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If you require additional information, please contact an Eaton customer service representative at (517) 787 8121.

Eaton's Gamah coupling product line is most commonly manufactured in aluminum, stainless steel and titanium alloys.

The flanges can be manufactured in butt, orbital, socket welded and swaged configurations.

Flexible Type	Series	Typical Operating Temperatures	Typical Operating Pressures	Flexibility	Axial Movement	Self Locking	Self Bonding
Threaded	J20000	Up to 500°F (260°C)	Neg. to 150 psi (10.3 bar)	±4°	Yes	No	No
	J20600	Up to 700°F (371°C)	Neg. to 200 psi (13.7 bar)	±4°	Yes	No	No
	J21000	Up to 500°F (260°C)	Neg. to 200 psi (13.7 bar)	±4°	Yes	No	No
	J30100	Up to 500°F (260°C)	Neg. to 200 psi (13.7 bar)	±4°	Yes	Yes	Yes
Threadless	J33000	Up to 500°F (260°C)	Neg. to 200 psi (13.7 bar)	±4°	Yes	Yes	Yes
	J33400	Up to 500°F (260°C)	Neg. to 200 psi (13.7 bar)	±6°	Yes	Yes	Yes
	J34000	Up to 500°F (260°C)	Neg. to 200 psi (13.7 bar)	±4°	Yes	Yes	Yes
	J34400	Up to 500°F (260°C)	Neg. to 200 psi (13.7 bar)	±6°	Yes	Yes	Yes

Most Gamah threaded and threadless couplings meet the requirements of MIL-C-22263. Unique situations have allowed our couplings to be utilized in applications up to 1,000 psi (69 bar). Depending on the sealing mechanism, these couplings may be used in temperatures of -120°F up to +700°F (-84°C to 371°C).

The axial movement distance will vary depending on the coupling size and type for the application. Gamah threaded couplings can be provided with captured or removable components.

Metal Seal Type	Series	Typical Operating Temperatures	Typical Operating Pressure	Leak Rate	Other
Threaded	14, 141, 142	-450° to +3000°F (-267° to +1,648°C)	10^{-8} Torr up to 3,000 psi (206.8 bar)	Less than 1 x 10^{-9} scc/sec of helium	No lock wire required
	144	-450° to +1500°F (-267° to +815°C)	10^{-8} Torr up to 6,000 psi (413.6 bar)	Less than 1 x 10^{-9} scc/sec of helium	Positive locking, redundant sealing
V-Band	145	50° to +1500°F (34° to +815°C)	10^{-8} Torr up to 400 psi (27.5 bar)	Less than 1 x 10^{-9} scc/sec of helium	

Particular conditions have allowed our metal seal couplings to be utilized in applications of up to 16,000 psi (1,103 bar). Eaton's Gamah metal seal couplings have been used in applications requiring fit and forget, rapid variations in pressure and temperature, large mechanical loads and corrosive fluid.

APPLICATIONS

Threaded and Threadless Couplings:

- 90% of these couplings are utilized in either fuel or air systems
- Active aircraft applications include C17, MH53, UH60, S-76, DC-10, MD-80, MD11, CH47, GIII, GIV, F14, F16, A6, B2, all Airbus aircraft models, SA2 Citation, EMB110, 120, 312 and AMX
- Other applications include the LCAC landing craft, environmental control systems on numerous aircraft and turbine engine lubrication/oil lines for use on land, sea and aircraft

Metal Seal Couplings:

- Aircraft applications include C17 (LOX and OBIGGS), F117 (engine)
- Missile applications include Trident (post boost control) Peacekeeper (thrust vector control, (3) stages)
- Nuclear power plants (liquid metal loops, gas lines)
- Space applications include: Lunar Excursion Module (environmental control, life support, reaction control and propulsion systems), Space Station (ammonia, water, nitrogen, waste and O^2

Note: This reference guide is for providing the basic differences between the numerous coupling designs Eaton has to offer. For the best coupling to meet your needs, fill out the application information request form on page 192 of this catalog and fax to (303) 360-8965 or contact our sales engineers at (303) 340-5200.

Index By Part Number

PART NUMBER	DESCRIPTION	SECTION
CG62020	Coupler/Sleeve Assembly	2C
CG62100	Coupler/Sleeve Assembly	2C
CT30100	Sleeve, Threaded, Locking	1A
E14000	Elbow	5B
F10000	Flange, Swivel	3
F10B00	Flange, Swivel, Retaining	3
F14000	Flange, Plain, Swaged	5B
F14T00	Flange, Threaded, Swaged	5B
F20000	Flange, Swaged	1A
F20100	Flange, Swaged, No Tubestop	1A
F20200	Flange, Socket Welded/Brazed	1A
F20300	Flange, Butt Welded	1A
F20800	Flange, Socket Welded/Brazed	1A
F21000	Flange, Swaged	2A
F30000	Flange, Swaged	2A
F30200	Flange, Socket Welded/Brazed	2A
F30300	Flange, Butt Welded	2A
F31000	Flange, Swaged	2A
F31200	Flange, Socket Welded/Brazed	2A
F31300	Flange, Butt Welded	2A
F33100	Flange, Swaged	1A & 2A
F84200	Flange	4
FBR84700	Flange, Brazed	4
FP14000	Flange Plug	5B
FP14T00	Flange Plug, Threaded	5B
FPS14100	Flange Plug, Plain	5B
FPS14T00	Flange Plug, Threaded	5B
FS14100	Flange, Plain, Swaged	5B
FS14200	Flange, Plain, Swaged	5B
FS14T00	Flange, Threaded, Swaged	5B
FS30100	Flange, Swaged	1A
FT14200	Flange, Threaded, Swaged	5B
FW14200	Flange, Plain, Butt Welded	5B
FW33200	Flange, Socket Welded/Brazed	1A &2A
FW33300	Flange, Butt Welded	1A &2A
FW84200	Flange, Welded	4
FWB14100	Flange, Butt Welded	5B
FWB141T00	Flange, Threaded, Butt Welded	5B
FWS14100	Flange, Plain, Socket Welded	5B
FWS14T00	Flange, Threaded, Socket Welded	5B
FWT14200	Flange, Threaded, Butt Welded	5B
G30000	Sleeve	2A
G31000	Sleeve	2A
G62000	Sleeve	2C
G84200	Sleeve	4

PART NUMBER	DESCRIPTION	SECTION
J14000	Metal Seal Coupling Assembly	5B
J14100	Metal Seal Coupling Assembly, Internal Stop	5B
J14200	Metal Seal Coupling Assembly, Lightweight	5B
J20000	Threaded Coupling Assembly	1A
J20400	Threaded Coupling Assembly, Removable Nut	1A
J20600	Threaded Coupling Assembly, Fluorocarbon Seal	1A
J21000	Threaded Coupling Assembly, Heavy Duty	1A
J30100	Threaded Coupling Assembly, Locking/Bonded	1A
J33000	Threadless Coupling Assembly	2A
J33100	Threadless Coupling Assembly, Fluorocarbon Seal	2A
J34000	Threadless Coupling Assembly, Heavy Duty	2A
J84200	Coupling Assembly, Copper-Nickel Coupler	4
J84700	Coupling Assembly, Cast Bronze Coupler	4
JA84200	Bulkhead Assembly, Copper-Nickel Coupler	4
J84300	Coupling Assembly, Aluminum Coupler	4
J84400	Coupling Assembly, Titanium Coupler	4
JA84300	Bulkhead Assembly, Aluminum Coupler	4
JBR84700	Coupling Transition Assembly, Cast Bronze Coupler	4
JT14400	Metal Seal Coupling Tee Assembly, Triple Seal	5B
JW14400	Metal Seal Coupling Assembly, Triple Seal	5B
JWB14100	Metal Seal Coupling Assembly, Butt Weld Flange	5B
JWS14100	Metal Seal Coupling Assembly, Socket Weld Flange	5B
K20000	Union Assembly, Threaded	1B
K20100	Union Assembly, Bolted	1B
K20200	Adapter Assembly, Bolted	1B
K21000	Union Assembly, Threaded	1B
K21200	Union Assembly, Bolted	1B
K30000	Bulkhead Union Assembly, Threaded	2B
KM33000	Bulkhead Union Assembly	2B
KM34000	Bulkhead Union Assembly	2B
M1120	Plug, Aluminum	3
M1212	Retaining Ring, Aluminum	1A
M1213	Retaining Ring, Steel & Titanium	1A
M1214	Retaining Ring, Aluminum	1A
M1215	Retaining Ring, Steel & Titanium	1A
M1239	Plug, Aluminum	3
M33100	Plug, Fluorocarbon Seal	3
N14000	Nut	5B
N14100	Nut	5B
N14200	Nut	5B
N20000	Nut	1A
N20500	Nut, Bulkhead	1A & 1B
N20900	Nut, Class 3 Thread	1B
N21000	Nut	1A
N30500	Nut, Bulkhead	2B

Index By Part Number

PART NUMBER	DESCRIPTION	SECTION
NA30100	Nut Assembly, Removable	1A
NA30300	Nut Assembly, Locking	1C
NA30400	Nut, Removable, Locking	1C
R14100	Retaining Ring	5B
R14300	Retaining Ring	5B
R20000	Retaining Ring	1A
R30300	Retaining Ring	1C
RA30100	Retaining Ring Assembly, Bonding	1A
S14000	Seal, Metal	5B
S14100	Seal, Metal	5B
S14200	Seal, Metal	5B
S2	O-Ring Seal	3
S33100	Fluorocarbon Seal	3
T1070	Plug	3
T1072	Cap	3
T14000	Tee	5B
T15	Nut, Aluminum, Removable	A
T20000	Tee	3
T21	Nut, Steel & Titanium, Removable	2A
T2158	Coupler, Removable	1A
T2159	Nut, Removable	1A
T2186	MS33656 Adapter	3
T2189	Nut, Bulkhead	5B
T22	Coupler, Steel & Titanium, Removable	1A
T2236	Nut, Bulkhead	2B
T2248	Adapter, Half Coupling	1B
T2268	Half Coupling	1A
T2269	Sleeve, Threaded	1A
T3071	Plug	3
U14000	Union, Threaded	5B
U14100	Union, Bolted	5B
U20000	Union, Threaded	1B
U20100	Union, Bulkhead, Bolted	1B
U20200	Adapter, Bolted	1B
U20900	Union, Class 3 Thread	1B
U21000	Union, Threaded	1B
U21200	Adapter, Bolted	1B
U30000	Union, Bulkhead, Threaded	2B
U30100	Union, Bulkhead, Bolted Flange	2B
U31100	Union, Bulkhead, Bolted Flange	2B
U33200	Union Adapter, Bolted Flange	2B
UM33000	Union, Bulkhead, Threaded	2B
UM34000	Union, Bulkhead, Threaded	2B

Threaded Flexible Couplings

PART NUMBER	DESCRIPTION	SERIES
J20000	Threaded Coupling Assembly	20
J20400	Threaded Coupling Assembly, Removable Nut	20
J20600	Threaded Coupling Assembly, Fluorocarbon Seal	20 & 331
J21000	Threaded Coupling Assembly, Heavy Duty	21
J30100	Threaded Coupling Assembly, Self-Locking & Bonding, Removable	301
C20000	Coupler	20
C21000	Coupler	21
C30100	Coupler, Removable	301
CT30100	Sleeve, Threaded	301
C30800	Coupler, Socket Welded/Brazed	301
F20000	Flange, Swaged	20
F20100	Flange, Swaged, No Tubestop	20
F20200	Flange, Socket Welded/Brazed	20
F20300	Flange, Butt Welded	20
F20800	Flange, Socket Welded/Brazed	20
F21000	Flange, Swaged	21
FS30100	Flange, Swaged	301
F33100	Flange, Swaged	331
FW33200	Flange, Socket Welded/Brazed	331
FW33300	Flange, Butt Welded	331
M1212	Retaining Ring, Aluminum	20 & 21*
M1213	Retaining Ring, Steel & Titanium	20 & 21*
M1214	Retaining Ring, Aluminum	20
M1215	Retaining Ring, Steel & Titanium	20
N20000	Nut	20
N21000	Nut	21
NA30100	Nut Assembly, Removable, Locking	301
R20000	Retaining Ring	20
RA30100	Retaining Ring Assembly, Bonding	301
T15	Nut, Aluminum, Removable	20
T21	Nut, Steel & Titanium, Removable	20
T2158	Coupler, Removable	21 & JT175
T2159	Nut, Removable	21 & JT175
T22	Coupler, Steel & Titanium, Removable	20
T2268	Half, Coupling	20
T2269	Sleeve, Threaded	20

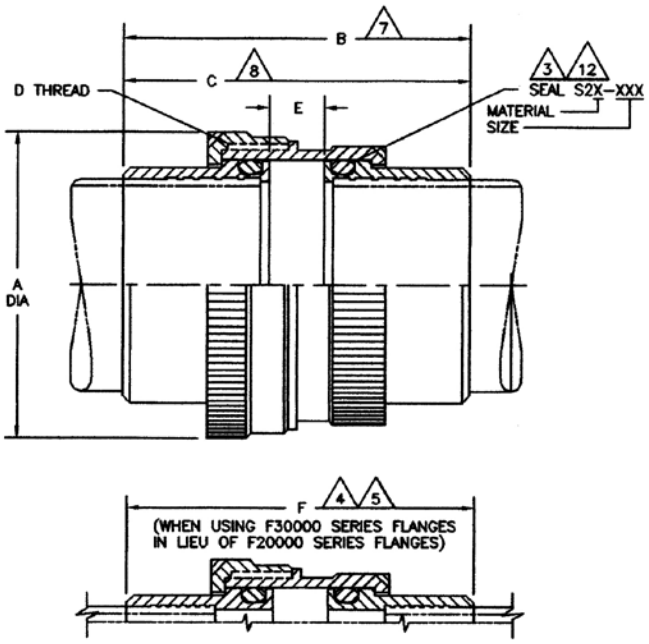
* Series 20 for sizes up to 1.25 inches and Series 21 for larger sizes.

Most components are available in various configurations and series.
Contact Eaton for your specific requirements.

J20000 Flexible Coupling
Series 20

Revision Letter N

NOM TUBE O D (IN)	ASSY PART NO.	NUT	COUPLER	FLANGE	SWAGE BLOCK	SEAL SIZE △3	A	B MAX △7	C MAX △8	D THREAD △6	E MIN	F MAX	WEIGHT (LB) (APPROX) △7 A	C	T
.250	J20002	N20004	C20004	F20002	B20004	–111	.91	1.15	—	.798- 2ONS-2	.21	1.87	—	—	—
.375	J20004	N20004	C20004	F20004	B20004	–111	.91	1.15	—	.798- 2ONS-2	.21	1.87	.031	.066	.049
.500	J20005	N20005	C20005	F20005	B20005	–113	1.04	1.15	—	.923- 2ONS-2	.21	1.87	.037	.11	.060
.625	J20006	N20006	C20006	F20006	B20006	–115	1.17	1.15	—	1.048-2OMS-2	.21	1.87	.042	.12	.071
.750	J20007	N20007	C20007	F20007	B20007	–211	1.35	1.36	—	1.218-2ONS-2	.21	2.20	.060	.17	.099
1.000	J20010	N20010	C20010	F20010	B20010	–215	1.60	1.36	1.69	1.468-2ONS-2	.21	2.20	.079	.23	.13
1.250	J20012	N20012	C20012	F20012	B20012	–219	1.88	1.66	2.06	1.734-2ONS-2	.23	2.27	.11	.33	.19
1.500	J20015	N20015	C20015	F20015	B20015	–222	2.16	1.98	2.44	2.000-16UN-2	.29	2.33	.16	.45	.26
1.750	J20017	N20017	C20017	F20017	B20017	–224	2.41	1.98	2.44	2.250-16UN-2	.29	2.33	.18	.50	.29
2.000	J20020	N20020	C20020	F20020	B20020	–226	2.67	1.98	2.44	2.500-16UN-2	.29	2.58	.21	.59	.34
2.250	J20022	N20022	C20022	F20022	B20022	–228	2.92	1.98	2.44	2.750-16UN-2	.29	2.58	.23	.65	.37
2.500	J20025	N20025	C20025	F20025	B20025	–230	3.18	1.98	2.44	3.000-16UN-2	.29	2.58	.26	.74	.43
2.750	J20027	N20027	C20027	F20027	B20027	–232	3.43	1.98	2.44	3.250-16UN-2	.29	2.58	.28	.80	.46
3.000	J20030	N20030	C20030	F20030	B20030	–234	3.78	1.98	2.44	3.500-16UN-2	.29	2.58	.33	.96	.55
3.500	J20035	N20035	C20035	F20035	B20035	–238	4.33	2.83	—	4.000-16UN-2	.29	2.85	.49	1.40	.80
4.000	J20040	N20040	C20040	F20040	B20040	–242	4.85	2.83	—	4.500-16UN-2	.29	2.85	.57	1.66	.95
4.500	J20045	N20045	C20045	F20045	B20045	–246	5.45	3.16	—	5.047-12NS-3	.39	3.18	.73	2.13	1.22
5.000	J20050	N20050	C20050	F20050	B20050	–250	5.99	3.22	—	5.563-12NS-3	.43	3.24	.86	2.50	1.43
5.500	J20055	N20055	C20055	F20055	B20055	–358	6.78	3.51	—	6.297-12NS-3	.47	3.66	1.29	3.68	2.13
6.000	J20060	N20060	C20060	F20060	B20060	–361	7.32	3.55	—	6.813-12NS-3	.51	3.70	1.55	4.46	2.57



ASSY PART NUMBER CODE:

J200 00 A L DN

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED), ANODIZED
- C = STAINLESS STEEL 304, PASSIVATED (FLANGES 17-4PH)
- T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)
- –09 = ALUMINUM 6061-T6, ANODIZED, BLACK

LONG FLANGE

OPTIONS
- D = DRY FILM LUBE PER MIL-L-46010 △13
- N = NYLOK INSERT

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. See dwg S2 for material
4. J20000 Series coupling assemblies using F30000 Series flanges are qualified to MIL-C-22263 (125 psi (8.61 bar) operating pressure) (all sizes)
5. F30000 Series flanges require B30000 Series swage blocks
6. Nuts and couplers of J20045 and larger are not interchangeable with JT315, JT317, JT321, JT325 assy parts because of different threads
7. Standard flange
8. Long flange
9. J20004 thru J20025 using F20000 Series flanges are qualified to MIL-C-2263, J20030 thru J20060 designed for fuel system vent line service "25 psig (2.73 bar) operating, 75 psig (6.18 bar) burst"
10. O-ring lube compatible with system fluid
11. Other materials and finishes available upon request
12. 2 required per assembly (not furnished)
13. No dry lube on N20045 thru N20060

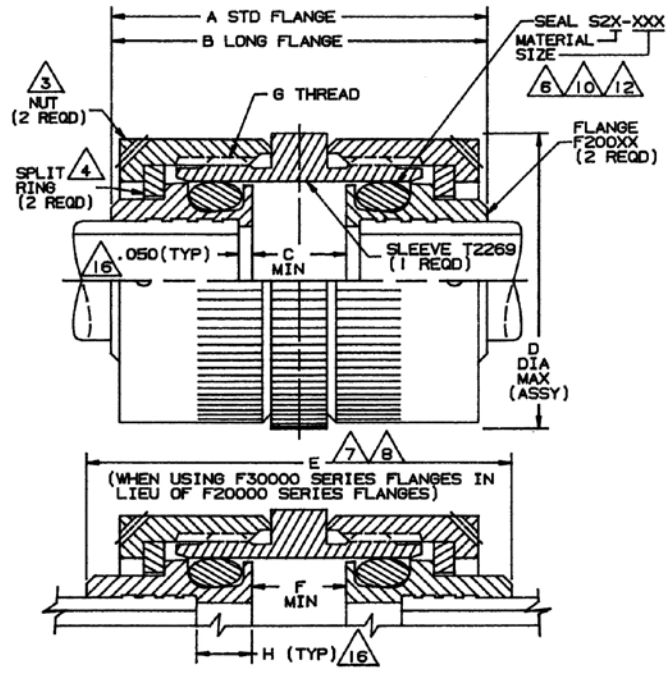
REVISION	LTR	DESCRIPTION	DATE
	K	Redrawn. Revised weights, notes	4/24/80
	L	Added Note 13	12/22/81
	M	Revised "C" and "T" materials	1/28/85
	N	Updated specs	4/13/99

This issue supersedes all previously issued catalog sheets and drawings

J20400 Flexible Coupling, Removable Nut
Series 20

Revision Letter F

NOM TUBE O D (IN)	ASSY PART NO. ⑨	SLEEVE T2269–	FLANGE	NUT ③	SPLIT RING ④	SEAL SIZE S2X–	A STD FLG	B LONG FLG	C MIN	D	E	F MIN	G THREAD	SWAGE BLOCK	H	WT (LB) ⑤ AL 2024
.500	J20405	–050	F20005	–050	–050	–113	1.23	—	.34	1.05	1.93	.34	.923-20UNS-2	B20005	.375	.055
.625	J20406	–063	F20006	–063	–063	–115	1.23	—	.34	1.20	1.93	.34	1.048-20UNS	B20006	.375	.068
.750	J20407	–075	F20007	–075	–075	–211	1.35	—	.24	1.38	2.17	.24	1.218-20UNS	B20007	.418	.086
1.000	J20410	–100	F20010	–100	–100	–215	1.35	1.68	.24	1.65	2.17	.24	1.468-20UNS	B20010	.418	.125
1.250	J20412	–125	F20012	–125	–125	–219	1.58	1.98	.21	1.90	2.17	.20	1.734-20UNS	B20012	.438	.154
1.500	J20415	–150	F20015	–150	–150	–222	1.90	2.36	.27	2.17	2.23	.26	2.000-16UN-2	B20015	.438	.211
1.750	J20417	–175	F20017	–175	–175	–224	1.90	2.36	.27	2.43	2.23	.26	2.250-16UN-2	B20017	.438	.254
2.000	J20420	–200	F20020	–200	–200	–226	1.90	2.36	.27	2.69	2.48	.26	2.500-16UN-2	B20020	.438	.281
2.250	J20422	–225	F20022	–225	–225	–228	1.90	2.36	.27	2.95	2.48	.26	2.750-16UN-2	B20022	.438	.349
2.500	J20425	–250	F20025	–250	–250	–230	1.90	2.36	.27	3.21	2.48	.26	3.000-16UN-2	B20025	.438	.370
2.750	J20427	–275	F20027	–275	–275	–232	1.90	2.36	.27	3.47	2.46	.24	3.250-16UN-2	B20027	.438	.403
3.000	J20430	–300	F20030	–300	–300	–234	1.90	2.36	.27	3.73	2.45	.23	3.500-16UN-2	B20030	.438	.459
3.500	J20435	–350	F20035	–350	–350	–238	2.82	—	.33	4.24	2.86	.36	4.000-16UN-2	B20035	.500	.646
4.000	J20440	–400	F20040	–400	–400	–242	2.95	—	.46	4.72	2.96	.46	4.500-16UN-2	B20040	.500	.777
4.500	J20445	–450	F20045	—	–450	–246	3.30	—	.57	5.48	3.29	.56	5.047-2UNS-3	B20045	.500	1.16
5.000	J20450	–500	F20050	—	–500	–250	3.35	—	.62	6.03	3.32	.69	5.563-12UNS-3	B20050	.500	1.50



REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn, revised seal callout and notes, added data and view for F30000	3/26/81
	B	Revised -450, -500, Notes 3 and 13, "A" material, added Note 14	4/10/81
	C	Added note 15	7/21/81
	D	Revised "F" for -125 thru -225 and -500, added "H"	10/22/81
	E	Revised Note 14	12/22/81
	F	Revised Note 3	10/29/85

This issue supersedes all previously issued catalog sheets and drawings

ASSY PART NUMBER CODE:

J204 00 X X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED)
  (T2269AZ = 2024 AGED, ANODIZED, DRY FILM LUBED;
  T2159 & M1212AZ = SAME AS T2269; T15A = SAME AS
  T2269AZ; M1214 NO DES = 2024 AGED & ANODIZED.
  F20000A = 2024 AGED; NR20000A = 2024 AGED

SPECIALS
- L = LONG FLANGE (F20010 THRU F20030 ONLY
- D = DRY FILM LUBE (F20000 = DRY FILM LUBED)
- N = THD LOCKING INSERT (T2269L = THD LOCKING INSERT

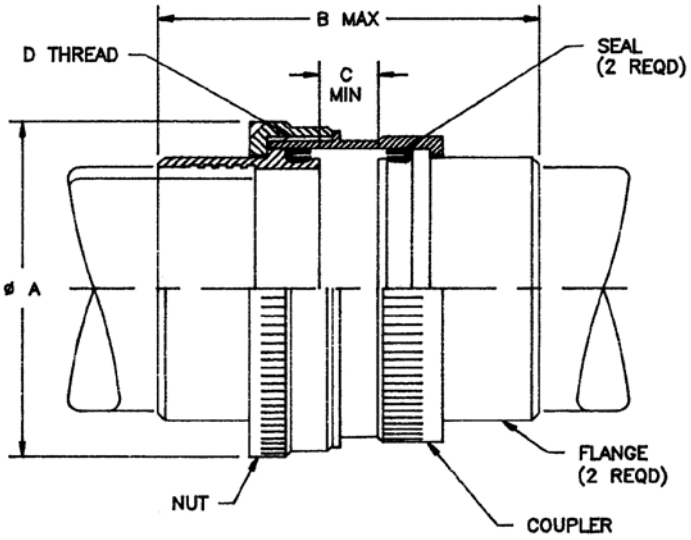
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. On J20405 thru J20407 use T2159 nuts
   On J20410 thru J20440 use T15 nuts
   On J20445 and J20450 use NR2000 nuts
4. On J20405 thru J20412 use M1212 split-rings
   On J24015 thru J20450 use M1214 split-rings
5. With F20000 flanges
6. See dwg S2 for material
7. J20400 series coupling assemblies using F30000 series flanges are qualified to MIL-C-22263 (125 psi operating pressure, all sizes)
8. F30000 series flanges require B30000 series swage blocks
9. J20405 thru J20425 using F20000 Series flanges are qualified to MIL-C-2263, J20430 thru J20450 designed for fuel system vent line service "25 psi operating, 75 psi burst"
10. O-ring lube compatible with system fluid
11. Other materials and finishes available upon request
12. 2 required per assembly (not furnished)
13. Designed for ± 4° angulation between flanges
14. No dry film lube on NR20000 nut
15. See drawing CNR20400 for assembly w/o flanges and O-rings
16. Allowance of .025 per flange shall be made to allow for linear growth after swaging

J20600 Flexible Coupling Assembly
F33100 Flange, Flourocarbon Seal
Series 331

Revision Letter F

NOM TUBE O D (IN)	ASSY PART NO.	COUPLER	NUT	FLANGE ④	SEAL	A	B MAX	C MIN	D THREAD	SWAGE BLOCK	— ASSY WEIGHT — (LB) C	T
0.500	J20605	C20005	N20005	F33105	S33105	1.09	1.88	0.22	.923-20UNS-2	B20005	.10	.061
0.750	J20607	C20007	N20007	F33107	S33107	1.35	2.21	0.21	1.218-20UNS-2	B20007	.18	.10
1.000	J20610	C20010	N20010	F33110	S33110	1.60	2.55	0.21	1.468-20UNS-2	B20010	.29	.17
1.250	J20612	C20012	N20012	F33112	S33112	1.88	2.28	0.24	1.734-20UNS-2	B20012	.35	.20
1.500	J20615	C20015	N20015	F33115	S33115	2.16	2.33	0.29	2.000-16UN-2	B20015	.47	.27
1.750	J20617	C20017	N20017	F33117	S33117	2.41	2.33	0.29	2.250-16UN-2	B20017	.54	.31
2.000	J20620	C20020	N20020	F33120	S33120	2.67	2.58	0.29	2.500-16UN-2	B20020	.65	.38
2.250	J20622	C20022	N20022	F33122	S33122	2.92	2.58	0.29	2.750-16UN-2	B20022	.73	.42
2.500	J20625	C20025	N20025	F33125	S33125	3.18	2.58	0.29	3.000-16UN-2	B20025	.82	.47
2.750	J20627	C20027	N20027	F33127	S33127	3.43	2.55	0.27	3.250-16UN-2	B20027	.90	.52
3.000	J20630	C20030	N20030	F33130	S33130	3.78	2.55	0.26	3.500-16UN-2	B20030	1.02	.59



ASSY PART NUMBER CODE:

J206 00 X X

BASIC PART NO.

SIZE

MATERIAL
C = STAINLESS STEEL, PASSIVATED
T = TITANIUM 6AL-4V

SPECIALS
N = NYLOK INSERT (IN COUPLER THREADS)

REVISION	LTR	DESCRIPTION	DATE
	A	Reversed callouts F/D	
	B	Revised swage blocks, deleted "D" code	1/2/84
	C	Added .075 inch size	11/6/85
	D	Added "T" Material	3/26/86
	E	Added Note 7	91/12/16
	F	Added J20605 size	92/6/5

This issue supersedes all previously issued catalog sheets and drawings

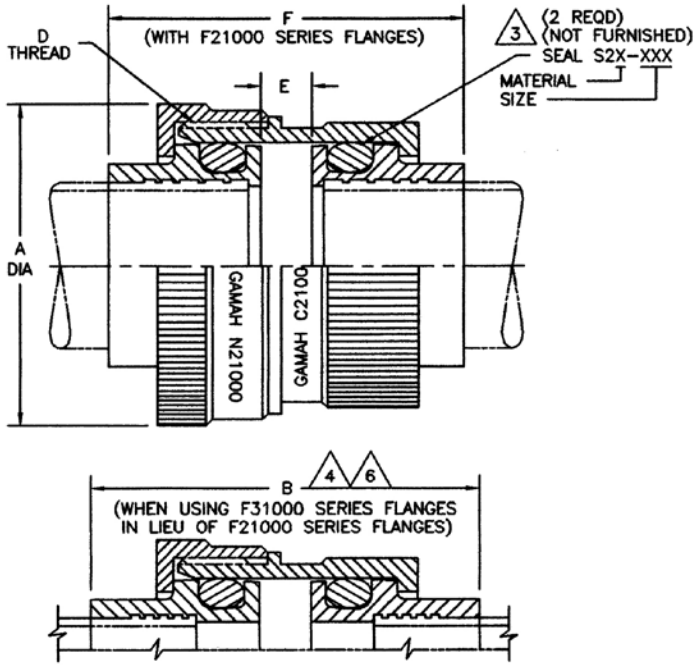
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Seal lube to be compatible with system fluid
3. Swage flanges per Gamah Technical Bulletin G2J-01
4. Welded flange configuration is available
5. Consult Eaton for specific applications
6. Other materials and finishes available upon request
7. Operating pressure = 125 psi (8.6 bar)
   Proof pressure = 250 psi (17.2 bar)
   Burst pressure = 375 psi (25.8 bar)
   Temperature to 700°F (371°C)

J21000 Flexible Coupling
Series 21

Revision Letter H

NOM TUBE O D (IN)	ASSY PART NO. ⚠5	NUT	CPLR	FLANGE	SWAGE BLOCK	SEAL SIZE ⚠3	A	B	D THREAD	E MIN	F MAX	— UNIT WEIGHT — (LB) (APPROX) A	C	T
1.500	J21015	N21015	C21015	F21015	B21015	–326	2.33	2.19	2.169-16NS-2	.21	1.90	.22	.61	.35
1.750	J21017	N21017	C21017	F21017	B21017	–328	2.58	2.19	2.419-16NS-2	.21	1.90	.24	.69	.40
2.000	J21020	N21020	C21020	F21020	B21020	–330	2.84	2.44	2.669-16NS-2	.21	1.90	.28	.79	.46
2.250	J21022	N21022	C21022	F21022	B21022	–332	3.09	2.44	2.919-16NS-2	.21	1.90	.32	.90	.51
2.500	J21025	N21025	C21025	F21025	B21025	–334	3.35	2.44	3.169-16NS-2	.21	1.90	.36	1.02	.59
2.750	J21027	N21027	C21027	F21027	B21027	–336	3.62	2.44	3.419-16NS-2	.21	1.90	.40	1.12	.65
3.000	J21030	N21030	C21030	F21030	B21030	–338	3.92	2.50	3.681-16NS-2	.21	2.26	.51	1.45	.84
3.500	J21035	N21035	C21035	F21035	B21035	–341	4.40	2.65	4.181-16NS-2	.25	2.26	.59	1.66	.96
4.000	J21040	N21040	C21040	F21040	B21040	–345	4.92	2.71	4.681-16NS-2	.27	2.32	.70	1.99	1.14
4.500	J21045	N21045	C21045	F21045	B21045	–426	5.63	3.29	5.375-12NS-3	.42	2.86	1.12	3.15	1.82
5.000	J21050	N21050	C21050	F21050	B21050	–430	6.26	3.33	5.891-12NS-3	.45	2.89	1.26	3.55	2.04
5.500	J21055	N21055	C21055	F21055	B21055	–434	6.80	3.43	6.406-12NS-3	.49	3.69	1.60	4.56	2.62
6.000	J21060	N21060	C21060	F21060	B21060	–437	7.34	3.46	6.922-12NS-3	.52	3.72	1.84	5.25	3.01



ASSY PART NUMBER CODE:

J210 00 X XX

BASIC PART NO.
SIZE
MATERIAL
- A = ALUMINUM 2024 (AGED)
- C = STAINLESS STEEL 304, PASSIVATED (FLANGES 17-4PH)
- T = TITANIUM TI-CP-70 (FLANGES 6AL-4V)

OPTIONS
- D = DRY FILM LUBE PER MIL-L-46010 ⚠10
- N = NYLOK INSERT (IN COUPLER THREADS)

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
- ⚠3 See drawing S2 for material
- ⚠4 J21000 Series coupling assemblies using F31000 Series flanges qualified to MIL-C-22263 (125 psi [8.6 bar] operating pressure) (all sizes)
- ⚠5 J21015 thru J21027 qualified to MIL-C-22263
- ⚠6 F31000 flanges require B31000 swage blocks

7. Nuts and couplers of J21045 are not interchangeable with components of JT115 and JT215-450 assemblies
8. O-ring lube to be compatible with system fluid
9. Other materials and finishes available upon request
- ⚠10 No dry lube on N21045 thru N21060

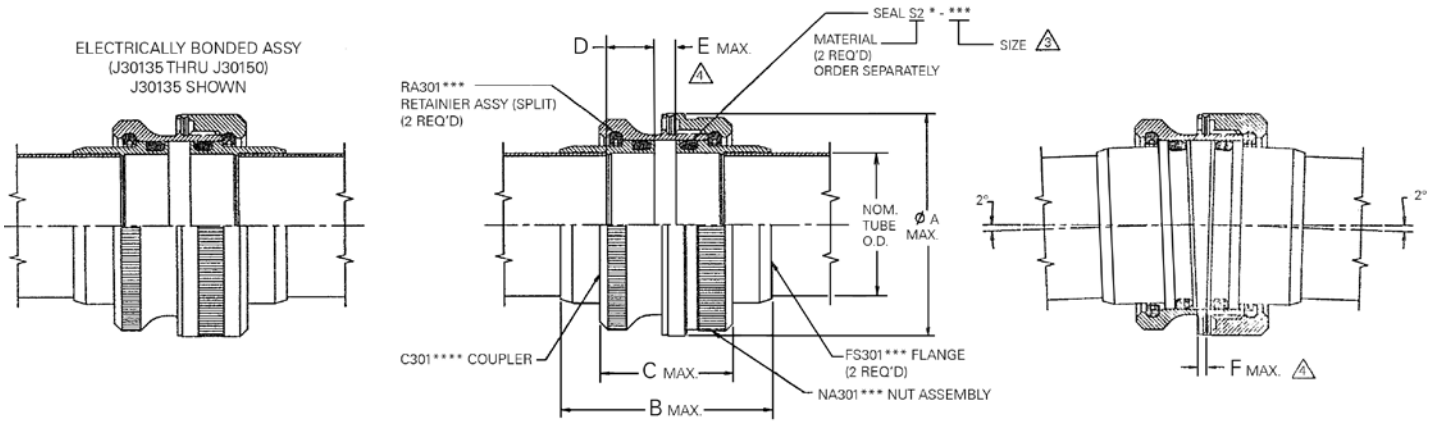
REVISION	LTR	DESCRIPTION	DATE
	C	Redrawn and revised	4/24/80
	D	Added Note 10	12/22/81
	E	Revised J21040 seal size	2/28/84
	F	Revised "C" and "T" material	1/30/85
	G	Revised J21035 seal size	9/1/87
	H	Updated specs	99/4/13

This issue supersedes all previously issued catalog sheets and drawings

J30100 Coupling Assembly .139 and .210 Dia. Section Locking Series 301

Revision Letter G

NOM TUBE O D (IN)	ASSY PART NO.	COUPLER PART NO.	FLANGE PART NO.	NUT ASSY PART NO.	RETAINER ASSY PART NO.	O-RING SIZE ③	THREAD SIZE	A MAX	B MAX	C MAX	D	E MAX ④	F MAX ④	ASSY WEIGHTS (LB) (CALCULATED) AR, AW, –095	C	–20	
.750	J30107	C30107	FS30107	NA30107	RA30107	–211	1.218-20UNS-2	1.56	2.12	1.26	.418	.10	.02	.098	.27	—	
1.000	J30110	C30110	FS30110	NA30110	RA30110	–215	1.468-20UNS-2	1.81	2.16	1.30	.418	.14	.05	.12	.33	—	
1.250	J30112	C30112	FS30112	NA30112	RA30112	–219	1.734-20UNS-2	2.07	2.24	1.36	.446	.16	.05	.16	.48	—	
1.500	J30115	C30115	FS30115	NA30115	RA30115	–222	2.000-16UN-2	2.34	2.38	1.45	.511	.17	.05	.23	.64	—	
1.750	J30117	C30117	FS30117	NA30117	RA30117	–224	2.250-16UN-2	2.59	2.40	1.47	.511	.19	.05	.26	.74	—	
2.000	J30120	C30120	FS30120	NA30120	RA30120	–226	2.500-16UN-2	2.84	2.52	1.49	.438	.21	.05	.30	.83	—	
2.250	J30122	C30122	FS30122	NA30122	RA30122	–228	2.750-16UN-2	3.09	2.54	1.50	.438	.22	.05	.33	.93	—	
2.500	J30125	C30125	FS30125	NA30125	RA30125	–230	3.000-16UN-2	3.34	2.55	1.52	.438	.24	.04	.36	1.03	—	
2.750	J30127	C30127	FS30127	NA30127	RA30127	–232	3.250-16UN-2	3.59	2.55	1.54	.438	.24	.03	.39	1.12	—	
3.000	J30130	C30130	FS30130	NA30130	RA30130	–234	3.500-16UN-2	3.84	2.56	1.56	.438	.24	.02	.44	1.22	—	
3.500	J30135	C30135	FS30135	NA30135	RA30135	–342	4.25-16UN-2	4.62	3.10	2.30	.675	.31	.03	.98	2.81	—	
4.000	J30140	C30140	FS30140	NA30140	RA30140	–345	4.750-16UN-2	5.13	3.30	2.34	.679	.34	.03	1.16	3.24	—	
4.500	J30145	C30145	FS30145	NA30145	RA30145	–350	5.375-12UN-3	5.75	3.55	2.38	.683	.38	.03	—	—	4.05	⑩
5.000	J30150	C30150	FS30150	NA30150	RA30150	–354	5.875-12UN-3	6.25	3.63	2.42	.683	.42	.03	—	—	4.32	



