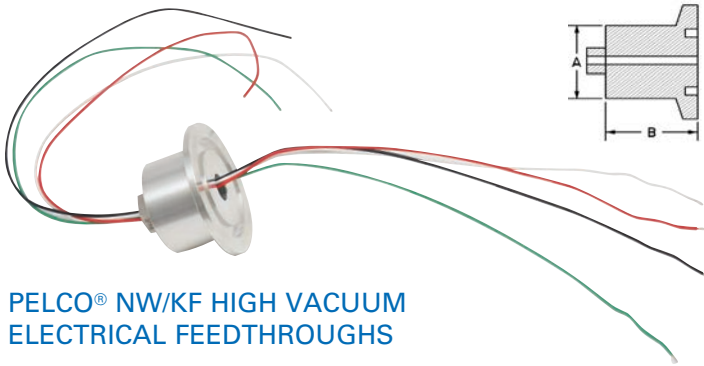
- 92487-25 NW 40 Adapter to 3/4", A=51mm..... each
- 92487-40 NW 40 Adapter to 3/4", A=51mm..... each
- 92487-50 NW 50 Adapter to 3/4", A=51mm..... each

*NW/KF Flange Adapters to 1", 1-1/4", 1-1/2" & 2"*

- Male NPT - Aluminum*
- 92488-5000 NW 50 Adaptor to 1", A=51mm..... each
- 92488-5025 NW 50 Adaptor to 1-1/4", A=65mm..... each
- 92488-5050 NW 50 Adaptor to 1-1/2", A=65mm..... each
- 92488-5100 NW 50 Adaptor to 2", A=65mm..... each

## VACUUM SUPPLIES

Electrical Feedthrough; NW/KF Viewports & Swagelok®



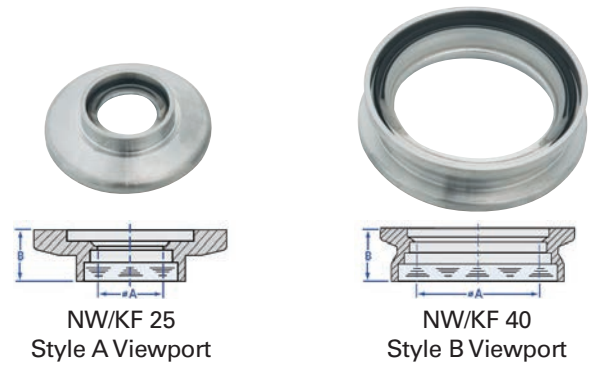
### PELCO® NW/KF HIGH VACUUM ELECTRICAL FEEDTHROUGHS

The PELCO® NW/KF Electrical Feedthrough is a universal type feedthrough, which can be used either as high voltage or instrumentation feedthrough for devices in vacuum. The PELCO® NW/KF Electrical Feedthrough has 4 wires and each wire is rated to a maximum of 1000V and 1A in vacuum. The wires are color coded; white, black, red and green and have no connectors. The feedthrough is based on an aluminum bored stub and available in NW/KF 16, 25, 40 and 50.

#### Specifications

- Flange Material: aluminum
- Flange Sizes: NW/KF 16, 25, 40 and 50
- Max. Voltage: 1000V
- Max. Current in Vacuum: 1A
- Vacuum Rating: up to  $10^{-6}$ mbar ( $10^{-6}$  Torr)
- Number of Wires: 4; white, black, red and green
- Wire Gauge (AWG) / Number of Strands: 24 / 7
- Wire Insulation: PTFE
- Wire Length: 8"
- Operating Temperature: -20°C to 125°C (-4°F to 257°F)
- Applications: high voltage or instrumentation

92516-16	PELCO® NW/KF 16 Electrical Feedthrough, 4 Wires, Aluminum/PTFE, A=19mm, B=27mm ..... each
92516-25	PELCO® NW/KF 25 Electrical Feedthrough, 4 Wires, Aluminum/PTFE, A=25mm, B=27mm ..... each
92516-40	PELCO® NW/KF 40 Electrical Feedthrough, 4 Wires, Aluminum/PTFE, A=38mm, B=33mm ..... each
92516-50	PELCO® NW/KF 50 Electrical Feedthrough, 4 Wires, Aluminum/PTFE, A=51mm, B=33mm ..... each



### NW/KF VIEWPORTS WITH 7056 GLASS WINDOW

The NW/KF Viewports consist of a one piece assembly. The viewport assembly replaces a blanking plate and uses a standard NW/KF Centering Assembly and Clamp for sealing (not included). The window size for NW16 and NW25 is 16mm (0.62"). For NW40 and NW50, the window has a diameter of 38mm (1.51"). The body is made of stainless steel, the window is made of 7056 borosilicate glass. Useful for observing inside vacuum lines or chambers. Temperature range -20°C to 200°C (-4°F to 392°F). Viton® seal. Vacuum range down to  $1 \times 10^{-9}$  Torr.

92519-16	NW/KF 16 Viewport, Style B, A=16mm, B=10mm ..... each
92519-25	NW/KF 25 Viewport, Style A, A=16mm, B=10mm ..... each
92519-40	NW/KF 40 Viewport, Style B, A=38mm, B=14mm ..... each
92519-50	NW/KF 50 Viewport, Style A, A=38mm, B=14mm ..... each



### PELCO® NW/KF TO SWAGELOK® ADAPTER

The NW/KF to Swagelok® Adapters allow the connection of small tubes with the widely used Swagelok® connectors. Enables easy connection to existing small diameter tube constructions for evacuating the tubes. Ideal for research, instrumentation and experimental set-ups. All stainless steel 304 construction. Available for 1/8", 1/4", 3/8" and 1/2" tubes.

#### NW/KF 16 to Swagelok® Adapters

92497-1612	Adapter for 1/8" Tubes, A=32mm ..... each
92497-1625	Adapter for 1/4" Tubes, A=39mm ..... each
92497-1638	Adapter for 3/8" Tubes, A=43mm ..... each
92497-1650	Adapter for 1/2" Tubes, A=50mm ..... each

#### NW/KF 25 to Swagelok® Adapters

92497-2512	Adapter for 1/8" Tubes, A=32mm ..... each
92497-2525	Adapter for 1/4" Tubes, A=39mm ..... each
92497-2538	Adapter for 3/8" Tubes, A=43mm ..... each
92497-2550	Adapter for 1/2" Tubes, A=50mm ..... each

#### NW/KF 40 to Swagelok® Adapters

92497-4012	Adapter for 1/8" Tubes, A=32mm ..... each
92497-4025	Adapter for 1/4" Tubes, A=39mm ..... each
92497-4038	Adapter for 3/8" Tubes, A=43mm ..... each
92497-4050	Adapter for 1/2" Tubes, A=50mm ..... each

