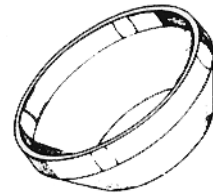


CONICAL SEALS®

joint perfection in tube fittings



**for all temperature
& pressure ranges.**

easy to install

Sophisticated aerospace systems constantly reveal the need for efficient and more durable metallic seals. Voi-Shan manufactures a variety of metallic seals to suit the most stringent applications wherever mechanically coupled tube fittings are used. Designed to effectively prevent or cure leakage problems in critical applications, they are available in a wide selection of materials. Voi-Shan metallic seals take high pressures, are easy to install, and cover an extensive temperature range.

A leakproof seal depends on the local yielding of one member of the connection to conform to the minor surface irregularities of the other. The frequent technique for stopping a leak - a little overtorquing of the nut — stresses the fitting to the point where the load is pushed beyond the elastic limit of the material involved, sometimes to the extent that components crack or break.

Voi-Shan metallic seals are malleable crush washers designed to yield and “flow” into imperfections of the mating surfaces. During installation, the metallic flow at the interface conforms to the imperfections; the material always has a yield point low enough to permit it to compensate for minor

surface defects. Metallic seals eliminate the potential problems caused by nicks, scratches or misalignment, as well as non-concentric conditions. Equally spaced friction flats hold them in place to avoid falling off during installation, and resulting leakproof connection is ideal for high or low pressure applications. Highly satisfactory performance is assured with metallic seals under vibration, flexure and impulse conditions. The seals are not affected by temperature variations in most cases, and have a high incidence of reusability. An assembly feature of the metallic seal is its practical avoidance of improper installation, and thus the optimum of quality assurance and supervision can be applied.

Many standard styles, sizes and materials are available as stock items. In addition, Voi-Shan's capability is geared to meet special requirements to match individual system needs on demand. Seal selection is readily gaged against the tube fitting's characteristics. This includes a determination of the fluid to be transmitted, the parent tubing and fitting material employed, and the desired temperature spectrum expected.

The accompanying technical data and standards pages illustrate the design features of Voi-Shan metallic seals. For additional information and comprehensive sales service, call on your nearest District Sales Office. For further assistance toward unique design applications or special configurations, contact Voi-Shan at Culver City, California.