NOTES (UNLESS OTHERWISE SPECIFIED):

1. Coupling design allows for ±4° angular misalignment
2. Consult Eaton for specific applications
3. See dwg S2 for seal material. Seal sizes and tolerances in accordance with current industrial and military numbering systems (AS568 or applicable specification). Order seal sizes separately. Seal lubricant to be compatible with system fluid.
4. E = Maximum gap at installation with no angulation
   F = Maximum gap at installation with 4° angulation. For additional information see Gamah document 2268.
5. Other sizes and material/finish combinations are available upon request
6. Electrical resistance of J301XX is less than 1 ohm across flanges in any coupling position
7. Interpret dimensions and tolerances per ANSI Y14.5M-1982
8. Deleted
9. Qualified per DAC 1786D1385
10. –20 material (SST 17-4PH) is for J30150 only

PART NUMBER CODE:

J301 XX XX

SERIES

SIZE

MATERIAL

AR = C301XXAR, NA301AR, AL 2024 -T35XX
RA301XXA, AL 2024 -T85
FS301XXA, AL 2024 -T85
AL PARTS ANODIZED, COLOR RED, EXCEPT RA301XXA AND FS301XXA: CHEM FILM TREATED, NO COLOR. DRY FILM LUBE ON COUPLER THREADS ONLY

C = C301XXC, NA301XXC, RA301XXC:
ALL SST 304
FS301C: SST 17-4PH. SST PARTS PASSIVATED, DRY FILM LUB ON COUPLER THREADS ONLY

–20 = C301XX–20, NAX301XX-20, RA301XX–20: All SST 17-4PH
FS301XXC : SST 17-4PH
SST PARTS PASSIVATED
DRY FILM LUBE ON COUPLER THREADS ONLY ⑩

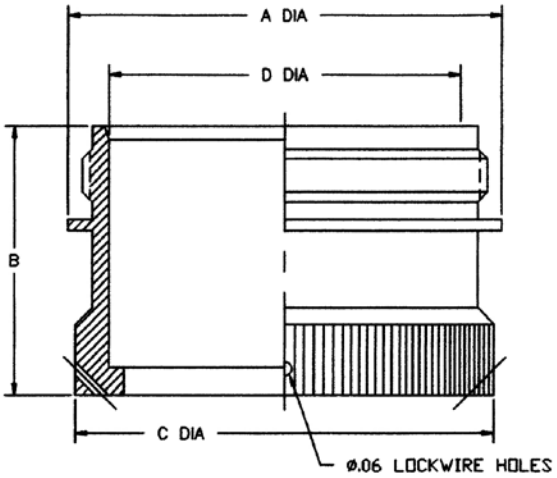
AW = C301XXAW, NA301XXAW, AL 2024 -T35XX, ANODIZED
RA301XXAW: AL 2024 -T83XX, ANODIZED
FS301XXA: AL 2024 -T85XX, CHEM FILM TREATED, NO COLOR

–095 = C301XX-095, NA301XX–095, AL 2024 -Y35XX
RA301XX-095: AL 2024 -T85XX NICOTEF PLATED
FS301XXA : AL 2024 -T85XX, CHEM FILM TREATED, NO COLOR

C20000 Coupler
Series 20

Revision Letter J

NOM TUBE O D (IN)	ASSY PART NO.	A	B	C	D	E – THREAD	WEIGHT (LB) A	C	T
.375	C20004	.86	.85	.78	.619	.798-2OUNS-2A	.013	.037	.021
.500	C20005	.98	.85	.92	.744	.923-2OUNS-2A	.016	.043	.026
.625	C20006	1.11	.85	1.05	.869	1.048-2OUNS-2A	.019	.053	0.03
.750	C20007	1.28	.98	1.22	1.039	1.218-2OUNS-2A	.025	.071	0.04
1.000	C20010	1.53	1.00	1.47	1.290	1.468-2OUNS-2A	.031	.09	.052
1.250	C20012	1.79	1.08	1.73	1.540	1.734-2OUNS-2A	.044	.12	.072
1.500	C20015	2.08	1.14	1.98	1.788	2.000-16UN-2A	.054	.15	.088
1.750	C20017	2.33	1.14	2.23	2.038	2.250-16UN-2A	.062	.17	.10
2.000	C20020	2.58	1.14	2.48	2.288	2.500-16UN-2A	.069	.19	.12
2.250	C20022	2.83	1.16	2.73	2.538	2.750-16UN-2A	.077	.22	.13
2.500	C20025	3.08	1.16	2.98	2.788	3.000-16UN-2A	.085	.24	.14
2.750	C20027	3.33	1.16	3.23	3.038	3.250-16UN-2A	.093	.27	.15
3.000	C20030	3.59	1.16	3.50	3.288	3.500-16UN-2A	0.10	.29	.17
3.500	C20035	4.09	1.27	4.00	3.788	4.000-16UN-2A	0.14	.40	.23
4.000	C20040	4.59	1.27	4.50	4.288	4.500-16UN-2A	0.15	.43	.25
4.500	C20045	5.13	1.38	5.03	4.788	5.047-12UNS-3A	0.27	.76	.43
5.000	C20050	5.66	1.42	5.56	5.288	5.563-12UNS-3A	0.29	.83	.47
5.500	C20055	6.41	1.76	6.27	6.010	6.298-12UNS-3A	0.43	1.31	.75
6.000	C20060	6.93	1.81	6.79	6.510	6.813-12UNS-3A	0.49	1.39	.79



PART NUMBER CODE:

C200 00 X X X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024-T851, -T8510, OR -T8511 ANODIZED
C = STAINLESS STEEL 304, PASSIVATED
T = TITANIUM TI-CP-70
–09 = 6061-T6, -T651, -T6510, OR -T6511 ANODIZED, COLOR: BLACK

D = DRY FILM LUBE PER MIL-L-46010 AS APPLICABLE (THREADS AND I.D. SURFACES) (OPTIONAL)

N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	J	Updated specs and callouts	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

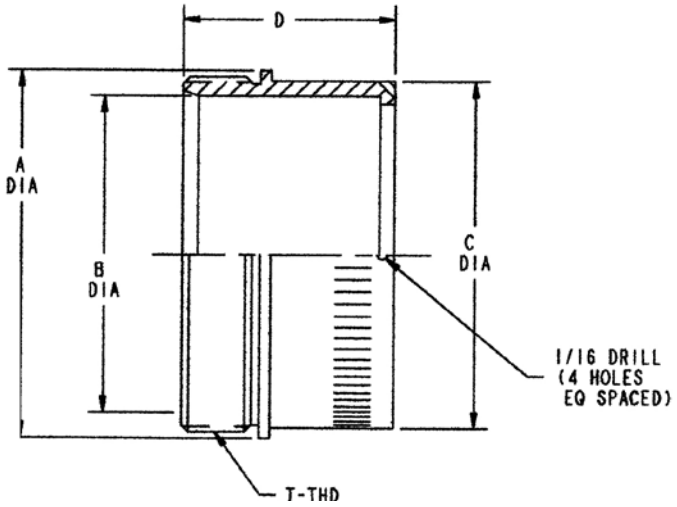
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Operating pressure: 125 psi (8.6 bar)
   Burst pressure: 500 psi (34.5 bar)

C21000 Coupler
Series 21

Revision Letter H

NOM TUBE O D (IN)	PART NO.	A ③	B	C	D	T-THREAD	WEIGHTS (LB) A	C	T
1.500	C21015	2.25	1.960	2.11	1.34	2.169-16NS-2A	.069	.20	.11
1.750	C21017	2.50	2.210	2.36	1.34	2.419-16NS-2A	.078	.22	.13
2.000	C21020	2.75	2.460	2.61	1.34	2.669-16NS-2A	.086	.25	.14
2.250	C21022	3.00	2.710	2.88	1.34	2.919-16NS-2A	.095	.27	.16
2.500	C21025	3.25	2.960	3.11	1.35	3.169-16NS-2A	.11	.30	.17
2.750	C21027	3.50	3.210	3.36	1.35	3.419-16NS-2A	.11	.32	.19
3.000	C21030	3.75	3.460	3.62	1.50	3.681-16NS-2A	.15	.41	.24
3.500	C21035	4.25	3.960	4.12	1.50	4.181-16NS-2A	.17	.48	.28
4.000	C21040	4.75	4.460	4.65	1.53	4.681-16NS-2A	.20	.55	.32
4.500	C21045	5.50	5.113	5.36	1.87	5.375-12UN-3A	.31	.88	.51
5.000	C21050	6.00	5.613	5.87	1.91	5.891-12NS-3A	.45	1.27	.72
5.500	C21055	6.50	6.113	6.39	2.06	6.406-12NS-3A	.50	1.47	.84
6.000	C21060	6.93	6.613	6.90	2.11	6.922-12NS-3A	.59	1.73	.99



PART NUMBER CODE:

C210 00 X X X

BASIC PART NO.

NOM TUBE SIZE (TENTHS INCHES)

MATERIAL

A = ALUMINUM 2024-T851, -T8510, OR -T8511 ANODIZED
C = STAINLESS STEEL 304, PASSIVATED PER QQ-P-35
32 = A286 STAINLESS PASSIVATED PER QQ-P-35
T = TITANIUM TI-CP-70

D = DRY FILM LUBE PER MIL-L-46010 (THREADS AND I.D. SURFACES ONLY)

N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	B	Redrawn, square nut stop added	3/13/79
	C	Added –32 material	12/21/81
	D	Added tolerance to "A" dim.	8/7/84
	E	Revised "T" material	1/28/85
	F	Rev "D" in p/n code	5/14/86
	G	In p/n code: "tenths inches"	2//26/90
	H	Updated specs	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

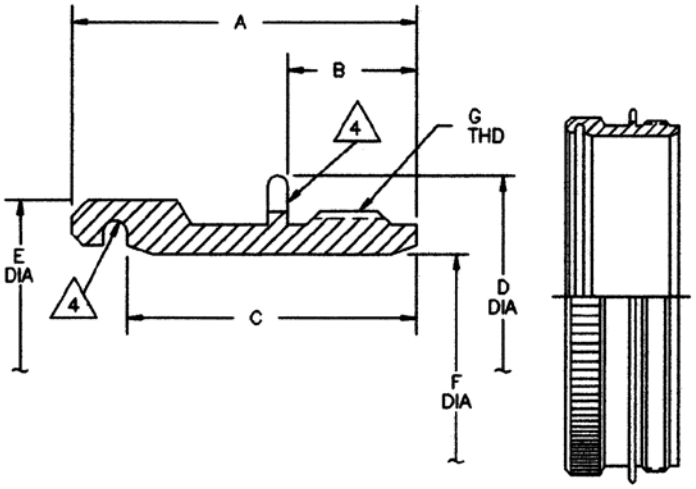
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Tolerance "A" dim.
   C21015 thru C21035 + .010/–.040
   C210040 thru C21060 + .010/–.060

C30100 Coupler, Flexible, Locking
Series 301

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G – THREAD	— WEIGHT (LB) — AR / AW	C / –20
.750	C30107	1.01	.37	.80	1.55	1.36	1.039	1.218-2OUNS-2A	.032	.092
1.000	C30110	1.05	.37	.84	1.80	1.62	1.290	1.468-2OUNS-2A	.038	.11
1.250	C30112	1.11	.37	.90	2.06	1.87	1.540	1.734-2OUNS-2A	.044	.13
1.500	C30115	1.16	.44	.91	2.33	2.23	1.788	2.000-16UN-2A	.073	.21
1.750	C30117	1.18	.44	.93	2.58	2.48	2.038	2.250-16UN-2A	.083	.24
2.000	C30120	1.19	.44	.95	2.83	2.73	2.288	2.500-16UN-2A	.094	.27
2.250	C30122	1.21	.44	.96	3.08	2.98	2.538	2.750-16UN-2A	.10	.30
2.500	C30125	1.23	.44	.98	3.33	3.23	2.788	3.000-16UN-2A	.11	.33
2.750	C30127	1.25	.44	1.00	3.58	3.48	3.038	3.250-16UN-2A	.12	.36
3.000	C30130	1.26	.44	1.02	3.83	3.73	3.288	3.500-16UN-2A	.14	.39
3.500	C30135	1.85	.50	1.44	4.58	4.52	3.960	4.250-16UN-2A	.30	.87
4.000	C30140	1.88	.50	1.48	5.08	5.01	4.460	4.750-16UN-2A	.35	1.00
4.500	C30145	1.92	.51	1.52	5.71	5.55	5.010	5.375-12UN-3A	(8)	1.18
5.000	C30150	1.96	.51	1.55	6.21	6.05	5.510	5.875-12UN-3A		1.31



PART NUMBER CODE:

C301 00 XX

BASIC PART NO.

NOM TUBE SIZE (TENTHS OF INCHES)

MATERIAL/FINISH

AR = ALUMINUM 2024-T351 PER QQ-A-225/6 OR 2024-T3511 PER QQ-A-200/3 ANODIZED PER MIL-A-8625, TYPE II CLASS 2, COLOR RED

AW = ALUMINUM 2024-T351 PER QQ-A-225/6 OR 2024-T3511 PER QQ-A-200/3 ANODIZED PER MIL-A-8625 TYPE II, CLASS 1

C = STAINLESS STEEL 304 PER AMS5560 OR AMS5639, PASSIVATED PER QQ-P-35

–20 = STAINLESS STEEL 17-4PH (H1150) PER AMS5643 OR 15-5PH (H1150) PER AMS5659, PASSIVATED PER QQ-P-35. (5)

–095 = ALUMINUM 2024-T351 PER QQ-A-225/6 OR 2024-T3511 PER QQ-A-200/3 NICKEL PHOSPHORUS – TEFLON PLATED

REVISION	LTR	DESCRIPTION	DATE
	A	Revised "A" and "C" dims and weights. Deleted 3.500 thru 5.00 sizes.	3/30/88
	B	Revised "A" & "E" dims and weights — all sizes. Added 3.500, 4.000 and 5.000 sizes, Note 5.	7/19/88
	C	Added "AW" material. Added 1.000, 1.250 and 4.500 sizes.	2/17/89
	D	Revised dimensions, notes, configuration, materials	5/28/92
	E	Added –095 configuration	12/19/94
	F	Revised Note 7	7/18/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

(4) To provide electrical continuity, entire inside surface and surface indicated to be free of anodize and are chemical conversion coated (alodined) per MIL-C-5541.

(5) –20 material is for 5.000 size only

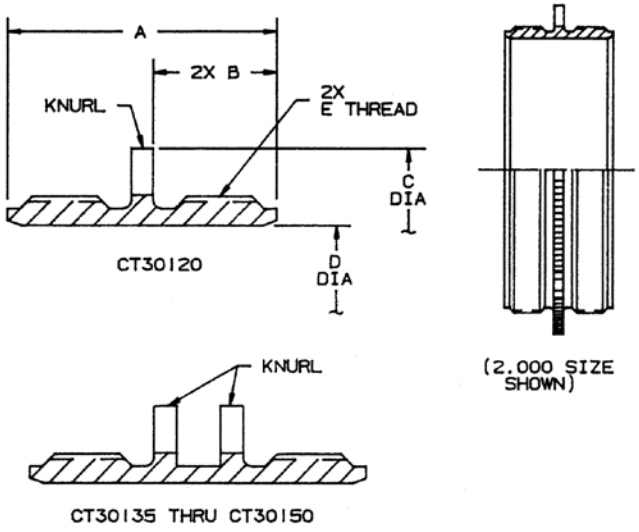
6. Pressure ratings:
   Operating: –5 psig (.66 bar) (vacuum) to 125 psig (9.63 bar)
   Proof: 250 psig (18.25 bar)
   Burst: –14 psig (.047 bar) (vacuum) to 375 psig (26.86 bar)
7. Threads are dry film lubricated per MIL-L-46010 (except –095)

(8) AR, AW & –095 materials are not available in 4.500 and 5.000 sizes

CT30100 Coupler, Threaded Sleeve, Lightweight, Removable, Flexible, Locking Series 301

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E THREAD	WEIGHT (LB) A	WEIGHT (LB) C / –20
2.000	CT30120	.95	.44	2.83	2.288	2.500-16UN-2A	.064	.18
3.500	CT30135	1.44	.50	4.58	3.960	4.250-16UN-2A	.24	.70
4.000	CT30140	1.48	.50	5.08	4.460	4.750-16UN-2A	.29	.82
5.000	CT30150	1.55	.51	6.22	5.510	5.875-12UN-3A	—	1.30



PART NUMBER CODE:

CT301 00 XX

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 2024 (AGED) PER QQ-A-200/3 OR QQ-A-225/6, CHEM FILM TREAT PER MIL-C-5541, DRY FILM LUBE PER MIL-L-8937 ON THREADS ONLY

C = STAINLESS STEEL 304 AMS5639, PASSIVATED PER QQ-P-35, DRY FILM LUBE PER MIL-L-46010 ON THREADS ONLY.

–20 = STAINLESS STEEL 17-4PH (H1150) PER AMS5643, PASSIVATED PER QQ-P-35, DRY FILM LUBE PER MIL-L-46010 ON THREADS ONLY

REVISION	LTR	DESCRIPTION	DATE
	A	Revised slots	3/2/90

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

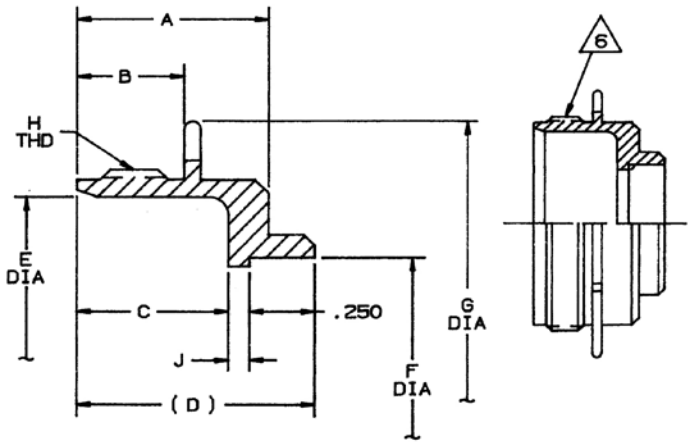
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

4 5.000 size offered in –20 material only

C30800 Coupler, Locking
Series 301

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	(D)	E +.002 -.000	F MIN/MAX	G	H – THREAD	J	WEIGHTS (LB) T	A	C
.750	C30807	.57	.366	.459	.73	1.039	.755/.758	1.55	1.218-20UNS-2A	.025	.037	.022	.063
1.000	C30810	.60	.366	.472	.75	1.290	1.003/1.006	1.80	1.468-20UNS-2A	.025	.048	.029	.084
2.000	C30820	.68	.441	.552	.83	2.288	2.006/2.010	2.83	2.500-16UN-2A	.025	.10	.060	.18
2.500	C30825	.70	.441	.575	.85	2.788	2.506/2.510	3.33	3.000-16UN-2A	.025	.12	.074	.22
3.000	C30830	.73	.441	.590	.87	3.288	3.006/3.010	3.83	3.500-16UN-2A	.025	.15	.087	.26
3.500	C30835	.96	.504	.833	1.09	3.960	3.508/3.513	4.58	4.250-16UN-2A	.025	.31	.18	.53
4.000	C30840	1.08	.504	.840	1.23	4.460	4.008/4.013	5.08	4.750-16UN-2A	.135	.42	.25	.75



PART NUMBER CODE:

C308 00 XX

BASIC PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL/FINISH

A = ALUMINUM 6061-T6 PER QQ-A-225/8

C = STAINLESS STEEL 321 PER AMS5576, PASSIVATED PER QQ-P-35

T = TITANIUM TI-CP-70 PER MIL-T-9047

REVISION	LTR	DESCRIPTION	DATE
	A	Revised material callout, added Note 5	7/15/88
	B	Added Note 6	9/8/88
	C	Completely revised	12/13/88
	D	Revised tube insertion depth. Was .025.	1/30/89
	E	Added C30810 data and "T" weights	2/23/89
	F	Added C30830 and C30840 data	4/24/89
	G	Revised "C" material. Added "J".	2/19/92

This issue supersedes all previously issued catalog sheets and drawings

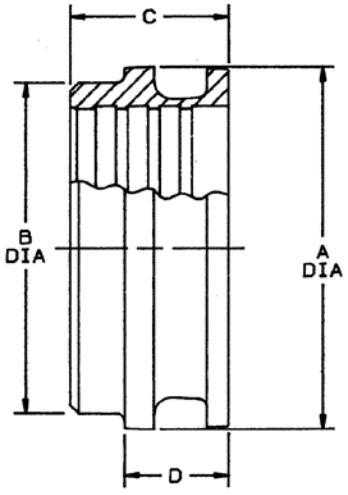
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Deleted
5. C30800 mates with NA30100 nut assembly and qualified per DAC 17B6D1385
6. Lubricate threads after welding

F20100 Flange (No Tube Stop)
Series 20

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B	C	D	WEIGHT (LB) A	C	T
.375	F20104	.616	.500	.40	.25	.004	.011	.006
.500	F20105	.741	.625	.40	.25	.005	.014	.008
.625	F20106	.866	.750	.40	.25	.006	.017	.010
.750	F20107	1.036	.875	.51	.32	.009	.027	.015
1.000	F20110	1.287	1.156	.51	.32	.012	.035	.020
1.250	F20112	1.537	1.406	.64	.34	.021	.060	.034
1.500	F20115	1.785	1.654	.77	.34	.029	.084	.048
1.750	F20117	2.035	1.904	.77	.34	.034	.096	.055
2.000	F20120	2.285	2.154	.77	.34	.038	.011	.063
2.250	F20122	2.535	2.404	.77	.34	.043	.121	.070
2.500	F20125	2.785	2.654	.77	.34	.048	.135	.078
2.750	F20127	3.035	2.904	.77	.34	.052	.148	.085
3.000	F20130	3.285	3.154	.77	.34	.057	.161	.092
3.500	F20135	3.785	3.654	1.20	.39	.103	.293	.168
4.000	F20140	4.285	4.154	1.20	.39	.118	.336	.193
4.500	F20145	4.785	4.654	1.33	.39	.146	.414	.238



PART NUMBER CODE:

F201 00 XX X

BASIC PART NO.

SIZE

MATERIAL/FINISH
- A = ALUMINUM 2024 (AGED) ANODIZED
- C = STAINLESS STEEL 15-5PH OR 17-4PH PASSIVATED
- T = TITANIUM TI-6AL-4V

SPECIALS
- D = DRY FILM LUBED PER MIL-L-46010 (EXTERNAL SURFACE ONLY)

REVISION	LTR	DESCRIPTION	DATE
	A	Revised "T" material	1/21/85
	B	Revised "A" and "C" material, "D" finish	10/30/90

This issue supersedes all previously issued catalog sheets and drawings

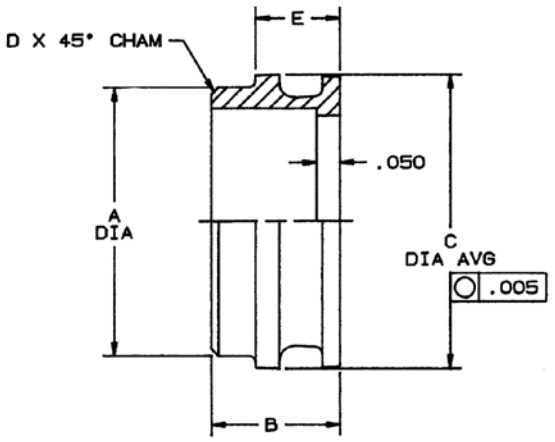
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

F20200 Flange, Welded/Brazed
Series 20

Revision Letter P

NOM TUBE O D (IN)	PART NO	A	B	C	D	E	UNIT WEIGHT (LB) A	C	T
.375	F20204	.50	.40	.62	.025	.25	.0036	.011	.0060
.500	F20205	.63	.40	.74	.025	.25	.0047	.014	.0079
.625	F20206	.75	.40	.87	.025	.25	.0057	.017	.0096
.750	F20207	.88	.44	1.04	.025	.32	.0078	.023	.013
1.000	F20210	1.12	.44	1.29	.025	.32	.010	.030	.017
1.250	F20212	1.37	.44	1.54	.035	.34	.013	.039	.022
1.500	F20215	1.63	.44	1.79	.035	.34	.015	.045	.025
1.750	F20217	1.88	.44	2.04	.035	.34	.017	.052	.029
2.000	F20220	2.13	.44	2.29	.035	.34	.020	.059	.033
2.250	F20222	2.38	.44	2.54	.035	.34	.022	.066	.037
2.500	F20225	2.63	.44	2.79	.035	.34	.025	.073	.041
2.750	F20227	2.88	.44	3.04	.035	.34	.027	.080	.045
3.000	F20230	3.12	.44	3.29	.035	.34	.031	.092	.052
3.500	F20235	3.63	.50	3.79	.035	.39	.043	.128	.072
4.000	F20240	4.13	.50	4.29	.035	.39	.048	.143	.081
4.500	F20245	4.63	.50	4.79	.035	.39	.054	.161	.091
5.000	F20250	5.13	.50	5.29	.035	.39	.059	.175	.099
5.500	F20255	5.63	.75	6.00	.035	.54	.160	.477	.269
6.000	F20260	6.13	.75	6.50	.035	.54	.177	.527	.297



PART NUMBER CODE:

F202 00 X

BASIC PART NO.
SIZE
MATERIAL/FINISH
A = ALUMINUM 6061-T6
C = STAINLESS STEEL 321/347, PASSIVATED
T = TITANIUM TI-CP-70
–15 = ALUMINUM 6061-T4

REVISION	LTR	DESCRIPTION	DATE
	J	Redrawn	2/6/80
	K	Revised "A" dia. (F20210 thru F20260)	4/6/81
	L	Revised "T" material	1/21/85
	M	Added "AVG" and ⌾ .005	11/19/85
	N	Revised "D" F20204 thru F20210	5/16/89
	P	Added tube stop dimension	12/7/90

This issue supersedes all previously issued catalog sheets and drawings

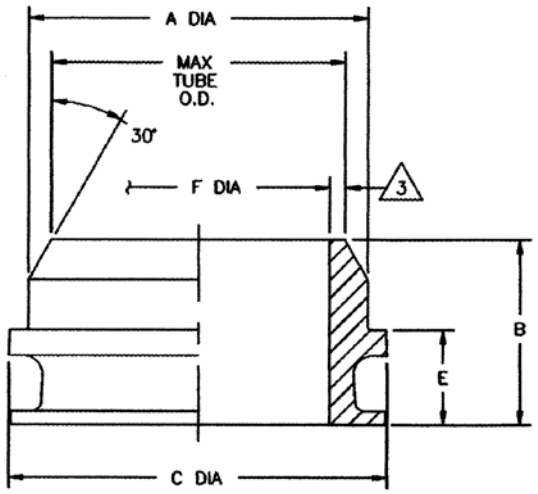
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Superseded F1084–038 thru –125
   F1038–038 thru –125
   F1085

F20300 Flange, Butt Welded
Series 20

Revision Letter R

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F DIA + .005/-.000 FOR 4 — TUBE WALL THICKNESS RANGE 3				
							–1624	–2534	–3548	–4982	–83119
.375	F20304	.50		.62		.25					
.500	F20305	.63	.60	.74		.25	.475	.457	.437	.411	.345
.625	F20306	.75		.87		.25					
.750	F20307	.88		1.04		.32					
1.000	F20310	1.16	.63	1.29		.32	.976	.958	.938	.912	.846
1.250	F20312	1.41		1.54		.34					
1.500	F20315	1.62	.63	1.79		.34	1.478	1.460	1.440	1.414	1.348
1.750	F20317	1.87	.63	2.04		.34	1.728	1.710	1.690	1.664	1.598
2.000	F20320	2.10	.63	2.29		.34	1.978	1.960	1.940	1.914	1.848
2.250	F20322	2.40		2.54		.34					
2.500	F20325	2.65	.63	2.79		.34	2.478	2.460	2.440	2.414	2.348
2.750	F20327	2.90		3.04		.34					
3.000	F20330	3.15	.63	3.29		.34	2.978	2.960	2.940	2.914	2.848
3.500	F20335	3.65		3.79		.39					
4.000	F20340	4.15		4.29		.39					
4.500	F20345	4.65		4.79		.39					
5.000	F20350	5.15	.75	5.29		.39	4.982	4.964	4.944	4.918	4.852
5.500	F20355	5.65		6.00		.54					
6.000	F20360	6.19	.97	6.50		.54	5.984	5.966	5.946	5.854	5.824



PART NUMBER CODE:

F203 00 X – XXX

BASIC PART NO.

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL/FINISH

A = ALUMINUM 6061-T6
C = STAINLESS STEEL 321/315 PASSIVATED
T = TITANIUM TI-CP-70

3

REVISION	LTR	DESCRIPTION	DATE
	H	Redrawn. Added weights.	2/6/81
	J	Added F20315, F20317, and F20350	8/19/81
	K	Revised "T" material	1/21/85
	L	Revised P/N code, revised Note 3, added Note 4, added "F" dia.	11/6/85
	M	Revised tube wall thickness range and Note 3	
	N	Added –83119 tube wall thickness range	11/20/85
	P	Added F20330 data. Revised "A" – F20315 and F20317	3/22/94
	R	Added F20325 data	5/3/95

This issue supersedes all previously issued catalog sheets and drawings

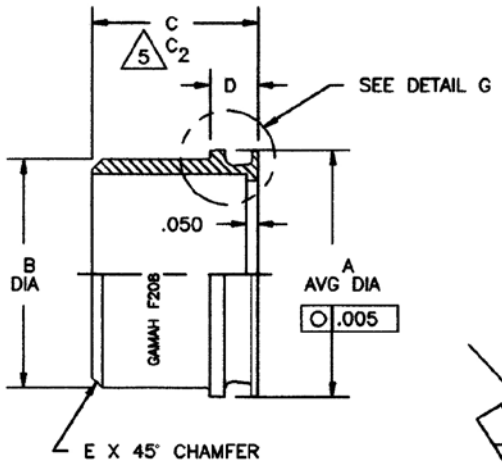
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness $\sqrt{125}$
3. Dash no. = wall thickness range of tube and flange to be welded in thousandths of an inch (i.e., –1624 for .016 thru .024 wall thickness range)
4. Tube I.D. to be expanded to match "F" dia. prior to welding

F20800 Flange, Skirt Welded/Brazed
Series 20

Revision Letter K

NOM TUBE O D (IN)	PART NO.	A +.000 -.006	B	C ±.015	D ±.020	S2X SEAL SIZE	E	C_2 ⚠5	WEIGHT (LB) A, –15	WEIGHT (LB) C	WEIGHT (LB) T
.375	F20804	.616	.496	.554	.254	–111	.025	—	.005	.015	.009
.500	F20805	.741	.622	.554	.254	–113	.025	—	.007	.019	.011
.625	F20806	.866	.747	.554	.254	–115	.025	—	.008	.023	.013
.750	F20807	1.036	.863	.622	.322	–211	.025	—	.011	.032	.018
1.000	F20810	1.287	1.126	.622	.322	–215	.025	—	.015	.044	.025
1.250	F20812	1.537	1.378	.642	.342	–219	.035	—	.020	.058	.033
1.500	F20815	1.785	1.630	.642	.342	–222	.035	.770	.023	.068	.039
1.750	F20817	2.035	1.880	.642	.342	–224	.035	.770	.027	.078	.045
2.000	F20820	2.285	2.130	.642	.342	–226	.035	.770	.028	.081	.046
2.250	F20822	2.535	2.380	.642	.342	–228	.035	.770	.034	.099	.057
2.500	F20825	2.785	2.630	.642	.342	–230	.035	.770	.038	.110	.063
2.750	F20827	3.035	2.880	.642	.342	–232	.035	.770	.041	.121	.069
3.000	F20830	3.285	3.128	.642	.342	–234	.035	.770	.046	.133	.076
3.500	F20835	3.785	3.633	.689	.389	–236	.035	1.200	.058	.168	.096
4.000	F20840	4.285	4.133	.689	.389	–242	.035	1.200	.066	.191	.109
4.500	F20845	4.785	4.633	.689	.389	–246	.035	1.325	.073	.214	.122
5.000	F20850	5.285	5.133	.689	.389	–250	.035	1.325	.081	.237	.135
5.500	F20855	6.003	5.633	.839	.539	–358	.035	1.450	.178	.519	.296
6.000	F20860	6.503	6.169	.839	.539	–361	.035	1.450	.193	.564	.322



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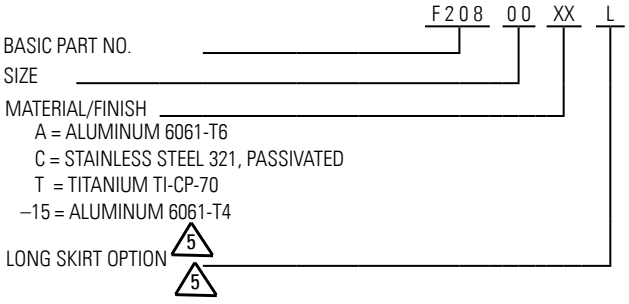
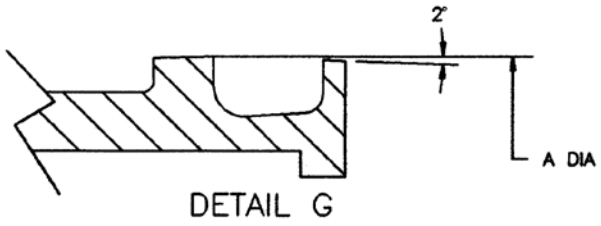




DETAIL G

REVISION	LTR	DESCRIPTION	DATE
	C	Redrawn from "Customer Use" dwg	7/23/81
	D	Revised "A" and "–15" materials	11/10/83
	E	Revised "T" material	1/21/85
	F	Added "AVG" and ⌀ .005	8/30/85
	G	Revised materials	3/19/86
	H	Revised cham. Added "E" dim. and Note 4.	2/3/89
	J	Added "L" option; Note 5; "C_2" dim.	6/15/94
	K	Revised "B" for F20860	7/9/96

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

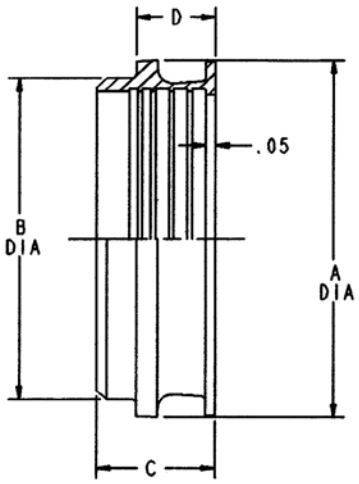
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Seals not furnished with flanges. See S2 drawing for seal materials.
4. When used with Series 33/34 threadless coupling, flanges must be fully extended to guarantee electrical bonding.

⚠5 Add "L" after material code for long skirt option

F21000 Flange
Series 21

Revision Letter E

NOM TUBE O D (IN)	PART NO.	A DIA	B DIA	C	D	WEIGHT (LB) A	C, –32	T
1.500	F21015	1.956	1.67	.77	.48	.04	.12	.07
1.750	F21017	2.206	1.92	.77	.48	.05	.13	.08
2.000	F21020	2.455	2.18	.77	.48	.06	.16	.09
2.250	F21022	2.705	2.43	.77	.48	.06	.18	.10
2.500	F21025	2.955	2.70	.77	.48	.07	.19	.12
2.750	F21027	3.205	2.95	.77	.48	.08	.24	.13
3.000	F21030	3.454	3.20	.95	.54	.11	.32	.18
3.500	F21035	3.954	3.70	.95	.54	.12	.36	.20
4.000	F21040	4.453	4.20	.95	.54	.14	.40	.23
4.500	F21045	5.106	4.74	1.15	.63	.24	.71	.41
5.000	F21050	5.606	5.24	1.15	.63	.26	.77	.44
5.500	F21055	6.106	5.69	1.53	.68	.35	1.01	.58
6.000	F21060	6.606	6.21	1.53	.68	.40	1.15	.66
6.500	F21065	7.106	6.72	1.53	.70	.44	1.28	.73
7.000	F21070	7.606	7.23	1.53	.70	.48	1.40	.81



PART NUMBER CODE:

F210 00 X X

BASIC PART NO.
SIZE
MATERIAL

A = ALUMINUM 2024-T8, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

C = STAINLESS STEEL 17-4PH (H1150 COND.) (15-5PH ALT) PASSIVATED PER QQ-P-35

T = TITANIUM TI-6AL-4V

–32 = A286 STAINLESS STEEL PASSIVATED PER QQ-P-35

FINISH

D = DRY FILM LUBE (EXTERNAL SURFACES ONLY) PER MIL-L-8737

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn	1/15/80
	B	Added –32 material	12/21/81
	C	Added weights	4/16/84
	D	Revised "T" material	1/21/85
	E	Revised "C" material	4/1/86

This issue supersedes all previously issued catalog sheets and drawings

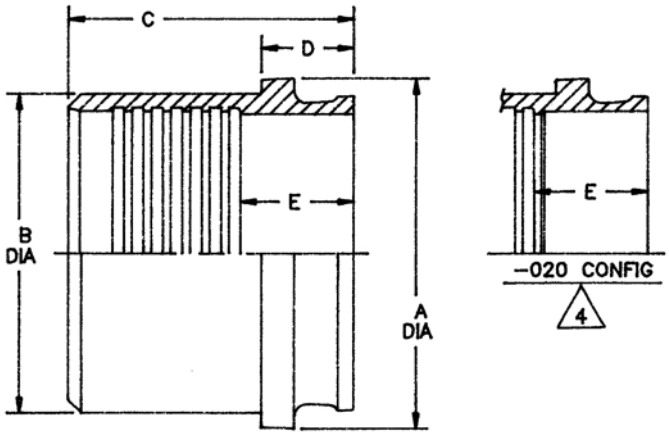
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125√
3. Other materials and finishes available upon request

F33100 Flange, Swaged, Fluorocarbon
Series 331

Revision Letter H

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	USE SWAGE BLOCK	WEIGHT (LB) T	C	–02	A
.500	F33105	.741	.63	.75	.25	.375	B20005	.010	.017	.018	.006
.750	F33107	1.036	.88	.92	.32	.418	B20007	.023	.04	.043	.014
1.000	F33110	1.287	1.16	1.08	.32	.418	B20010	.05	.08	.085	.028
1.250	F33112	1.537	1.41	.94	.34	.438	B20012	.05	.09	.096	.03
1.500	F33115	1.785	1.65	.94	.34	.438	B20015	.06	.10	.107	.03
1.750	F33117	2.035	1.90	.94	.34	.438	B20017	.07	.12	.130	.04
2.000	F33120	2.285	2.15	1.06	.34	.438	B20020	.09	.15	.160	.05
2.250	F33122	2.535	2.40	1.06	.34	.438	B20022	.10	.17	.181	.06
2.500	F33125	2.785	2.65	1.06	.35	.438	B20025	.11	.19	.203	.07
2.750	F33127	3.035	2.90	1.06	.36	.438	B20027	.12	.21	.224	.07
3.000	F33130	3.285	3.15	1.06	.36	.438	B20030	.13	.23	.245	.08



PART NUMBER CODE:

F331 00 XX X

BASIC PART NO.