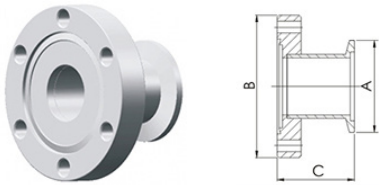
#### NW/KF 50 to Swagelok® Adapters

92497-5012	Adapter for 1/8" Tubes, A=32mm ..... each
92497-5025	Adapter for 1/4" Tubes, A=39mm ..... each
92497-5038	Adapter for 3/8" Tubes, A=43mm ..... each
92497-5050	Adapter for 1/2" Tubes, A=50mm ..... each

FOR PRODUCT TECHNICAL NOTES,  
DETAILED SPECIFICATIONS, DEPOSITION  
TECHNIQUES  
AND APPLICATION SUGGESTIONS, VISIT

[www.tedpella.com](http://www.tedpella.com)

CF to NW/KF & ISO-KI to NW/KF Flange Adapters; CF Copper Gaskets; ISO-K Style Centering Rings & Fitting Clamps



**NEW CF 1.33 TO NW/KF FLANGE ADAPTERS**

- 92620-16 CF 1.33 to NW/KF 16 Adapter, 304 Stainless Steel, Non-rotatable A=16mm (0.63"), B=33.78mm (1.33"), C=44.45mm (1.75").....each
- 92620-25 CF 1.33 to NW/KF 25 Adapter, 304 Stainless Steel, Non-rotatable A=25mm (0.98"), B=33.78mm (1.33"), C=45.21mm (1.78").....each
- 92620-40 CF 1.33 to NW/KF 40 Adapter, 304 Stainless Steel, Non-rotatable A=40mm (1.57"), B=33.78mm (1.33"), C=45.21mm (1.78").....each
- 92620-50 CF 1.33 to NW/KF 50 Adapter, 304 Stainless Steel, Non-rotatable A=50mm (1.97"), B=33.78mm (1.33"), C=44.45mm (1.95").....each

**NEW CF 2.75 TO NW/KF FLANGE ADAPTERS**

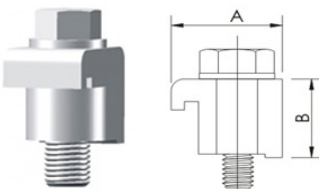
- 92630-16 CF 2.75 to NW/KF 16 Adapter, 304 Stainless Steel, Non-rotatable A=16mm (0.63"), B=69.85mm (2.75"), C=45.21mm (1.78") .....each
- 92630-25 CF 1.33 to NW/KF 25 Adapter, 304 Stainless Steel, Non-rotatable A=25mm (0.98"), B=69.85mm (2.75"), C=45.21mm (1.78") .....each
- 92630-40 CF 1.33 to NW/KF 40 Adapter, 304 Stainless Steel, Non-rotatable A=40mm (1.57"), B=69.85mm (2.75"), C=45.21mm (1.78") .....each
- 92630-50 CF 1.33 to NW/KF 50 Adapter, 304 Stainless Steel, Non-rotatable A=50mm (1.97"), B=69.85mm (2.75"), C=44.45mm (1.95") .....each

**NEW CF 3.38 TO NW/KF FLANGE ADAPTERS**

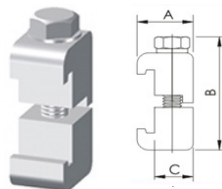
- 92640-40 CF 3.38 to NW/KF 40 Adapter, 304 Stainless Steel, Non-rotatable A=40mm (1.57"), B=85.85mm (3.38"), C=45.72mm (1.80") .....each
- 92640-50 CF 3.38 to NW/KF 50 Adapter, 304 Stainless Steel, Non-rotatable A=50mm (1.57"), B=85.85mm (3.38"), C=45.72mm (1.80") .....each

**NEW CF 4.50 TO NW/KF FLANGE ADAPTERS**

- 92650-50 CF 4.50 to NW/KF 50 Adapter, 304 Stainless Steel, Non-rotatable A=50mm (1.97"), B=114.30mm (4.50"), C=49.53mm (1.95") .....each



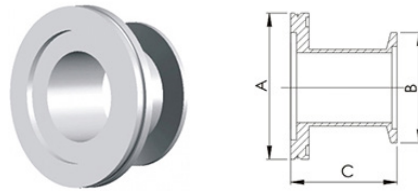
92660-CS Single Claw Clamp



92660-C Double Claw Clamp

**NEW ISO-K FITTING CLAMPS**

- 92660-CS Single Claw Clamp, Aluminum ISO=63/80/100, A=24.13mm (0.95"), B=22.61mm (0.89"), Thread=M8 x 35L .....each
- 92660-C Double Claw Clamp, 304 Stainless Steel ISO=63/80/100, A=24.13mm (0.95"), B=50.29mm (1.98"), Thread=M8 x 45L .....each



**NEW ISO-K 63 TO NW/KF FLANGE ADAPTERS**

- 92660-25 ISO 63 to NW/KF 25 Adapter, 304 Stainless Steel A=ISO 63, B=NW/KF 25, C=46.23mm (1.82") ..... each
- 92660-40 ISO 63 to NW/KF 40 Adapter, 304 Stainless Steel A=ISO 63, B=NW/KF 40, C=46.23mm (1.82") ..... each
- 92660-50 ISO 63 to NW/KF 50 Adapter, 304 Stainless Steel A=ISO 63, B=NW/KF 50, C=46.23mm (1.82") ..... each

**NEW ISO-K 80 TO NW/KF FLANGE ADAPTERS**

- 92670-40 ISO 80 to NW/KF 40 Adapter, 304 Stainless Steel A=ISO 80, B=NW/KF 40, C=46.23mm (1.82") ..... each
- 92670-50 ISO 80 to NW/KF 50 Adapter, 304 Stainless Steel A=ISO 80, B=NW/KF 50, C=46.23mm (1.82") ..... each

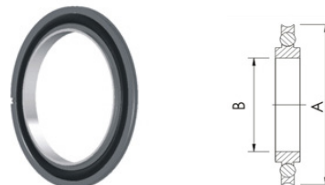
**NEW ISO-K 100 TO NW/KF FLANGE ADAPTERS**

- 92680-40 ISO 100 to NW/KF 40 Adapter, 304 Stainless Steel A=ISO 100, B=NW/KF 40, C=46.23mm (1.82") ..... each
- 92680-50 ISO 100 to NW/KF 50 Adapter, 304 Stainless Steel A=ISO 100, B=NW/KF 50, C=46.23mm (1.82") ..... each



**NEW CF COPPER GASKETS**

- 92620-13 CF Copper Gasket, Oxygen-free Copper CF=1.33, A=16.27mm (0.64"), B=21.34mm (0.84") ..... each
- 92630-37 CF Copper Gasket, Oxygen-free Copper CF=2.75, A=36.83mm (1.45"), B=48.00mm (1.89") ..... each
- 92640-33 CF Copper Gasket, Oxygen-free Copper CF=3.38, A=51.05mm (2.01"), B=61.47mm (2.42") ..... each
- 92650-45 CF Copper Gasket, Oxygen-free Copper CF=4.50, A=76.45mm (3.01"), B=91.44mm (3.60") ..... each