CONICAL SEALS

TECHNICAL INFORMATION

SEAL TYPES

flared fitting seals



MATERIAL AVAILABILITY

aluminum, nickel, copper, stainless steel
others as required



PLATING

silver, tin



SIZES

see standards pages

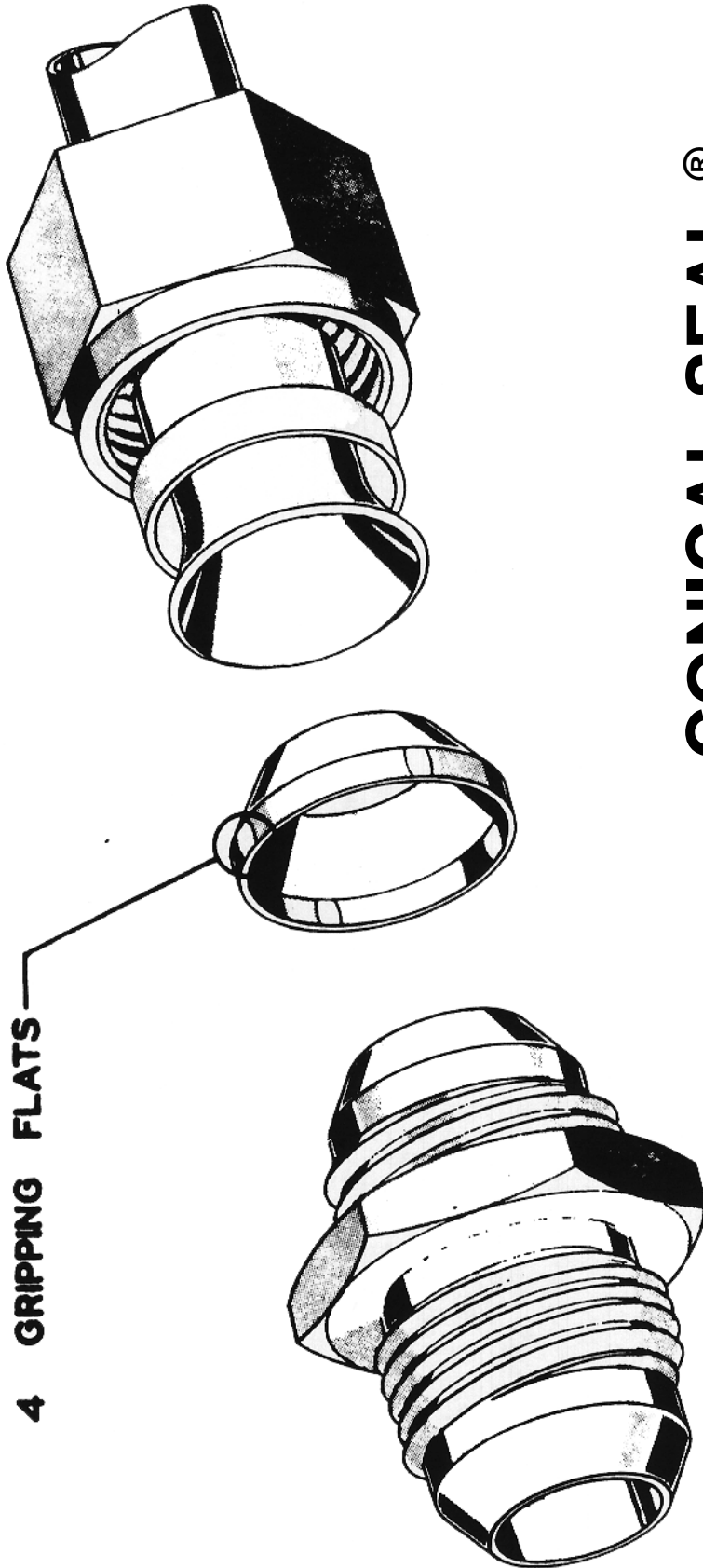


PATENT NUMBER

3,129,294



Additional technical information and standards pages are available from the Voi-Shan sales service staff.



4 GRIPPING FLATS

CONICAL SEAL®

SEAL CAPABILITY

NOTE: Seal Selection is based on:

1. The fluid to be transmitted
2. The parent tubing and fitting material
3. The temperature spectrum

Material	Temp. Spectrum	Can be used with the Following Fluids and Gasses
Aluminum	-420°F to +275°F	Pneumatics Liquid Hydrogen Liquid Nitrogen Hydrogen Peroxide Oxygen Hydraulic Oil Helium UDMH Hydrozine Nitric Acid
Copper	-420°F to +800°F	Helium Nitrogen Hydraulic Oil Oxygen JP-4 JP-5 Pneumatics
Nickel	-420°F to +1500°F	Liquid Hydrogen Liquid Nitrogen Oxygen Hydraulic Oil JP-4 JP-5 Pneumatic
Stainless Steel	-423°F to +1500°F	Hydrazine, Anhydrous Undimethylhydrazine (UDMH) Monomehtylhydrazine (MMH) 40% UDMH + 60% JP-4 (JP-X) 50% Hydrazine +50% UDMH (Aerozine) UDMH + Diethylenethriamine (UETA) Nitric Acid

SEAL CAPABILITY

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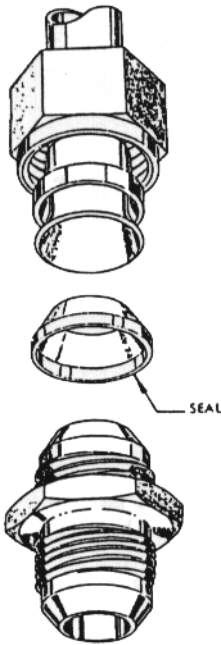
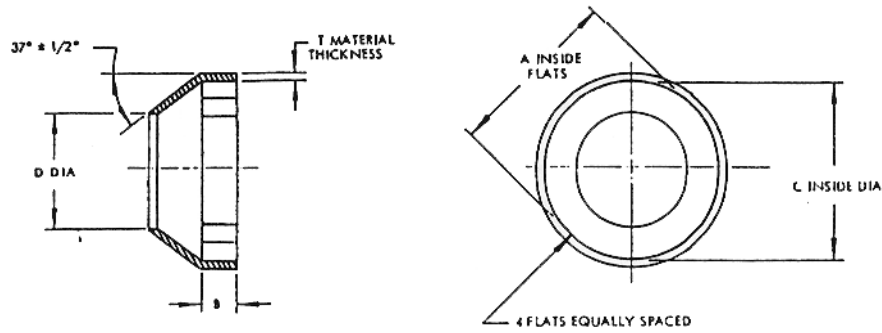
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Nickel	-420°F to +1500°F	Liquid Hydrogen Liquid Nitrogen Oxygen Hydraulic Oil JP-4 JP-5 Pneumatic
Stainless Steel	-423°F to +1500°F	Hydrazine, Anhydrous Undimethylhydrazine (UDMH) Monomehtylhydrazine (MMH) 40% UDMH + 60% JP-4 (JP-X) 50% Hydrazine +50% UDMH (Aerozine) UDMH + Diethylenethriamine (UETA) Nitric Acid