SIZE

MATERIAL

C = STAINLESS STEEL 17-4PH (H1150), PASSIVATED
STAINLESS STEEL 15.5PH (H1150), PASSIVATED

A = ALUMINUM 2024 (AGED), ANODIZED

–02 = INCONEL 625

T = TITANIUM, 6AL-4V

SPECIAL 4

REVISION	LTR	DESCRIPTION	DATE
	A	Revised swage blocks	12/21/83
	B	Added material description to "C"	5/2/84
	C	Added "A" material	4/12/85
	D	Added .750 inch size	11/6/85
	E	Added –02 material	2/13/86
	F	Added "T" material	3/26/86
	G	Added –020 configuration and Note 4	5/15/89
	H	Added F33105 size	6/4/92

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

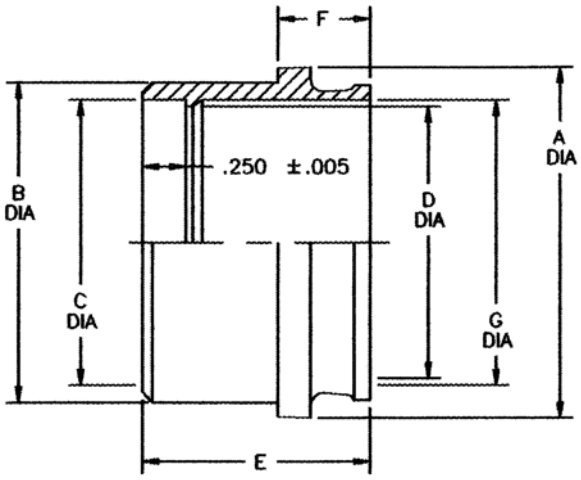
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

4 The –020 configuration may be substituted for the basic configuration (mfrs option). Use only –020 flanges with tube wall thickness less than .028.

FW33200 Flange, Socket Welded
Fluorocarbon Seal
Series 331

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	WEIGHT (LB) A	C	–02	T
.500	FW33205	.741	.62	.51	.44	.750	.25	.50	.008	.024	.025	.014
.750	FW33207	1.036	.88	.76	.69	.920	.32	.75	.014	.04	.043	.023
1.000	FW33210	1.287	1.16	1.01	.94	1.085	.32	1.00	.031	.09	.096	.05
1.250	FW33212	1.537	1.41	1.21	1.19	1.080	.34	1.25	.034	.10	.107	.06
1.500	FW33215	1.785	1.65	1.51	1.44	1.080	.34	1.50	.041	.12	.128	.07
1.750	FW33217	2.035	1.90	1.76	1.69	1.080	.34	1.75	.048	.14	.149	.08
2.000	FW33220	2.285	2.15	2.01	1.94	1.080	.34	2.00	.055	.16	.171	.09
2.250	FW33222	2.535	2.40	2.26	2.19	1.080	.34	2.25	.058	.17	.181	.10
2.500	FW33225	2.785	2.65	2.51	2.44	1.080	.35	2.50	.065	.19	.203	.11
2.750	FW33227	3.035	2.90	2.76	2.69	1.080	.36	2.75	.072	.21	.224	.12
3.000	FW33230	3.285	3.15	3.01	2.94	1.080	.36	3.00	.079	.23	.245	.13



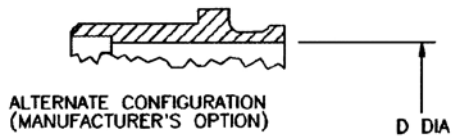
PART NUMBER CODE:

FW332 00 X X XX

BASIC PART NO.
SIZE
MATERIAL
C = STAINLESS STEEL 321, PASSIVATED
–02 = INCONEL 625
T = TITANIUM, COMM PURE
4 A = ALUMINUM 6061-T6

OPTIONS
U = UNDERSIZE FOR PLATING AFTER WELDING

PLATING ALLOWANCE PER SURFACE IN TENTH THOUSANDTHS
(E.G. 15 = .0015 IN.)



REVISION	LTR	DESCRIPTION	DATE
	A	Added .750 inch size	11/6/85
	B	Revise tube stop, weights. Added "G" dia. and alternate configuration.	1/9/85
	C	Added –02 material	2/13/86
	D	Added "T" and "A" materials	3/26/86
	E	Added FW33205 size	6/4/92
	F	Added "U" option and Note 4	4/5/95

This issue supersedes all previously issued catalog sheets and drawings

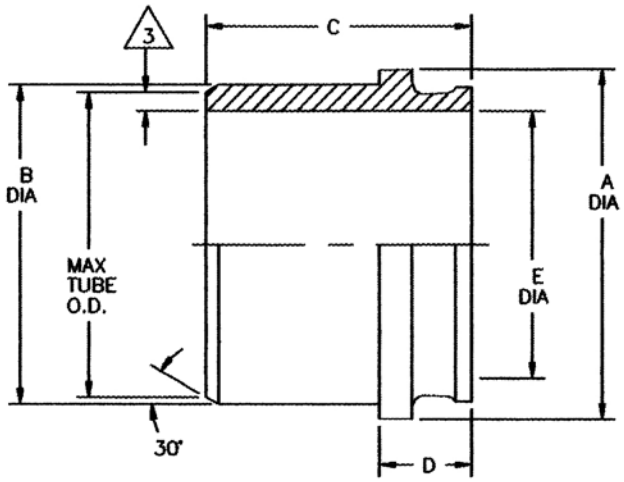
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. 500°F (260°C) maximum operating temperature for aluminum flanges

FW33300 Flange, Butt Welded
Fluorocarbon Seal
Series 331

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E DIA + .005/-.000 FOR 5 TUBE WALL THICK RANGE 3				WEIGHT (LB) 6			
						-1624	-2534	-3548	-4982	A	C	-2	T
.500	FW33305	.741	.625	.950	.25	.468	.450	.430	—	.015	.044	.047	.025
.750	FW33307	1.036	.875	1.042	.32	.726	.708	.688	.662	.023	.068	.073	.039
1.000	FW33310	1.287	1.156	1.211	.32	.976	.958	.938	.912	.041	.12	.12	.067
1.250	FW33312	1.537	1.406	1.182	.34	1.228	1.210	1.190	1.164	.048	.14	.15	.081
1.500	FW33315	1.785	1.654	1.182	.34	1.478	1.460	1.440	1.414	.058	.17	.18	.094
1.750	FW33317	2.035	1.904	1.182	.34	1.728	1.710	1.690	1.664	.065	.19	.21	.11
2.000	FW33320	2.285	2.154	1.182	.34	1.978	1.960	1.940	1.914	.075	.22	.24	.13
1.250	FW33322	2.535	2.404	1.182	.34	2.229	2.211	2.191	2.164	.086	.25	.26	.14
2.500	FW33325	2.785	2.654	1.179	.35	2.479	2.461	2.441	2.415	.092	.27	.29	.16
2.750	FW33327	3.035	2.904	1.179	.36	2.729	2.711	2.691	2.665	.10	.30	.32	.17
3.000	FW33330	3.285	3.154	1.164	.36	2.979	2.961	2.941	2.915	.11	.33	.35	.19



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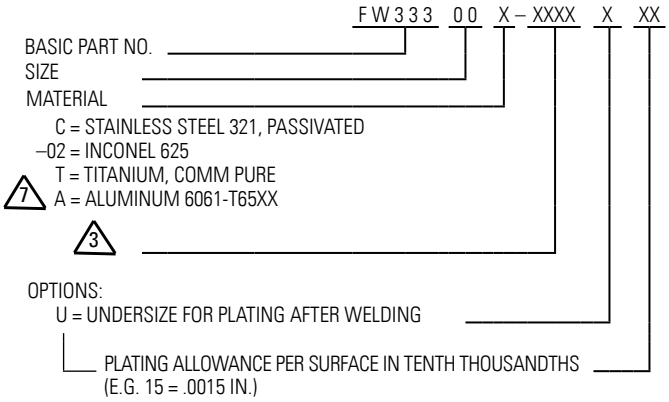


REVISION	LTR	DESCRIPTION	DATE
	A	Revised p/n code and Note 3. Added "E" dim. and Note 5.	8/13/85
	B	Added .750 size. Revised Note 3 and tube wall thickness range.	11/6/85
	C	Added –02 material	2/13/86
	D	Added "T" weights and Note 6	3/31/86
	E	Added FW33305 size	6/4/92
	F	Added "A" material and options to p/n code, weight data, Note 7	4/5/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

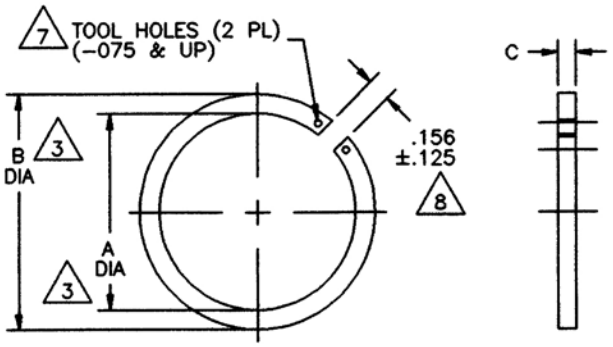
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Dash no. = wall thickness range of tube and flange to be welded in thousandths of an inch (e.g. –1624 for .016 thru .024 wall thickness range)
4. Consult Eaton for specific applications
5. Tube I.D. to be expanded to match "E" dia. prior to welding
6. Weights for –3458 tube wall thickness
7. 500°F (260°C) maximum operating temperature for aluminum flanges

M1212 Ring, Split
Series 20 & 21

Revision Letter K

NOM TUBE O D (IN)	PART NO. SIZE	A (3)	B (3)	C	WEIGHT (LB)
.375	–38	.540	.740	.060	.002
.500	–50	.665	.865	.060	.003
.625	–63	.790	.990	.060	.003
.750	–75	.938	1.169	.70	.003
1.000	–100	1.195	1.419	.70	.004
1.250	–125	1.439	1.685	.80	.005
1.500	–150	1.841	2.097	.90	.006
1.750	–175	2.041	2.346	.100	.007
2.000	–200	2.302	2.597	.100	.008
2.250	–225	2.552	2.847	.100	.009
2.500	–250	2.822	3.097	.100	.010
2.750	–275	3.072	3.347	.100	.011
3.000	–300	3.321	3.609	.100	.012
3.500	–350	3.821	4.106	.100	.014
4.000	–400	4.320	4.609	.110	.017
4.500	–450	4.916	5.303	.110	.021
5.000	–500	5.415	5.825	.110	.039

(6) applies to .003, .003, .004



STANDARD CONFIGURATION PART NUMBER CODE:

(5) M1212 – 000

BASIC PART NO.
SIZE
MATERIAL
- 2024-T851/QQ-A-225
- 2024-T8510/ASTM B221 OR ASTM B241
- 2024-T8511/ASTM B221 OR ASTM B241

FINISH: ANODIZE/MIL-A-8625, TYPE II, DYE RED

ALTERNATE CONFIGURATION PART NUMBER CODE:

(5) M1212 – 000 X X

BASIC PART NO.
SIZE
MATERIAL
- A = (SEE STANDARD CONFIGURATION)
- B = 6061-T6/ASTM B221 OR ASTM B241

FINISH:
- J = ANODIZE/MIL-A-8625, TYPE II, DYE RED
- Z = ANODIZE/MIL-A-8625, TYPE II, FOLLOWED BY DRY FILM LUBE PER MIL-L-46010

REVISION	LTR	DESCRIPTION	DATE
	H	Redrawn. Added –500. Deleted "D". Revised notes.	11/27/79
	J	Added tolerance to slot width (F/D & Note 3). Added Note 8. Added Note 3 to "A" and "B" (F/D)	11/20/80
	K	Added tool hole dia. Updated material specs.	2/27/97

This issue supersedes all previously issued catalog sheets and drawings

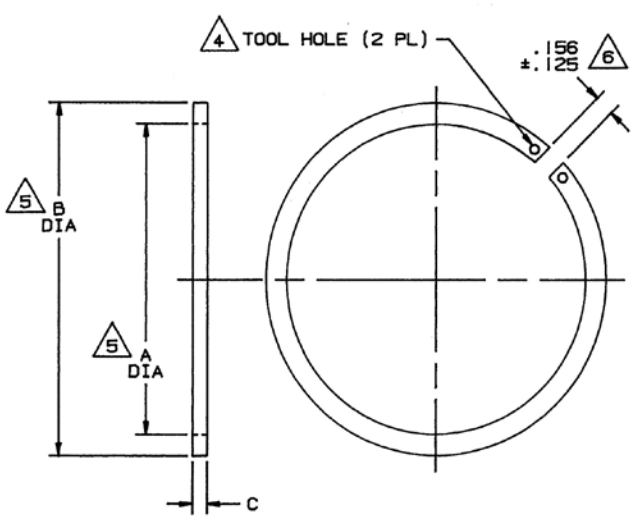
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Check with slot set at .156
4. Use with T2159 nut, all sizes
   Use with T2158 coupler –100 & up
   Use with T15 nut –100 & –125
   Use with T22 coupler –100 & –125
5. Substitutions may be made between standard configurations and "AJ" configurations
6. M1212–075 thru –125 are identical to and fully interchangeable with M1214–075 thru –125
7. No holes in sizes –038 thru –063: Production effectivity April 1973
8. With ring unrestrained

M1213 Ring, Split
Series 20 & 21

Revision Letter R

NOM TUBE O D (IN)	PART NO. M1213 △3	A △5	B △5	C	WEIGHT (LB) TI	WEIGHT (LB) SST
.375	–38	.540	.740	.060	.001	.002
.500	–50	.665	.865	.060	.002	.003
.625	–63	.790	.990	.060	.002	.004
.750	–75	.938	1.169	.070	.003	.005
1.000	–100	1.195	1.419	.070	.004	.007
1.250	–125	1.439	1.685	.080	.006	.011
1.500	–150	1.841	2.097	.090	.013	.022
1.750	–175	2.041	2.346	.100	.014	.024
2.000	–200	2.302	2.597	.100	.015	.027
2.250	–225	2.552	2.847	.100	.017	.030
2.500	–250	2.822	3.097	.100	.019	.033
2.750	–275	3.072	3.347	.100	.021	.036
3.000	–300	3.321	3.609	.100	.023	.040
3.500	–350	3.821	4.109	.100	.026	.046
4.000	–400	4.320	4.609	.110	.033	.058



PART NUMBER CODE:

M1213–000 X

BASIC PART NO.

NOM TUBE O.D. (HUNDREDTH INCHES)

MATERIAL
STAINLESS STEEL 304 (OR 304L)
FINISH: PASSIVATED PER QQ-P-35

T = TITANIUM 6AL-4V (NO FINISH)

REVISION	LTR	DESCRIPTION	DATE
	N	Redrawn. Renumbered notes. Deleted –450 size.	2/15/80
	P	Revised Note 5 and "D" dim.	5/14/80
	Q	Deleted "D", added .156 and tolerance. Title was "Snap Ring". Added Note 5 to "A" (F/D and table) and to "B" (table). Added Note 6.	11/20/80
	R	Added titanium to material	10/26/86

This issue supersedes all previously issued catalog sheets and drawings

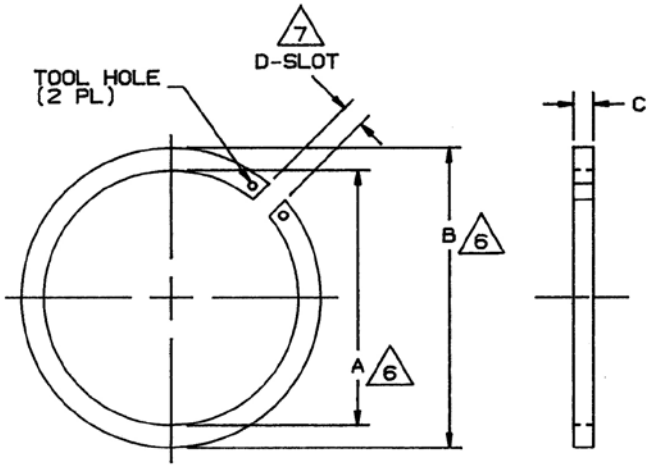
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. M1213–075 thru –125 are identical to and fully interchangeable with M1215–075 thru –125
4. No holes in sizes –138 thru –175. Production effectivity April 1973.
5. Check with slot set at .156
6. With ring unrestrained

M1214 Ring, Split
Series 20

Revision Letter M

NOM TUBE O D (IN)	PART NO. SIZE	A (6)	B (6)	C	D ±.125 (7)	WEIGHT (LB)
.750		(4)				
1.000						
1.250						
1.500	–150	1.687	1.935	.090	.156	.005
1.750	–175	1.937	2.185	.100	↑	.006
2.000	–200	2.187	2.435	.100		.007
2.250	–225	2.437	2.685	.100		.008
2.500	–250	2.687	2.935	.100		.009
2.750	–275	2.937	3.185	.100		.010
3.000	–300	3.187	3.440	.100		.011
3.500	–350	3.687	3.950	.100		.013
4.000	–400	4.187	4.450	.110	↓	.016
4.500	–450	4.687	4.950	.110	.156	.020
5.000	–500	5.182	5.482	.160	.187	.040
5.500	–550	5.808	6.208	.160	.187	.060
6.000	–600	6.230	6.730	.160	.187	.083



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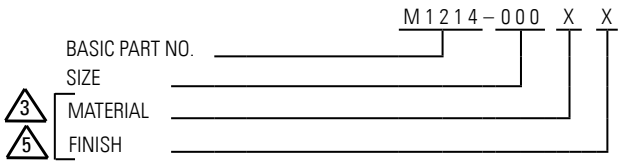


NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. When material and finish codes are not specified, material is 2024, aged, anodized & dyed red per MIL-A-8625, Type II, Class 2
4. See M1212-XXX for smaller sizes. (M1214–075 thru –125 are identical and fully interchangeable with M1212–075 thru –125)
5. When code letters B & Z are specified, material is 6061-T6, and anodized per MIL-A-8625, Type II, Class I, followed by dry film lube
6. Check with slot set at "D"
7. With ring unrestrained

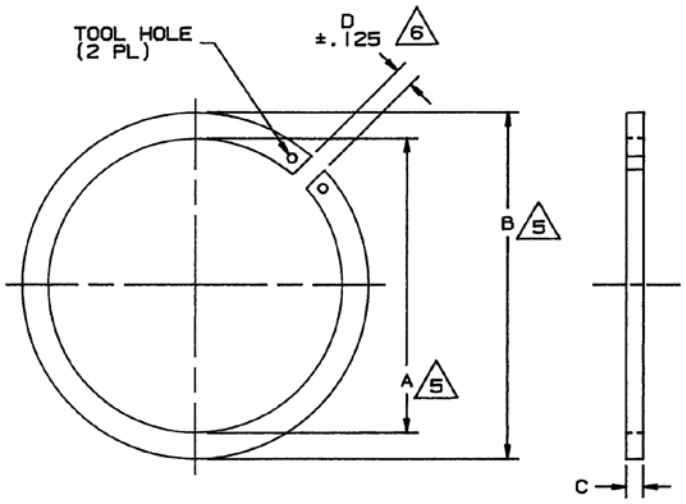
REVISION	LTR	DESCRIPTION	DATE
	M	Revised Note 4	4/22/88

This issue supersedes all previously issued catalog sheets and drawings

M1215 Ring, Split
Series 20

Revision Letter J

NOM TUBE O D (IN)	PART NO. SIZE	A ⑤	B ⑤	C	D	WEIGHT (LB) TI	WEIGHT (LB) SST
.750	–75	④					
1.000	–100						
1.250	–125						
1.500	–150	1.687	1.935	.090	.156	.011	.020
1.750	–175	1.937	2.185	.100		.013	.023
2.000	–200	2.187	2.435	.100		.014	.025
2.250	–225	2.437	2.684	.100		.016	.028
2.500	–250	2.687	2.935	.100		.018	.031
2.750	–275	2.937	3.185	.100		.019	.034
3.000	–300	3.187	3.440	.100		.021	.037
3.500	–350	3.687	3.950	.100		.025	.044
4.000	–400	4.187	4.450	.110		.031	.055
4.500	–450	4.687	4.950	.110	.156	.035	.062
5.000	–500	5.182	5.482	.160	.187	.063	.11
5.500	–550	5.808	6.208	.160	.187	.097	.17
6.000	–600	6.230	6.730	.160	.187	.131	.23



PART NUMBER CODE:

M1215 – 000 X X

BASIC PART NO.

SIZE

MATERIAL
STAINLESS STEEL 304
304L ALTERNATE

OPTIONAL IDENTIFICATION
D = STAINLESS STEEL 304
T = TITANIUM 6AL-4V

L = PASSIVATE

REVISION	LTR	DESCRIPTION	DATE
	E	Redrawn. Added tolerance to slot width. Added Note 5 to "A" and "B" (F/D). Added Note 6. Reversed "A" and "B".	11/20/80
	F	Revised part no. code	12/23/80
	G	Revised Note 5. Added –500, –550, –600.	4/26/85
	H	Added titanium material and weight	10/21/85
	J	Revised Note 4	3/21/88

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Passivate per QQ-P-35

④ See M1213-XXX for smaller sizes. (M1215–075 thru –125 are identical and fully interchangeable with M1213–075 thru –125)

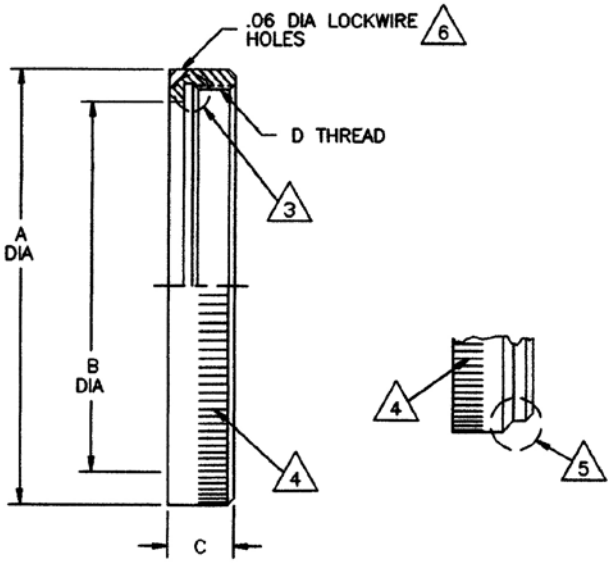
⑤ Check with slot set at "D" dimension

⑥ With ring unrestrained

N20000 Nut
Series 20

Revision Letter G

NOM TUBE O D (IN)	PART NO. SIZE	A	B	C	D THREAD	WEIGHT A	WEIGHT C	WEIGHT T
.375	N20004	.91	.53	.45	.798-20NS-2B	.008	.022	.013
.500	N20005	1.04	.65	.45	.923-20NS-2B	.009	.025	.015
.625	N20006	1.17	.77	.45	1.048-20NS-2B	.011	.030	.017
.750	N20007	1.35	.94	.46	1.218-20NS-2B	.014	.038	.022
1.000	N20010	1.60	1.19	.46	1.468-20NS-2B	.016	.046	.027
1.250	N20012	1.88	1.44	.46	1.734-20NS-2B	.020	.057	.033
1.500	N20015	2.16	1.69	.55	2.000-16UN-2B	.041	.12	.067
1.750	N20017	2.41	1.94	.55	2.250-16UN-2B	.047	.13	.076
2.000	N20020	2.67	2.19	.56	2.500-16UN-2B	.055	.16	.090
2.250	N20022	2.92	2.44	.56	2.750-16UN-2B	.061	.17	.10
2.500	N20025	3.18	2.69	.57	3.000-16UN-2B	.069	.20	.11
2.750	N20027	3.43	2.94	.57	3.250-16UN-2B	.076	.22	.12
3.000	N20030	3.78	3.19	.58	3.500-16UN-2B	.10	.28	.16
3.500	N20035	4.33	3.69	.67	4.000-16UN-2B	.14	.40	.23
4.000	N20040	4.85	4.19	.74	4.500-16UN-2B	.18	.51	.29
4.500	N20045	5.45	4.69	.79	5.047-12NS-3B	.22	.62	.35
5.000	N20050	5.99	5.19	.79	5.562-12NS-3B	.27	.76	.44
5.500	N20055	6.78	5.89	.79	6.297-12NS-3B	.34	.87	.56
6.000	N20060	7.32	6.39	.80	6.812-12NS-3B	.43	1.21	.70



PART NUMBER CODE:

N200 – 00 X

BASIC PART NO.
SIZE
MATERIAL

A = ALUMINUM 2024 (AGED), ANODIZED
C = STAINLESS STEEL 17-4PH (H1150), PASSIVATED
T = TITANIUM 6AL-4V
–09 = ALUMINUM 6061-T6 ANODIZE, COLOR OPTIONAL

REVISION	LTR	DESCRIPTION	DATE
	B	Redrawn	6/29/79
	C	N20045 and N0050 — Revised "C"	9/18/79
	D	Material –09 "color optional" was "dye black"	10/26/79
	E	Added Note 8	12/22/81
	F	Revised "T" material	1/28/85
	G	Deleted dichromate	5/13/99

This issue supersedes all previously issued catalog sheets and drawings

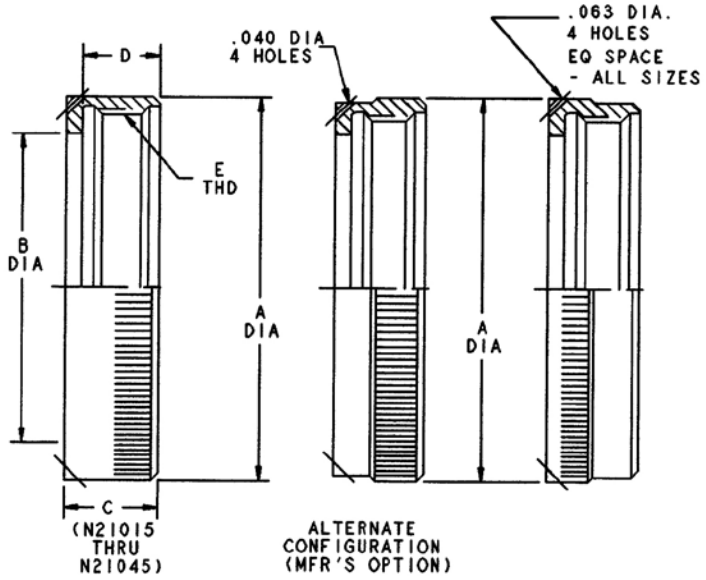
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Thread relief not present on N20015 thru N20027
4. Knurl may be located in either position shown
5. Undercut as shown for N20035 thru N20060
6. Lockwire hole break-thru to I.D. may occur on some sizes and is allowable
7. Dry film lube I.D. surfaces per MIL-L-8937
8. No dry film lube on –3B thread

N21000 Nut
Series 21

Revision Letter F

NOM TUBE O D (IN)	PART NO. SIZE	A	B	C	D	E THREAD	WEIGHT (LB) A	C , –32	T
1.500	N21015	2.33	1.841	.62	.515	2.169-16NS-2B	.05	.13	.08
1.750	N21017	2.58	2.091	.62	.515	2.419-16NS-2B	.05	.16	.09
2.000	N21020	2.84	2.341	.62	.515	2.669-16NS-2B	.06	.18	.10
2.250	N21022	3.09	2.591	.64	.515	2.919-16NS-2B	.07	.20	.11
2.500	N21025	3.35	2.841	.64	.515	3.169-16NS-2B	.08	.22	.13
2.750	N21027	3.62	3.091	.64	.515	3.419-16NS-2B	.09	.26	.15
3.000	N21030	3.92	3.341	.67	.515	3.681-16NS-2B	.13	.37	.22
3.500	N21035	4.40	3.841	.67	.515	4.181-16NS-2B	.13	.39	.22
4.000	N21040	4.92	4.341	.67	.515	4.681-16NS-2B	.16	.45	.27
4.500	N21045	5.63	4.932	.77	.630	5.375-12UN-3B	.24	.71	.40
5.000	N21050	6.26	5.433	.78	.630	5.891-12NS-3B	.29	.85	.49
5.500	N21055	6.80	5.933	.79	.630	6.406-12NS-3B	.38	1.11	.64
6.000	N21060	7.34	6.433	.81	.630	6.922-12NS-3B	.44	1.29	.74



PART NUMBER CODE:

N210 – 00 X

BASIC PART NO.

SIZE

4 MATERIAL

A = ALUMINUM 2024-T8 ANODIZED PER MIL-A-8625, TYPE II, CLASS I, AND DRY FILM LUBRICATED (I.D. AND THREADS) PER MIL-L-8937

C = STAINLESS STEEL 304, PASSIVATED PER QQ-P-35, AND DRY FILM LUBRICATED (I.D. AND THREADS) PER MIL-L-8937

T = TITANIUM TI-CP-70 DRY FILM LUBRICATED (I.D. AND THREADS) PER MIL-L-8937

–32 = STAINLESS STEEL A286, PASSIVATED PER QQ-P-35 AND DRY FILM LUBRICATED (I.D. AND THREADS) PER MIL-L-8937

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn. Added "D" dimension.	1/14/80
	B	Added "–32" material	5/20/80
	C	Added alternate configuration	10/10/80
	D	Added Note 4	12/22/81
	E	Added weights	4/16/84
	F	Revised "T" material	1/30/85

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

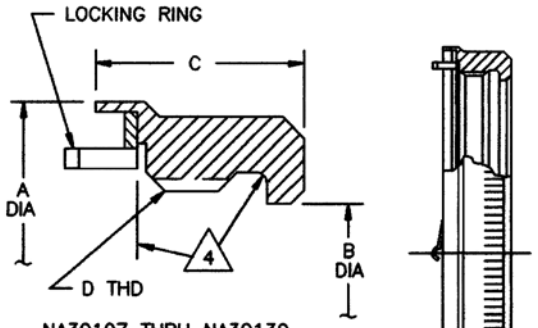
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Other materials and finishes available upon request

4 No dry lube on N21045 thru N21060

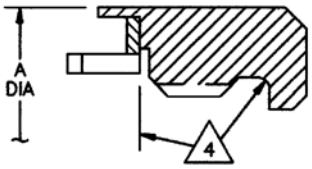
NA30100 Nut Assembly, Lightweight, Removable, Flexible, Locking Series 301

Revision Letter F

NOM TUBE O D (IN)	ASSY PART NO.	A	B	C	D THREAD	WEIGHT (LB) AR, AW	WEIGHT (LB) C, –020
.750	NA30107	1.55	1.08	.58	1.218-20UNS-2B	.012	.035
1.000	NA30110	1.80	1.33	.58	1.468-20UNS-2B	.015	.043
1.250	NA30112	2.07	1.58	.58	1.734-20UNS-2B	.032	.13
1.500	NA30115	2.34	1.85	.70	2.000-16UN-2B	.058	.16
1.750	NA30117	2.59	2.10	.70	2.500-16UN-2B	.065	.18
2.000	NA30120	2.84	2.35	.70	2.500-16UN-2B	.072	.19
2.250	NA30122	3.09	2.60	.70	2.750-16UN-2B	.079	.21
2.500	NA30125	3.34	2.85	.70	3.000-16UN-2B	.085	.23
2.750	NA30127	3.59	3.10	.70	3.250-16UN-2B	.092	.25
3.000	NA30130	3.84	3.35	.70	3.500-16UN-2B	.099	.27
3.500	NA30135	4.59	4.01	.92	4.250-16UN-2B	.22	.62
4.000	NA30140	5.09	4.51	.92	4.750-16UN-2B	.27	.74
4.500	NA30145	5.72	5.05	.93	5.375-12UN-3B	7	.91
5.000	NA30150	6.22	5.55	.93	5.875-12UN-3B		1.03



NA30107 THRU NA30130



NA30135 THRU NA30150

PART NUMBER CODE:

NA301 – 00 – XX

BASIC PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL/FINISH

AR = AL 2024-T351 PER QQ-A-225/6 OR 2024--T3511 PER QQ-A-200/3, ANODIZED PER MIL-A-8625, TYPE II, CLASS 2, COLOR RED. LOCKING RING: 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED.

AW = AL 2024-T351 PER QQ-A-225/6 OR 2024-T3511 PER QQ-A-200/3, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1. LOCKING RING: 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED.

C = STAINLESS STEEL 304 PER AMS5560 OR AMS5639, PASSIVATED PER QQ-P-35. LOCKING RING: 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED.

–20 = STAINLESS STEEL 17–RPH (H1150) PER AMS5643 OR 15-5PH (H1150) PER AMS5659, PASSIVATED PER QQ-P-35. LOCKING RING: 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED. 5

–095 = AL 2024-T351 PER QQ-A-225/6 OR 2024-T3511 PER QQ-A-200/3. NICKEL–PHOSPHORUS–TEFLON PLATED. LOCKING RING: 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED.

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

4 Areas free of anodize for continuity. Chemical conversion coated (alodine) per MIL-C-5541.

5 –20 material is for 5.000 size only

6. Pressures:
   Operating: -5 psig (vacuum) to 125 psig (.668 to 9.63 bar)
   Proof: 250 psig (18.25 bar)
   Burst: -14 psig (vacuum) to 375 psig (.047 to 26.86 bar)

7 AR, AW and –095 materials are not available in 4.500 and 5.000 sizes

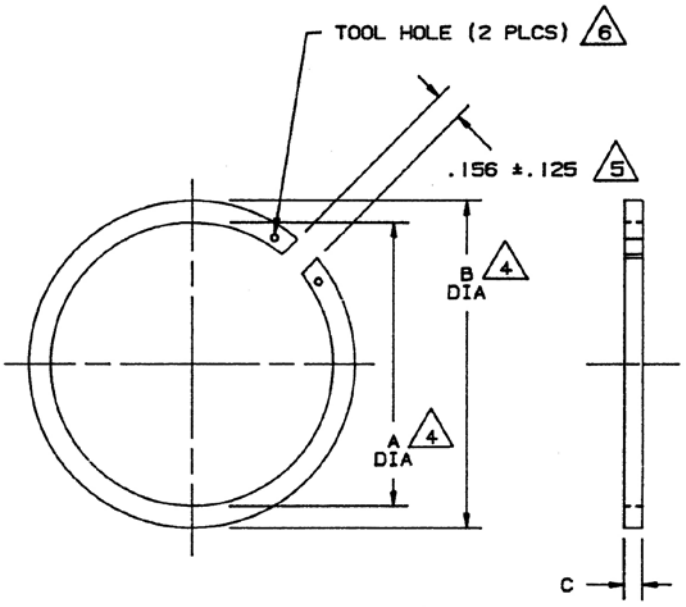
REVISION	LTR	DESCRIPTION	DATE
	A	Completely revised	7/19/88
	B	Added "AW" material; Note 6; 10,12 and 45 sizes.	2/17/89
	C	Revised dimensions "A" and "C", notes, p/n code	10/6/92
	D	Added –095 material	1/18/95
	E	Ring was passivated	7/13/95
	F	Revised locking ring material	5/20/96

This issue supersedes all previously issued catalog sheets and drawings

R20000 Ring, Split
Series 20

Revision Letter B

NOM TUBE O D (IN)	ASSY PART NO. SIZE	A (4)	B (4)	C	WEIGHT (LB) (MAX) .20
.375	R20004	.540	.740	.060	.002
.500	R20005	.665	.865	.060	.003
.625	R20006	.790	.990	.060	.004
.750	R20007	.938	1.169	.060	.005
1.000	R20010	1.195	1.419	.060	.007
1.250	R20012	1.439	1.685	.080	.011
1.500	R20015	1.687	1.935	.090	.020
1.750	R20017	1.937	2.185	.100	.023
2.000	R20020	2.187	2.435	.100	.025
2.250	R20022	2.437	2.684	.100	.028
2.500	R20025	2.687	2.935	.100	.031
2.750	R20027	2.937	3.185	.100	.034
3.000	R20030	3.187	3.440	.100	.037
3.500	R20035	3.687	3.950	.100	.044
4.000	R20040	4.187	4.450	.110	.055



PART NUMBER CODE:

R200 – 00 X

BASIC PART NO.

SIZE

MATERIAL

–20 = STAINLESS STEEL 17-4PH PER AMS5643 OR 15-5PH PER AMS5659 (H1150)

REVISION	LTR	DESCRIPTION	DATE
	A	Revised 17-4PH material specification	8/9/83
	B	Revised 17-4PH material specification	11/15/88

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125√
3. Passivate per QQ-P-35

4 Check with slot set at .156

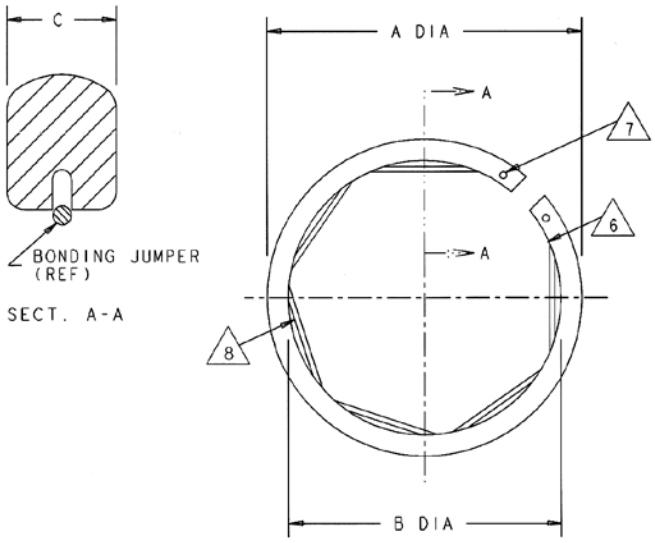
5 With ring unrestrained

6 No holes in sizes R20004 thru R20007

RA30100 Retainer Assy, Split, Removable
Series 301

Revision Letter F

NOM TUBE O D (IN)	ASSY PART NO. SIZE	A (4)	B (4)	C MIN/MAX	WEIGHT (LB) ALUM	WEIGHT (LB) SST
.750	RA30107	1.18	.99	.108/.116	.003	.008
1.000	RA30110	1.43	1.23	.108/.116	.005	.015
1.250	RA30112	1.68	1.45	.108/.116	.006	.018
1.500	RA30115	1.97	1.68	.128/.136	.010	.027
1.750	RA30117	2.22	1.93	.128/.136	.012	.031
2.000	RA30120	2.47	2.18	.128/.136	.013	.035
2.250	RA30122	2.72	2.43	.128/.136	.015	.039
2.500	RA30125	2.97	2.68	.128/.136	.016	.043
2.750	RA30127	3.22	2.93	.128/.136	.018	.047
3.000	RA30130	3.47	3.18	.128/.136	.019	.055
3.500	RA30135	4.21	3.73	.238/.246	.059	.17
4.000	RA30140	4.71	4.23	.238/.246	.072	.20
4.500	RA30145	5.25	4.77	.238/.246	.088	.25
5.000	RA30150	5.75	5.27	.238/.246	.096	.27



PART NUMBER CODE:

RA301 – 00 – XXX

BASIC PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL/FINISH

A = RETAINER ALUMINUM 2024-T85XX, CHEM. FILM TREATED. BONDING JUMPER PHOSPHOR BRONZE (SPRING TEMPER).