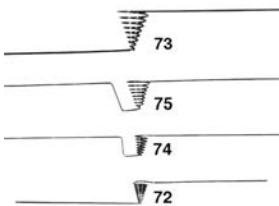
**NEW ISO-K STYLE CENTERING RINGS**

- 92660-63 ISO 63 Centering Ring ISO=63, A=94mm (3.70"), B=66.8mm (2.63").....each
- 92670-80 ISO 80 Centering Ring ISO=80, A=109mm (4.29"), B=79.8mm (3.14").....each
- 92680-100 ISO 100 Centering Ring ISO=100, A=128mm (5.04"), B=98.8mm (3.89").....each

**TUNGSTEN WIRE BASKETS**

*A Wide Selection of Single & Multiple Strand Wire Baskets for EM and Thin Film Applications*

The tungsten boats, baskets and filaments are manufactured from high grade tungsten. Of all metals pure form, tungsten has the highest melting point (3422°C / 6192°F), the lowest vapor pressure at temperatures above 1650°C (3000°F) and has the highest tensile strength. Tungsten also has the lowest coefficient of thermal expansion of any pure metal. This combination of properties makes tungsten the ideal material for evaporation sources. During evaporation, it can alloy with some materials such as Al or Au. In this case, another evaporation source material should be used such as alumina coated boats or baskets. Other materials useful for evaporation sources are molybdenum and tantalum.

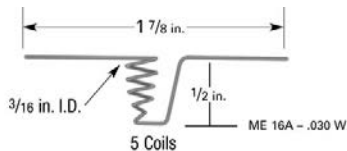


**SINGLE STRAND TUNGSTEN WIRE BASKETS**

Single strand, thin tungsten wire (0.5 - 0.75mm) baskets designed for small power supplies rated at 30 - 50A as commonly used in EM coating system. **Suitable for thin films only.**

Prod. No.	Turns	I.D. (mm)	Height (mm)	Overall Length (mm)	Wire Dia. (inches)
72-1	9	4	8	72	0.50 / 0.020
73-1	8	9	13	82	0.75 / 0.030
74-1	9	4	7	80	0.50 / 0.020
75-1	8	7	9	100	0.50 / 0.020

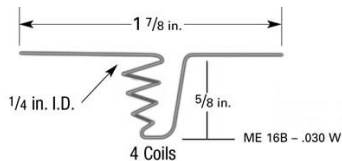
- 72-1 Tungsten Wire Baskets .....pkg/10
- 73-1 Tungsten Wire Baskets .....pkg/10
- 74-1 Tungsten Wire Baskets .....pkg/10
- 75-1 Tungsten Wire Baskets .....pkg/10



**SINGLE STRAND, 5-COIL**

0.030" (0.76mm) wire diameter, 5 coils, 1-7/8" L (47.6mm), 1/2" (12.7mm) basket height, 3/16" (4.8mm) inside coil diameter. Settings: 2.48V/23A/57W for 1800°C.

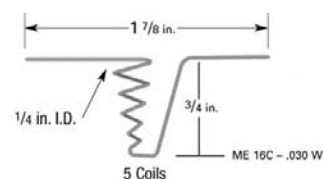
- 76-1 5-Coil Tungsten Wire Baskets, 1/2" x 3/16" .....pkg/5



**SINGLE STRAND, 4-COIL**

0.030" (0.76mm) wire diameter, 4 coils, 1-7/8" L (47.6mm), 5/8" (15.9mm) basket height, 1/4" (6.35mm) inside coil diameter. Settings: 2.90V/23A/67W for 1800°C.

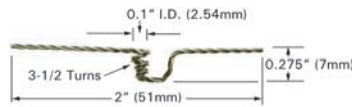
- 76-2 4-Coil Tungsten Wire Baskets, 5/8" x 1/4" .....pkg/5



**SINGLE STRAND, 5-COIL**

0.030" (0.76mm) wire diameter, 5 coils, 1-7/8" L (47.6mm), 3/4" (19mm) basket height, 1/4" (6.35mm) inside coil diameter. Settings: 3.77V/23A/87W for 1800°C.

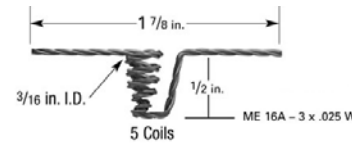
- 76-3 5-Coil Tungsten Wire Baskets, 3/4" x 1/4" .....pkg/5



**3-STRAND**

0.020" (0.51mm) diameter wire, 2" L (51mm), 3-1/2 turns, top inside diameter 0.1" (2.54mm), height 0.275" (7mm). For use with the Cressington 208C and 308R metal evaporation accessory.

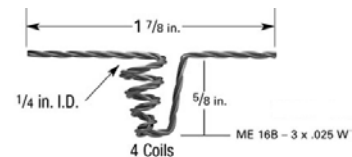
- 76 3-Strand Tungsten Wire Baskets, 0.1" x 0.275" .....pkg/10



**3-STRAND, 5-COIL**

3 x 0.025" (0.635mm) wire diameter, 5 coils, 1-7/8" L (47.6mm), 1/2" (12.7mm) basket height, 3/16" (4.8mm) inside coil diameter. Settings: 2.30V/23A/90W for 1800°C.

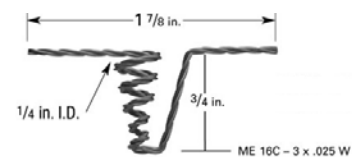
- 76-13 3-Strand, 5-Coil Tungsten Wire Baskets, 1/2" x 3/16" ...pkg/5



**3-STRAND, 4-COIL**

3 x 0.025" (0.635mm) wire diameter, 4 coils, 1-7/8" L (47.6mm), 5/8" (15.9mm) basket height, 1/4" (6.35mm) inside coil diameter. Settings: 2.66V/42A/112W for 1800°C.

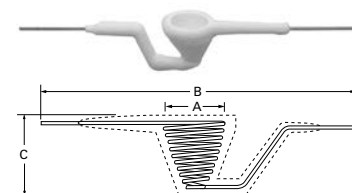
- 76-23 3-Strand, 4-Coil Tungsten Wire Baskets, 5/8" x 1/4" .....pkg/5



**3-STRAND, 5-COIL**

3 x 0.025" (0.635mm) wire diameter, 5 coils, 1-7/8" L (47.6mm), 3/4" (19mm) basket height, 1/4" (6.35mm) inside coil diameter. Settings: 3.54V/43A/152W for 1800°C.

- 76-33 3-Strand, 5-Coil Tungsten Wire Baskets, 3/4" x 1/4" .....pkg/5



**ALUMINA COATED EVAPORATION SOURCES**

*Ideal for Low Power Thermal Evaporation Supplies*

The Alumina coated tungsten evaporation basket is an efficient design which acts as an internally heated crucible. The ceramic coated evaporation baskets for vacuum evaporation have the distinct advantage that they require relatively low power (63 to 768 W) to reach a temperature of 1475°C (high enough to evaporate Ni in high vacuum). This will enable many researchers to experiment with thermal evaporation who only have access to low cost, low power evaporation supplies. The closed side crucible form allows to use pellets, grains, wires or even powders as evaporation material for upwards evaporation applications. Molten metal evaporants are contained as an induction propelled spinning ball inside the cavity. Most

*Continued on next page.*

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materials can be completely evaporated without loss to the crucible. A broad range of evaporation materials can be used in these alumina coated sources: Au, Ag, Pd, In, Sn, Sb, Bi, Cd, Cu, Pb, Zn, Co, Ni, Fe, Mn and alloys such as Nichrome and Permalloy. Maximum temperature for this type of alumina coated tungsten basket should not exceed 1800°C. There are 6 different types of baskets available with a top opening ranging from 0.15" to 0.90".