RECOMMENDED TORQUE *VALUES FOR CONICAL SEALS

Tubing O.D. Inches	Seal Dash No.	All Alum. System except 6061-T6	All Alum. 6061-T6 System	All Cres. & Steel System	All Cres. & Steel System	All Cres. & Steel System	All Cres. & Steel System	Alum. T6 Seal	Alum. Seal	Aluminum Seal	Copper Seal	Nickel Seal	Stainless Steel Seal	Aluminum Plated	Aluminum "B" Nut & Sleeve Cres. Fitting	Cres. & Steel "B" Nut & Sleeve Alum. Fitting	Alum. "B" Nut Stainless Sleeve Alum Fitting	
1/8	-2	30-50	35-65	80-90	90-100	90-100	90-100	Aluminum Seal	Aluminum Seal	35-65	Tin Plated Aluminum	Tin Plated Aluminum	Stainless Steel Seal	Tin Plated Aluminum Plated	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	70-80
3/16	-3	35-60	35-70	100-110	110-125	110-125	110-125	Aluminum Seal	Aluminum Seal	35-70	100-110	110-125	110-125	35-70	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	90-100
1/4	-4	40-65	70-120	150-165	165-190	165-190	165-190	Aluminum Seal	Aluminum Seal	70-120	150-165	165-190	165-190	70-120	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	135-150
5/16	-5	60-80	80-130	200-220	225-250	225-250	225-250	Aluminum Seal	Aluminum Seal	80-130	200-220	225-250	225-250	80-130	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	180-200
3/8	-6	75-125	130-180	335-375	335-375	335-375	335-375	Aluminum Seal	Aluminum Seal	130-180	335-375	335-375	335-375	130-180	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	270-300
1/2	-8	150-250	300-400	575-625	575-625	575-625	575-625	Aluminum Seal	Aluminum Seal	300-400	575-625	575-625	575-625	300-400	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	450-500
5/8	-10	200-350	430-550	810-875	810-875	810-875	810-875	Aluminum Seal	Aluminum Seal	430-550	810-875	810-875	810-875	430-550	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	650-700
3/4	-12	300-500	650-800	1125-1250	1125-1250	1125-1250	1125-1250	Aluminum Seal	Aluminum Seal	650-800	1125-1250	1125-1250	1125-1250	650-800	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	900-1000
1	-16	500-700	900-1100	1500-1750	1500-1750	1500-1750	1500-1750	Aluminum Seal	Aluminum Seal	900-1100	1500-1750	1500-1750	1500-1750	900-1100	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	1200-1400
1 1/4	-20	600-900	1200-1450	1875-2250	1875-2250	1875-2250	1875-2250	Aluminum Seal	Aluminum Seal	1200-1450	1875-2250	1875-2250	1875-2250	1200-1450	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	1500-1800
1 1/2	-24	600-900	1550-1850	2500-2850	2500-2850	2500-2850	2500-2850	Aluminum Seal	Aluminum Seal	1550-1850	2500-2850	2500-2850	2500-2850	1550-1850	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	2000-2300
1 3/4	-28	700-1000	2000-2350	3250-3600	3250-3600	3250-3600	3250-3600	Aluminum Seal	Aluminum Seal	2000-2350	3250-3600	3250-3600	3250-3600	2000-2350	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	2600-2900
2	-32	800-1100	2500-2900	4000-4500	4000-4500	4000-4500	4000-4500	Aluminum Seal	Aluminum Seal	2500-2900	4000-4500	4000-4500	4000-4500	2500-2900	Nut & Sleeve Cres. Fitting	Alum. Fitting	Tin Plated Copper Seal	3200-3600

*Torque values in inch-pounds.

Revised 25 November 1969



NOTE: CONICAL SEALS MAY ALSO BE USED IN BOSS APPLICATIONS, SEE VSD 1000.

DASH NO.	TUBE SIZE O.D	A REF	B +.000 -.015	C +.005 -.000	D +.015 -.000	T MAT'L SIZE
2	1/8	.240	.060	.245	.103	.005
3	3/16	.302	.060	.307	.166	
4	1/4	.354	.075	.359	.213	
5	5/16	.416	.075	.421	.275	
6	3/8	.421	.075	.476	.338	
7	7/16	.534	.075	.539	.401	
8	1/2	.649	.095	.654	.446	
9	9/16	.717	.095	.722	.529	
10	5/8	.762	.105	.767	.562	
10.5	21/32	.817	.085	.822	.625	.010
11	11/16	.877	.105	.882	.625	
12	3/4	.933	.105	.938	.687	
14	7/8	1.065	.105	1.070	.826	
16	1	1.183	.125	1.188	.936	
18	1 1/8	1.370	.075	1.375	1.046	
20	1 1/4	1.496	.125	1.501	1.175	
22	1 3/8	1.620	.120	1.625	1.287	
24	1 1/2	1.745	.125	1.750	1.418	
28	1 3/4	2.120	.125	2.125	1.680	
32	2	2.370	.125	2.375	1.913	
40	2 1/2	2.877	.055	2.882	2.500	.015
44	2 3/4	3.127	.055	3.132	2.742	
47	2 15/16	3.235	.090	3.245	3.015	
48	3	3.377	.055	3.382	2.990	