C = RETAINER STAINLESS STEEL 304, PASSIVATED. BONDING JUMPER PHOSPHOR BRONZE (SPRING TEMPER).

–20 = RETAINER STAINLESS STEEL 17-4PH, PASSIVATED. BONDING JUMPER PHOSPHOR BRONZE (SPRING TEMPER).

–095 = RETAINER AL 2024-T85XX, NICKEL PHOSPHORUS-TEFLON PLATED. BONDING JUMPER 302 STAINLESS STEEL (SPRING TEMPER).

–097 = RETAINER ALUMINUM 2219-T85XX, NICKEL PHOSPHORUS–TEFLON PLATED. BONDING JUMPER 302 STAINLESS STEEL (SPRING TEMPER).

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Check dimension with ring restrained in coupler/nut
5. Deleted
6. Bonding jumper staked in retaining ring. Location and quantity at manufacturer's option
7. No tooling holes in RA30107 thru RA30112
8. Bonding jumper configuration shall be manufacturer's option and shall comply with MIL-B-5087, Class S. Number of contact points will vary with diameter.

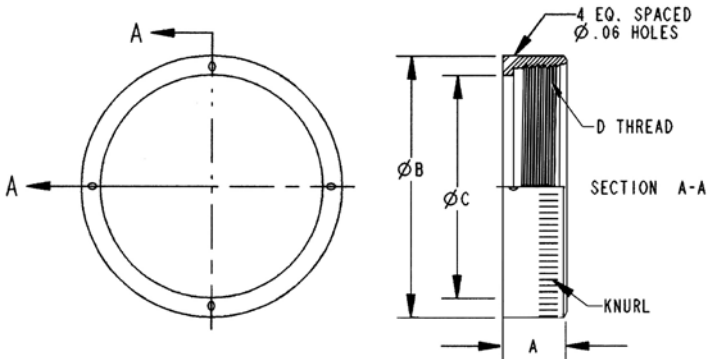
REVISION	LTR	DESCRIPTION	DATE
	F	Added –097 and –020 materials. Deleted Note 5.	3/31/98

This issue supersedes all previously issued catalog sheets and drawings

T15 Nut, Removable
Series 20

Revision Letter T

NOM TUBE O D (IN)	PART NO. SIZE	A	B	C	D THREAD SIZE	USE WITH SNAP RING:	WEIGHT (LB)
1.000	–100	.56	1.62	1.29	1.468-20-2B	M1214–100	.016
1.250	–125	.57	1.90	1.54	1.734-20-2B	M1214–125	.030
1.500	–150	.64	2.18	1.79	2.000-16UNEF-2B	M1214–150	.043
1.750	–175	.66	2.44	2.04	2.250-16UN-2B	M1214–175	.055
2.000	–200	.66	2.70	2.29	2.500-16UN-2B	M1214–200	.065
2.250	–225	.67	2.96	2.54	2.750-16UN-2B	M1214–225	.077
2.500	–250	.67	3.22	2.79	3.000-16UN-2B	M1214–250	.088
2.750	–275	.68	3.48	3.04	3.250-16UN-2B	M1214–275	.102
3.000	–300	.68	3.74	3.29	3.500-16UN-2B	M1214–300	.115
3.500	–350	.77	4.25	3.79	4.000-16UN-2B	M1214–350	.167
4.000	–400	.85	4.74	4.29	4.500-16UN-2B	M1214–400	.206
4.500	–450	.87	5.29	4.79	5.000-16P-2 (9)	M1214–450	.259



PART NUMBER CODE:

"T15A BBB C"

WHERE: A = (12) (AS REQ'D)
BBB = SIZE
C = MATERIAL/FINISH (AS REQ'D) (7) (6)

REVISION	LTR	DESCRIPTION	DATE
	J	Redrawn. Revised Note 5.	
	K	Added –500	
	L	Revised "A" dim., –500 only	
	M	Revised Note 6. Deleted –500, added Note 11.	
	N	Deleted –750	
	P	Revised Notes 3 & 8	
	Q	Revised Note 3 and 4. (T15 no suffix superseded by T15A).	
	R	Clarified material/finish code	
	S	Redrawn, modified notes.	
	T	Released	1/18/05

This issue supersedes all previously issued catalog sheets and drawings

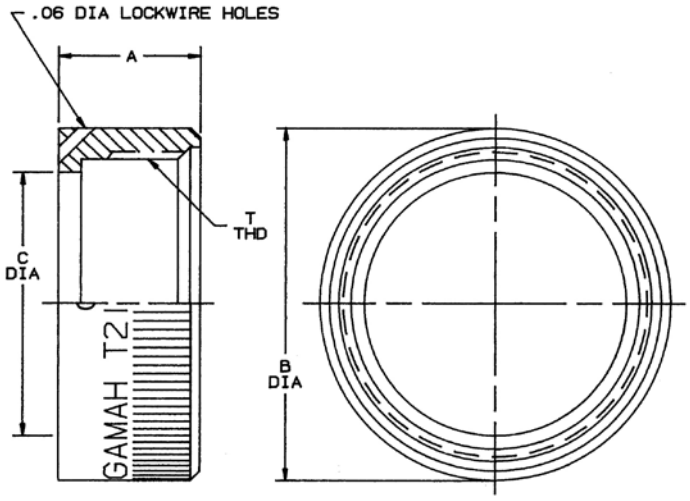
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125√
3. Consult Eaton for specific applications
4. Other materials available upon request
5. When material/finish code is not specified, code "A" material will be supplied
6. When code "A" is specified, material is 2024 aged to -T8 or -T851 and anodized red. Dry film lube on I.D. surfaces.
7. When code "BZ" is specified, material is 6061-T6, anodized black. Dry film lube on I.D. surfaces.
8. All sizes except –450 are interchangeable with Series N20000 Nuts
9. Standard Acme threads
10. See T2159 for sizes smaller than 1.000 inch
11. T15–450 is restricted to 30 psig (3.08 bar) operating pressure
12. L = Thread locking insert (Nylok)

T21 Nut
JT320 Flexible Coupling, Removable
Series 20

Revision Letter Q

NOM TUBE O D (IN)	PART NO. T21-	A	B	C	T THREAD	NOM WT (LB) TI	NOM WT (LB) SST
.750	–075	.555	1.37	1.038	1.218-20NS-2B	.036	.063
1.000	–100	.555	1.62	1.289	1.468-20NS-2B	.043	.075
1.250	–125	.565	1.90	1.539	1.734-20NS-2B	.054	.095
1.500	–150	.640	2.19	1.789	2.000-16UN-2B	.078	.136
1.750	–175	.655	2.45	2.039	2.250-16UN-2B	.094	.165
2.000	–200	.660	2.71	2.289	2.500-16UN-2B	.111	.195
2.250	–225	.665	2.97	2.539	2.750-16UN-2B	.126	.221
2.500	–250	.670	3.23	2.789	3.000-16UN-2B	.142	.250
2.750	–275	.675	3.49	3.039	3.250-16UN-2B	.161	.283
3.000	–300	.680	3.75	3.289	3.500-16UN-2B	.182	.320
3.500	–350	.770	4.26	3.789	4.000-16UN-2B	.254	.446
4.000	–00	.852	4.71	4.289	4.500-16UN-2B	.269	.472



PART NUMBER CODE:

T21 – 000 X X

BASIC PART NO.

SIZE

MATERIAL

D = TYPE 304 STAINLESS STEEL WITH TYPE 304L AS ALTERNATE
T = TITANIUM 6AL-4V (NO FINISH)

FINISH

Y = PASSIVATE PER QQ-P-35 FOLLOWED BY DRY FILM LUBE PER MIL-L-8937

REVISION	LTR	DESCRIPTION	DATE
	N	Redrawn. Revised material.	8/20/80
	P	Added –100 and –125 weights	9/22/83
	Q	Added titanium to material	10/26/86

This issue supersedes all previously issued catalog sheets and drawings

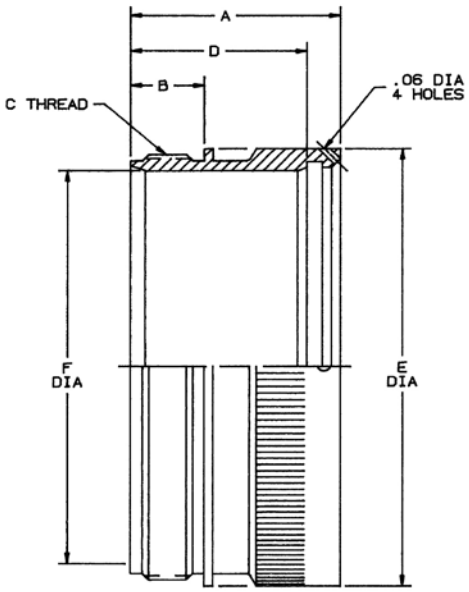
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

T2158 Sleeve
JT175 Flexible Coupling, Removable

Revision Letter F

NOM TUBE O D (IN)	PART NO. T2158	A	B	C THREAD	D	E DIA	F DIA
1.500	–150	1.43	.50	2.169-16UNS-2A	1.23	2.25	1.96
1.750	–175	1.44	.50	2.419-16UNS-2A	1.23	2.50	2.21
2.000	–200	1.45	.50	2.669-16UNS-2A	1.23	2.75	2.46
2.250	–225	1.46	.50	2.919-16UNS-2A	1.23	3.00	2.71
2.500	–250	1.46	.50	3.169-16UNS-2A	1.23	3.25	2.96
2.750	–275	1.46	.50	3.419-16UNS-2A	1.23	3.50	3.21
3.000	–300	1.58	.50	3.681-16UNS-2A	1.35	3.77	3.46
3.500	–350	1.60	.50	4.181-16UNS-2A	1.35	4.27	3.96
4.000	–400	1.64	.50	4.681-16UNS-2A	1.38	4.77	4.46



PART NUMBER CODE:

T2158 X 000 X X

BASIC PART NO.

SPECIAL REQUIREMENTS

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL

A = ALUMINUM 2024-T3510/QQ-A-200/3 ARTIFICIAL AGED PER MIL-H-6088 TO -T8510 CONDITION

G = ALUMINUM 2024-T3, -T351, -T3510, OR -T3511 PER WW-T-700/3, QQ-A-200/3 OR QQ-A-225/6

FINISH:

Z = ANODIZE PER MIL-A-8625, TYPE II, CLASS 2, DYE RED FOLLOWED BY DRY FILM LUBRICANT PER MIL-L-8937 (THREADS AND I.D.)

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn with changes	9/5/79
	E	Revised material spec	7/15/80
	F	Added "G" material, revised "A" material	4/27/82

This issue supersedes all previously issued catalog sheets and drawings

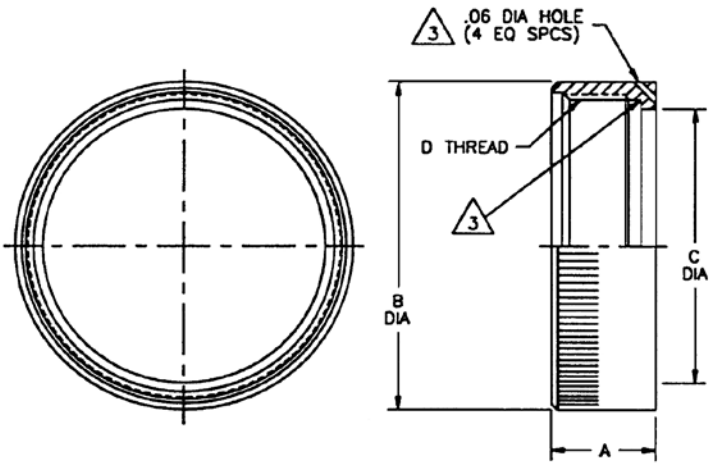
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

T2159 Nut
Flexible Aluminum Coupling
Series JT175

Revision Letter L

NOM TUBE O D (IN)	PART NO. T2159	A ±.015	B	C +.010 -.000	D THREAD	WT (LB)
.375	–038	.515	.92	.618	.798-20-2B	.010
.500	–050	.515	1.04	.743	.923-20-2B	.012
.625	–063	.515	1.18	.868	1.048-20-2B	.014
.750	–075	.525	1.36	1.038	1.218-20-2B	.018
1.000	–100	.535	1.61	1.289	1.468-20-2B	.021
1.250	–125	.545	1.88	1.539	1.734-20-2B	.028
1.500	–150	.720	2.33	1.959	2.169-16-2B	.05
1.750	–175	.735	2.59	2.209	2.419-16-2B	.06
2.000	–200	.740	2.85	2.458	2.669-16-2B	.06
2.250	–225	.745	3.11	2.708	2.919-16-2B	.08
2.500	–250	.750	3.37	2.958	3.169-16-2B	.09
2.750	–275	.755	3.69	3.208	3.419-16-2B	.13
3.000	–300	.760	3.96	3.458	3.681-16-2B	.15
3.500	–350	.770	4.47	3.958	4.181-16-2B	.18
4.000	–400	.790	4.99	4.458	4.681-16-2B	.21



PART NUMBER CODE:

T2159 X 000 X X

BASIC PART NO.

SPECIAL REQUIREMENTS

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL:
- A = ALUMINUM 2024-T8510/QQ-A-200/3 ALUMINUM 2024-T851/QQ-A-225/6
- B = ALUMINUM 6061-T6, /QQ-A-225/8

FINISH:
- (A)Z = ANODIZE PER MIL-A-8625, TYPE II, CLASS 2, DYE RED, DRY FILM LUBE PER MIL-L-8937, INTERNAL SURFACES ONLY
- (B)Z = ANODIZE PER MIL-A-8625, TYPE II, CLASS 2, COLOR OPTIONAL, DRY FILM LUBE PER MIL-L-8937, INTERNAL SURFACES ONLY

REVISION	LTR	DESCRIPTION	DATE
	C	Redrawn from customer use only drawing Rev. B	1/3/79
	D	Revised spec: was MIL-L-8939	4/25/79
	E	Added "B", (B)Z. Added Note 3	6/21/79
	F	Deleted chem film/MIL-C-5541	9/6/79
	G	(B)Z = "color optional" was "dye black"	10/31/79
	H	Revised "B" material spec	7/15/80
	J	Revised "B" material spec	12/6/82
	K	Added weights	9/22/83
	L	Added Note 4	2/27/98

This issue supersedes all previously issued catalog sheets and drawings

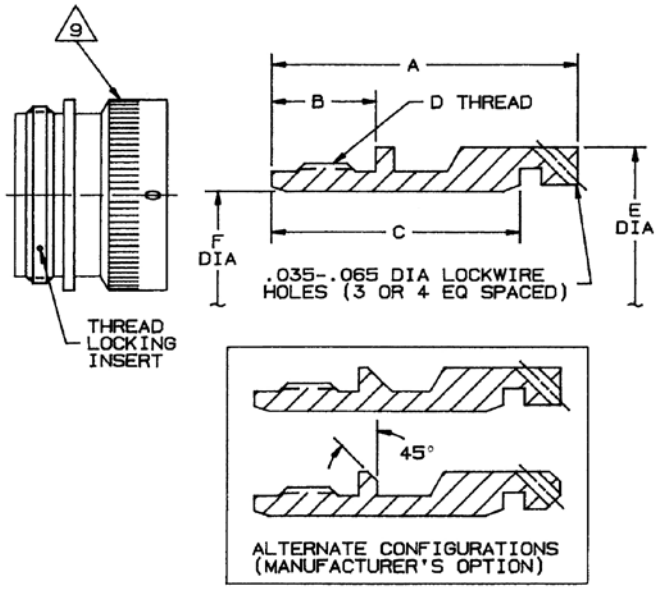
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Lockwire hole breakthrough on I.D. may occur on some sizes and is acceptable
4. When material/finish code is not specified, code "AZ" material and finish will be supplied

T22 Coupler, Removable
Series 20

Revision Letter Y

NOM TUBE O D (IN)	PART NO. SIZE	A ±.05	B	C	D	E	F	SNAP RING REF.	WEIGHT (LB)
1.000	–100	1.08	.37	.88	1.468-20NS-2A	1.60	1.290	M1212	.043
1.250	–125	1.16	.37	.95	1.734-20NS-2A	1.86	1.540	M1212	.056
1.500	–150	1.27	.42	1.03	2.000-16UN-2A	2.10	1.788	M1214	.070
1.750	–175	1.27	.42	1.03	2.250-16UN-2A	2.35	2.038	M1214	.074
2.000	–200	1.27	.42	1.03	2.500-16UN-2A	2.60	2.288	M1214	.083
2.250	–225	1.28	.42	1.03	2.750-16UN-2A	2.85	2.538	M1214	.096
2.500	–250	1.28	.42	1.03	3.000-16UN-2A	3.10	2.788	M1214	.103
2.750	–275	1.28	.42	1.03	3.250-16UN-2A	3.35	3.038	M1214	.113
3.000	–300	1.28	.42	1.03	3.500-16UN-2A	3.60	3.288	M1214	.122
3.500	–350	1.34	.50	1.09	4.000-16UN-2A	4.12	3.788	M1214	.167
4.000	–400	1.35	.56	1.09	4.500-16UN-2A	4.62	4.288	M1214	.189
4.500	–450	1.42	.56	1.09	5.000-16P-2 (7)	5.12	4.788	M1214	.230



PART NUMBER CODE:

T22 – 000 X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED) (4)
- B = ALUMINUM 6061-T6

FINISH
- J = RED ANODIZED ("A" MAT'L)
- M = BLACK ANODIZED ("B" MAT'L)
- Z = BLACK ANODIZED & DRY FILM LUBED ON I.D. AND THREADS ONLY ("B" MAT'L)

OPTIONS
- –1 = NO THREAD LOCKING INSERT
- NO CODE = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	S	Added alternate configurations	10/19/79
	T	Revised Note 7	8/20/80
	U	Revised Notes 3, 4, 5 and p/n code	4/21/81
	V	Revised p/n code, Notes 3 & 4	10/2/84
	W	Deleted Note 3	10/29/86
	X	Revised –150 thread data, Note 3, and thread locking insert callout	5/13/88
	Y	Added "–1" option	10/10/91

This issue supersedes all previously issued catalog sheets and drawings

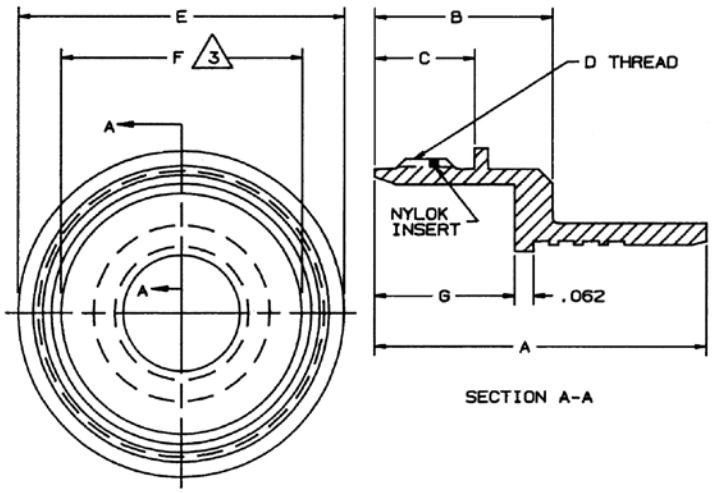
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. When material and finish codes are not specified, code "A" material will be supplied
4. When no finish code is given for "A" material code, parts are red anodized and dry film lubed on I.D. and threads only
5. Deleted
6. –450 is restricted to 30 psig (3.08 bar) operating pressure
7. Standard Acme threads
8. Refer to C20000 & N20000 for larger sizes and high pressure application
9. Knurl located over lockwire holes on larger sizes (–400 & up)

T2268 Coupling Half
Series 20

Revision Letter E

NOM TUBE O D (IN)	PART NO. T2268	A	B	C	D THREAD	E	F	G	— WEIGHT (LB) — D	A
.375	—	—	—	—	—	—	—	—	—	—
.500	–050	1.30	1.01	.350	.923-20NS-2A	.98	.744	.885	.058	.020
.625	—	—	—	—	—	—	—	—	—	—
.750	–075	1.39	1.01	.350	1.218-20NS-2A	1.33	1.039	.885	.086	.030
1.000	–100	1.56	1.01	.350	1.468-20NS-2A	1.58	1.290	.885	.12	.042
1.250	–125	1.78	1.07	.350	1.734-20NS-2A	1.85	1.540	.941	.18	.062
1.500	–150	2.06	1.19	.420	2.000-16UN-2A	2.08	1.788	1.063	.24	.084
1.750	–175	2.06	1.19	.420	2.250-16UN-2A	2.33	2.038	1.063	.29	.10
2.000	–200	2.06	1.19	.420	2.500-16UN-2A	2.58	2.288	1.063	.31	.11
2.250	–225	2.06	1.19	.420	2.750-16UN-2A	2.83	2.538	1.063	.37	.13
2.500	–250	2.06	1.19	.420	3.000-16UN-2A	3.08	2.788	1.063	.40	.14
2.750	–275	2.06	1.19	.420	3.250-16UN-2A	3.33	3.038	1.063	—	—
3.000	–300	2.06	1.19	.420	3.500-16UN-2A	3.58	3.288	1.063	—	—
3.500	–350	2.39	1.31	.500	4.000-16UN-2A	4.10	3.788	1.188	.63	.22
4.000	–400	2.39	1.31	.562	4.500-16UN-2A	4.60	4.288	1.188	.72	.25



PART NUMBER CODE:

T2268 X – 000 X X

BASIC PART NO.

SPECIAL REQUIREMENT
L = NYLOK INSERT

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL
A = ALUMINUM 2024
D = STAINLESS STEEL 304

FINISH
Z = 3
Y = 4
L = 5

REVISION	LTR	DESCRIPTION	DATE
	A	Revised nut stop contour	3/21/79
	B	Added "D" material and "Y" finish. Revised weights.	9/19/80
	C	Added "L" finish and Note 5	3/27/84
	D	Added additional weights and ½ inch size	7/12/85
	E	Revised p/n code	5/22/91

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

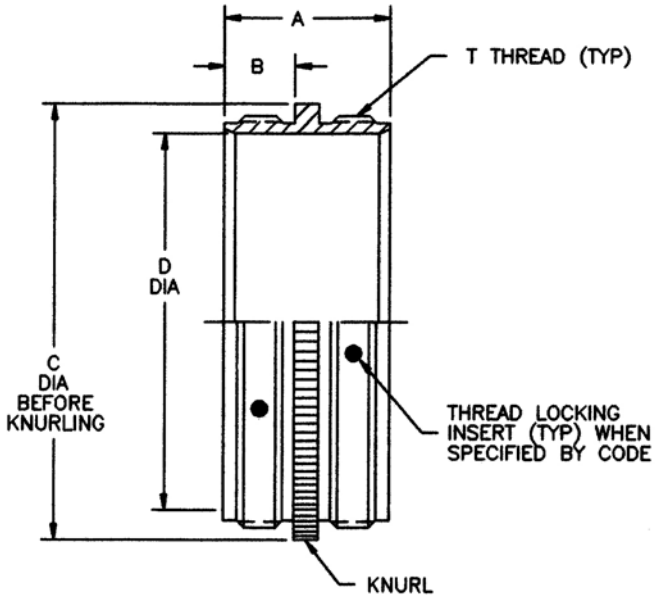
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

3. Anodize per MIL-A-8625 followed by dry film lube to threads and "F" dia.
4. Passivate per QQ-A-35 followed by dry film lube to threads and "F" dia.
5. Chem film treat per MIL-C-5541

T2269 Sleeve, Flexible
Series 20

Revision Letter W

NOM TUBE O D (IN)	PART NO. T2269	A	B	C	D +.002 -.000	T THREAD	— WEIGHT (LB) — A	D
.375	–038	.89	.350	.93	.619	.798-20UNS-2A	.016	.047
.500	–050	.89	.350	1.07	.744	.923-20UNS-2A	.019	.055
.625	–063	.89	.350	1.22	.869	1.048-20UNS-2A	.023	.065
.750	–075	.89	.350	1.40	1.039	1.218-20UNS-2A	.027	.077
1.000	–100	.89	.350	1.67	1.290	1.468-20UNS-2A	.034	.097
1.250	–125	.89	.350	1.92	1.540	1.724-20UNS-2A	.043	.123
1.500	–150	1.00	.425	2.17	1.788	2.000-16UN-2A	.051	.147
1.750	–175	1.00	.425	2.40	2.038	2.250-16UN-2A	.062	.178
.000	–200	1.00	.425	2.65	2.288	2.500-16UN-2A	.066	.190
2.250	–225	1.00	.425	2.90	2.538	2.750-16UN-2A	.073	.211
2.500	–250	1.00	.425	3.15	2.788	3.000-16UN-2A	.080	.231
2.750	–275	1.00	.425	3.40	3.038	3.250-16UN-2A	.087	.250
3.000	–300	1.00	.425	3.65	3.288	3.500-16UN-2A	.095	.273
3.500	–350	1.16	.505	4.16	3.788	4.000-16UN-2A	.126	.363
4.000	–400	1.28	.567	4.67	4.288	4.500-16UN-2A	.157	.454
4.500	–450	1.39	.620	5.19	4.788	5.047-12UNS-3A	.219	.627
5.000	–500	1.44	.620	5.71	5.288 (3)	5.563-12UNS-3A	.280	.799



PART NUMBER CODE:

T2269 X – 000 X X

BASIC PART NO.

SPECIAL REQUIREMENT
L = NYLOK INSERT
(NO DRY FILM LUBE ON BORE)

SIZE

MATERIAL
A = ALUMINUM 2024 (AGED)
D = STAINLESS STEEL 304 WITH TYPES 304L 316, 316L & 321 STAINLESS AS ALTERNATES

FINISH
Y = PASSIVATE PER QQ-P-35 FOLLOWED BY DRY FILM LUBE (O.D. AND I.D. SURFACES) PER MIL-L-46010
Z = ANODIZE PER MIL-A-8625 FOLLOWED BY DRY FILM LUBE (O.D. AND I.D. SURFACES) PER MIL-L-46010
L = ALODINE PER MIL-C-5541 (FOR ALUMINUM)
L = PASSIVATE PER QQ-P-35 (FOR STAINLESS STEEL)
W = ANODIZE PER MIL-A-8625, (DICHROMATE)

REVISION	LTR	DESCRIPTION	DATE
	V	Redrawn, added –038 data	9/22/83
	W	Redrawn	1/25/96

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

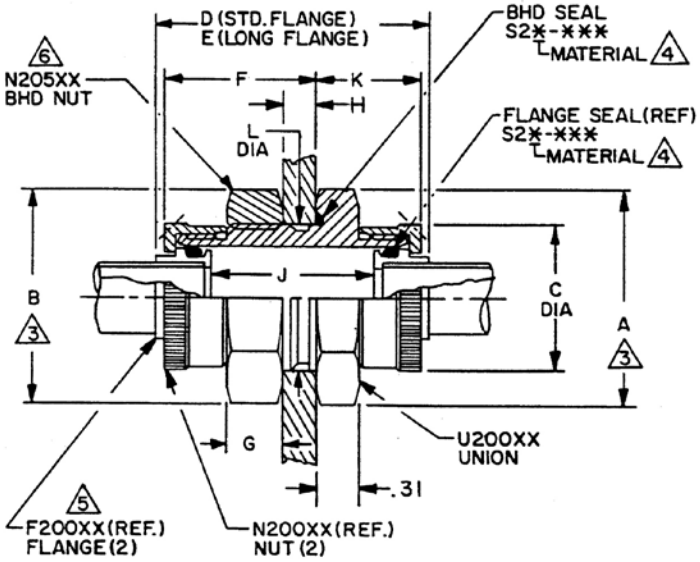
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Tolerance = +.003/-.000
4. Sleeve can be used with: N20005 thru N20050 Nuts, T15–075 thru T15–400 Nuts, T2159–050 thru T2159–125 Nuts, or NR20045 & NR20050 Nuts

Index — Threaded Flexible Couplings, Unions and Adapters

K20000 Threaded Union
Max ¼ Inch to 7/16 Inch Bulkhead
Series 20

Revision Letter F

NOM TUBE O D (IN)	PART NO.	FLANGE SEAL	BHD-SEAL	A	B	C	D MAX	E MAX	F	G	H MAX	J MIN	K	L MAX	WEIGHT A, –09,	WEIGHT C	WEIGHT T
.250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
.375	K20004	–111	–021	1.44	1.27	.91	2.07	—	1.09	.36	.25	1.11	.76	.906	.11	.32	.18
.500	K20005	–113	–024	1.59	1.56	1.04	2.12	—	1.14	.41	.25	1.15	.76	1.094	.14	.39	.22
.625	K20006	–115	–029	2.02	1.83	1.17	2.12	—	1.14	.41	.25	1.15	.76	1.344	.21	.59	.33
.750	K20007	–211	–029	2.02	1.83	1.35	2.20	—	1.15	.41	.25	1.02	.77	1.344	.20	.57	.32
1.000	K20010	–215	–031	2.31	2.18	1.60	2.20	2.53	1.15	.41	.25	1.02	.77	1.656	.26	.74	.42
1.250	K20012	–219	–033	2.60	2.47	1.88	2.47	2.87	1.15	.41	.25	1.02	.77	1.906	.31	.87	.50
1.500	K20015	–222	–036	3.18	3.18	2.17	2.89	3.35	1.31	.41	.25	1.18	.86	2.344	.55	1.48	.89
1.750	K20017	–224	–038	3.46	3.46	2.42	2.95	3.41	1.38	.41	.32	1.24	.86	2.656	.65	1.84	1.04
2.000	K20020	–226	–040	3.44	3.19	2.68	3.00	3.46	1.42	.41	.37	1.29	.87	2.781	.66	1.90	1.07
2.250	K20022	–228	–042	3.69	3.31	2.93	3.00	3.46	1.43	.41	.42	1.29	.87	3.031	.70	1.99	1.13
2.500	K20025	–230	–043	3.94	3.56	3.19	3.00	3.46	1.44	.41	.42	1.29	.88	3.281	.81	2.18	1.24
2.750	K20027	–232	–044	4.19	3.81	3.43	3.00	3.46	1.45	.41	.42	1.29	.88	3.531	.84	2.38	1.34
3.000	K20030	–234	–045	4.44	4.12	3.78	3.00	3.46	1.45	.41	.42	1.29	.89	3.781	.92	2.59	1.36
3.500	K20035	–238	–046	4.94	4.62	4.32	4.13	4.59	1.52	.41	.42	1.36	.98	4.281	1.01	2.76	1.42



PART NUMBER CODE:

K2000 00 X X X X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED), ANODIZED

C = STAINLESS STEEL 304 PASSIVATED (FLANGES 17-4PH)

T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)

–09 = 6061-T6 ANODIZE COLOR: BLACK

L = LONG FLANGE (F200XX ONLY)

D = DRY LUBE PER MIL-L-46010

N = THREAD LOCKING INSERT (FOR U20000 ONLY)

EXAMPLE DETAIL COMPONENT PART NO. CODE N205 XX

SIZE

REVISION	LTR	DESCRIPTION	DATE
	C	Added slanted BHD seal cavity	2/23/79
	D	Material –09: "color optional" was "dye black"	10/26/79
	E	Revised "C" & "T" material Note 5	1/28/85
	F	Updated specs	4/14/99

This issue supersedes all previously issued catalog sheets and drawings

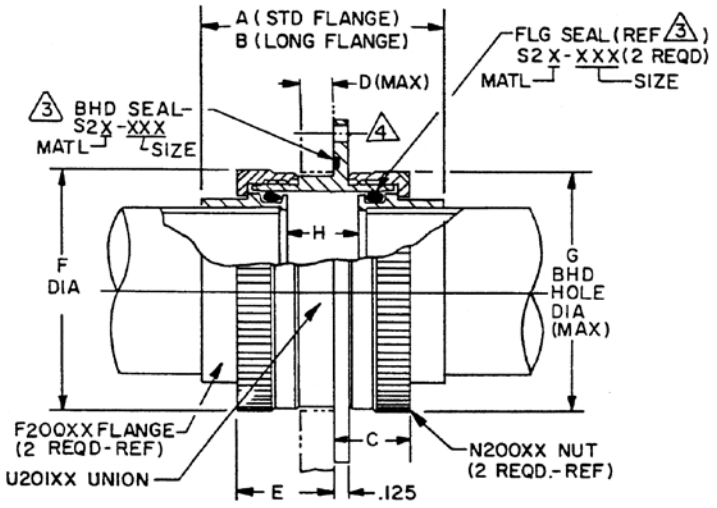
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125 unless noted
3. Across hex on KM20005 thru KM20017 dia. on KM20020 and up 5/32 dia. spanner holes provided
4. See dwg S2 for O-ring material
5. Swage per Stanley document G2J-01
6. Available in aluminum and stainless only

K20100 Flanged Bulkhead Union
Series 20

Revision Letter E

NOM TUBE O D (IN)	ASSY PART NO.	BHD SEAL SIZE	FLG SEAL SIZE	A (MAX)	B (MAX)	C	D (MAX)	E	F	G (MAX)	H (MIN)	WEIGHT (LB) STD FLANGE A	C	T
.375	K20104	022	111	1.39	—	.57	.24	.69	.91	.938	.52	.077	.22	.14
.500	K20105	024	113	1.39	—	.57	.24	.69	1.04	1.063	.52	.040	.25	.15
.625	K20106	027	115	1.39	—	.57	.24	.69	1.17	1.188	.52	.11	.30	.17
.750	K20107	029	211	1.46	—	.58	.24	.70	1.35	1.359	.38	.14	.40	.23
1.000	K20110	031	215	1.46	1.79	.58	.24	.70	1.60	1.625	.38	.17	.44	.28
1.250	K20112	033	219	1.69	2.09	.58	.24	.70	1.88	1.875	.34	.21	.59	.34
1.500	K20115	034	222	2.13	2.59	.67	.28	.83	2.17	2.114	.52	.30	.85	.48
1.750	K20117	035	224	2.13	2.59	.68	.28	.83	2.42	2.344	.52	.36	1.00	.57
2.000	K20120	038	226	2.13	2.59	.68	.28	.84	2.68	2.625	.52	.40	1.12	.64
2.250	K20122	040	228	2.26	2.72	.69	.41	.97	2.93	2.859	.65	.45	1.27	.73
2.500	K20125	041	230	2.26	2.72	.69	.41	.97	3.19	3.109	.65	.50	1.41	.82
2.750	K20127	042	232	2.26	2.72	.70	.41	.98	3.44	3.359	.65	.55	1.54	.87
3.000	K20130	043	234	2.26	2.72	.70	.41	.98	3.78	3.609	.65	.59	1.64	.94



PART NUMBER CODE:

K201 00 X X X X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED), ANODIZED
C = STAINLESS STEEL 304 PASSIVATED (FLANGES 17-4PH)
T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)
–09 = ALUMINUM 6061-T6 ANODIZE COLOR BLACK

L = LONG FLANGE

D = DRY LUBE PER MIL-L-46010

N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	B	Redrawn as catalog sheet	—
	C	Material –09 "color optional" was "dye black"	10/26/79
	D	Revised "C" & "T" material	1/28/85
	E	Update specs	4/14/99

This issue supersedes all previously issued catalog sheets and drawings

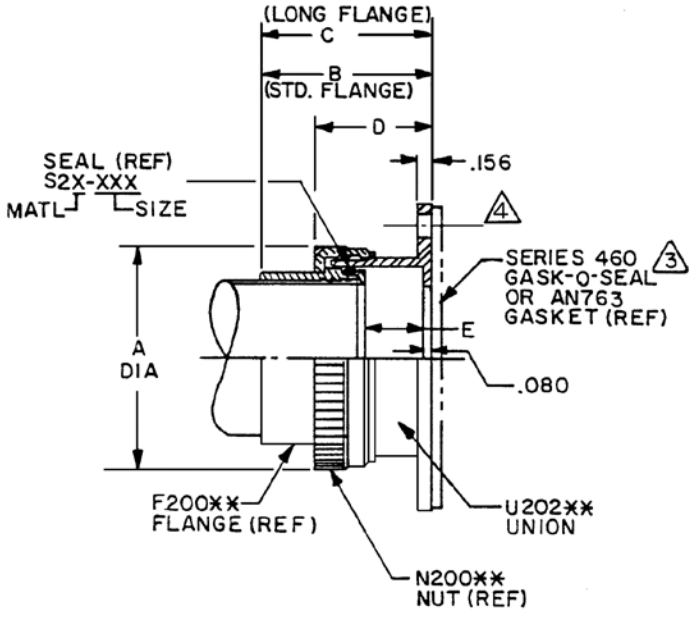
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. See dwg S2 for material
4. For hole size, quantity and location, see U20100

K20200 Union Adapter Assembly
Series 21

Revision Letter E

NOM TUBE O D (IN)	ASSY PART NO.	SEAL SIZE (REF)	A	B (MAX)	C (MAX)	D	E (MIN)	—— WEIGHT (LB) WITH STD FLG —— A, –09	C	T
.375	K20203	111	.91	1.17	—	1.06	.60	.047	.14	.079
.500	K20205	113	1.04	1.17	—	1.06	.60	.055	.17	.093
.625	K20206	115	1.17	1.17	—	1.06	.60	.063	.19	.11
.750	K20207	211	1.35	1.21	—	1.07	.53	.076	.23	.13
1.000	K20210	215	1.60	1.21	1.38	1.07	.53	.088	.27	.15
1.250	K20212	219	1.88	1.38	1.58	1.12	.56	.14	.39	.22
1.500	K20215	222	2.16	1.61	1.84	1.25	.67	.18	.51	.29
1.750	K20217	224	2.41	1.61	1.84	1.25	.67	.20	.58	.33
2.000	K20220	226	2.67	1.61	1.84	1.26	.67	.23	.68	.38
2.250	K20222	228	2.92	1.61	1.84	1.26	.67	.25	.73	.41
2.500	K20225	230	3.18	1.61	1.84	1.27	.67	.30	.86	.49
2.750	K20227	232	3.43	1.61	1.84	1.27	.68	.32	.93	.53
3.000	K20230	234	3.78	1.61	1.84	1.28	.68	.36	1.05	.60
3.500	K20235	238	4.33	2.21	—	1.41	.88	.55	1.57	.90
4.000	K20240	242	4.85	2.15	—	1.42	.81	.67	1.01	1.09
4.500	K20245	246	5.45	2.22	—	1.42	.76	.78	2.22	1.26
5.000	K20250	250	5.99	2.22	—	1.42	.76	.92	2.63	1.50



PART NUMBER CODE:

K202 00 X X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED), ANODIZED
- C = STAINLESS STEEL 304 PASSIVATED (FLANGES 17-4PH)
- T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)
- –09 = ALUMINUM 6061-T6 ANODIZE COLOR BLACK

L = LONG FLANGE

D = DRY LUBE PER MIL-L-46010

N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn. Added 6061-T6 material.	6/27/79
	B	Material –09 "color optional" was "dye black"	10/26/79
	C	Revised "C" and "T" material	1/28/85
	D	Added 3.500, 4.000, 4.500 and 5.000 tube sizes	5/23/86
	E	Update specs	4/14/99

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

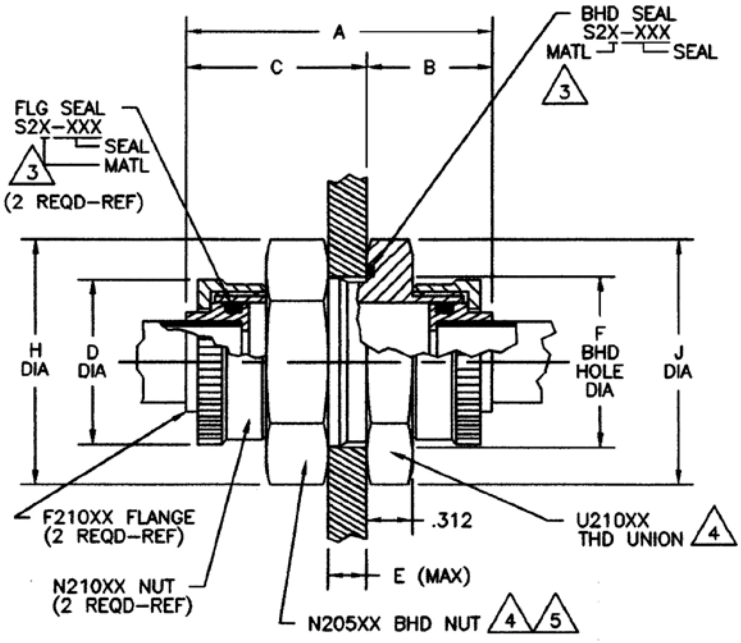
3 Available for .750 size couplings and larger. Use Form-A-Gasket for smaller sizes.