Prod. No. / Style	Volts	Amps	Watts	Wire Dia.	"A" Top ID	Inside Depth	"B" OAL	"C" Height	VOL cm <sup>3</sup>
84-21 Style 1	5.70	11	63	0.020"	0.150"	0.225"	4"	0.375"	0.021
84-22 Style 2	6.20	40	248	0.040"	0.375"	0.350"	4"	0.500"	0.21
84-23 Style 3	6.90	39	272	0.040"	0.420"	0.425"	4"	0.575"	0.32
84-24 Style 4	13.00	33	429	0.040"	0.790"	0.725"	3 1/4"	0.875"	1.92
84-25 Style 5	7.00	50	350	0.050"	0.500"	0.775"	4"	0.925"	0.83
84-27 Style 6	15.80	49	768	0.050"	0.900"	0.975"	4"	1.125"	3.36

- 84-21 Style 1, Alumina Coated Tungsten Wire Basket..... each
- 84-22 Style 2, Alumina Coated Tungsten Wire Basket..... each
- 84-23 Style 3, Alumina Coated Tungsten Wire Basket..... each
- 84-24 Style 4, Alumina Coated Tungsten Wire Basket..... each
- 84-25 Style 5, Alumina Coated Tungsten Wire Basket..... each
- 84-27 Style 6, Alumina Coated Tungsten Wire Basket..... each



**MOLYBDENUM FOIL**

For aperture cleaning, evaporation and experimentation

- 86 Molybdenum Foil, 0.002" (0.05mm) Thick, 6" x 6" (15.2 x 15.2cm).....each



**EVAPORATION VIEWING GLASS**

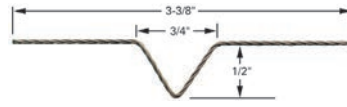
Dark glass to safely view metal or carbon evaporation process through belljars or glass windows. Impact resistant. 2 x 4-1/4" (5 x 10.8cm). AWS shade #10.

- 55 Evaporation Viewing Glass.....each

**TUNGSTEN FILAMENTS & TUNGSTEN COILS**

Vacuum Deposition Supplies for EM Sample Preparation

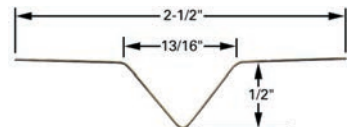
Tungsten filaments and coils are manufactured from high grade tungsten. Of all metals in pure form, tungsten has the highest melting point (3422°C/6192°F), the lowest vapor pressure at temperatures above 1650°C (3000°F) and has the highest tensile strength. Tungsten also has the lowest coefficient of thermal expansion of any pure metal. This combination of properties makes tungsten the ideal material for evaporation sources.



**3-STRAND TUNGSTEN "V" FILAMENT**

Vacuum grade tungsten wire, 0.5mm (0.020") diameter, 89mm long (3-3/8"). The "V" is 12.7mm (1/2") deep, and has an included angle of 45°.

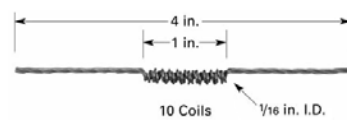
- 27-101 3-Strand "V" Filament.....pkg/10



**1-STRAND TUNGSTEN "V" FILAMENT**

Vacuum grade tungsten wire filaments, 0.5mm (0.02") diameter, 64mm long (2-1/2"). The "V" is 12.7mm (1/2") deep, and has an included angle of 45°.

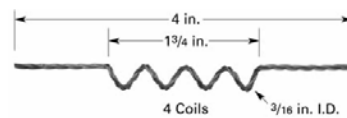
- 27-19 1-Strand "V" Filament.....pkg/10



**3-STRAND, 10-COIL, TUNGSTEN FILAMENT**

3 x 0.025" (0.635mm) diameter, 10 coils, 4" L (101.6mm), coil length 1" (25.4mm), 1/16" (1.6mm) ID of coil. Settings: 3.0V/42A/126W for 1800°C.

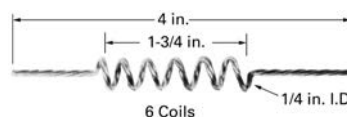
- 84-11 3-Strand, 10-Coil Tungsten Filament, 1/16" ID.....pkg/5



**3-STRAND, 4-COIL, TUNGSTEN FILAMENT**

3 x 0.025" (0.635mm) diameter, 4 coils, 4" L (101.6mm), coil length 1-3/4" (44.45mm), 3/16" (4.8mm) ID of coil. Settings: 3.43V/49A/168W for 1800°C.

- 84-12 3-Strand, 4-Coil Tungsten Filament, 3/16" ID.....pkg/5



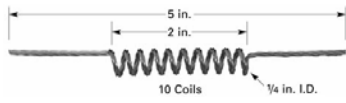
**3-STRAND, 6-COIL, TUNGSTEN FILAMENT**

3 x 0.025" (0.635mm) diameter, 6 coils, 4" L (101.6mm), coil length 1-3/4" (4.5cm), 1/4" (6.3mm) ID of coil. Settings: 5.3V/48A/254W for 1800°C.

- 84-20 3-Strand, 6-Coil Tungsten Filament, 1/4" ID.....pkg/5

VACUUM SUPPLIES

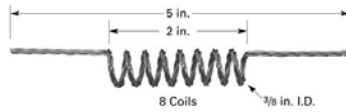
Tungsten Filaments & Tungsten Evaporation Boats



**3-STRAND, 10-COIL, TUNGSTEN FILAMENT**

3 x 0.025" (0.635mm) diameter, 10 coils, 5" L (127mm), coil length 2" (50.8mm), 1/4" (6.35mm) ID of coil. Settings: 8.05V/45A/362W for 1800°C.

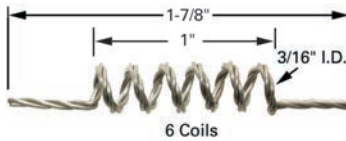
84-17 3-Strand, 10-Coil Tungsten Filament, 1/4" ID.....pkg/5



**3-STRAND, 8-COIL, TUNGSTEN FILAMENT**

3 x 0.025" (0.635mm) diameter, 8 coils, 5" L (127mm), coil length 2" (50.8mm), 3/8" (9.5mm) ID of coil. Settings: 8.72V/44A/384W for 1800°C.