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COPYRIGHT 1964 VSI CORPORATION		U.S. PATENT NUMBER 3,139,294		CODE IDENT. NO. 92215
APPROVED DATE 5 NOVEMBER 1959		TITLE SEAL -- CONICAL FLARED FITTING		STANDARD
REV. LETTER AND DATE U 26 MAY 1987				VSF 1015
				SHEET 1 OF 2

NOTES:

1. REMOVE ALL SHARP EDGES AND BURRS.
2. THESE PARTS ARE ANNEALED. DIMENSIONS "A" AND "C" SHALL BE VERIFIED BY INSTALLING THE SEAL ON A STANDARD FITTING PER MS24385 OR MS24386 OF APPROPRIATE SIZE. AN OUT-OF-ROUND CONDITION WHICH DOES NOT PREVENT SUCH INSTALLATION SHALL NOT BE CAUSE FOR REJECTION UNLESS THE SEAL MATERIAL IS CREASED OR NICKED.

MATERIAL AND FINISH:

3. LOX-CLEANED PARTS HAVE A MAXIMUM SHELF LIFE OF 6 MONTHS.
- A ALUMINUM ALLOY 1100 (25) SHEET, CONDITION "O" PER QQ-A-250/1 OR QQ-A-1876.
- AT ALUMINUM ALLOY 1100 (25) SHEET, CONDITION "O" PER QQ-A-250/1 OR QQ-A-1876. TIN PLATED PER AMS 2408-2 OR MIL-T-10727, TYPE II.
- C OXYGEN FREE COPPER STRIP, SOFT-ANNEALED PER QQ-C-576.
- CT OXYGEN FREE COPPER STRIP, SOFT-ANNEALED PER QQ-C-576, TIN PLATED PER AMS 2408-2, OR MIL-T-10727, TYPE II.
- G 99.9% PURE GOLD.
- N LOW-CARBON NICKEL STRIP, ANNEALED PER ASTM-8162.
- NT LOW-CARBON NICKEL STRIP, ANNEALED PER ASTM-8162, TIN PLATED PER AMS 2408-2, OR MIL-T-10727, TYPE II.
- NS LOW-CARBON NICKEL STRIP, ANNEALED PER ASTM-8162, SILVER PLATED PER AMS 2410.
- S CORROSION RESISTANT STEEL PER AISI 305.
- T TIN PER MIL-T-12076.

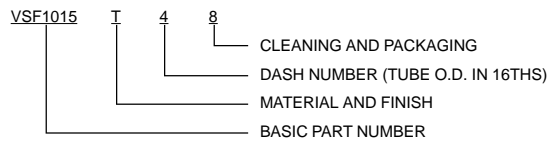
HEAT TREAT:

ALL MATERIALS; ANNEAL PER AEROSPACE FITTINGS SPECIFICATION VS-2A-15.

CLEANING & PACKAGING:

CODE	CLEANING AND PACKAGING
NONE △	LOX-CLEANED AND PACKAGED IN SEALED INDIVIDUAL POCKETS OF POLYETHYLENE PLASTIC STRIPS PER VS-VSF-5-1.
B	NON-LOX CLEANED AND BULK PACKAGED PER VS-VSF-5-2, METHOD 3.
BX	NON-LOX-CLEANED AND INDIVIDUALLY PACKAGED IN A RIGID, CLEAR, HINGED PLASTIC BOX PER VS-VSF-5-2, METHOD 2.
BXB	NON-LOX-CLEANED AND PACKAGED IN SEALED INDIVIDUAL POCKETS OF POLYETHYLENE PLASTIC STRIPS PER VS-VSF-5-2, METHOD 4.
SP △	SPECIAL CLEANING AND/OR PACKAGING REQUIREMENT. (SEE APPLICABLE CUSTOMER SPECIFICATION FOR REQUIREMENTS).
X △	LOX-CLEANED AND PACKAGED IN SEALED INDIVIDUAL POLYETHYLENE PLASTIC BAGS PER VS-VSF-5-1 AND BAGS INDIVIDUALLY PACKAGED IN A RIGID, CLEAR, HINGED PLASTIC BOX PER VS-VSF-5-2, METHOD 2.

EXAMPLE OF CODE:



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REV. LETTER AND DATE U 26 MAY 1987		SHEET 2 OF 2