4 For hole size and pattern, see U20200

K21000 Threaded Bulkhead Union Assembly
Series 21

Revision Letter G

NOM TUBE O D (IN)	ASSY PART NO.	FLG SEAL	BHD SEAL	A (MAX)	B	C	D	E (MAX)	F (MAX)	G (MIN)	H	J	WEIGHT (LB) A	C	T
1.500	K21015	–326	–036	2.69	.93	1.39	2.33	.32	2.344	1.08	2.89	3.18	.57	1.60	.92
1.750	K21017	–328	–038	2.74	.93	1.44	2.58	.37	2.656	1.13	3.18	3.46	.66	1.87	1.07
2.000	K21020	–330	–040	2.79	.93	1.49	2.84	.42	2.781	1.18	3.19	3.44	.69	1.95	1.11
2.250	K21022	–332	–042	2.79	.95	1.51	3.09	.42	3.031	1.18	3.31	3.69	.73	2.04	1.17
2.500	K21025	–334	–043	2.79	.95	1.51	3.35	.42	3.281	1.18	3.56	3.94	.81	2.26	1.28
2.750	K21027	–336	–044	2.79	.95	1.51	3.62	.42	3.531	1.18	3.81	4.19	.88	2.45	1.42
3.000	K21030	–338	–045	3.03	.98	1.53	3.92	.42	3.781	1.06	4.12	4.44	1.09	3.00	1.74



PART NUMBER CODE:

K210 00 X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED), ANODIZED
- C = STAINLESS STEEL 304 PASSIVATED (FLANGES 17-4PH)
- T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)

OPTIONS
- D = DRY LUBE PER MIL-L-46010
- N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn as catalog sheet	7/26/79
	E	Revised "C" and "T" material	1/30/85
	F	Revised "A" material and "D" special	7/25/86
	G	Updated specs.	4/13/99

This issue supersedes all previously issued catalog sheets and drawings

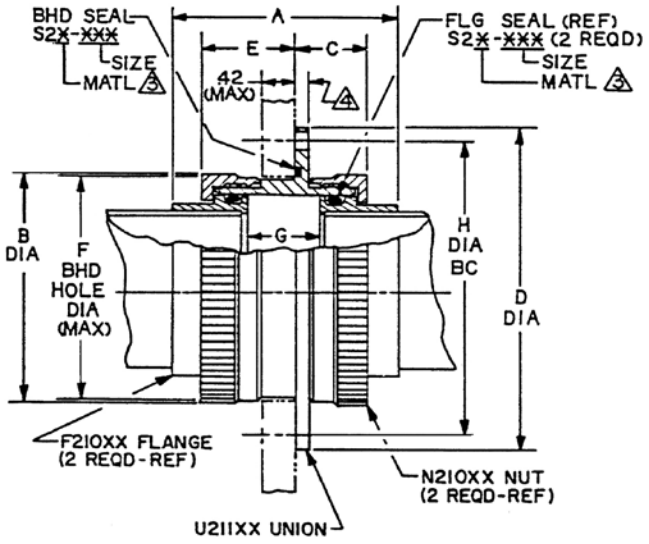
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. See S2 dwg for O-ring material
4. Hex configuration for 1½ and 1-3/4 inch sizes; round with spanner holes 2-inch size and up
5. Available only in aluminum and stainless

K21100 Bolted Bulkhead Union Assembly
Series 21

Revision Letter F

NOM TUBE O D (IN)	ASSY PART NO.	FLG SEAL	BHD SEAL	A (MAX)	B	C	D	E	F (MAX)	G (MIN)	H	— WEIGHT (LB) — A	C	T
1.500	K21115	–326	–036	2.26	2.33	.75	3.60	1.03	2.297	.46	3.06	.38	1.03	.58
1.750	K21117	–328	–038	2.26	2.58	.75	4.02	1.03	2.547	.51	3.36	.48	1.34	.77
2.000	K21120	–330	–040	2.26	2.84	.75	4.22	1.03	2.797	.56	3.57	.53	1.47	.85
2.250	K21122	–332	–042	2.30	3.09	.77	4.57	1.06	3.047	.56	3.92	.61	1.69	.97
2.500	K21125	–334	–043	2.30	3.35	.77	4.82	1.06	3.297	.56	4.17	.67	1.87	1.06
2.750	K21127	–336	–044	2.30	3.62	.77	5.07	1.06	3.547	.56	4.42	.73	2.04	1.18
3.000	K21130	–338	–045	2.54	3.92	.79	5.30	1.09	3.813	.44	4.65	.91	2.50	1.44
3.500	K21135	–342	–047	2.54	4.40	.79	5.80	1.09	4.313	.44	5.15	1.01	2.79	1.62
4.000	K21140	–345	–049	2.54	4.92	.79	6.30	1.09	4.813	.44	5.65	1.13	3.12	1.80
4.500	K21145	–426	–161	2.98	5.63	.92	7.00	1.19	5.516	.52	6.34	1.61	4.48	2.57
5.000	K21150	–430	–163	2.98	6.26	.93	7.53	1.20	6.031	.52	6.87	1.87	5.22	3.00



PART NUMBER CODE:

K211 00 X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED), ANODIZED
- C = STAINLESS STEEL 304 PASSIVATED (FLANGES 17-4PH)
- T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)

OPTIONS
- D = DRY LUBE PER MIL-L-46010
- N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	B	Redrawn as catalog sheet	7/25/79
	C	4 inch seal size was –346	11/12/84
	D	Revised "C" and "T" material	1/30/85
	E	Revised "A" material and "D" special	7/23/86
	F	Updated specs	4/14/99

This issue supersedes all previously issued catalog sheets and drawings

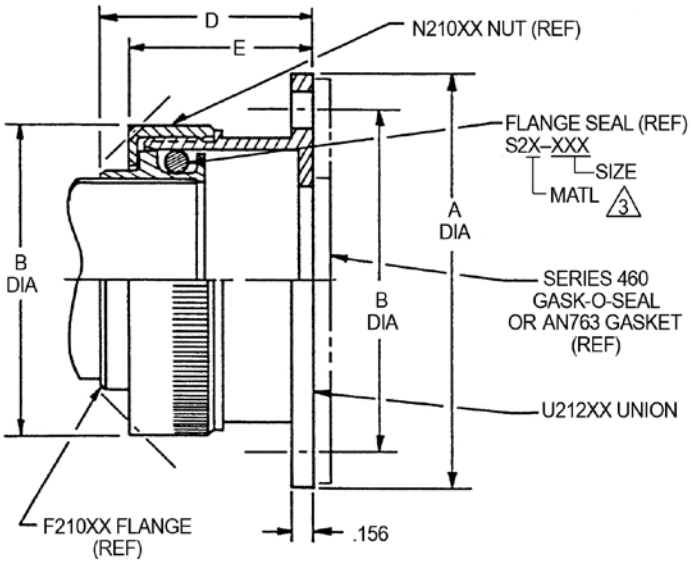
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. See S2 dwg for O-ring material
4. .125 for K21115 thru K21140
   .150 for K21145 thru K21150

K21200 Bolted Adapter Union Assembly
Series 21

Revision Letter C

NOM TUBE O D (IN)	ASSY PART NO.	A	B	C	D (MAX)	E	FLANGE SEAL
1.500	K21215	3.09	2.562	2.33	1.58	1.35	–326
1.750	K21217	3.41	2.898	2.58	1.58	1.35	–328
2.000	K21220	3.95	3.359	2.84	1.64	1.40	–330
2.250	K21222	4.06	3.468	3.09	1.64	1.42	–332
2.500	K21225	4.50	3.812	3.35	1.64	1.42	–334
2.750	K21227	4.75	4.062	3.62	1.64	1.42	–336
3.000	K21230	5.00	4.312	3.92	1.76	1.45	–338
3.500	K21235	5.56	4.875	4.40	1.76	1.45	–342



PART NUMBER CODE:

K212 00 X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED), ANODIZED
- C = STAINLESS STEEL 304 PASSIVATED (FLANGES 17-4PH)
- T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)

OPTIONS
- D = DRY LUBE PER MIL-L-46010
- N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	A	Revised "C" and "T" material	1/30/85
	B	Revised "A" material and "D" finish	7/21/86
	C	Update specs	4/14/99

This issue supersedes all previously issued catalog sheets and drawings

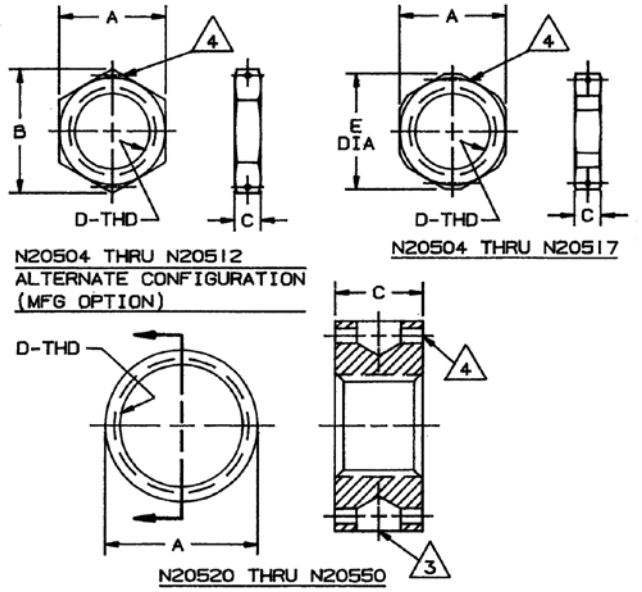
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. See S2 dwg for O-ring material

N20500 Bulkhead
Series 20 & 21

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B (MIN)	C (MAX)	D THREAD	E DIA	WEIGHT (LB) A	C	–09
.375	N20504	1.13	1.27	.359	.875-14UNF-2B	1.24	.019	.054	.018
.500	N20505	1.38	1.56	.406	1.062-12UN-2B	1.47	.034	.098	.033
.625	N20506	1.63	1.83	.406	1.312-12UN-2B	1.76	.041	.12	.040
.750	N20507	1.63	1.83	.406	1.312-12UN-2B	1.76	.041	.12	.040
1.000	N20510	1.94	2.18	.406	1.625-12UN-2B	2.12	.053	.15	.052
1.250	N20512	2.19	2.47	.406	1.875-12UN-2B	2.35	.062	.18	.061
1.500	N20515	2.75	—	.406	2.313-16UNS-2B	3.00	.10	.29	.098
1.750	N20517	3.00	—	.406	2.625-16UN-2B	3.29	.10	.30	.098
2.000	N20520	3.19	—	.406	2.750-16UN-2B	—	.094	.27	.087
2.250	N20522	3.31	—	.406	3.000-16UN-2B	—	.069	.20	.068
2.500	N20525	3.56	—	.406	3.250-16UN-2B	—	.077	.22	.074
2.750	N20527	3.81	—	.406	3.500-16UN-2B	—	.080	.23	.078
3.000	N20530	4.12	—	.406	3.750-16UN-2B	—	.10	.30	.098
3.500	N20535	4.62	—	.406	4.250-16UN-2B	—	.104	.30	.102
4.000	N20540	5.25	—	.406	4.750-16UN-2B	—	.159	.45	.155
4.500	N20545	6.00	—	.406	5.500-16UN-2B	—	.183	.52	.179
5.000	N20550	6.25	—	.406	5.750-16UN-2B	—	.191	.54	.187



PART NUMBER CODE:

N205 00 X – 6

BASIC PART NO.

NOM TUBE O.D. IN TENTH INCHES

MATERIAL/FINISH
- A = ALUMINUM 2024-T851, ANODIZED, DYE BLUE
- C = STAINLESS STEEL PASSIVATED
- –09 = 6061-T6, ANODIZE, DYE BLACK

OPTION
- –6 = 6 LOCKWIRE HOLES REQUIRED ON HEX CONFIGURATION

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn. Revised views and "B" dim. Added "E" dia. Revised weights for N20504, N20520 and N20525. Revised thread series for N20520.	5/15/80
	E	Revised "E" for N20504 and N20512	11/3/81
	F	Added Note 8	12/8/81
	G	Added –6 option	2/5/92

This issue supersedes all previously issued catalog sheets and drawings

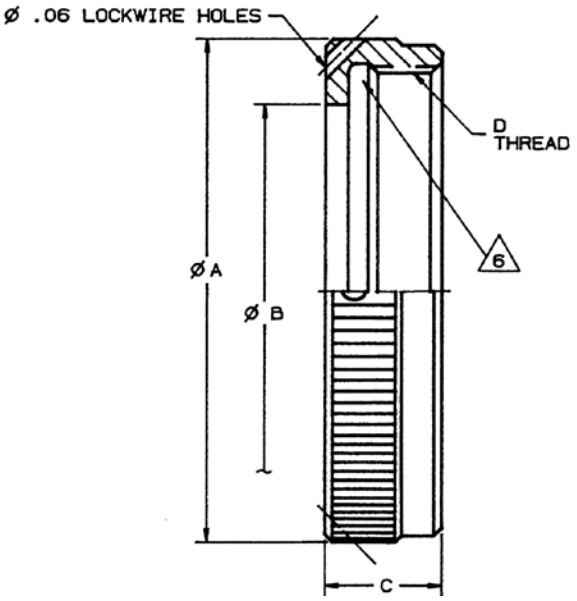
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Spanner wrench hole (4 plcs) 5/32 dia.
4. Lockwire holes (2 pcs) provided in each nut
5. Threads are dry film lubed per MIL-L-8937
6. Gamah Series 20/21 bulkhead nuts are used with U2000 and U21000 Series threaded union
7. See spanner wrench M1015
8. This part supersedes:
   T1060–150, –175, –225 thru –450 only;
   T2236–200 thru –500 only; T2304 all sizes

N20900 Nut, Class 3 Thread
Series 20

Revision Letter N/C

NOM TUBE O D (IN)	NUT PART NO.	A	B	C	D THREAD	WEIGHT (LB) –20
1.250	N20912	1.95	1.44	.46	1.7734-20UNS-3B	.094
1.500	N20915	2.24	1.69	.55	2.000-16UN-3B	.15



PART NUMBER CODE:

N209 00 X

BASIC PART NO.

SIZE

MATERIAL

–20 = STAINLESS STEEL 17-4PH (H1150) OR 15-5PH (H1150), PASSIVATED PER QQ-P-35

NOTES (UNLESS OTHERWISE SPECIFIED):

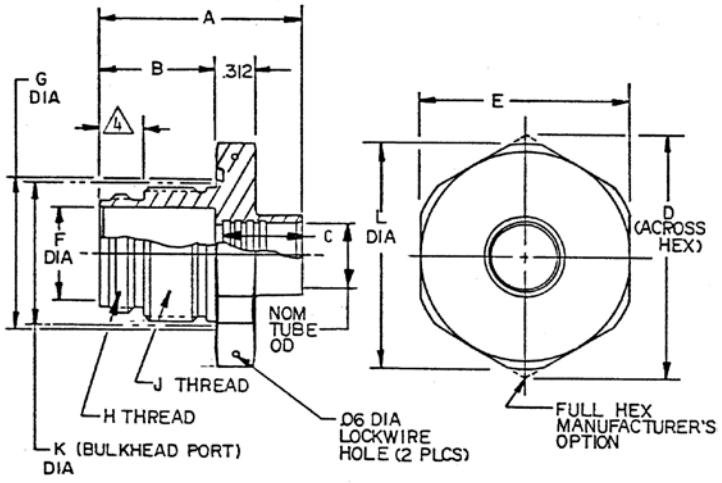
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request
5. Dry film lubricated per MIL-L-46010, Type II (I.D. surfaces only)

6 Thread relief not present on N20915

T2248 Adapter
JT315 Series Flange-Half Coupling
¼ Inch Max Bulkhead

Revision Letter U

NOM TUBE O D (IN)	PART NO. T2248	A	B	C	D	E	F	G	H – THREAD	J – THREAD	K BKHD PORT	L	— MAX WT (LBS) — ST ST	AL
.500	–050	1.58	.91	.608	1.88	1.63	.744	1.19	.923-20NS-2A	1.063-16UN-2A	1.093	1.76	.34	.11
.750	–075	1.58	.91	.608	2.02	1.75	1.039	1.50	1.218-20NS-2A	1.375-16UN-2A	1.390	1.90	.35	.12
1.000	–100	1.58	.91	.608	2.31	2.00	1.290	1.75	1.468-20NS-2A	1.625-16UN-2A	1.640	2.13	.41	.14
1.250	–125	1.78	.94	.778	2.60	2.25	1.540	2.00	1.734-20NS-2A	1.875-16UN-2A	1.890	2.42	.53	.19
1.500	–150	2.04	1.04	.938	3.18	2.75	1.788	2.39	2.000-16UN-2A	2.250-16UN-2A	2.280	3.00	.86	.30
1.750	–175	2.04	1.04	.938	3.46	3.00	2.038	2.64	2.250-16UN-2A	2.500-16UN-2A	2.530	3.29	.95	.34
2.000	–200	2.04	1.04	.938	3.75	3.25	2.288	2.89	2.500-16UN-2A	2.750-16UN-2A	2.780	3.57	1.06	.37
2.250	–225	2.04	1.04	.938	4.04	3.50	2.538	3.14	2.750-16UN-2A	3.000-16UN-2A	3.030	3.68	1.18	.42
2.500	–250	2.04	1.04	.938	4.33	3.75	2.788	3.39	3.000-16UN-2A	3.250-16UN-2A	3.280	4.15	1.29	.45
2.750	–275	2.04	1.04	.938	4.62	4.00	3.038	3.64	3.250-16UN-2A	3.500-16UN-2A	3.580	4.44	1.43	.50
3.000	–300	2.04	1.04	.938	4.91	4.25	3.288	3.89	3.500-16UN-2A	3.750-16UN-2A	3.780	4.73	1.57	.55
3.500	–350	2.32	1.12	1.138	5.49	4.75	3.788	4.39	4.000-16UN-2A	4.250-16UN-2A	4.280	5.31	1.78	.62
4.000	–400	2.32	1.19	1.138	5.06	5.25	4.288	4.89	4.500-16UN-2A	4.750-16UN-2A	4.780	5.89	1.99	.71



PART NUMBER CODE:

T2248 X 000 X X

BASIC PART NO.

SPECIAL REQUIREMENTS

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL
- A = ALUMINUM 2024 HEAD TREATED
- C = STAINLESS STEEL 15-5PH (H1150) PER AMS5659 OR 17-4PH (H1150) PER AMS5643

FINISH
- Y = PASSIVATE PER QQ-P-35 FOLLOWED BY DRY FILM LUBE PER MIL-L-8937 ("F" BORE AND THREADS ONLY)
- Z = ANODIZE PER MIL-A-8625, TYPE II, CLASS I FOLLOWED BY DRY FILM LUBE PER MIL-L-8937 ("F" BORE AND THREADS ONLY)

REVISION	LTR	DESCRIPTION	DATE
	P	Redrawn to new format. Added "L". Deleted "G".	11/3/80
	R	Reinstated "G"; revised "K" for –450; revised "D" for –500	3/13/81
	S	Deleted –450, –500 and Note 3	4/21/81
	T	Revised 17-4PH material specification	11/15/81
	U	Revised "C". Added Note 4.	2/12/88

This issue supersedes all previously issued catalog sheets and drawings

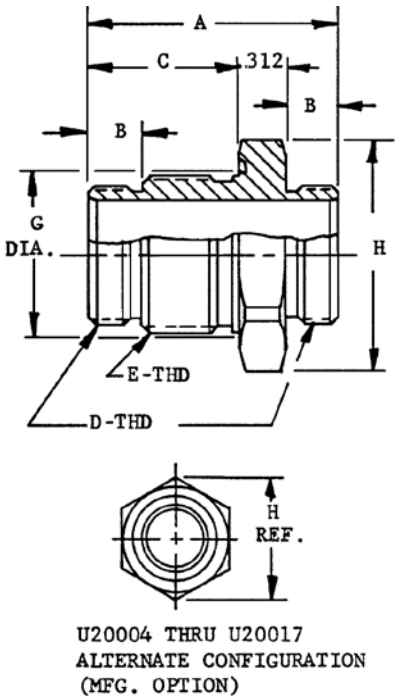
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Deleted
4. Sizes –050 thru –125: dim. = .36
   –150 thru –300: dim = .43
   –350: dim = .51
   –400: dim = .57

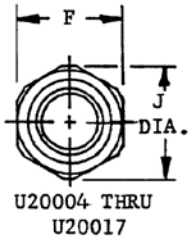
U20000 Union
Series 20

Revision Letter M

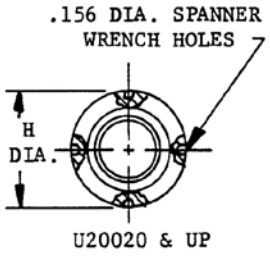
NOM TUBE O D (IN)	PART NO.	A	B	C	D – THREAD	E – THREAD	F	G MIN	H	J	— WEIGHT (LB) — A, –09	C	T
.375	U20004	1.67	.35	1.00	.798-2ONS-2A	.875-14UNF-2A	1.25	.982	1.44	1.32	.06	.17	.10
.500	U20005	1.72	.35	1.05	.923-2ONS-2A	1.062-12UN-2A	1.38	1.140	1.59	1.47	.07	.21	.12
.625	U20006	1.72	.35	1.05	1.048-2ONS-2A	1.312-12UN-2A	1.75	1.510	2.02	1.90	.12	.36	.20
.750	U20007	1.72	.35	1.05	1.218-2ONS-2A	1.312-12UN-2A	1.75	1.510	2.02	1.90	.10	.29	.17
1.000	U200010	1.72	.35	1.05	1.468-2ONS-2A	1.625-12UN-2A	2.00	1.760	2.31	2.13	.13	.38	.22
1.250	U200012	1.72	.35	1.05	1.734-2ONS-2A	1.873-12UN-2A	2.25	2.010	2.60	2.42	.14	.42	.24
1.500	U200015	1.92	.43	1.18	2.000-16UN-2A	2.313-16UN-2A	2.75	2.452	3.18	3.00	.29	.83	.48
1.750	U200017	1.98	.43	1.24	2.250-16UN-2A	2.625-16UN-2A	3.00	2.733	3.46	3.29	.36	1.03	.58
2.000	U200020	2.03	.43	1.29	2.500-16UN-2A	2.750-16UN-2A	—	2.970	3.44	—	.36	1.03	.58
2.250	U200022	2.03	.43	1.29	2.750-16UN-2A	3.000-16UN-2A	—	3.260	3.69	—	.39	1.13	.64
2.500	U200025	2.03	.43	1.29	3.000-16UN-2A	3.250-16UN-2A	—	3.510	3.94	—	.42	1.23	.71
2.750	U200027	2.03	.43	1.29	3.250-16UN-2A	3.500-16UN-2A	—	3.760	4.19	—	.46	1.33	.75
3.000	U200030	2.03	.43	1.29	3.500-16UN-2A	3.750-16UN-2A	—	4.010	4.44	—	.47	1.35	.78
3.500	U200035	2.19	.51	1.37	4.000-16UN-2A	4.250-16UN-2A	—	4.420	4.94	—	.53	1.63	.90



U20004 THRU U20017
ALTERNATE CONFIGURATION
(MFG. OPTION)



U20004 THRU
U20017



U20020 & UP

PART NUMBER CODE:

U200 00 X X X

BASIC PART NO.

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL

A = ALUMINUM 2024-T851, ANODIZE
C = STAINLESS STEEL 304, PASSIVATED
T = TITANIUM TI-CP-70
–09 = ALUMINUM 6061-T6, ANODIZE AND DYE BLACK

D = DRY FILM LUBE (THREADS AND I.D. ONLY)

N = NYLOK INSERTS ("D" THREADS ONLY)

REVISION	LTR	DESCRIPTION	DATE
	K	Redrawn. Revised, added alternate configuration.	4/23/80
	L	Revised "C" and "T" materials	1/28/85
	M	Deleted dichromate	5/19/99

This issue supersedes all previously issued catalog sheets and drawings

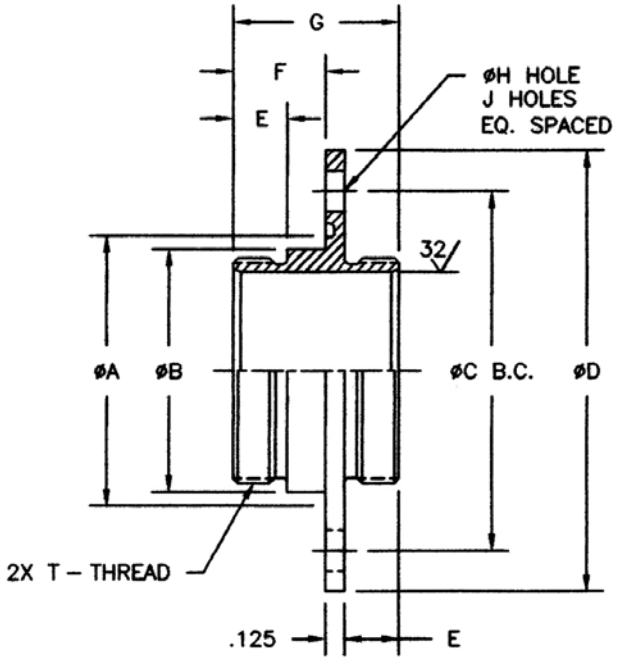
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

U20100 Flanged Bulkhead Union
Series 20

Revision Letter E

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	H	J	T – THREAD	WEIGHT (LB) A	C	T
.375	U20104	1.010	.91	1.468	1.88	.36	.60	1.08	.206	4	.798-20NS-2A	.049	.14	.080
.500	U20105	1.151	1.04	1.635	2.05	.36	.60	1.08	.206	4	.923-20NS-2A	.057	.17	.093
.625	U20106	1.323	1.16	1.855	2.27	.36	.60	1.08	.206	4	1.048-20NS-2A	.068	.20	.11
.750	U20107	1.510	1.33	2.024	2.56	.36	.60	1.08	.266	4	1.218-20NS-2A	.084	.24	.14
1.000	U20110	1.760	1.58	2.342	2.87	.36	.60	1.08	.266	4	1.468-20NS-2A	.10	.29	.17
1.250	U20112	2.010	1.85	2.562	3.09	.36	.60	1.08	.266	4	1.734-20NS-2A	.11	.32	.18
1.500	U20115	2.199	2.08	2.745	3.28	.43	.71	1.26	.266	4	2.000-16UN-2A	.14	.40	.23
1.750	U20117	2.449	2.33	3.057	3.71	.43	.71	1.26	.328	4	2.250-16UN-2A	.17	.49	.27
2.000	U20120	2.710	2.58	3.307	3.96	.43	.71	1.26	.328	6	2.500-16UN-2A	.18	.52	.29
2.250	U20122	2.950	2.83	3.557	4.21	.43	.83	1.38	.328	6	2.750-16UN-2A	.21	.62	.35
2.500	U20125	3.145	3.08	3.807	4.46	.43	.83	1.38	.328	6	3.000-16UN-2A	.23	.67	.38
2.750	U20127	3.400	3.33	4.057	4.71	.43	.83	1.38	.328	6	3.250-16UN-2A	.25	.72	.41
3.000	U20130	3.663	3.58	4.307	4.96	.43	.83	1.38	.328	6	3.500-16UN-2A	.27	.78	.43



PART NUMBER CODE:

U201 00 X X X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024-T851, ANODIZED
C = STAINLESS STEEL 304 PASSIVATED
T = TITANIUM TI-CP-70
– 09 = ALUMINUM 6061-T6, ANODIZE AND DYE BLACK

D = DRY FILM LUBE PER MIL-L-8937

N = THREAD LOCKING INSERT (BOTH THREADS)

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn as catalog sheet	5/31/79
	B	Added U20140 and U20150	3/18/81
	C	Deleted U20140 and U20150	11/20/81
	D	Revised "T" material	1/28/85
	E	Deleted dichromate	5/13/99

This issue supersedes all previously issued catalog sheets and drawings

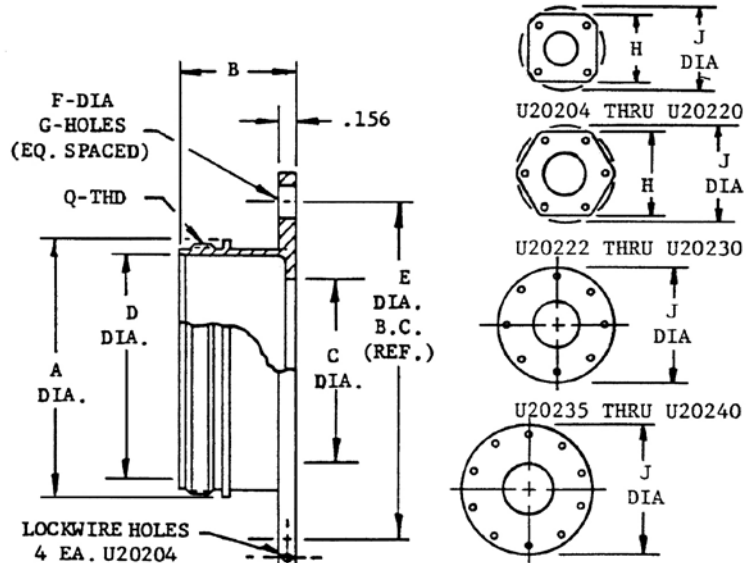
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

U20200 Union Adapter
Series 20

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E (REF)	F	G	H	J	Q – THREAD	—— WEIGHT (LB) —— A, –09	C	T
.375	U20204	.86	.97	.36	.619	1.216	.206	4	1.25	1.61	.798-20NS-2A	.034	.11	.057
.500	U20205	.98	.97	.47	.744	1.344	.206	4	1.38	1.77	.923-20NS-2A	.040	.12	.067
.625	U20206	1.11	.97	.57	.869	1.468	.206	4	1.50	1.91	1.048-20NS-2A	.044	.13	.074
.750	U20207	1.28	.97	.67	1.039	1.635	.206	4	1.50	2.09	1.218-20NS-2A	.051	.15	.086
1.000	U20210	1.53	.97	.90	1.290	1.855	.206	4	1.75	2.30	1.468-20NS-2A	.057	.17	.097
1.250	U20212	1.79	1.02	1.14	1.540	2.342	.266	4	2.25	2.87	1.734-20NS-2A	.089	.26	.15
1.500	U20215	2.08	1.13	1.37	1.788	2.563	.266	4	2.50	3.09	2.000-16UN-2A	.095	.29	.17
1.750	U20217	2.33	1.13	1.59	2.038	2.898	.266	4	2.63	3.41	2.250-16UN-2A	.11	.33	.18
2.000	U20220	2.58	1.13	1.84	2.288	3.359	.328	4	3.00	3.95	2.500-16UN-2A	.13	.39	.22
2.250	U20222	2.83	1.13	2.09	2.538	3.468	.328	6	3.50	4.04	2.750-16UN-2A	.14	.41	.23
2.500	U20225	3.08	1.13	2.34	2.788	3.812	.328	6	4.00	4.50	3.000-16UN-2A	.19	.54	.31
2.750	U20227	3.33	1.13	2.59	3.038	4.062	.328	6	4.25	4.75	3.250-16UN-2A	.18	.52	.29
3.000	U20230	3.59	1.13	2.84	3.288	4.312	.328	6	4.50	5.00	3.500-16UN-2A	.21	.61	.35
3.500	U20235	4.09	1.25	3.34	3.788	4.875	.328	8	—	5.56	4.000-16UN-2A	.31	.88	.50
4.000	U20240	4.59	1.25	3.84	4.288	5.438	.328	8	—	6.13	4.500-16UN-2A	.36	1.02	.58
4.500	U20245	5.13	1.25	4.34	4.788	5.963	.328	10	—	6.65	5.047-12NS-3A	.42	1.20	.68
5.000	U20250	5.66	1.25	4.84	5.288	6.438	.328	10	—	7.13	5.563-12NS-3A	.47	1.35	.77



PART NUMBER CODE:

U202 00 X XXX

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (–T81, –T8510, –T8511/QQ-A-200/3 OR –T6, –T851/QQ-A-225/6), ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

C = STAINLESS STEEL 304 PASSIVATED

T = TITANIUM TI-CP-70

–09 = ALUMINUM 6061–T6, ANODIZE AND DYE BLACK

SPECIAL (OPTIONAL)

D = DRY FILM LUBE PER MIL-L-8937

N = THREAD LOCKING INSERT (BOTH THREADS)

L = LOCKWIRE HOLES

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn. Revised weights.	4/23/80
	E	Revised "T" material	1/28/85
	F	Added U20235 thru U20250 data	5/23/86
	G	Revised "A" material callout	8/14/89

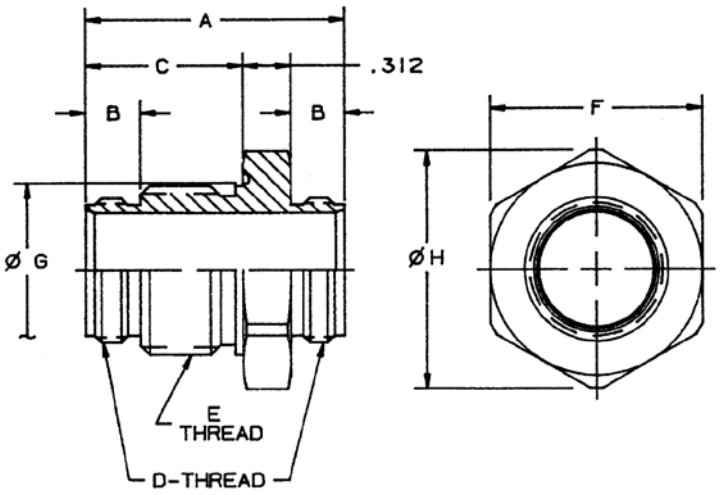
This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. U20204 thru U20212 supersede and are interchangeable with T1075–030 thru T1075–125

U209000 Union, Class 3 Thread
Series 20

NOM TUBE O D (IN)	UNION PART NO.	A	B	C	D – THREAD	E – THREAD	F	G (MIN)	H	SEAL SIZE [5]	WEIGHT (LB) -20
1.250	U20912	1.72	.35	1.05	1.734-20UNS-3A	1.875-12UN-2A	2.25	2.010	2.42	–033	.42
1.500	U20915	1.92	.43	1.18	2.000-16UN-3A	2.313-16UN-2A	2.75	2.452	3.00	–037	.83



PART NUMBER CODE:

U209 00 X X X

BASIC PART NO.