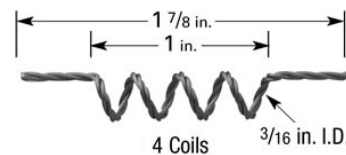
84-18 3-Strand, 8-Coil Tungsten Filament, 3/8" ID.....pkg/5



**3-STRAND, 6-COIL, TUNGSTEN FILAMENT**

0.025" (0.635mm) diameter, 6 coils, 1-7/8" L (47.6mm), coil length 1" (25.4 mm), 3/16" (4.8mm) ID of coil. Settings: 3.13V/44A/138W for 1800°C.

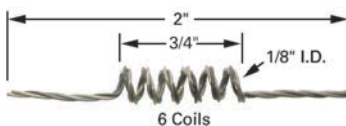
84-19 3-Strand, 6-Coil Tungsten Filament, 3/16" ID.....pkg/5



**3-STRAND, 4-COIL, TUNGSTEN FILAMENT**

3 x 0.025" (0.635mm) diameter, 4 coils, 1-7/8" L (47.6mm), coil length 1" (25.4mm), 3/16" (4.8mm) ID of coil. Settings: 2.3V/47A/108W for 1800°C.

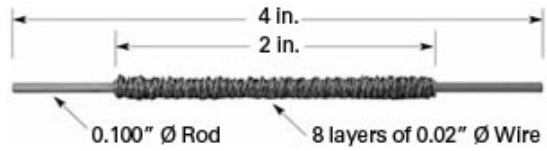
84-15 3-Strand, 4-Coil Tungsten Filament, 3/16" ID.....pkg/5



**3-STRAND, 6-COIL, TUNGSTEN FILAMENT**

3 x 0.020" (0.51mm) diameter, 6 coils, 2" L (5cm), coil length 3/4" (19.1 mm), 1/8" (3.2mm) ID of coil. For use with the Cressington 208C and 308R metal evaporation accessory.

84-16 3-Strand, 4-Coil Tungsten Filament, 1/8" ID.....pkg/5



**TUNGSTEN WIRE ROD SOURCE**

Tungsten rod source with fine tungsten wire. This type of source is designed for applications where a relatively large amount of material needs to be evaporated with a lower power evaporation source. The fine tungsten wire accommodates more molten material than the standard single or three strand evaporation filaments. Suitable for low and medium temperature materials. The rod is 4" (101.6mm) long with a 0.1" (2.5mm) diameter. The 0.020" (0.5mm) diameter wire is wrapped in 8 layers over a 2" (50.8mm) wide length.

Settings: 1.12V/148A/166W for 1500°C

84-14 Tungsten Rod Source, 4" L..... each



**CHROMIUM PLATED TUNGSTEN RODS**

Chromium Plated Tungsten Rods are an alternative for Cr evaporation when only a low power evaporation power supply is available. 0.05" (1.27mm) W rod, plated with a 0.01" (0.25mm) high purity Cr layer. Available in 2" (51mm) and 4" (102mm) lengths.

Settings for 2" L: 1.05V / 78A / 82W for 1800°C.  
Settings for 4" L: 2.02V / 78A / 158W for 1800°C.

29-242 Cr Plated Tungsten Rod, 2"..... each  
29-244 Cr Plated Tungsten Rod, 4"..... each

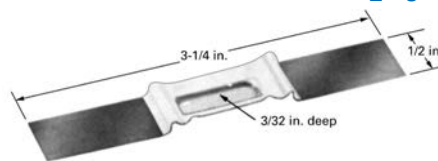
**TUNGSTEN METAL BOATS**

*For Cleaning Molybdenum Apertures & Evaporation*

Two of the tungsten boats listed in this brochure are a combination of the refractory metal tungsten and an alumina barrier (Al<sub>2</sub>O<sub>3</sub>) coating over the tab area. The exposed metal area comprising the bottom of the boat allows the sample to be in good thermal contact with the source. The barrier will tend to help concentrate the heat towards the center. The alumina barrier will inhibit an evaporant (if used as a sample instead of an aperture) from creeping toward the heat sink or from wetting the entire boat.

The tungsten boats are manufactured from high grade tungsten. Of all metals in pure form, tungsten has the highest melting point (3422°C/6192°F), the lowest vapor pressure at temperatures above 1650°C (3000°F) and has the highest tensile strength. Tungsten also has the lowest coefficient of thermal expansion of any pure metal. This combination of properties makes tungsten the ideal material for evaporation sources.

**TUNGSTEN BOATS WITH Al<sub>2</sub>O<sub>3</sub> BARRIERS**

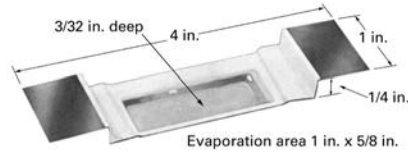


3-1/4" L x 1/2" W (82.5 x 12.7mm), trough: 1/4" W x 3/4" L (6.35 x 19.05mm) x 3/32" D (2.38mm).

Tungsten thickness: 0.010" (0.25mm). Al<sub>2</sub>O<sub>3</sub> = 0.010" (0.25mm) coating; Settings: 0.95V/136A/129W for 1200°C.

84-2 Tungsten Boat- Al<sub>2</sub>O<sub>3</sub> Barrier, 1/4" x 3/4" Trough.....pkg/5

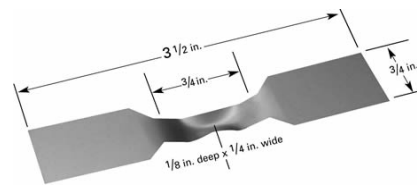
**TUNGSTEN BOATS WITH Al<sub>2</sub>O<sub>3</sub> BARRIERS**



4" L x 1" W (101.6 x 25.4mm), trough: 5/8" W x 1-3/4" L (15.9 x 44.5mm) x 3/32" D (2.4mm).

Tungsten thickness: 0.010" (0.25mm). Al<sub>2</sub>O<sub>3</sub> = 0.010" (0.25mm) coating; Settings: 1.43V/264A/378W for 1200°C.

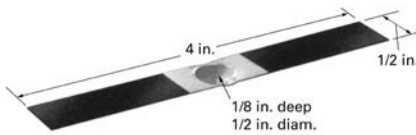
84-3 Tungsten Boat- Al<sub>2</sub>O<sub>3</sub> Barrier, 5/8" x 1-3/4" Trough..pkg/5



Tungsten evaporation boat with narrow section trough, 3.5" x 3/4" (89 x 19mm), trough is 1/4" W x 1/8" D x 3/4" L (6.35 x 3.2 x 19mm). Tungsten thickness: 0.005" (0.127mm); Settings: 1.95V/100A/195W for 1800°C.

84-36 Tungsten Boat, 1/4" x 1/8" x 3/4" Narrow Trough ...pkg/5

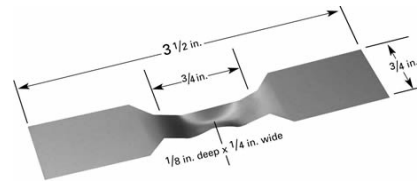
**ALUMINA COATED EVAPORATION SOURCE**



Replaces alumina crucibles for some specific applications. Good heat transfer yet has alumina inertness. Evaporant does not wet the alumina: no resistant change of the boat when evaporant melts. Due to the non-wetting characteristic, the evaporant forms a sphere when melted resulting in a point source.