SIZE

MATERIAL

–20 = STAINLESS STEEL 17-4PH (H1150) OR 15-5PH (H1150), PASSIVATED PER QQ-P-35

OPTIONS

D = DRY FILM LUBRICANT PER MIL-L-46010, TYPE II (THREADS AND I.D. SURFACES)

N = THREAD LOCKING INSERT, ("D" THREADS ONLY)

NOTES (UNLESS OTHERWISE SPECIFIED):

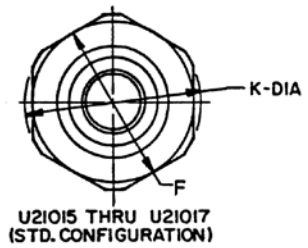
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

[5] Size dash number in accordance with current industrial and military systems (AS568 and MS28775)

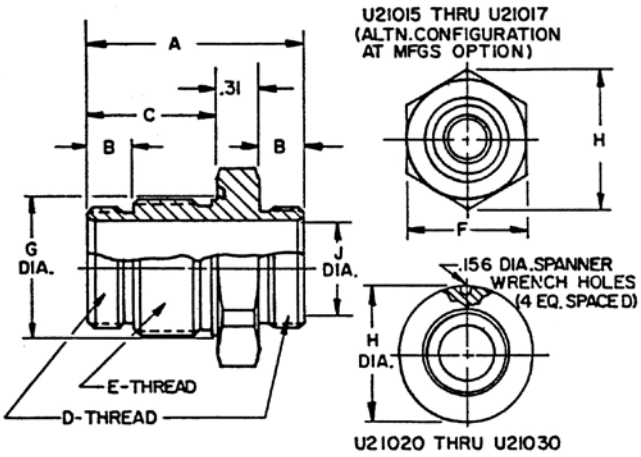
U21000 Threaded Union
Series 21

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A	B	C	D – THREAD	E – THREAD	F	G (MIN)	H (REF)	J	K	— WEIGHT (LB) — A	C	T
1.500	U21015	2.09	.51	1.27	2.169-16NS-2A	2.313-16UN-2A	2.75	2.452	3.18	1.960	3.00	.24	.71	.40
1.750	U21017	2.14	.51	1.32	2.419-16NS-2A	2.625-16UN-2A	3.00	2.733	3.46	2.210	3.29	.30	.86	.49
2.000	U21020	2.19	.51	1.37	2.669-16NS-2A	2.750-16UN-2A	—	2.970	3.44	2.460	—	.29	.85	.48
2.250	U21022	2.19	.51	1.37	2.919-16NS-2A	3.000-16UN-2A	—	3.260	3.69	2.710	—	.32	.93	.52
2.500	U21025	2.19	.51	1.37	3.169-16NS-2A	3.250-16UN-2A	—	3.510	3.94	2.960	—	.35	1.00	.56
2.750	U21027	2.19	.51	1.37	3.419-16NS-2A	3.500-16UN-2A	—	3.760	4.19	3.210	—	.37	1.08	.61
3.000	U21030	2.19	.51	1.37	3.681-16NS-2A	3.750-16UN-2A	—	4.010	4.44	3.460	—	.41	1.18	.67



U21015 THRU U21017
(STD. CONFIGURATION)



U21020 THRU U21030

PART NUMBER CODE:

U210 00 X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED) ANODIZE
- C = STAINLESS STEEL 304, PASSIVATED
- T = TITANIUM TI-CP-70

OPTIONS
- D = DRY FILM LUBE PER MIL-L-8937 OR MIL-L-46010 AS APPLICABLE (THREADS ONLY)
- N = THREAD LOCKING INSERT (D-THREADS ONLY)

REVISION	LTR	DESCRIPTION	DATE
	B	Redrawn as catalog sheet	4/19/79
	C	Revised "E" thread. Added "J" dia. and "K" dia. Revised hex views.	5/30/80
	D	Revised "T" material	1/30/85
	E	Revised "A" material and "D" special	7/25/86
	F	Deleted dichromate	5/19/99

This issue supersedes all previously issued catalog sheets and drawings

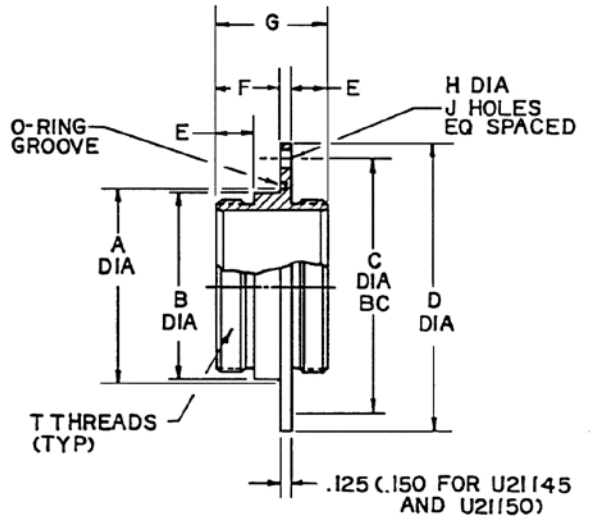
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Next assembly is K21000

U21100 Bolted Bulkhead Union
Series 21

Revision Letter D

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	H	J	T-THREAD	— WEIGHT (LB) — A	C	T
1.500	U21115	2.450	2.27	3.057	3.60	.51	.92	1.55	.27	4	2.169-16NS-2A	.14	.41	.23
1.750	U21117	2.694	2.52	3.359	4.02	.51	.92	1.55	.33	4	2.419-16NS-2A	.21	.62	.35
2.000	U21120	2.922	2.77	3.565	4.22	.51	.92	1.55	.33	6	2.669-16NS-2A	.23	.66	.37
2.250	U21122	3.260	3.02	3.915	4.57	.51	.92	1.55	.33	6	2.919-16NS-2A	.26	.75	.42
2.500	U21125	3.510	3.27	4.165	4.82	.51	.92	1.55	.33	6	3.169-16NS-2A	.28	.81	.45
2.750	U21127	3.760	3.52	4.415	5.07	.51	.92	1.55	.33	6	3.419-16NS-2A	.30	.86	.49
3.000	U21130	4.010	3.78	4.648	5.30	.51	.92	1.55	.33	6	3.681-16NS-2A	.33	.95	.53
3.500	U21135	4.510	4.28	5.148	5.80	.51	.92	1.55	.33	8	4.181-16NS-2A	.37	1.06	.60
4.000	U21140	5.010	4.78	5.648	6.30	.51	.92	1.55	.33	8	4.681-16NS-2A	.40	1.16	.65
4.500	U21145	5.640	5.48	6.344	7.00	.62	1.04	1.81	.33	8	5.375-12UN-2A	.57	1.66	.93
5.000	U21150	6.160	5.99	6.869	7.53	.62	1.04	1.81	.33	10	5.891-12NS-3A	.65	1.90	1.06



PART NUMBER CODE:

U211 00 X X X

BASIC PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2024 (AGED) ANODIZE
- C = STAINLESS STEEL 304, PASSIVATED
- T = TITANIUM TI-CP-70

OPTIONS
- D = DRY FILM LUBE PER MIL-L-8937 OR MIL-L-46010 AS APPLICABLE (ID AND THREADS ONLY)
- N = THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn as catalog sheet	7/18/79
	B	Revised "T" material	1/30/85
	C	Revised "A" material and "D" special	7/23/86
	D	Deleted dichromate	5/19/99

This issue supersedes all previously issued catalog sheets and drawings

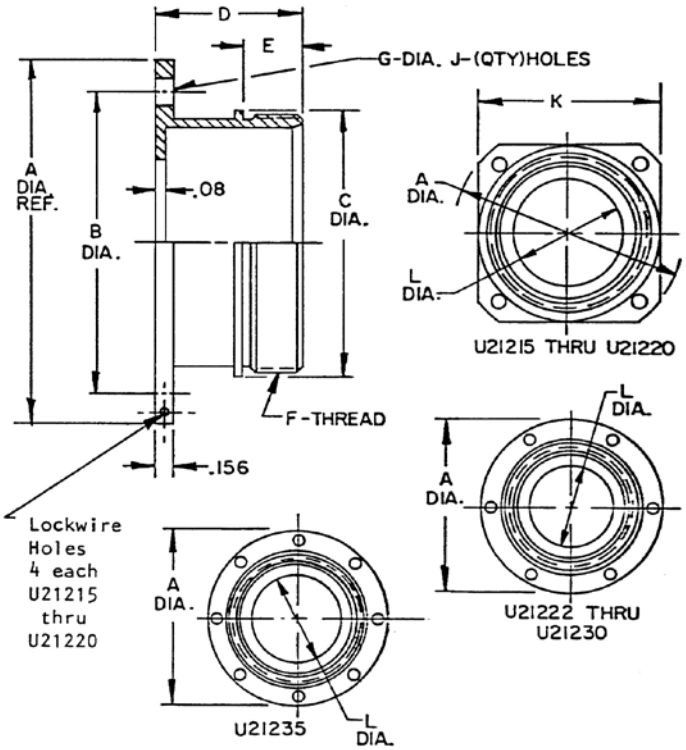
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

U21200 Adapter Union
Series 21

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F – THREAD	G	J	K	L
1.500	U21215	3.09	2.56	2.24	1.23	.505	2.169-16NS-2A	.266	4	2.50	1.37
1.750	U21217	3.41	2.90	2.49	1.23	.505	2.419-16NS-2A	.266	4	2.63	1.59
2.000	U21220	3.95	3.36	2.74	1.29	.505	2.669-16NS-2A	.328	4	3.00	1.84
2.250	U21222	4.06	3.47	2.99	1.29	.505	2.919-16NS-2A	.328	6	—	2.09
2.500	U21225	4.50	3.81	3.24	1.29	.505	3.169-16NS-2A	.328	6	—	2.34
2.750	U21227	4.75	4.06	3.54	1.29	.505	3.419-16NS-2A	.328	6	—	2.59
3.000	U21230	5.00	4.31	3.75	1.29	.505	3.681-16NS-2A	.328	6	—	2.84
3.500	U21235	5.56	4.88	4.25	1.29	.505	4.181-16NS-2A	.328	8	—	3.34



PART NUMBER CODE:

U211 00 X X X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (–T81, –T8510, –T8511/QQ-A-200/3 OR –T6, –T851/QQ-A-225/6) ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

C = STAINLESS STEEL 304, PASSIVATED

T = TITANIUM TI-CP-70

–32 = A286 STAINLESS, PASSIVATED PER QQ-P-35

OPTIONS

D = DRY FILM LUBE PER MIL-L-8937 OR MIL-L-46010 AS APPLICABLE

N = THREAD LOCKING INSERT

L = LOCKWIRE HOLES

REVISION	LTR	DESCRIPTION	DATE
	A	Added end views	4/3/80
	B	Added "L" dia. (I.D.)	7/29/80
	C	Added "–32" material	12/21/81
	D	Revised "T" material	1/30/85
	E	Revised "A" material and "D" finish	7/21/86
	F	Added "L" option	7/25/88
	G	Revised "A" material callout	7/25/89

This issue supersedes all previously issued catalog sheets and drawings

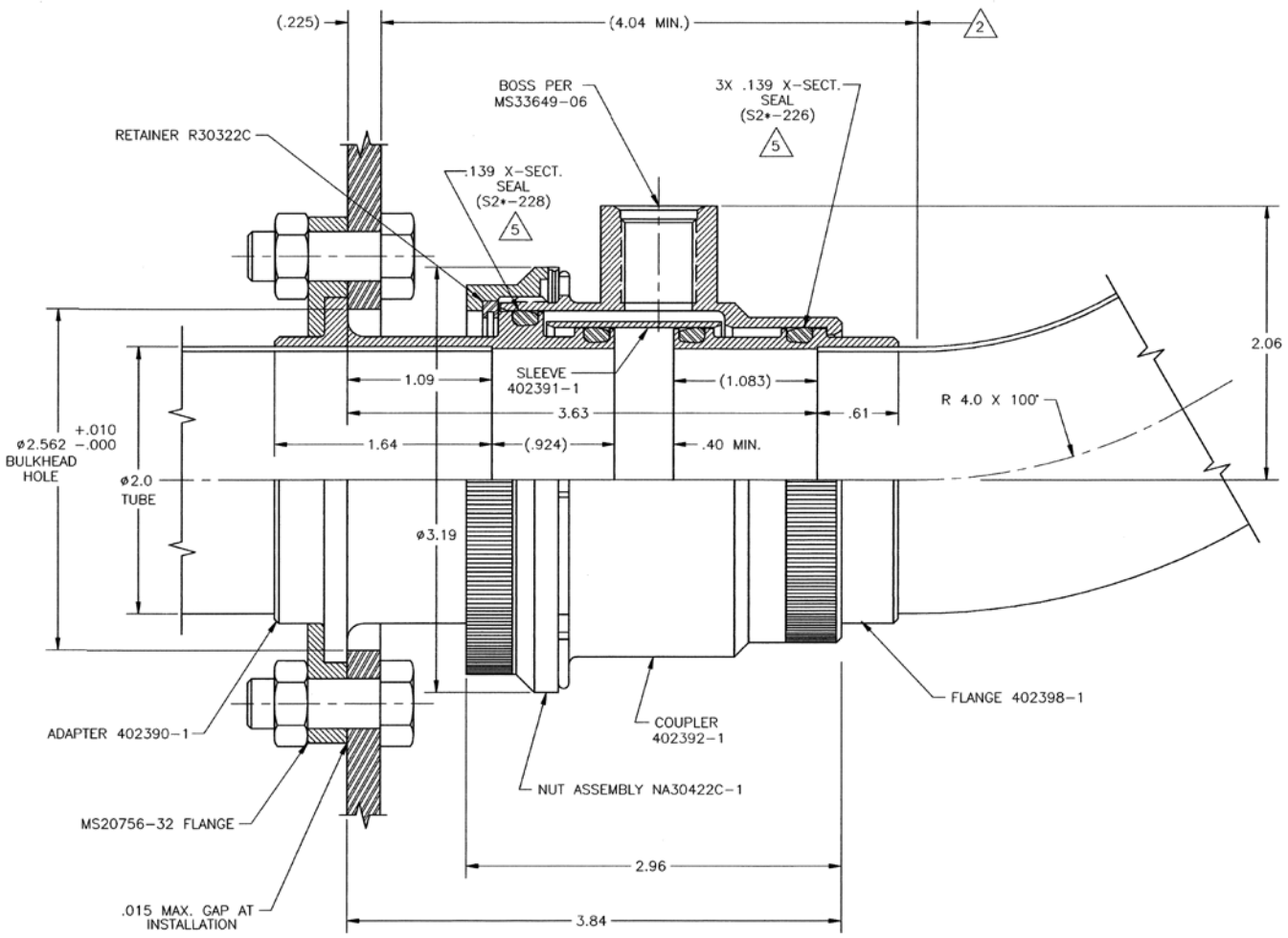
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. These adapter unions supersede T1075–150 thru T1075–350 adapters

Shrouded Threaded Flexible Couplings

PART NUMBER	DESCRIPTION	SERIES
402386	Shrouded Coupling Assembly	303
402450	Shrouded Coupling Assembly	303
402507	Shrouded Bulkhead Assembly	303
402390	Adapter, Bulkhead, Socket Welded	303
402391	Sleeve	303
402392	Coupler/Port, Brazed	303
402398	Flange, Socket Welded	303
402449	Flange, Socket Welded	303
402473	Sleeve	303
402474	Coupler/Port, Brazed	303
402476	Flange, Socket Welded	303
402508	Sleeve	303
402509	Flange, Socket Welded	303
402510	Coupler/Port, Brazed	303
402512	Adapter, Bulkhead, Socket Welded	303
NA30300	Nut Assembly, Locking	303
NA30400	Nut Assembly, Removable, Locking	303
R30300	Retaining Ring	303

402386 Coupling, Shrouded Assembly for 2 Inch O.D. Tube Series 21

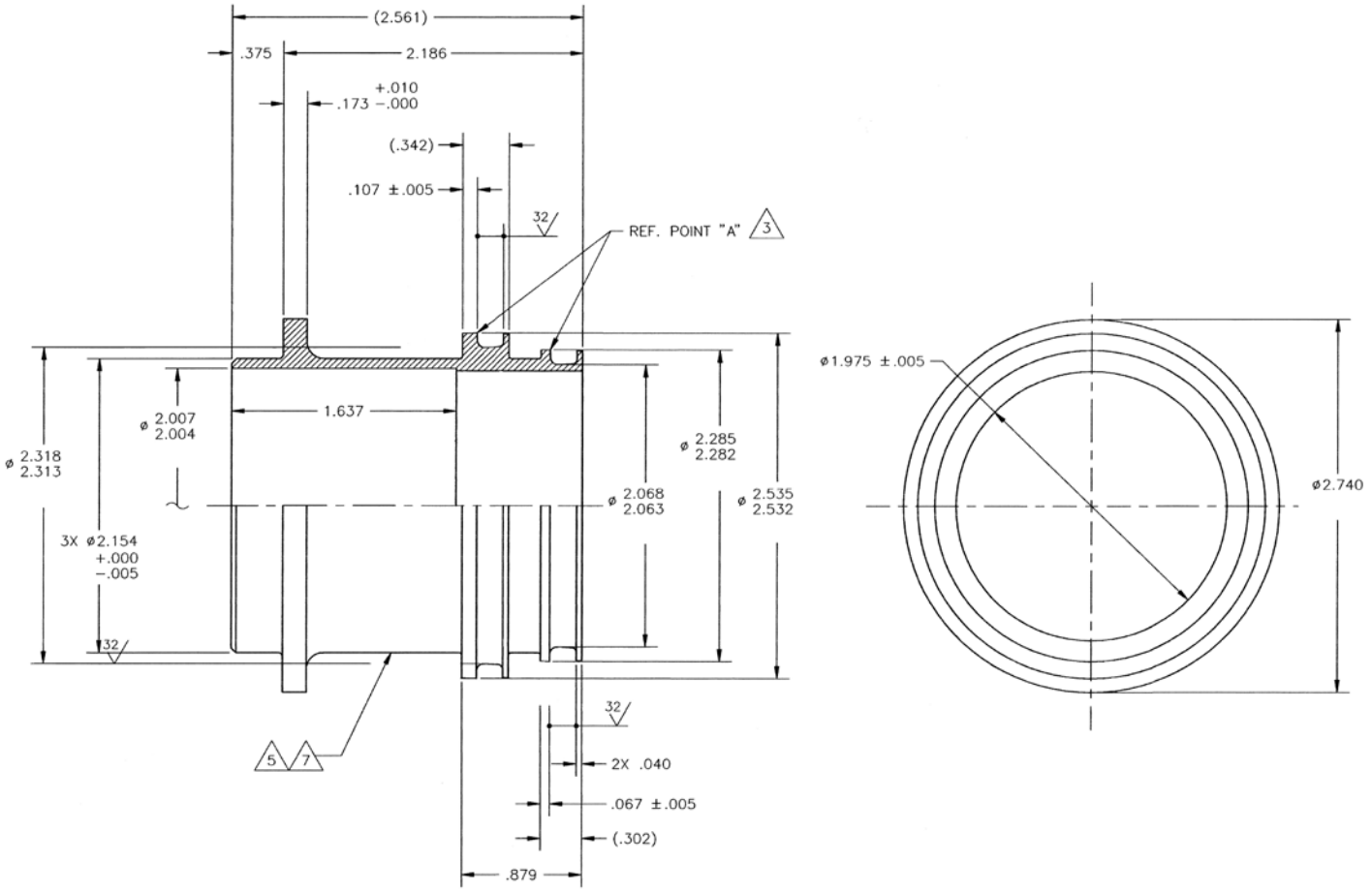


PART NO.	Description	Material
402386-1	Coupler Assembly	—
402391-1	Sleeve	SST 304
402398-1	Flange	SST 321
402392-1	Coupler	SST 304
402390-1	Adapter	SST 321
NA30422C-1	Nut Assembly	SST 304
R30322C	Retainer	SST 304

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Angular adjustment = ±1° min.
2. Tangent point of tube bend
3. Pressure rating: Operating = 60 psi (4.13 bar)
   Proof = 130 psi (8.96 bar)
   Burst = 260 psi (17.92 bar)
4. Components individually identified
5. Seals not included. See S2 catalog sheet.
6. Interpret dimensions and tolerances per ANSI Y14.5M–1982
7. Parts unique to this assembly are permanently identified with green stripes 1.0 in. long X .12 in. wide, 4 places equally spaced

402390 Adapter, Special for 2 Inch O.D. Tube Series 303

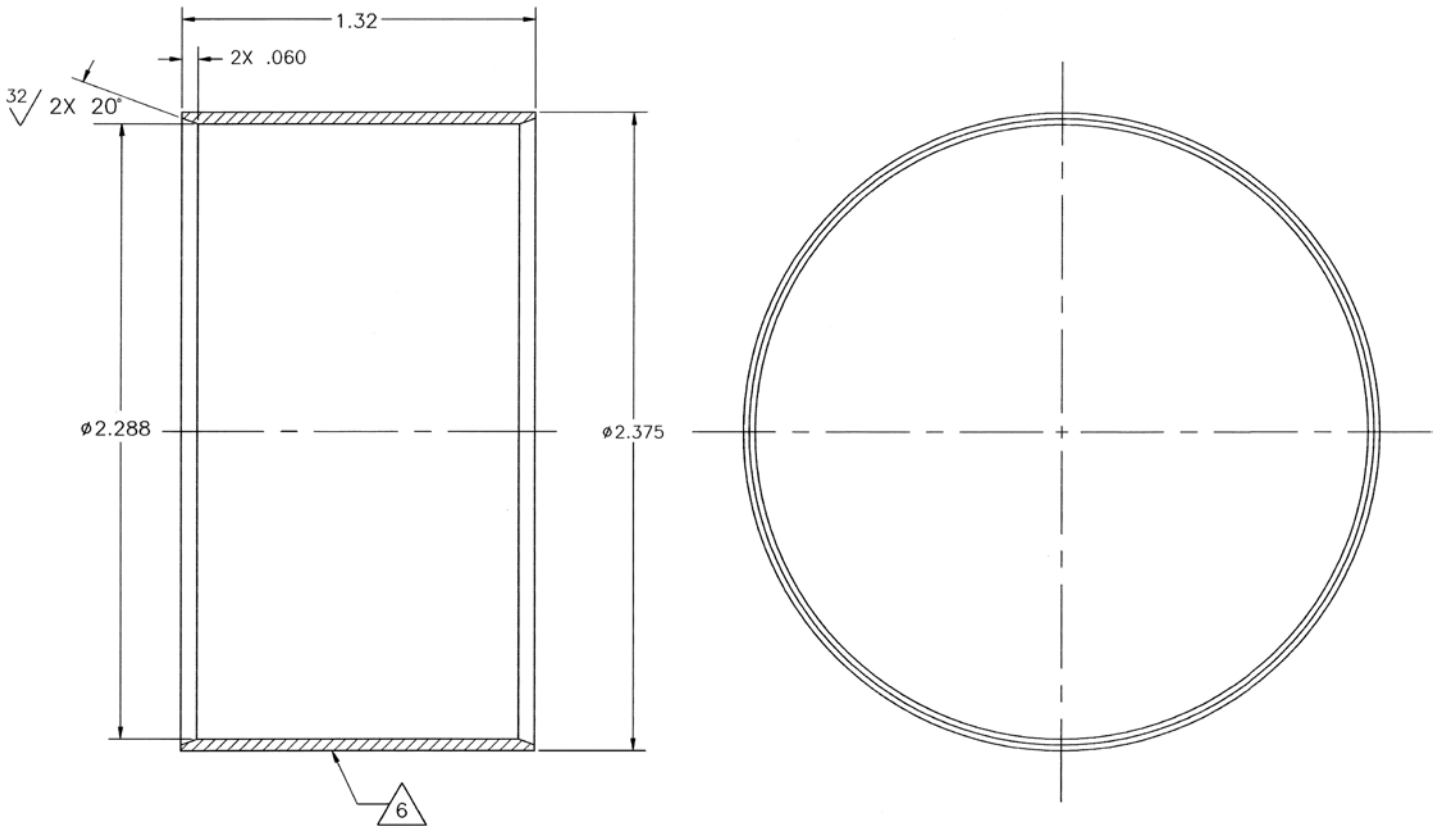


NOTES (UNLESS OTHERWISE SPECIFIED):

1. Surface roughness 125/. Surface texture per ANSI B46.1
2. Break edges .015 maximum and radius fillets .015
3. O-ring groove per dwg 410001, cavity size 2
4. Passivated per QQ-P-35, Type VI
5. Permanently identified with part no. "Gamah 402390-*" (* = Material/Finish Dash No.)
6. Interpret dimensions and tolerances per ANSI Y14.5M-1982
7. "Markem" green ink stripe 1.0 inch long x .12 inch wide

402391 Sleeve, Special for 2 Inch O.D. Tube Series 303

Revision Letter C



	PART NO.	Descriptions	Material Specification	Weight (lbs)
2	402391-2	Sleeve	Al 2024 (ages)	.041
1	402391-1	Sleeve	SST 304	.119

NOTES (UNLESS OTHERWISE SPECIFIED):

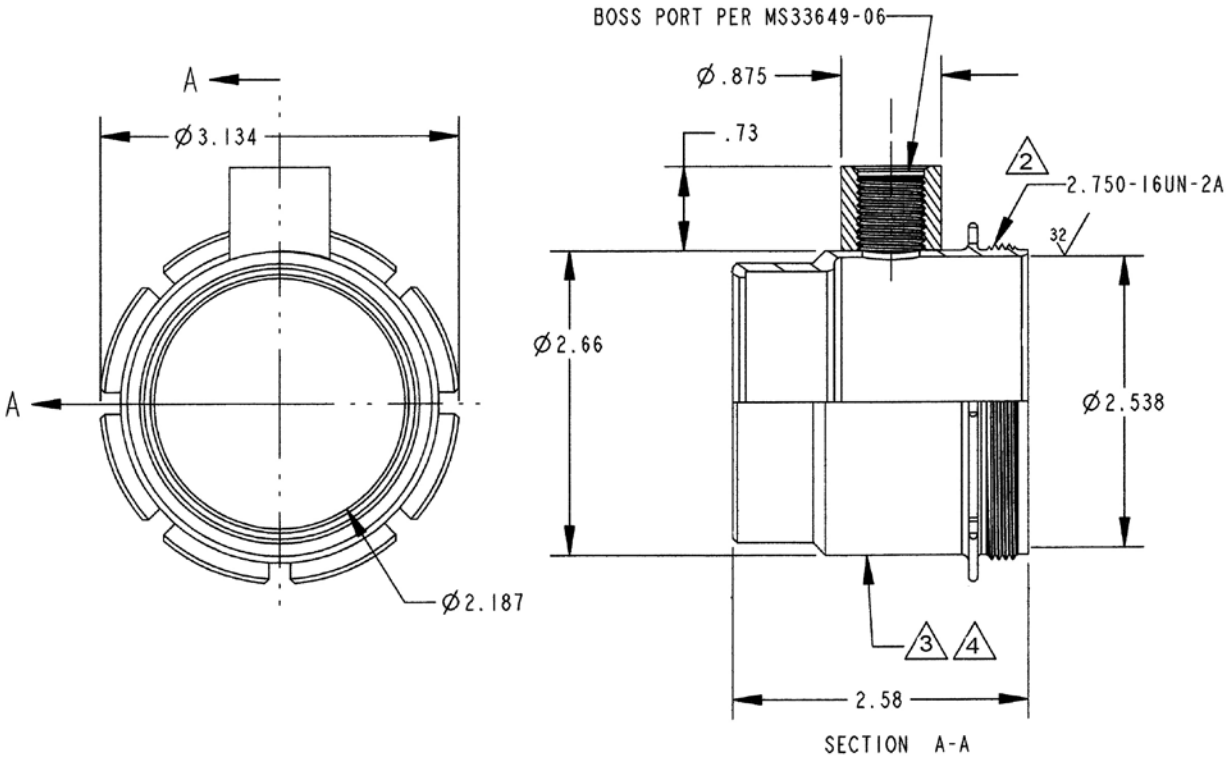
1. Passivated per QQ-P-35, Type VI
2. Chemical film treated per MIL-C-5541, Class 3
3. Permanently identified with part no.: "Gamah 402391-X" Material/Finish Dash No.
4. Consult Eaton for specific applications.
5. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
6. "Markem" green ink stripe 1.0 inch long x .12 wide, 4 places, equally spaced

REVISION	LTR	DESCRIPTION	DATE
	A	1.24 was 1.12. Added weights.	1/14/88
	B	1.32 was 1.24. Revised weights.	9/8/88
	C	Added Notes 5 and 6	1/28/95

This issue supersedes all previously issued catalog sheets and drawings

402392 Coupler, Port for 2 Inch O.D. Tube Series 303

Revision Letter F



NOTES (UNLESS OTHERWISE SPECIFIED):

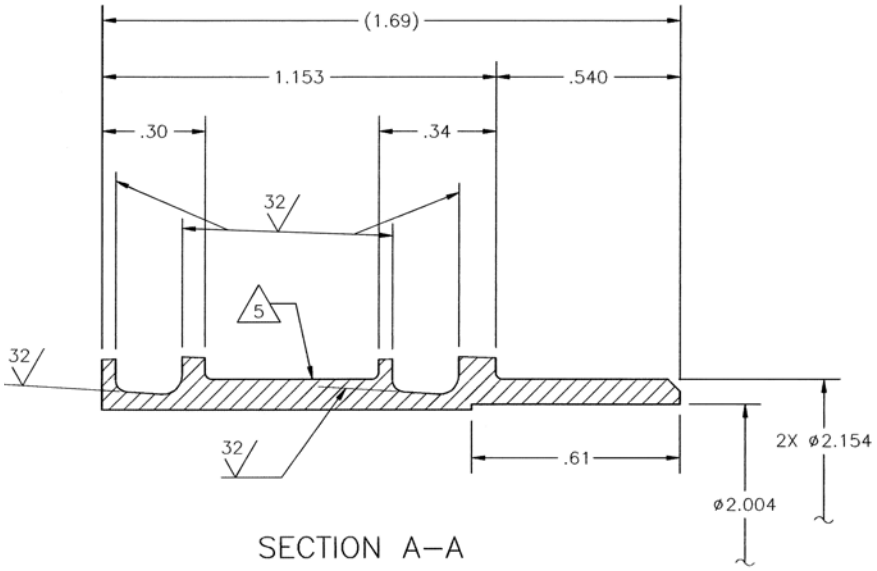
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. These adapter unions supersede T1075–150 thru T1075–350 adapters
4. Other materials available upon request
5. Chemical film treated per MIL-C-5541, Class 3
6. Permanently identified with part no.: "Gamah 402392-X" Material/Finish Dash No.
7. Passivated per QQ-P-35
8. Dry film lube per MIL-L-46010 (threads only)
9. Welded per Stanley SSP 2120
10. Interpret dimensions and tolerances per ANSI Y14.5M — 1994
11. "Markem" green ink stripe 1.0 inch long x .12 wide - 4 places equally spaced

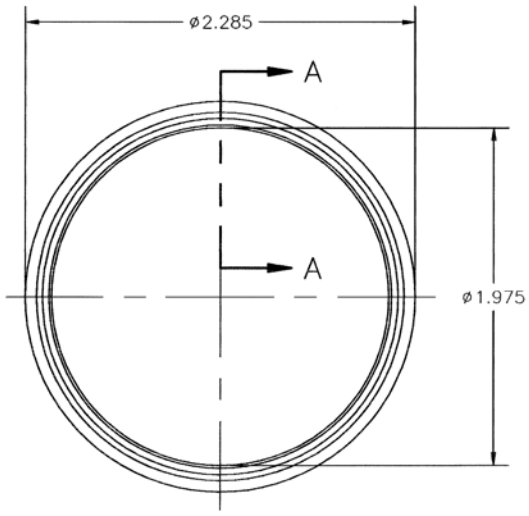
REVISION	LTR	DESCRIPTION	DATE
	F	Redrawn for customer use	6/27/05

This issue supersedes all previously issued catalog sheets and drawings

402398 Flange, Special – Welded for 2 Inch O.D. Tube Series 303

Revision Letter E





PART NO.	Descriptions	Material Specification	Weight (lbs)
402398-3	Flange	Titanium TI-CP-70	.15
402398-2	Flange	Al 6061-T6	.088
1 402398-1	Flange	SST 321	.26

NOTES (UNLESS OTHERWISE SPECIFIED):

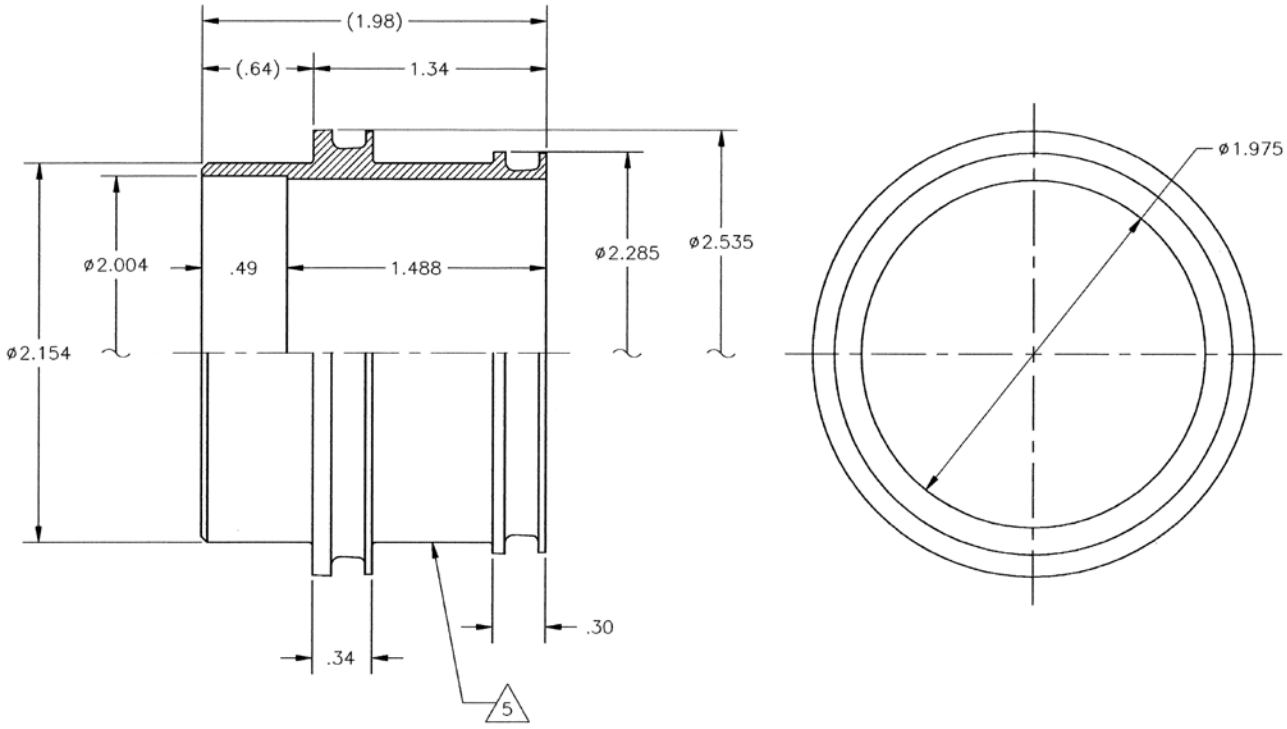
1. Passivated per QQ-P-35, Type VI
2. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
3. Permanently identified with part no.: "Gamah 402398-X" Material/Finish Dash No.
4. Consult Eaton for specific applications
5. "Markem" green ink stripe 1.0 inch long x .12 inch wide 4 places equally spaced

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn with changes	9/22/94
	E	Added Notes 2 and 5	1/28/95

This issue supersedes all previously issued catalog sheets and drawings

402449 Adapter, Special for 2 Inch O.D. Tube Series 303

Revision Letter B



	PART NO.	Descriptions	Material Specification	Weight (lbs)
	402449-2	Adapter	Al 6061-T6	.14
1	402449-1	Adapter	SST 321	.41

REVISION	LTR	DESCRIPTION	DATE
	A	(.64) was .64. Added 1.488. (1.98) was 1.98.	1/20/94
	B	Added Notes 4 and 5	1/30/95

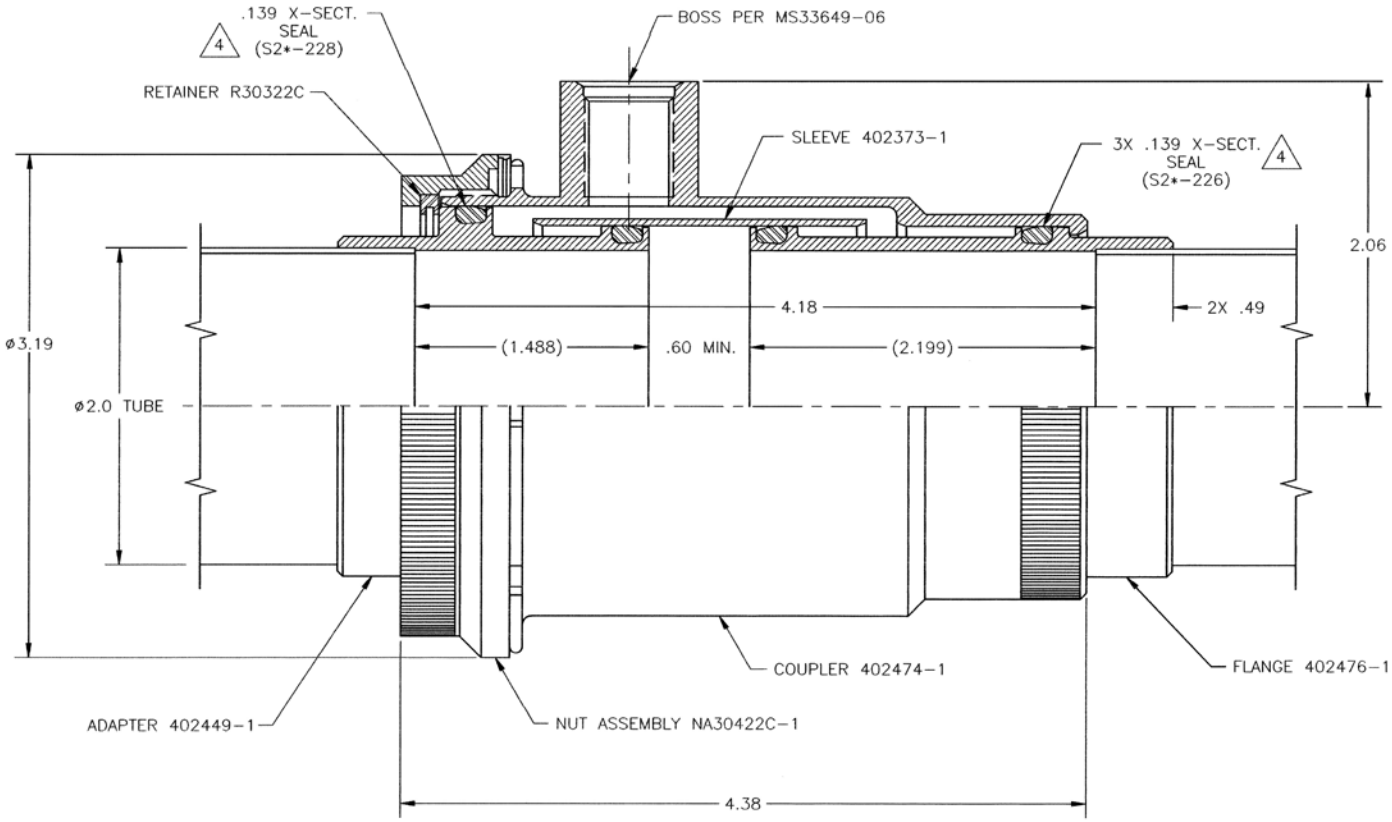
This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Passivated per QQ-P-35, Type VI
2. Permanently identified with part no.: "GAMAH 402449-X" (Material/Finish Dash No.)
3. Consult Eaton for specific applications.
4. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
5. "Markem" green ink stripe 1.0 inch long x .12 wide 4 places equally spaced

402450 Coupling, Shrouded for 2 Inch O.D. Tube Series 303

Revision Letter E



PART NO.	Descriptions	Material Specification
R30322C	Retainer	SST 304
NA30422C-1	Nut Assy	SST 304
402449-1	Adapter	SST 321
6 402474-1	Coupler	SST 304
6 402476-1	Flange	SST 321
6 402473-1	Sleeve	SST 304
6 402450-1	Coupler Assembly	

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Angular adjustment = ±4° minimum
2. Pressure rating: Operation =60 psig (5.15 bar)
   Proof = 130 psig (9.97 bar)
   Burst = 260 psig (18.93 bar)
3. Components individually identified