4" L x 1/2" W (101 x 12mm). Trough is a dimple: 1/2" diameter and 1/8" deep (12 x 3mm). Alumina coated thickness: 0.005" (0.127mm); Tungsten thickness: 0.010" (0.25mm); Settings: 1.29V/190A/245W for 1200°C.

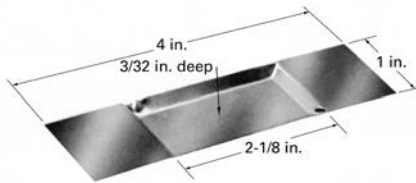
84-4 Tungsten Boat, Alumina Coated, 1/2" Dimple .....pkg/5



Tungsten evaporation boat with narrow section trough, 3.5" x 3/4" (89 x 19mm). Trough is 1/4" W x 1/8" D x 3/4" L (6.35 x 3.2 x 19mm). Tungsten thickness: 0.010" (0.254mm); Settings: 1.47V/158A/232W for 1800°C.

84-37 Tungsten Boat, 1/4" x 1/8" x 3/4" Narrow Trough ....pkg/5

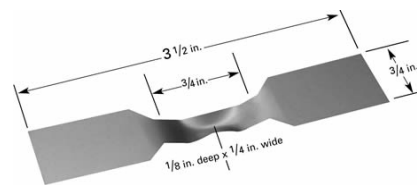
**TUNGSTEN BOATS WITHOUT ALUMINA BARRIERS**



4" L x 1" W (101.6 x 25.4mm), trough: 1" W x 2-1/8" L (25.4 x 58.8mm) x 3/32" D (2.4mm).

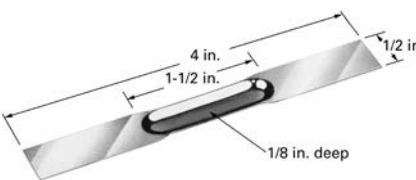
Tungsten thickness: 0.010" (0.25mm); Settings: 3.01V/391A/1177W for 1800°C.

84-5 Tungsten Boat, 1" x 2-1/8" Trough .....pkg/5



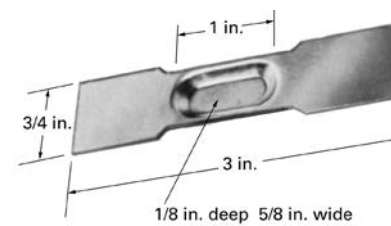
Tungsten evaporation boat with narrow section trough, 4" x 3/4" (102 x 19mm). Trough is 1/4" W x 1/8" D x 1-1/2" L (6.35 x 3.2 x 38mm). Tungsten thickness: 0.005" (0.127mm); Settings: 2.76V/96A/265W for 1800°C.

84-38 Tungsten Boat, 1/4" x 1/8" x 1-1/2" Narrow Trough..pkg/5



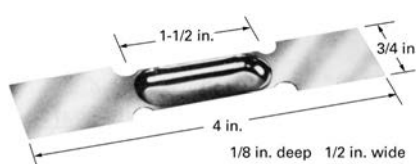
4" L x 1/2" W (101.6 x 12.7mm), trough: 1/2" W x 1-1/2" L x (12.7 x 38.1mm) x 1/8" D (3.2mm). Tungsten thickness: 0.010" (0.25mm); Settings: 2.90V/196A/568W for 1800°C.

84-7 Tungsten Boat, 1/2" x 1-1/2" Trough .....pkg/5



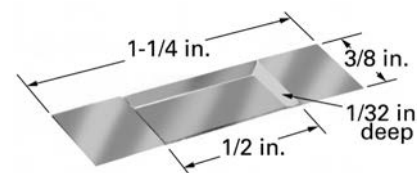
3" L x 3/4" W (76.2 x 19.5mm), trough: 5/8" W x 1" L (15.9 x 25.4mm) x 1/8" D (3.18mm). Tungsten thickness: 0.005" (0.127mm); Settings: 3.04V/199A/605W for 1800°C.

84-6 Tungsten Boat, 5/8" x 1" Trough.....pkg/5



4" L x 3/4" W (101.6 x 19mm), trough: 1/2" W x 1-1/2" L x (12.7 x 38.1mm) x 1/8" D (3.2mm). Tungsten thickness: 0.010" (0.25mm); Settings: 3.28V/300A/984W for 1800°C.

84-8 Tungsten Boat, 1/2" x 1-1/2" Trough .....pkg/5



1-1/4" L x 3/8" W (32 x 9.5mm), trough: 3/8" W x 1/2" L (9.5 x 12.7mm) x 1/32" D (0.8mm). Tungsten thickness: 0.002" (0.05mm).

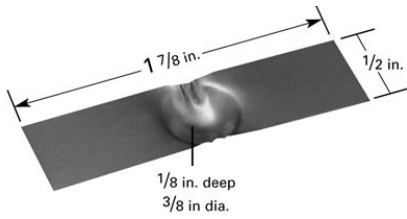
84 Tungsten Boat, 3/8" x 1/2" Trough.....pkg/5



1-1/4" L x 1/4" W (32 x 6.35mm), trough: 1/8" W x 3/8" L (3mm x 9.5mm) x 1/16" D (1.6mm). Tungsten thickness: 0.001" (0.025mm).

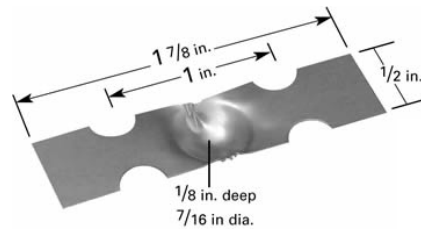
84-30 Tungsten Boat, 1/8" x 3/8" Trough.....pkg/5

**VACUUM SUPPLIES**  
**Tungsten Evaporation Boats**



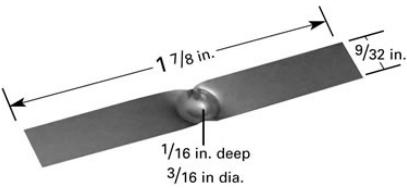
Small tungsten evaporation boat with dimple, 1-7/8" x 1/2" (47.6 x 12.7mm). Dimple: 3/8" (9.5mm) diameter x 1/8" D (3.2mm). Tungsten thickness: 0.005" (0.127mm); Settings: 1.83V/143A/262W for 1800°C.

80-30 Tungsten Boat, Small, 3/8" x 1/8" Dimple..... pkg/5



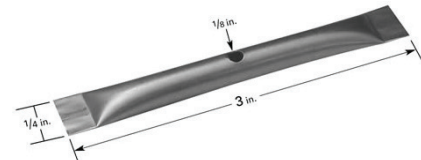
Small tungsten evaporation boat with dimple, 1-7/8" x 1/2" (47.6 x 12.7mm). Decreased cross section. Dimple: 7/16" (11.1mm) diameter x 1/8" (3.2mm) deep. Tungsten thickness: 0.005" (0.127mm); Settings: 2.57V/129A/332W for 1800°C.

84-35 Tungsten Boat, Small, 7/16" x 1/8" Dimple..... pkg/5



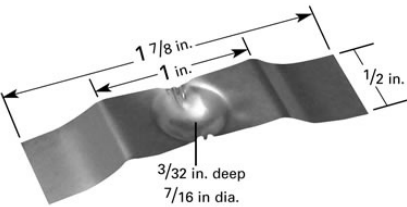
Small tungsten evaporation boat with dimple, 1-7/8" x 1/4" (47.6 x 6.35mm). Dimple: 3/16" (4.76mm) diameter x 1/16" (1.6mm) deep. Tungsten thickness: 0.005" (0.127mm); Settings: 1.69V/80A/135W for 1800°C.

84-31 Tungsten Boat, Small, 3/16" x 1/16" Dimple..... pkg/5



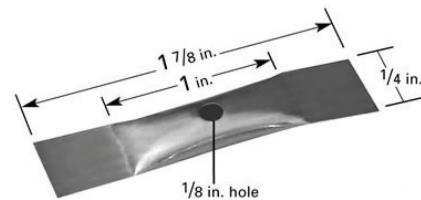
Directional (covered) boat source for small area / thick deposition. Efficient source. 3" x 1/4" (76 x 6.4mm) with 1/8" (3.2mm) hole. Tantalum thickness: 0.005" (0.127mm); Settings: 1.43V/267A/267W for 1600°C.

84-41 Tantalum Directional Boat Source, 3" x 1/4" .....each



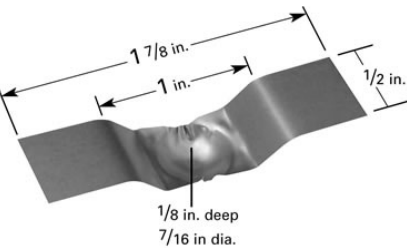
Small tungsten evaporation boat with dimple, 1-7/8" x 1/2" (47.6 x 12.7mm). Middle section raised. Dimple: 7/16" (11.1mm) diameter x 3/32" (2.38mm) deep. Tungsten thickness: 0.005" (0.127mm); Settings: 1.83V/145A/265W for 1800°C.

84-32 Tungsten Boat, Small, 7/16" x 3/32" Dimple..... pkg/5



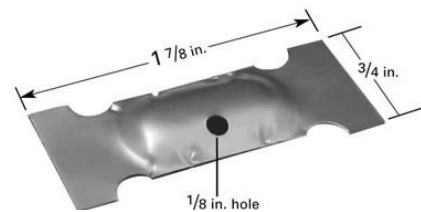
Directional (covered) boat source for small area / thick deposition. Efficient, small source. 1-7/8" x 1/4" (47.6 x 6.4mm) with 1/8" (3.2mm) hole. Tantalum thickness: 0.005" (0.127mm); Settings: 1.07V/131A/140W for 1600°C.

84-51 Tantalum Directional Boat Source, 1-7/8" x 1/4" .....each



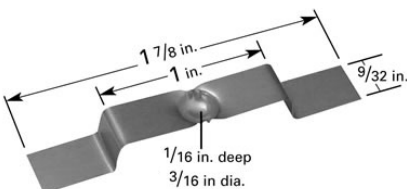
Small tungsten evaporation boat with dimple, 1-7/8" x 1/2" (47.6 x 12.7mm). Middle section recessed. Dimple: 7/16" (11.1mm) diameter x 1/8" (3.2mm) deep. Tungsten thickness: 0.005" (0.127mm); Settings: 1.88V/144A/271W for 1800°C.

84-33 Tungsten Boat, Small, 7/16" x 1/8" Dimple..... pkg/5



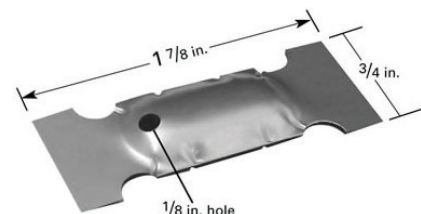
Covered boat source for directional deposition. Efficient, small source allows for either small area deposition or thicker deposition in a small area. 1-7/8" x 3/4" (47.6 x 19.2mm) with 1/8" (3.2mm) hole. Molybdenum thickness: 0.005" (0.127mm); Settings: 0.79V/251A/198W for 1400°C.

84-52 Molybdenum Covered Boat Source, 1-7/8" x 3/4", Hole on One Side..... pkg/3



Small tungsten evaporation boat with dimple, 1-7/8" x 1/4" (47.6 x 6.35mm). Middle section raised. Dimple: 3/16" (4.76mm) diameter x 1/16" (1.6mm) deep. Tungsten thickness: 0.005" (0.127mm); Settings: 2.03V/76A/154W for 1800°C.

84-34 Tungsten Boat, Small, 3/16" x 1/16" Dimple..... pkg/5



Covered boat source for directional deposition. On-axis hole. 1-7/8" x 3/4" (47.6 x 19.2mm) with 1/8" (3.2mm) hole. Molybdenum thickness: 0.005" (0.127mm); Settings: 0.83V/248A/206W for 1400°C.

84-55 Molybdenum Covered Boat Source, 1-7/8" x 3/4", Hole on Axis ..... pkg/3





**WIRES FOR EVAPORATION**

High purity Al, Au, Au/Pd, Pd, Pt, Pt/Ir, Ag and Nichrome thin wires for EM and thin film applications. Use Tungsten Filaments for evaporation in high vacuum evaporation systems made by Cressington, Denton, Edwards, Joel, Ladd or others. W thin wire is offered for additional deposition/evaporation/filament applications.

**Aluminum**

- 20/10-1 99.99% Al,  $\phi$ 0.25mm/15.2m ( $\phi$ 0.010"/50 ft.) ..... each
- 20/15-1 99.99% Al,  $\phi$ 0.38mm/15.2m ( $\phi$ 0.015"/50 ft.) ..... each

**Gold**

- 21-2 99.95% Au,  $\phi$ 0.20mm/0.6m ( $\phi$ 0.008"/2 ft.) ..... each
- 21-10 99.95% Au,  $\phi$ 0.20mm/3m ( $\phi$ 0.008"/10 ft.) ..... each
- 21-50 99.95% Au,  $\phi$ 0.20mm/15.2m ( $\phi$ 0.008"/50 ft.) ..... each
- 21-100 99.95% Au,  $\phi$ 0.20mm/30.4m ( $\phi$ 0.008"/100 ft.) ..... each

**Gold / Palladium**

- 22-2 60:40, 99.95% Au:Pd,  $\phi$ 0.20mm/0.6m ( $\phi$ 0.008"/2 ft.) .... each
- 22-10 60:40, 99.95% Au:Pd,  $\phi$ 0.20mm/3.05m ( $\phi$ 0.008"/10 ft.) ...each
- 22-50 60:40, 99.95% Au:Pd,  $\phi$ 0.20mm/15.2m ( $\phi$ 0.008"/50 ft.) ...each