4 Seals not included, see S2 catalog sheet

5. Interpret dimensions and tolerances per ANSI Y14.5M – 1982

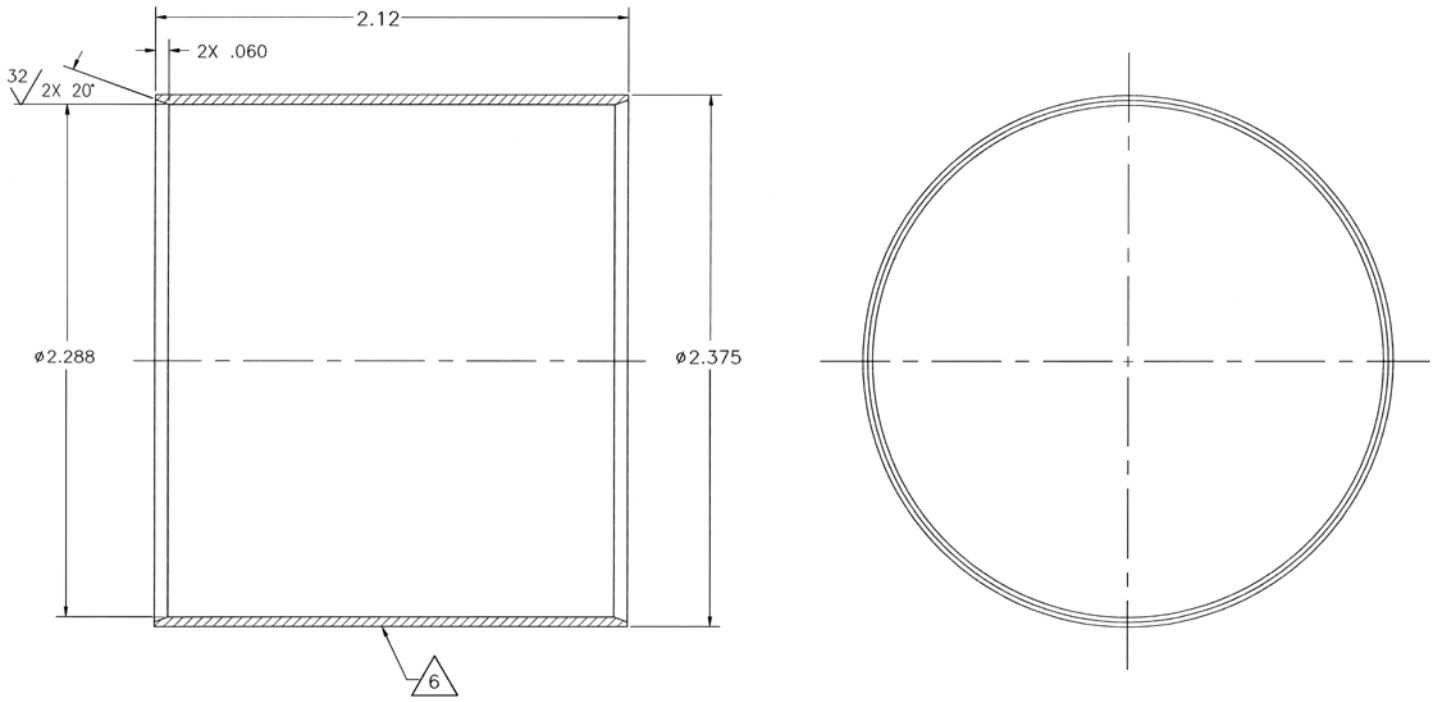
6 Parts unique to this assembly are permanently identified with magenta stripes 1.0 inch long x .12 inch wide, 4 places equally spaced

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn, completely revised	1/26/88
	B	Revised assembly weights and item 5 material	
	C	Revised Notes 3, added Note 4	6/19/88
	D	Deleted –2 assembly	11/14/89
	E	Added Notes 5 and 6	02/01/95

This issue supersedes all previously issued catalog sheets and drawings

402473 Sleeve, Special for 2 Inch O.D. Tube Series 303

Revision Letter A



	PART NO.	Descriptions	Material Specification	Weight (lbs)
2	402473-2	Sleeve	Al 2024 (aged)	.068
1	402473-1	Sleeve	SST 304	.193

NOTES (UNLESS OTHERWISE SPECIFIED):

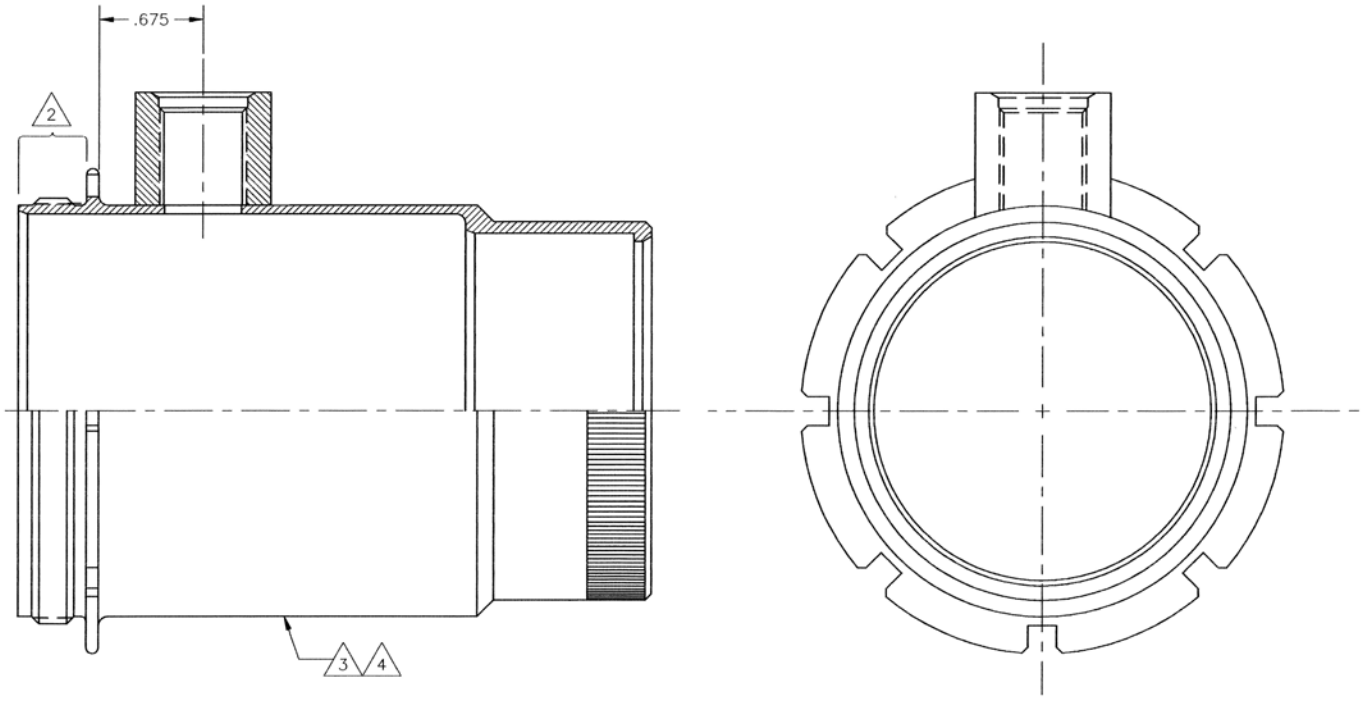
1. Passivated per QQ-P-35
2. Chemical film treated per MIL-C-5541, Class 3
3. Permanently identified with part no.: "GAMAH 402473-X" (Material/Finish Dash No.)
4. Consult Eaton for specific applications.
5. Interpret dimensions and tolerances per ANSI Y14.5M – 1982
6. "Markem" green ink stripe 1.0 inch long x .12 inch wide 4 plcs equally spaced

REVISION	LTR	DESCRIPTION	DATE
	A	Added Notes 5 and 6	1/26/95

This issue supersedes all previously issued catalog sheets and drawings

402474 Coupler – Port for 2 Inch O.D. Tube Series 303

Revision Letter E



PART NO.	Descriptions	Material Specification
402513-1	Sleeve	SST 304
402475-1	Sleeve	SST 304
402474-1	Coupler	

REVISION	LTR	DESCRIPTION	DATE
	D	Deleted –2 configuration and Note 1. Revised Notes 2 and 6.	8/17/90
	E	Added Notes 1 and 4	1/31/95

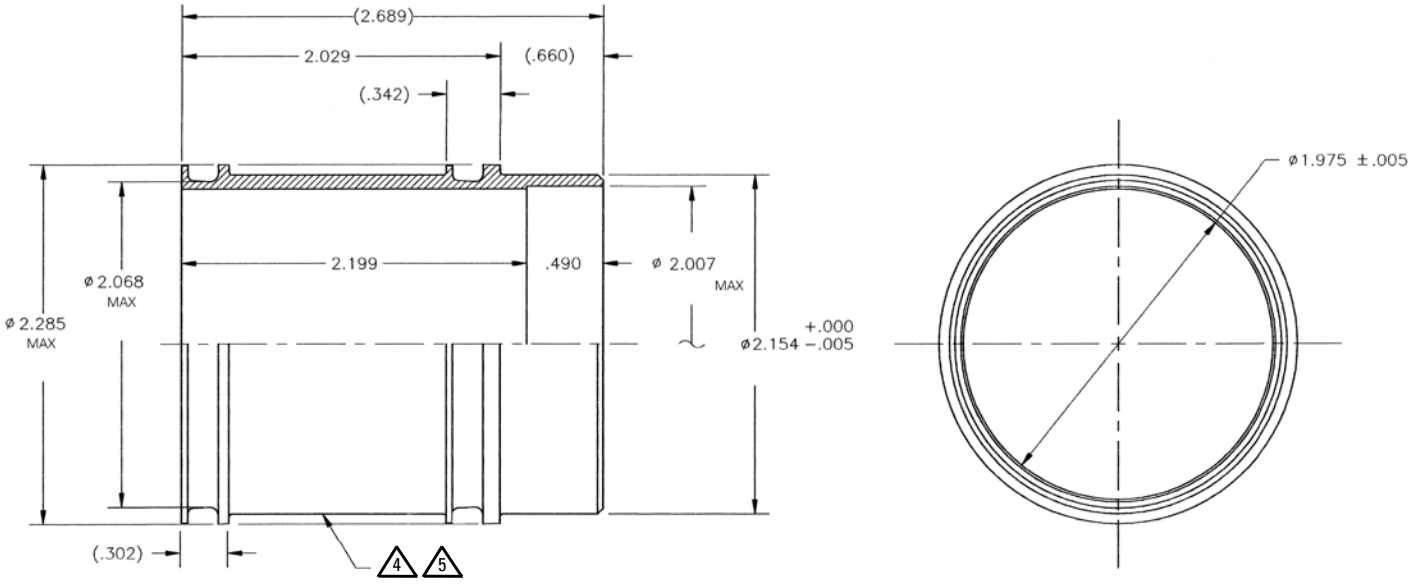
This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
2. Dry film lube per MIL-L-46010 (on threads only)
3. Permanently identified with part no.: "GAMAH 402474-X"
   Material/Finish Dash No.
4. "Markem" magenta ink stripe 1.0 inch long x .12 inch wide 4 plcs equally spaced
5. Deleted

402476 Flange, Special for 2 Inch O.D. Tube Series 303

Revision Letter C



REVISION	LTR	DESCRIPTION	DATE
	A	Revised Note 4 and chamfer. Ø 2.154 +.000/–.005 was Ø 2.145–2.151. Deleted –2 configuration (aluminum 6061).	4/16/91
	B	(.660) was .660. Added 2.199 dimension, deleted stock size.	2/24/94
	C	Added Notes 6 & 7	1/30/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

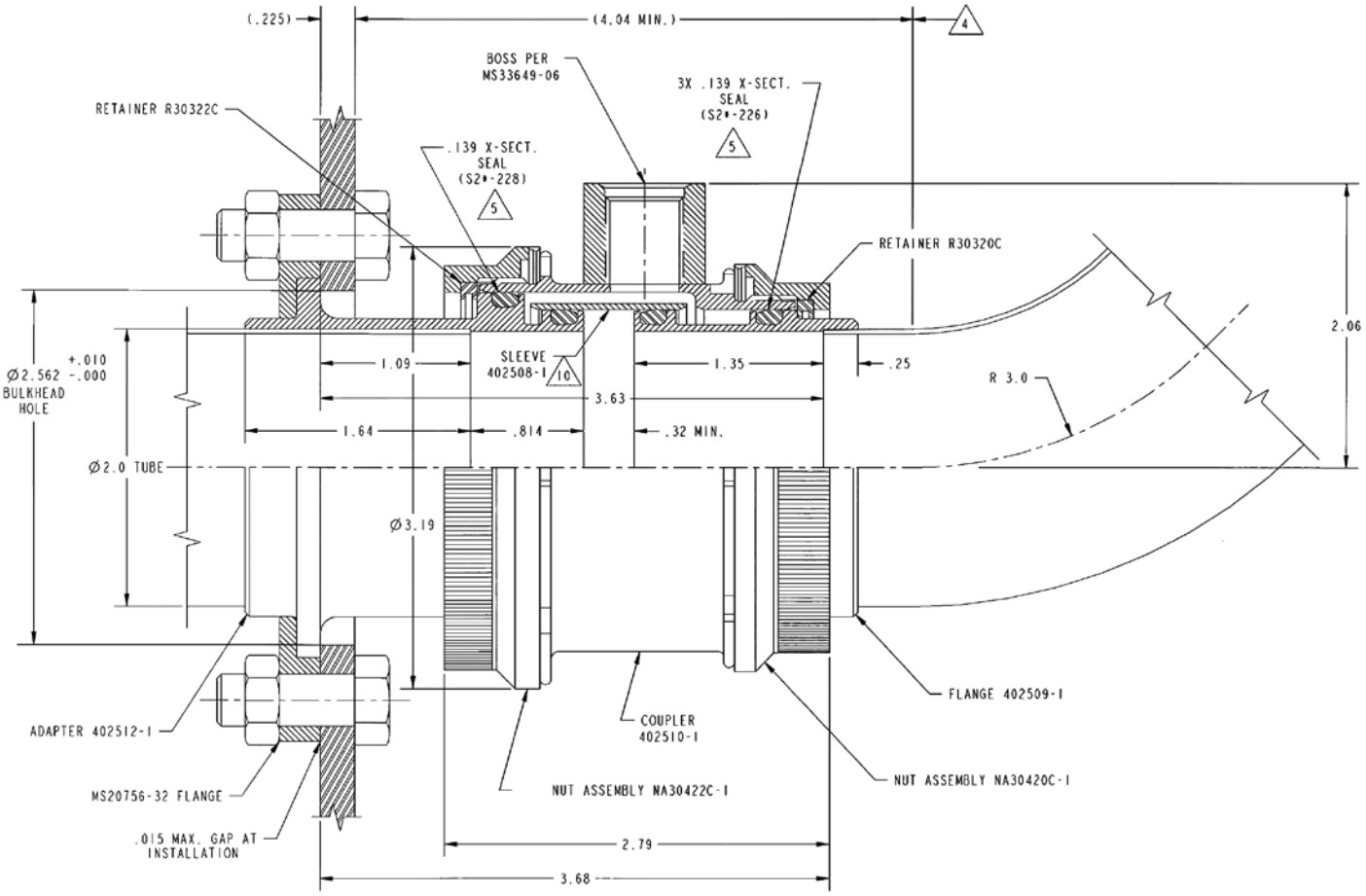
1. Passivate per QQ-P-35, Type VI (Stanley PS 9-3)
2. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
3. Material: SST 321 per AMS5645

4 Permanently identified with part no.: "GAMAH 402476-X"
Material/Finish Dash No.

5 "Markem" magenta ink stripe 1.0 inch long x .12 inch wide 4 plcs equally spaced

402507 Coupling, Shrouded Assy for 2 Inch O.D. Tube Series 303

Revision Letter D



Qty Req'd	Part Number	Description	Material
1	402507-1	Coupler Assy	
9 1	402508-1	Sleeve	SST 304
9 1	402509-1	Flange	SST 321
9 1	402510-1	Coupler	SST 304
9 1	402512-1	Adapter	SST 321
1	NA30422C-1	Nut Assy	SST 304
1	NA30420C	Nut Assy	SST 304
1	R30322C	Retainer	SST 304
1	R30320C	Retainer	SST 304

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Angular adjustment = ±4°
2. Pressure rating: Operating = 60 psig (5.15 bar)
   Proof = 130 psig (9.97 bar)
   Burst = 260 psig (18.93 bar)
3. Coupling assembly designed for use with fuel or air

4 Tanget point of tube bend

5 Seals not included. See S2 catalog sheet.

6 Consult Eaton for specific applications

7. Components individually identified
8. Interpret dimensions and tolerances per ANSI Y14.5M – 1982

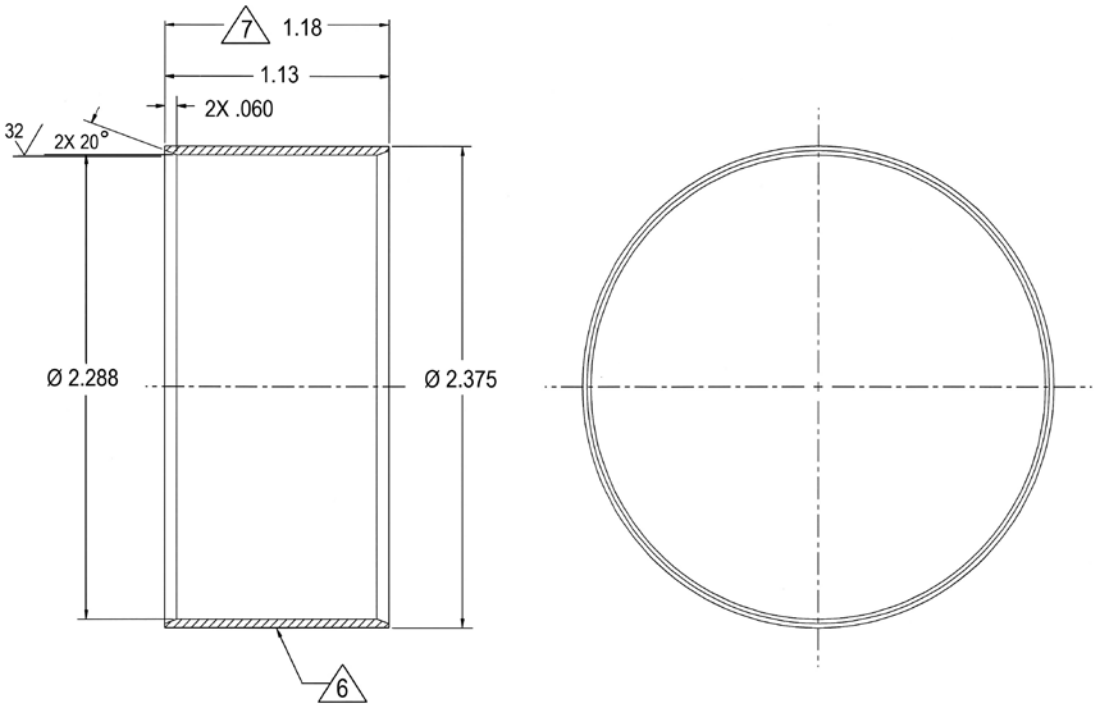
9 Parts unique to this assembly are permanently identified with yellow stripes 1.0 inch long x .12 inch wide, 4 places equally spaced

REVISION	LTR	DESCRIPTION	DATE
	A	Revised retainer and nut part numbers	6/29/88
	B	Revised part numbers for items 5 & 6	4/16/90
	C	Added gap note to field of drawing	8/19/92
	D	Added Notes 8 & 9	1/27/95

This issue supersedes all previously issued catalog sheets and drawings

402508 Sleeve, Special for 2 Inch O.D. Tube Series 303

Revision Letter B



	Part Number	Description	Material	Weight (lbs)
7 2	402508-1	Sleeve, Modified	AL 2024 (aged)	.035
7 1	402508-2	Sleeve, Modified	SST 304	.10
2	402508-1M	Sleeve	AL 2024 (aged)	.035
1	402510-2M	Sleeve	SST 304	.10

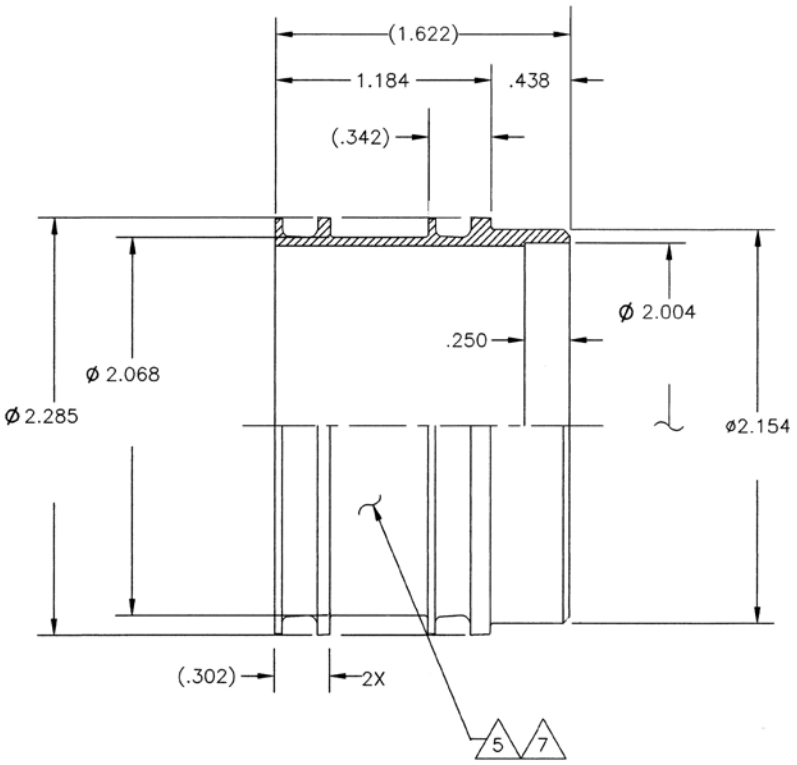
NOTES (UNLESS OTHERWISE SPECIFIED):

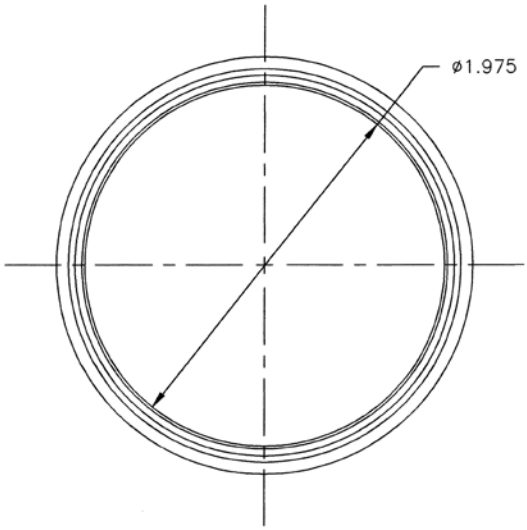
1. Passivated per QQ-P-35
2. Chemical film treated per MIL-C-5541, Class 3
3. Permanently identified with part no.: "GAMAH 402476-X" Material/Finish Dash No.
4. Consult Eaton for specific applications
5. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
6. "Markem" yellow ink stripe 1.0 inch long x .12 inch wide 4 places equally spaced
7. For "M" parts use modified length

REVISION	LTR	DESCRIPTION	DATE
	A	Added Notes 5 & 6	10/26/95
	B	Redrawn	12/16/09

This issue supersedes all previously issued catalog sheets and drawings

402509 Flange, Special for 2 Inch O.D. Tube Series 303





	PART NO.	Description	Material
4	402509-1	Flange	SST 321 per AMS5645

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Surface roughness 125. Surface texture per ANSI B46.1.
2. Break edges .015 max. and radius fillet .015.

3 O-Ring groove per dwg. 410001, cavity size 2

4 Passivated per QQ-P-35, Type VI (Stanley PS 9-3)

Permanently identified with part no.: "GAMAH 402509-X"
Material/Finish Dash No.

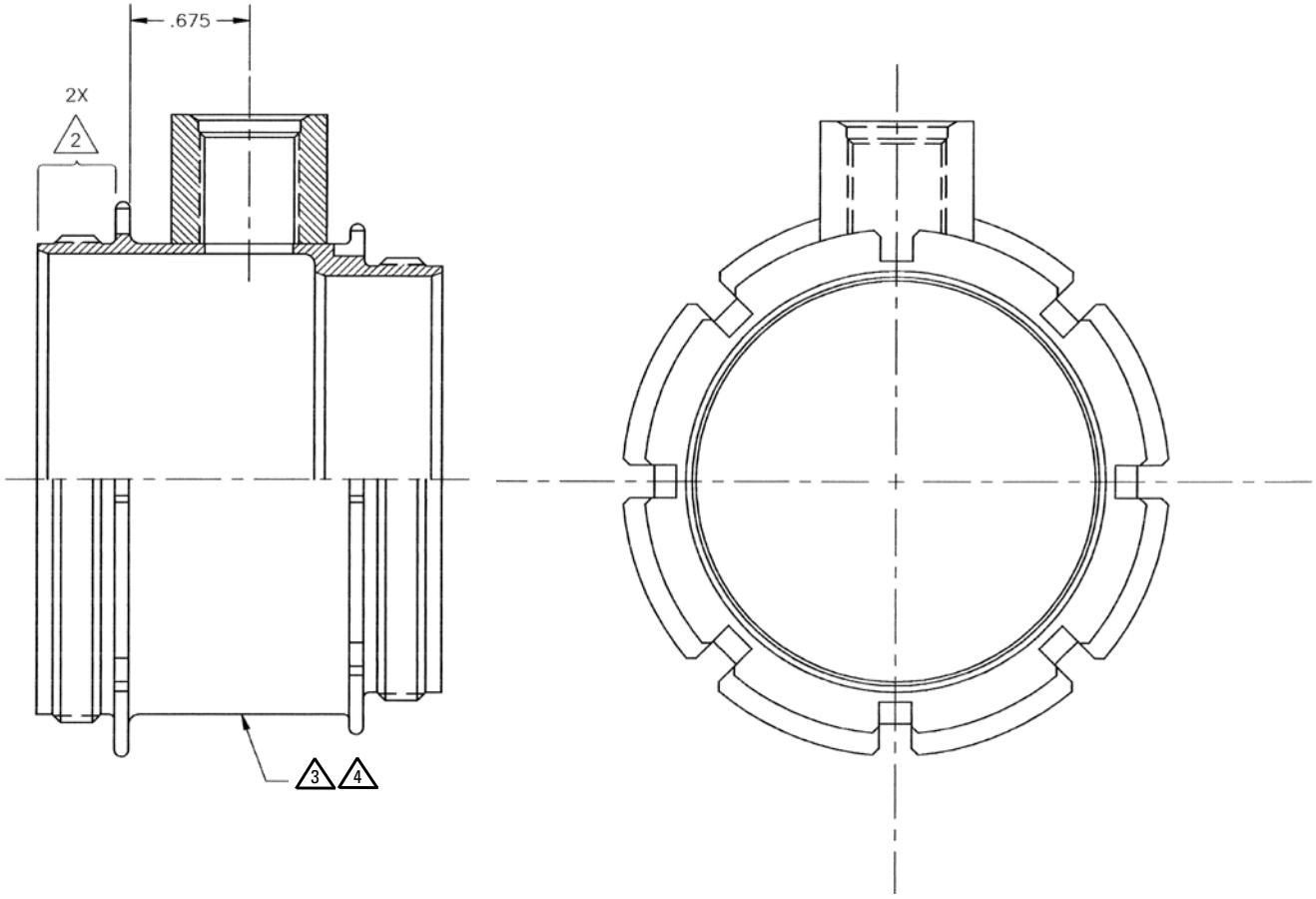
5 Interpret dimensions and tolerances per ANSI Y14.5M — 1982

6 "Markem" green ink stripe 1.0 inch long x .12 inch wide 4 places equally spaced

REVISION	LTR	DESCRIPTION	DATE
	A	Revised Note 4 and chamfer. Deleted –2 configuration, aluminum.	4/16/91
	B	Added Notes 6 and 7	1/30/95

This issue supersedes all previously issued catalog sheets and drawings

402510 Coupler, Port for 2 Inch O.D. Tube Series 303



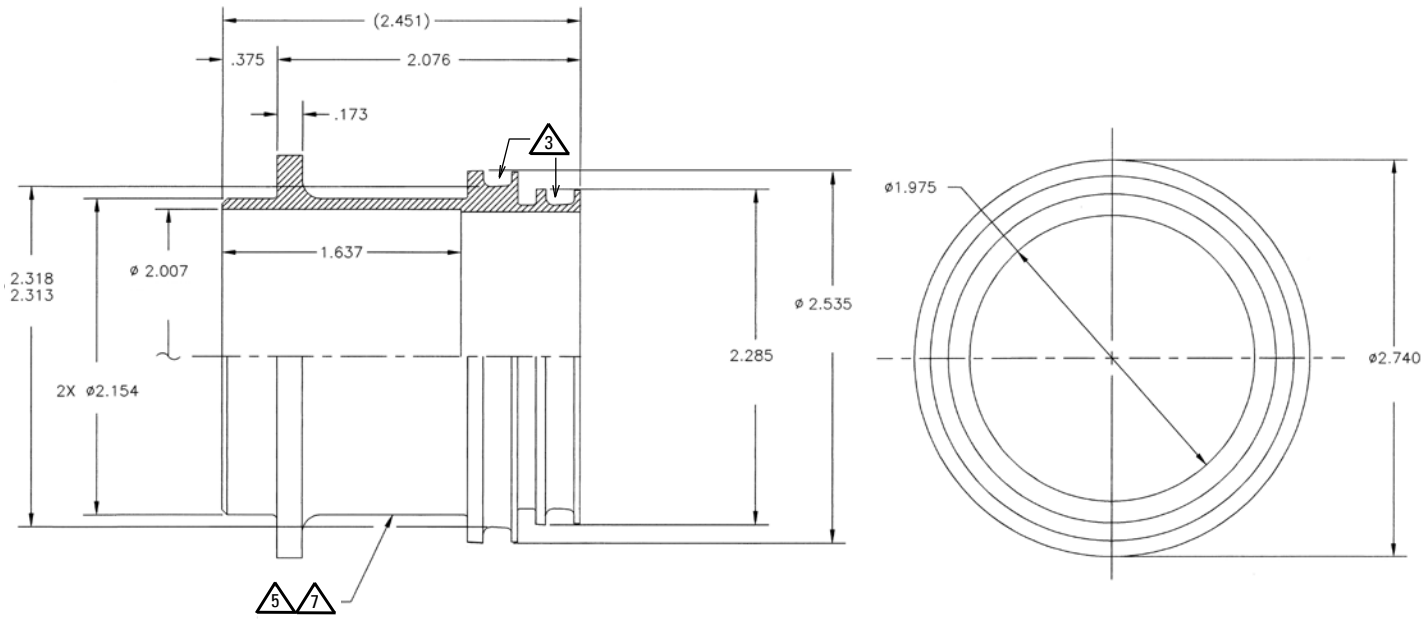
REVISION	LTR	DESCRIPTION	DATE
	A	Added Note 4	9/8/88
	B	Revised Note 1, added Note 5, 32 finish and chamfer in slots	6/19/89
	C	Revised Note 1	8/16/90
	D	Added Notes 6 & 7	1/31/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
2. Dry film lube per MIL-L-46010 (on threads only)
3. Permanently identified with part no.: "GAMAH 402510-X" (X = Material/Finish Dash No.)
4. "Markem" yellow ink stripe 1.0 inch long x .12 inch wide 4 places equally spaced

402512 Adapter, Special for 2 Inch O.D. Tube Series 303



	PART NO.	Description	Material
4	402512-1	Adapter	SST 321 per AMS5645

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Surface roughness 125 surface texture per ANSI B46.1
2. Break edges .015 max and radius fillets .015
3. O-ring groove per drawing 410001, cavity size 2.
4. Passivated per QQ-P-35
5. Permanently identified with part no.: "GAMAH 402512-X" (Material/Finish Dash No.)
6. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
7. "Markem" yellow ink stripe 1.0 inch long x .12 inch wide 4 places equally spaced

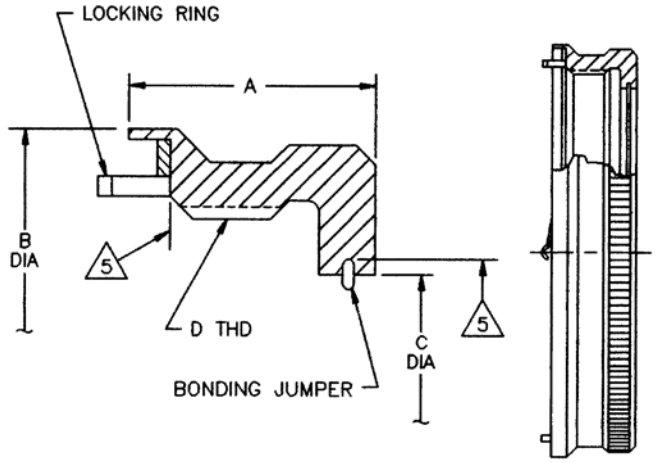
REVISION	LTR	DESCRIPTION	DATE
	A	Revised Note 4 and chamfer. Deleted –2 configuration (aluminum 6061)	4/16/91
	B	Deleted 1.137 dim. Added .173 +.010/–.000	8/4/92
	C	Added Notes 6 and 7	1/30/95

This issue supersedes all previously issued catalog sheets and drawings

NA30300 Nut Assy
Captive, Flexible Locking
Series 303

Revision Letter G

NOM TUBE O D (IN)	ASSY PART NO.	A	B	C	D – THREAD	WEIGHT (LB) –44, –55
.750	NA30307	.48	1.66	.94	1.218-20UNS-2B	.029
1.000	NA30310	.49	1.91	1.19	1.468-20UNS-2B	.035
1.250	NA30312	.50	2.18	1.44	1.734-20UNS-2B	.046
1.500	NA30315	.58	2.44	1.69	2.000-16UN-2B	.057
1.750	NA30317	.58	2.69	1.94	2.250-16UN-2B	.065
2.000	NA30320	.59	2.94	2.19	2.500-16UN-2B	.075
2.250	NA30322	.60	3.19	2.44	2.750-16UN-2B	.091
2.500	NA30325	.60	3.44	2.69	3.000-16UN-2B	.10
2.750	NA30327	.60	3.69	2.94	3.250-16UN-2B	.11
3.000	NA30330	.61	3.94	3.19	3.500-16UN-2B	.14
3.500	NA30335	.70	4.44	3.69	4.000-16UN-2B	.20
4.000	NA30340	.77	4.94	4.19	4.500-16UN-2B	.25
4.500	NA30345	.82	5.49	4.69	5.047-12UNS-3B	.33
5.000	NA30350	.82	6.01	5.19	5.563-12UNS-3B	.39



PART NUMBER CODE:

NA303 00 – XX

BASIC PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL

–44 = NUT ALUMINUM 2024-T351 PER QQ-A-225/6 OR 2024-T3510, -T3511 PER QQ-A-200/3. ANODIZED PER MIL-A-8625, COLOR MAGENTA
BONDING JUMPER: PHOSPHOR BRONZE (SPRING TEMPER) PER QQ-W-321
LOCKING RING 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED

– 55 = NUT ALUMINUM 2024-T351 PER QQ-A-225/6 OR 2024-T3510, -T3511 PER QQ-A-200/3. CHEMICAL CONVERSION COATED PER MIL-C-5541, COLOR GOLD.
BONDING JUMPER: NONE
LOCKING RING 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED

REVISION	LTR	DESCRIPTION	DATE
	A	Configuration change	5/15/87
	B	Revised "A" dim. Deleted note on locking ring. Added –55. Revised "A" dim.	5/28/87
	C	Revised "A" dim	11/5/87
	D	Added dimple callout	10/25/89
	E	Deleted dimple callout	8/13/91
	F	Revised material codes. Added Note 5.	4/11/94
	G	Revised locking ring material	5/20/96

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

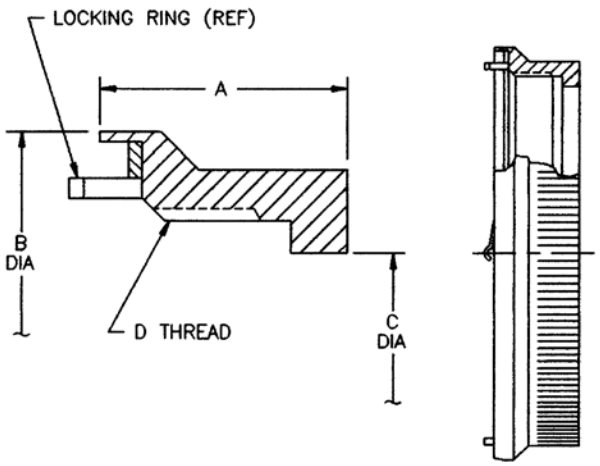
1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. This drawing will not be changed without prior approval of Douglas Power Plant Engineering

5 To provide electrical continuity, surfaces indicated are free of anodize and are chemical conversion coated per MIL-C-5541 (–44 material only)

NA30400 Nut Assy Removable, Flexible Series 303

Revision Letter J

NOM TUBE O D (IN)	ASSY PART NO.	A	B	C	D – THREAD	— WEIGHT (LB) — –44, –55	C
.750	NA30407	.58	1.66	1.04	1.218-20UNS-2B	.032	.092
1.000	NA30410	.58	1.91	1.29	1.468-20UNS-2B	.038	.11
1.250	NA30412	.58	2.18	1.54	1.734-20UNS-2B	.049	.14
1.500	NA30415	.67	2.44	1.79	2.000-16UN-2B	.059	.17
1.750	NA30417	.68	2.69	2.04	2.250-16UN-2B	.070	.20
2.000	NA30420	.69	2.94	2.29	2.500-16UN-2B	.080	.23
2.250	NA30422	.69	3.19	2.54	2.750-16UN-2B	.098	.28
2.500	NA30425	.70	3.44	2.79	3.000-16UN-2B	.11	.31
2.750	NA30427	.70	3.69	3.04	3.250-16UN-2B	.12	.34
3.000	NA30430	.71	3.94	3.29	3.500-16UN-2B	.16	.46
3.500	NA30435	.80	4.44	3.79	4.000-16UN-2B	.21	.60
4.000	NA30440	.88	4.94	4.29	4.500-16UN-2B	.28	.80
4.500	NA30445	.95	5.49	4.79	5.047-12UNS-3B	.38	1.09
5.000	NA30450	1.00	6.01	5.29	5.563-12UNS-3B	.44	1.26



PART NUMBER CODE:

NA304 00 XX X

SERIES

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL

C = NUT SST 304, PASSIVATED
LOCKING RING, 300 SERIES SST, SPRING TEMPER
ELECTROPOLISHED

–44 = NUT AL 2024-T35XX MAGENTA COLOR CODED FOR BONDING, CHEMICAL CONVERSION COATED IN BONDING AREAS.
LOCKING RING 300 SERIES SST, SPRING TEMPER, ELECTROPOLISHED.

– 55 = NUT AL 2024-T35XX, CHEMICAL CONVERSION COATED.
LOCKING RING, 300 SERIES SST, SPRING TEMPER,
ELECTROPOLISHED.

CONFIGURATION

–1 = REINSPECTED OR MANUFACTURED AFTER 3Q89 (CRES ONLY)

REVISION	LTR	DESCRIPTION	DATE
	H	Drawing errata	12/21/94
	J	Added locking ring material	5/20/96

This issue supersedes all previously issued catalog sheets and drawings

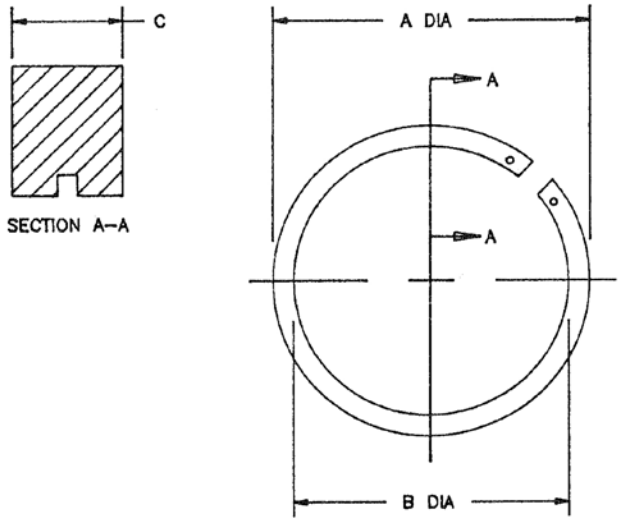
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. This drawing will not be changed without prior approval of Douglas Power Plant Engineering.