**Nichrome**

- 13082 30 gauge ( $\phi$ 0.010", 10mil, 0.25mm), 30.48m (100 ft.)... each

**Palladium**

- 26-2 99.95% Pd,  $\phi$ 0.20mm/0.6m ( $\phi$ 0.008"/2 ft.) ..... each
- 26-10 99.95% Pd,  $\phi$ 0.20mm/3m ( $\phi$ 0.008"/10 ft.) ..... each
- 26-50 99.95% Pd,  $\phi$ 0.20mm/15.2m ( $\phi$ 0.008"/50 ft.) ..... each

**Platinum**

- 23-2 99.95% Pt,  $\phi$ 0.20mm/0.6m ( $\phi$ 0.008"/2 ft.)..... each
- 23-10 99.95% Pt,  $\phi$ 0.20mm/3m ( $\phi$ 0.008"/10 ft.)..... each
- 23-50 99.95% Pt,  $\phi$ 0.20mm/15.2m ( $\phi$ 0.008"/50 ft.) ..... each

**Platinum / Iridium**

- 24-6-2 80:20, 99.95% Pt:Ir,  $\phi$ 0.20mm/0.6m ( $\phi$ 0.008"/2 ft.)..... each
- 24-6-10 80:20, 99.95% Pt:Ir,  $\phi$ 0.20mm/3m ( $\phi$ 0.008"/10 ft.) ..... each

**Platinum / Palladium**

- 24-2 80:20, 99.95% Pt:Pd,  $\phi$ 0.20mm/0.6m ( $\phi$ 0.008"/2 ft.)..... each
- 24-10 80:20, 99.95% Pt:Pd,  $\phi$ 0.20mm/3m ( $\phi$ 0.008"/10 ft.)..... each

**Silver**

- 25-10 99.99% Ag,  $\phi$ 0.20mm/3m ( $\phi$ 0.008"/10 ft.) ..... each
- 25-50 99.99% Ag,  $\phi$ 0.20mm/15.2m ( $\phi$ 0.008"/50 ft.) ..... each



**TUNGSTEN WIRE**

Tungsten, vacuum grade, cleaned and coiled.

- 27-20 99.95% W,  $\phi$ 0.51mm/6.1m ( $\phi$ 0.020"/20 ft.) ..... each
- 27-2-20 99.95% W,  $\phi$ 0.64mm/6.1m ( $\phi$ 0.025"/20 ft.) ..... each
- 27-3-20 99.95% W,  $\phi$ 0.76mm/6.1m ( $\phi$ 0.030"/20 ft.) ..... each
- 27-11 99.95% W,  $\phi$ 0.13mm/6.1m ( $\phi$ 0.005"/20 ft.) ..... each



**HIGH PURITY EVAPORATION MATERIALS**

High Purity Evaporation Materials in form of pieces, granules or pellets. Packed in glass vials in quantities varying from 5-25 grams. Used for thin film research, thermal evaporation and electron microscopy coatings.

- 29-12 Magnesium, Mg, Purity 99.95%,  $\phi$ 1/4" x 1/4" Pellets..... 10g
- 29-13 Aluminum, Al, Purity 99.999%,  $\phi$ 1/4" x 1/4" Pellets.....25g
- 29-14 Silicon, Si, Purity 99.999%, 1-3mm Random Sized Pieces..... 10g
- 29-22 Titanium, Ti, Purity 99.995%,  $\phi$ 1/4" x 1/4" Pellets ..... 10g
- 29-23 Vanadium, V, Purity 99.7%,  $\phi$ 1/4" x 1/4" Pellets.....5g
- 29-24 Chromium, Cr, Purity 99.95%, 1-3mm Random Sized Pieces.....25g
- 29-25 Manganese, Mn, Purity 99.7%, 1-3mm Random Sized Pieces.....25g
- 29-26 Iron, Fe, Purity 99.9%,  $\phi$ 1/4" x 1/4" Pellets.....25g
- 29-27 Cobalt, Co, Purity 99.95%,  $\phi$ 1/4" x 1/4" Pellets..... 10g
- 29-28 Nickel, Ni, Purity 99.9%,  $\phi$ 1/8" x 1/8" Pellets .....25g
- 29-2824 Nichrome, Ni (80%) / Cr (20%), Purity 99.9%,  $\phi$ 1/4" x 1/4" Pellets.....25g
- 29-29 Copper, Cu, Purity 99.999%, 1-3mm Random Sized Pieces..... 10g
- 29-30 Zinc, Zn, Purity 99.99%, 1-3mm Random Sized Pieces....25g
- 29-32 Germanium, Ge, Purity 99.999%, 1-3mm Random Sized Pieces.....5g
- 29-39 Yttrium, Y, Purity 99.9%, 1-3mm Random Sized Pieces ....5g
- 29-40 Zirconium, Zr, Purity 99.7%,  $\phi$ 1/4" x 1/4" Pellets .....25g
- 29-41 Niobium, Nb, Purity 99.95%,  $\phi$ 1/4" x 1/4" Pellets..... 10g
- 29-46 Palladium, Pd, Purity 99.99%,  $\phi$ 1/8" x 1/8" Pellets ..... 10g
- 29-47 Silver, Ag, Purity 99.99%, 1-3mm Random Sized Pieces... 10g
- 29-49 Indium, In, Purity 99.99%, 1-3mm Random Sized Pieces.. 10g
- 29-50 Tin, Sn, Purity 99.999%, 1-3mm Random Sized Pieces ... 10g
- 29-51 Antimony, Sb, Purity 99.999%, 1-3mm Random Sized Pieces..... 10g
- 29-52 Tellurium, Te, Purity 99.999%, 1-3mm Random Sized Pieces.....25g
- 29-79 Gold, Au, Purity 99.99%, 1-3mm Random Sized Pieces .. 10g
- 29-82 Lead, Pb, Purity 99.999%, 1-3mm Random Sized Pieces...25g
- 29-83 Bismuth, Bi, Purity 99.999%, 1-3mm Random Sized Pieces...25g
- 29-7946 Gold/Palladium, Purity 99.99%,  $\phi$ 1/8" x 1/8" Pellets..... 10g



**CHROMIUM PLATED TUNGSTEN RODS**

Chromium Plated Tungsten Rods are an alternative for Cr evaporation when only a low power evaporation power supply is available. 0.05" (1.27mm) W rod, plated with a 0.01" (0.25mm) high purity Cr layer. Available in 2" (51mm) and 4" (102mm) lengths.

Settings for 2" L: 1.05V / 78A / 82W for 1800°C.  
Settings for 4" L: 2.02V / 78A / 158W for 1800°C.

- 29-242 Cr Plated Tungsten Rod, 2" ..... each
- 29-244 Cr Plated Tungsten Rod, 4" ..... each

*Evaporation Materials Pricing:*

*Please call or email for pricing on precious evaporation materials/wires. Actual prices may vary due to sudden price changes for precious metals.*

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