R30300 Retainer, Split Removable, Flexible Series 303

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B	C	WEIGHT (LB) –44, –55	WEIGHT (LB) C
.750	R30307	1.17	.94	.107	.004	.011
1.000	R30310	1.42	1.20	.107	.005	.014
1.250	R30312	1.69	1.44	.107	.006	.017
1.500	R30315	1.94	1.69	.107	.007	.020
1.750	R30317	2.19	1.94	.107	.008	.023
2.000	R30320	2.44	2.19	.117	.009	.026
2.250	R30322	2.69	2.44	.117	.010	.029
2.500	R30325	2.94	2.69	.117	.011	.031
2.750	R30327	3.19	2.94	.117	.012	.034
3.000	R30330	3.44	3.19	.117	.013	.037
3.500	R30335	3.95	3.69	.117	.016	.046
4.000	R30340	4.45	4.16	.127	.020	.057
4.500	R30345	4.95	4.69	.127	.022	.063
5.000	R30350	5.48	5.18	.177	.040	.11



PART NUMBER CODE:

NA304 00 XX

SERIES

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL

– 55 = ALUMINUM 2024-T351 PER QQ-A-225/6 OR 2024-T3510, T3511 PER QQ-A-200/3, CHEMICAL CONVERSION COATED PER MIL-C-554

C = STAINLESS STEEL 304 PER AMS5560 OR AMS5639, PASSIVATED PER QQ-P-35

REVISION	LTR	DESCRIPTION	DATE
	A	Added "C" material and weight	3/14/88
	B	Revised material callouts	2/3/94

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. This drawing will not be changed without prior approval of Douglas Power Plant Engineering.

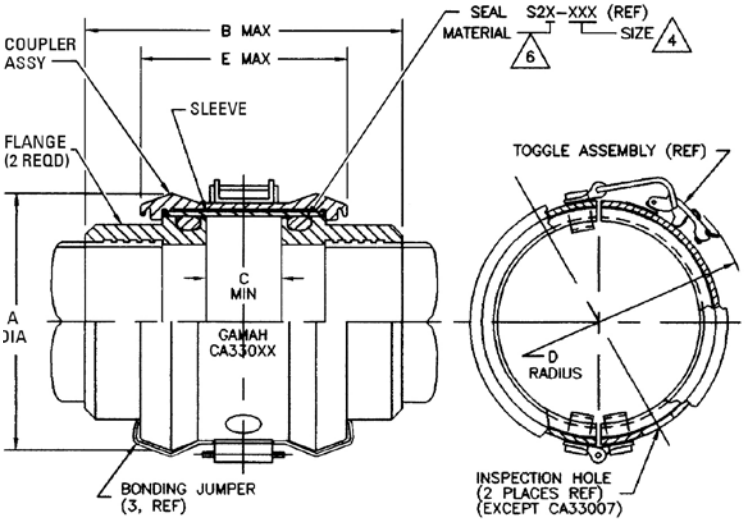
Threadless Flexible Couplings

PART NUMBER	DESCRIPTION	SERIES
J33000	Threadless Coupling Assembly	33
J33100	Threadless Coupling Assembly, Fluorocarbon Seal	331
J34000	Threadless Coupling Assembly, Heavy Duty	34
CA33000	Coupler Assembly	33 & 331
CA34000	Coupler Assembly	34
F3000	Flange, Swaged	33 & 30
F30200	Flange, Socket Welded/Brazed	30 & 33
F30300	Flange, Butt Welded	30 & 33
F31000	Flange, Swaged	34
F31200	Flange, Socket Welded/Brazed	34
F31300	Flange, Butt Welded	34
F33100	Flange, Swaged	331
FW33200	Flange, Socket Welded/Brazed	331
FW33300	Flange, Butt Welded	331
G30000	Sleeve	30, 22 & 331
G31000	Sleeve	34

J33000 Flexible Threadless Coupling Assy
Series 33

Revision Letter AC

NOM TUBE O D (IN)	ASSY PART NO.	COUPLER ASSY	SLEEVE	FLANGE ⚠8	SEAL SIZE (REF) ⚠4	A DIA	B (MAX)	C (MIN) ⚠10	D RADIUS	E (MAX)	SWAGE BLOCK	F ⚠7 ⚠10	ASSY WEIGHT (LB) A	C	T
.500	J33005	CA33005	G30005	F30005	–113	1.00	1.901	.27	.82	1.26	B30005	.100	.06	.12	.09
.750	J33007	CA33007	G30007	F30007	–211	1.30	2.099	.14	.97	1.26	B30007	0	.09	.17	.11
1.000	J33010	CA33010	G30010	F30010	–215	1.64	2.692	.38	1.13	1.58	B30010	.168	.16	.30	.20
1.250	J33012	CA33012	G30012	F30012	–219	1.89	2.356	.34	1.25	1.58	B30012	.123	.19	.35	.24
1.500	J33015	CA33015	G30015	F30015	–222	2.14	2.356	.34	1.37	1.58	B30015	.123	.21	.40	.28
1.750	J33017	CA33017	G30017	F30017	–224	2.39	2.356	.34	1.58	1.58	B30017	.123	.24	.45	.31
2.000	J33020	CA33020	G30020	F30020	–226	2.64	2.608	.34	1.70	1.58	B30020	0	.28	.55	.37
2.250	J33022	CA33022	G30022	F30022	–228	2.89	2.608	.34	1.83	1.58	B30022	0	.31	.61	.41
2.500	J33025	CA33025	G30025	F30025	–230	3.14	2.602	.34	1.95	1.58	B30025	0	.33	.66	.45
2.750	J33027	CA33027	G30027	F30027	–232	3.39	2.582	.32	2.08	1.58	B30027	0	.36	.73	.49
3.000	J33030	CA33030	G30030	F30030	–234	3.64	2.572	.31	2.20	1.58	B30030	0	.39	.78	.53
3.500	J33035	CA33035	G30035	F30035	–238	4.22	3.054	.51	2.61	1.93	B30035	0	.61	1.12	.78
4.000	J33040	CA33040	G30040	F30040	–242	4.72	3.028	.49	2.86	1.93	B30040	0	.70	1.31	.91
4.500	J33045	CA33045	G30045	F30045	–246	5.22	3.260	.47	3.10	1.93	B30045	0	.80	1.51	1.04
5.000	J33050	CA33050	G30050	F30050	–250	5.72	3.240	.45	3.36	1.93	B30050	0	.88	1.70	1.16



PART NUMBER CODE:

J330 00 X X

ASSEMBLY NO.

SIZE

MATERIAL

- A = CA33000 COUPLER: 2024 AGED AND BLACK ANODIZED
  G30000A SLEEVE: 2024 AGED AND BLACK ANODIZED
  F30000A FLANGE: 2024 AGED AND BLACK ALODINED
- C = CA33000 COUPLER: 2024 AGED AND BLACK ANODIZED
  G30000C SLEEVE: 304 SST PASSIVATED
  F30000C FLANGE: 17-4PH/15-5PH SST. PASSIVATED
- T = CA33000 COUPLER: 2024 AGED AND BLACK ANODIZED
  G30000T SLEEVE: TITANIUM TI-CP-70
  F30000T FLANGE: TITANIUM 6AL-4V

SPECIALS

- D = DRY FILM LUBRICANT PER MIL-L-8937
  (ON SLEEVE I.D. ONLY)

REVISION	LTR	DESCRIPTION	DATE
	Z	Added Note 11	3/19/86
	AA	Delete Notes 11 and –09, –091 and –092 materials	9/19/89
	AB	Added J33005	2/4/92
	AC	Deleted 6 inch data	9/18/98

This issue supersedes all previously issued catalog sheets and drawings

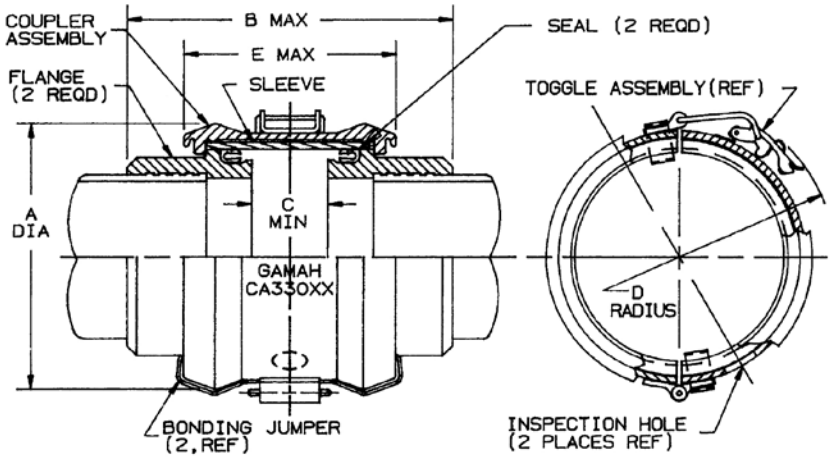
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Deleted
3. O-ring lube to be compatible with system fluid
4. ⚠4 Size per AS568
5. Swage flanges per Gamah Tech Bulletin G2J-01
6. ⚠6 2 req'd (not furnished). See dwg S2 for material.
7. ⚠7 For F30010XL flanges in J33010 coupling assembly, "F" = 0
8. ⚠8 Welded flange configuration is available, refer to individual catalog sheets
9. Additional materials and finishes available upon request
10. ⚠10 "C" min. is minimum inter-flange gap with flanges extended against coupler. To ensure electrical continuity across flanges, installed inter-flange gap must be "F" or greater.
11. Consult Eaton for specific applications

J33100 Flexible Threadless Coupling Assembly
Fluorocarbon Seal
Series 331

Revision Letter B

NOM TUBE O D (IN)	ASSY PART NO.	COUPLER ASSY	SLEEVE	FLANGE △4	SEAL	A DIA	B (MAX)	C (MIN) △5	D	E (MAX)	F △5	SWAGE BLOCK	ASSY WEIGHT (LB) C
.750	J33107	CA33007	G30007	F33107	S33107	1.30	2.099	.14	.97	1.26	0	B20007	.17
1.000	J33110	CA33010	G30010	F33110	S33110	1.64	2.692	.38	1.13	1.58	0	B20010	.30
1.250	J33112	CA33012	G30012	F33112	S33112	1.89	2.356	.34	1.25	1.58	.123	B20012	.35
1.500	J33115	CA33015	G30015	F33115	S33115	2.14	2.356	.34	1.37	1.58	.123	B20015	.39
1.750	J33117	CA33017	G30017	F33117	S33117	2.39	2.356	.34	1.58	1.58	.123	B20017	.46
2.000	J33120	CA33020	G30020	F33120	S33120	2.64	2.608	.34	1.70	1.58	0	B20020	.55
2.250	J33122	CA33022	G30022	F33122	S33122	2.89	2.608	.34	1.83	1.58	0	B20022	.61
2.500	J33125	CA33025	G30025	F33125	S33125	3.14	2.602	.34	1.95	1.58	0	B20025	.67
2.750	J33127	CA33027	G30027	F33127	S33127	3.39	2.582	.32	2.08	1.58	0	B20027	.73
3.000	J33130	CA33030	G30030	F33130	S33130	3.64	2.572	.31	2.20	1.58	0	B20030	.79



PART NUMBER CODE:

J331 00 X X

ASSEMBLY NO.

SIZE

MATERIAL

C = CA33000 COUPLER: 2024 AGED AND BLACK ANODIZED
G30000C SLEEVE: 304 STAINLESS STEEL, PASSIVATED
F33100C FLANGE: 17-4PH/15-5PH STAINLESS STEEL, PASSIVATED

SPECIALS

D = DRY FILM LUBRICANT PER MIL-L-8937 (SLEEVE I.D. ONLY)

REVISION	LTR	DESCRIPTION	DATE
	A	Revised swage blocks	12/21/83
	B	Added .750 inch size	11/6/85

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. O-ring lube to be compatible with system fluid
3. Swage flanges per Gamah Tech Bulletin G2J-01

△4 Welded flange configuration is available, refer to individual catalog sheets

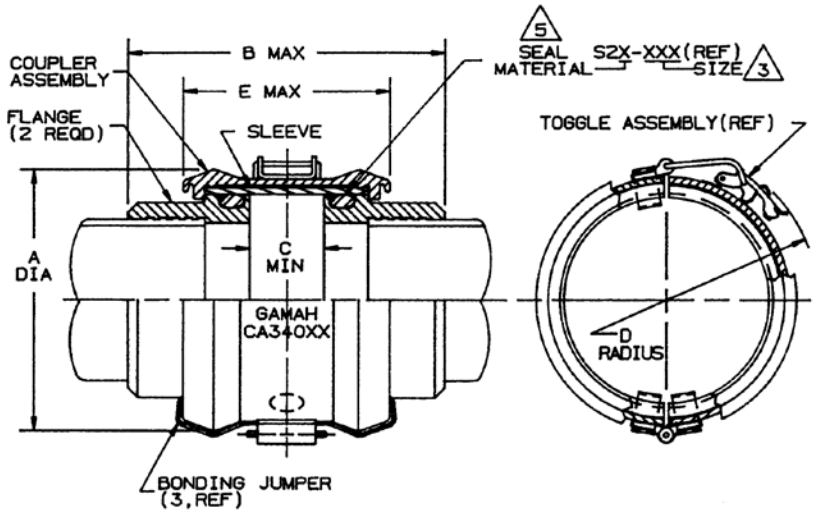
△5 "C" min. is minimum inter-flange gap with flanges extended against coupler to ensure electrical continuity across flanges. Installed inter-flange gap must be "F" or greater.

6. Consult Eaton for specific applications

J34000 Flexible Threadless Coupling Assy
Series 34

Revision Letter H

NOM TUBE O D (IN)	ASSY PART NO.	COUPLER ASSY	SLEEVE	FLANGE ⑥	SEAL SIZE (REF) ③	A DIA	B (MAX)	C (MIN) ⑦	D RADIUS	E (MAX)	ASSY WEIGHT (LB) A
2.500	J34025	CA34025	G31025	F31025	–334	3.44	3.041	.58	2.07	2.12	.57
3.000	J34030	CA34030	G31030	F31030	–338	3.94	3.191	.45	2.30	2.12	.72
3.500	J34035	CA34035	G31035	F31035	–341	4.44	3.343	.45	2.66	2.12	.80
4.000	J34040	CA34040	G31040	F31040	–345	4.95	3.343	.45	2.92	2.12	.91
4.500	J34045	CA34045	G31045	F31045	–350	5.50	3.595	.45	3.19	2.12	1.35
5.000	J34050	CA34050	G31050	F31050	–354	6.00	3.595	.45	3.43	2.12	1.47



PART NUMBER CODE:

J340 00 X X

ASSEMBLY NO.

SIZE

MATERIAL

A = CA34000 COUPLER: 2024 AGED AND BLACK ANODIZED
G31000A SLEEVE: 2024 AGED AND ANODIZED
F31000A FLANGE: 2024 AGED AND ANODIZED

SPECIALS

D = DRY FILM LUBRICANT PER MIL-L-8937 (SLEEVE I.D. ONLY)

REVISION	LTR	DESCRIPTION	DATE
	A	Revised J34050 data, added J34045 data	12/16/82
	B	Added J34035, J34030 & J34025 data	8/9/83
	C	Added –091 to code	11/6/85
	D	Added –092 to code	1/20/86
	E	Added Note 9	3/19/86
	F	Revised J34035 seal size	9/1/87
	G	Deleted –091 material	7/25/89
	H	Deleted –092 and –093 materials	9/6/89

This issue supersedes all previously issued catalog sheets and drawings

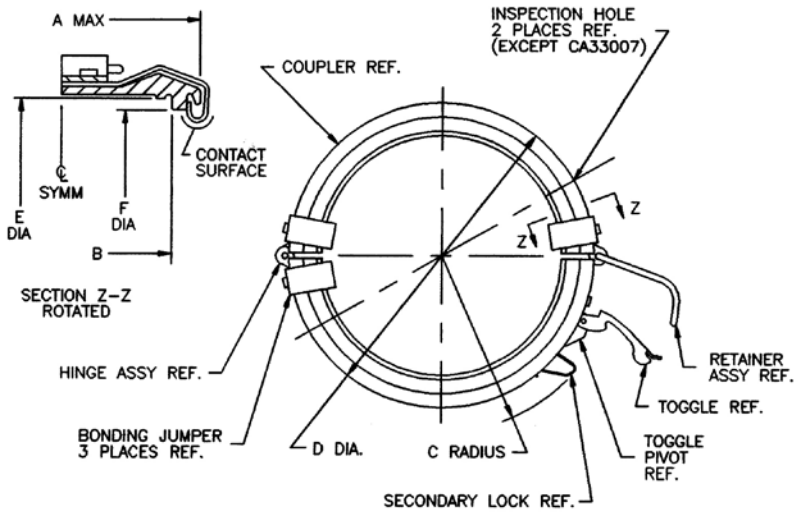
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. O-ring lube to be compatible with system fluid
3. Size per AS568
4. Swage flanges per Gamah Tech Bulletin G2J-01
5. 2 req'd (not furnished). See dwg S2 for material.
6. Welded flange configuration is available, refer to individual catalog sheets
7. "C" min. is minimum inter-flange gap with flanges extended against coupler.
8. Consult Eaton for specific applications
9. Additional materials and finishes available

CA33000 Coupler Assy
Series 33

Revision Letter S

TUBE O D (IN)	PART NO.	A	B	C	D	E	F	WEIGHT (LB)
.500	CA33005	1.26	.82	.82	1.00	.84	.65	.04
.750	CA33007	1.26	.82	.97	1.30	1.14	.94	.05
1.000	CA33010	1.58	1.08	1.13	1.65	1.39	1.19	.08
1.250	CA33012	1.58	1.08	1.25	1.90	1.64	1.44	.10
1.500	CA33015	1.58	1.08	1.37	2.15	1.89	1.69	.11
1.750	CA33017	1.58	1.08	1.58	2.40	2.14	1.94	.12
2.000	CA33020	1.58	1.08	1.70	2.65	2.39	2.19	.14
2.250	CA33022	1.58	1.08	1.83	2.90	2.64	2.44	.15
2.500	CA33025	1.58	1.08	1.95	3.15	2.89	2.69	.16
2.750	CA33027	1.58	1.08	2.08	3.40	3.14	2.94	.17
3.000	CA33030	1.58	1.08	2.20	3.65	3.39	3.19	.18
3.500	CA33035	1.92	1.31	2.61	4.23	3.89	3.69	.33
4.000	CA33040	1.92	1.31	2.86	2.73	4.39	4.19	.37
4.500	CA33045	1.92	1.31	3.10	5.23	4.89	4.69	.41
5.000	CA33050	1.92	1.31	3.36	5.73	5.39	5.19	.45
6.000	CA33060	2.35	1.69	3.99	6.98	6.62	6.38	.72



PART NUMBER CODE:

CA330 00

BASIC PART NO. _____

SIZE _____

MATERIAL _____

HINGES: 316 STAINLESS STEEL
BONDING JUMPERS, TOGGLE ASSY AND RETAINER ASSY:
17–7PH STAINLESS STEEL
COUPLER HALVES: ALUMINUM (AGED)
NO SUFFIX = ALUMINUM 2024 BLACK ANODIZED

REVISION	LTR	DESCRIPTION	DATE
	K	Added Note 5	3/19/86
	L	Added –093 configuration	6/23/87
	M	Added Note 6	7/1/87
	N	Changed Notes 3 & 6, deleted –091 configuration	7/28/87
	P	Deleted –09 configuration, Note 5, –092 and –093 configurations	8/16/89
	R	Added CA33005	2/4/92
	S	Revised hinge material	2/14/96

This issue supersedes all previously issued catalog sheets and drawings

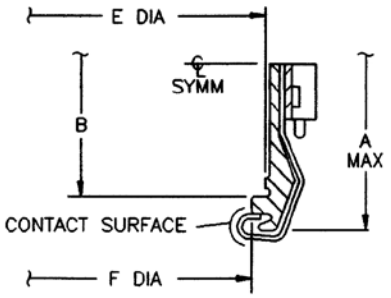
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. For top assembly, see J33000 catalog sheet.
4. Consult Eaton for specific applications
5. Deleted
6. In elevated temperature service, some discoloration of the dye may be experienced, and is not detrimental to the performance of the coupling
7. Additional materials and finishes available upon request

CA34000 Coupler Assembly
Series 34

Revision Letter K

TUBE O D (IN)	PART NO.	A	B	C	D	E	F	WEIGHT (LB)
2.000	CA34020	2.12	1.578	1.82	2.94	2.55	2.26	.23
2.500	CA34025	2.12	1.578	2.07	3.44	3.05	2.76	.26
3.000	CA34030	2.12	1.578	2.30	3.94	3.55	3.26	.31
3.500	CA34035	2.12	1.578	2.66	4.44	4.05	3.76	.35
4.000	CA34040	2.12	1.578	2.92	4.95	4.56	4.27	.42
4.500	CA34045	2.12	1.578	3.19	5.50	5.10	4.82	.47
5.000	CA34050	2.12	1.578	3.43	6.00	5.60	5.31	.52



PART NUMBER CODE:

CA340 00

BASIC PART NO.

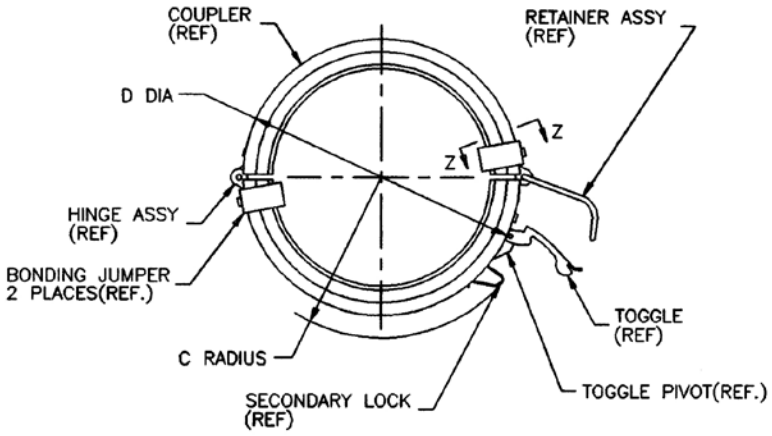
SIZE

MATERIAL

HINGES: 316 STAINLESS STEEL

BONDING JUMPERS, TOGGLE ASSY AND RETAINER ASSY: 17–7PH STAINLESS STEEL

COUPLER HALVES: ALUMINUM (AGED) BLACK ANODIZED



REVISION	LTR	DESCRIPTION	DATE
	H	Deleted –092 material	7/25/89
	J	Deleted –09 configuration	8/28/89
	K	Redrawn	2/14/96

This issue supersedes all previously issued catalog sheets and drawings

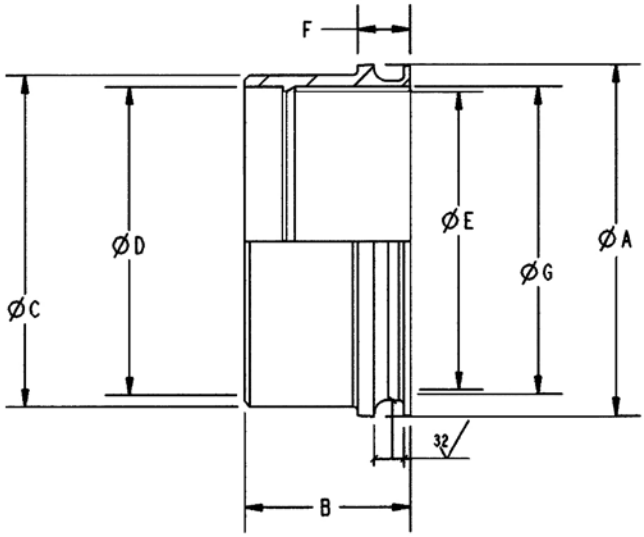
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Deleted
3. For additional design criteria and dimensions see J34000 catalog sheet
4. Consult Eaton for specific applications
5. Additional materials and finishes available upon request

F30200 Flange, Socket Welded
Series 30

Revision Letter L

TUBE O D (IN)	PART NO.	A	B ± .005	C	D	E	F	G	WEIGHT (LB) (STD CONFIG)		
									A, –15	C	T
.375	F30204	.616	.750	.50	.38	.31	.25	.38	.007	.020	.012
.500	F30205	.741	.750	.63	.51	.44	.25	.50	.009	.026	.015
.625	F30206	.866	.750	.75	.64	.56	.25	.63	.011	.031	.018
.750	F30207	1.036	.920	.88	.76	.69	.32	.75	.016	.047	.027
1.000	F30210	1.287	1.085	1.16	1.01	.94	.32	1.00	.028	.083	.048
1.250	F30212	1.537	1.080	1.41	1.26	1.19	.34	1.25	.042	.121	.070
1.500	F30215	1.785	1.080	1.65	1.51	1.44	.34	1.50	.043	.124	.071
1.750	F30217	2.035	1.080	1.90	1.76	1.69	.34	1.75	.044	.143	.082
2.000	F30220	2.285	1.080	2.15	2.01	1.94	.34	2.00	.056	.163	.094
2.250	F30222	2.535	1.080	2.40	2.26	2.19	.34	2.25	.063	.183	.105
2.500	F30225	2.785	1.080	2.65	2.51	2.44	.34	2.50	.069	.202	.116
2.750	F30227	3.035	1.080	2.90	2.76	2.69	.35	2.75	.075	.220	.127
3.000	F30230	3.285	1.080	3.15	3.01	2.94	.35	3.00	.083	.240	.138
3.500	F30235	3.785	1.200	3.65	3.51	3.44	.37	3.50	.106	.310	.179
4.000	F30240	4.285	1.200	4.15	4.01	3.94	.39	4.00	.122	.357	.206
4.500	F30245	4.785	1.330	4.65	4.51	4.44	.40	4.50	.152	.444	.256
5.000	F30250	5.285	1.330	5.15	5.01	4.94	.41	5.00	.170	.496	.286
5.500	F30255	6.003	1.520	5.65	5.51	5.44	.52	5.50	.274	.800	.461
6.000	F30260	6.503	1.520	6.19	6.01	5.94	.53	6.00	.336	.980	.565



PART NUMBER CODE:

F3020 00 X

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM, 6061-T6
C = STAINLESS STEEL 321, PASSIVATED
T = TITANIUM TI-CP-70
–02 = INCONEL 625
–15 = ALUMINUM 6061-T4

REVISION	LTR	DESCRIPTION	DATE
	G	Revised I.D. configuration, added "G" dim. Added weights.	5/21/84
	H	Revised "T" material	1/21/85
	J	Deleted alternate configurations	2/11/85
	K	Revised materials	4/7/86
	L	Added titanium weights	7/18/86

This issue supersedes all previously issued catalog sheets and drawings

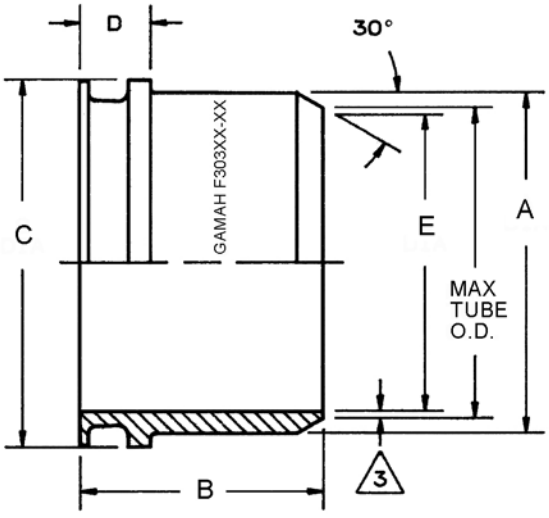
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

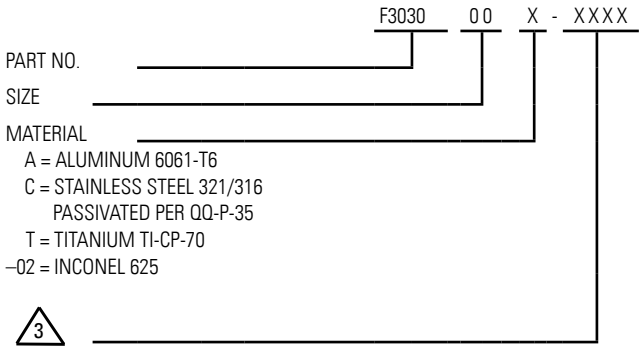
F30300 Flange, Butt Welded
Series 30

Revision Letter H

NOM TUBE O D (IN)	PART NO.	A	B	C	D	"E" DIA +.005 / -.000 FOR TUBE WALL THICKNESS RANGE ③				
						–1624	–2534	–3548	–4982	–95
.500	F30305	.625	.950	.741	.25	.468	.450	.430	—	—
.750	F30307	.875	.950	1.036	.32	.718	.700	.680	—	—
1.000	F30310	1.156	1.211	1.287	.32	.968	.950	.930	.902	.810
1.250	F30312	1.406	1.182	1.537	.34	1.218	1.200	1.180	1.152	1.060
1.500	F30315	1.654	1.182	1.785	.34	1.468	1.450	1.430	1.402	1.310
1.750	F30317	1.904	1.182	2.035	.34	1.718	1.700	1.680	1.652	1.560
2.000	F30320	2.154	1.182	2.285	.34	1.968	1.950	1.930	1.902	1.810
2.250	F30322	2.404	1.182	2.535	.34	2.218	2.200	2.180	2.152	2.060
2.500	F30325	2.654	1.179	2.785	.35	2.468	2.450	2.430	2.402	2.310
2.750	F30327	2.904	1.169	3.035	.36	2.718	2.700	2.680	2.652	2.560
3.000	F30330	3.154	1.164	3.285	.36	2.968	2.950	2.930	2.902	2.810
3.500	F30335	3.654	1.436	3.785	.37	3.468	3.450	3.430	3.402	3.310
4.000	F30340	4.154	1.423	4.285	.39	3.968	3.950	3.930	3.902	3.810
4.500	F30345	4.654	1.413	4.785	.40	4.468	4.450	4.430	4.402	4.310
5.000	F30350	5.154	1.403	5.285	.41	4.968	4.950	4.950	4.902	4.810



PART NUMBER CODE



REVISION	LTR	DESCRIPTION	DATE
	A	Revised "B" dim. all sizes	1/5/83
	B	Revised "T" material	1/21/85
	C	Added –02 material	3/4/85
	D	Revised p/n code and Note 3; added "E" dia. Added Note 4.	8/13/85
	E	Revised p/n code and Note 3	9/25/85
	F	Added –95 wall thickness range	4/13/87
	G	Revised wall thickness	1/11/90
	H	Added F30305 and F30307	2/4/92

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

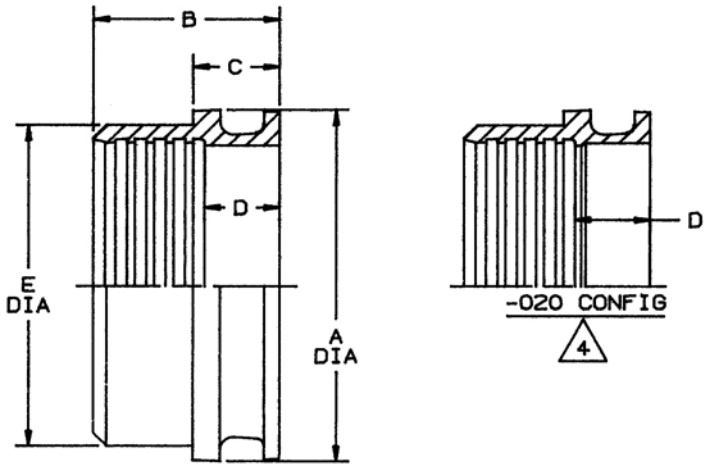
1. Tolerances: .XX = ± .010
2. Surface roughness 125

③ Dash no. = wall thickness range of tube and flange to be welded in thousandths of an inch (e.g.: -1624 is for .016 thru .024 wall thickness range).

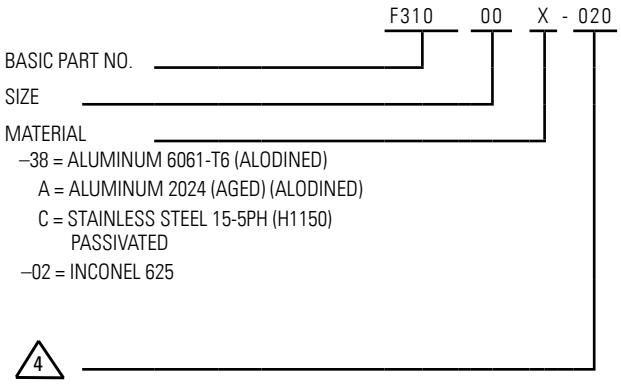
F31000 Flange Series 34

Revision Letter H

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	SWAGE BLOCK	— WEIGHT (LB) — A, –38	C
1.500	F31015	—	—	—	—	—	B31015	—	—
1.750	F31017	—	—	—	—	—	B31017	—	—
2.000	F31020	2.45	1.18	.48	.558	2.18	B31020	.08	.24
2.250	F31022	2.70	1.18	.48	.558	2.43	B31022	.09	.27
2.500	F31025	2.95	1.18	.48	.558	2.70	B31025	.12	.34
2.750	F31027	3.20	1.18	.48	.558	2.95	B31027	.12	.34
3.000	F31030	3.45	1.30	.54	.678	3.20	B31030	.15	.43
3.500	F31035	3.95	1.30	.54	.678	3.70	B31035	.19	.54
4.000	F31040	4.45	1.38	.54	.678	4.20	B31040	.20	.57
4.500	F31045	5.00	1.51	.54	.678	4.74	B31045	.30	.85
5.000	F31050	5.50	1.51	.54	.678	5.24	B31050	.33	.94
5.500	F31055	—	—	—	—	—	B31055	—	—
6.000	F31060	—	—	—	—	—	B31060	—	—



PART NUMBER CODE



REVISION	LTR	DESCRIPTION	DATE
	H	Added –02 material	3/8/85

This issue supersedes all previously issued catalog sheets and drawings

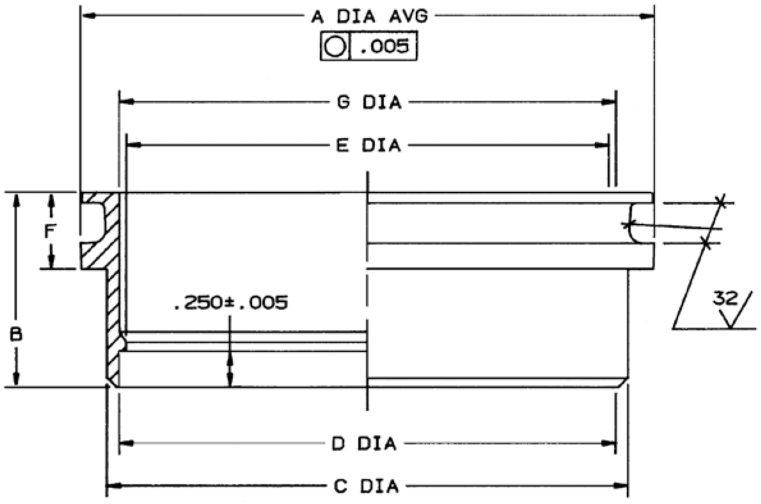
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Deleted
4. The –020 configuration may be substituted for the baic configuration (mfrs option). Use only –020 flanges with tube wall thickness less than .028.
5. Consult Eaton for specific applications

F31200 Flange, Socket Welded
Series 34

Revision Letter J

NOM TUBE O D (IN)	PART NO.	A	B ±.005	C	D	E	F	G	WEIGHT (LB) (STD CONFIG)		WEIGHT (LB) (ALTN CONFIG)	
									A	C	–15, A	C
1.500	F31215	—	—	—	—	—	—	—	—	—	—	—
1.750	F31217	—	—	—	—	—	—	—	—	—	—	—
2.000	F31220	2.455	1.183	2.18	2.006	1.97	.48	2.00	.08	.23	—	—
2.250	F31222	2.705	1.183	2.43	2.256	2.22	.48	2.25	.09	.26	—	—
2.500	F31225	2.955	1.183	2.70	2.506	2.47	.48	2.50	.11	.30	.11	.31
2.750	F31227	3.205	1.183	2.95	2.756	2.72	.48	2.75	.12	.33	—	—
3.000	F31230	3.454	1.303	3.20	3.006	2.97	.54	3.00	.14	.42	.15	.43
3.500	F31235	3.954	1.303	3.70	3.508	3.47	.54	3.50	.17	.48	—	—
4.000	F31240	4.453	1.379	4.19	4.008	3.97	.54	4.00	.20	.57	.21	.59
4.500	F31245	5.002	1.379	4.74	4.508	4.47	.54	4.50	.27	.77	—	—
5.000	F31250	5.502	1.379	5.24	5.008	4.97	.54	5.00	.30	.85	.31	.88
5.500	F31255	—	—	—	—	—	—	—	—	—	—	—
6.000	F31260	—	—	—	—	—	—	—	—	—	—	—



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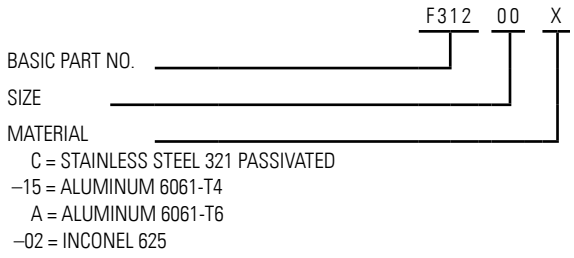
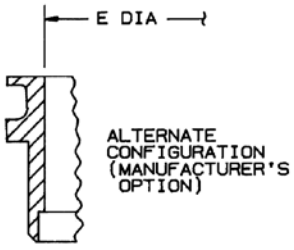




REVISION	LTR	DESCRIPTION	DATE
	G	Revised I.D. configuration	5/21/84
	H	Added –02 material	3/8/85
	J	Added "AVG" and ⌀ .005	11/19/85

This issue supersedes all previously issued catalog sheets and drawings

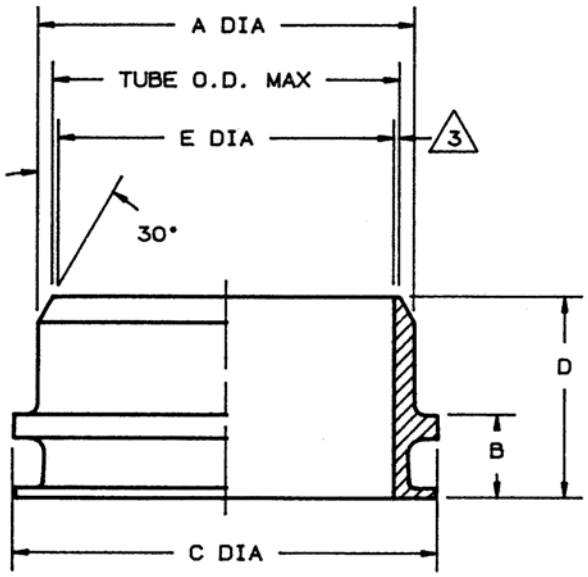
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

F31300 Flange, Butt Welded
Series 34

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	"E" DIA +.005 / -.000 FOR TUBE WALL THICKNESS RANGE ③			
						–1624	–2534	–3548	–4982
2.000	F31320	2.18	.48	2.455	1.470	1.968	1.950	1.930	1.902
2.250	F31322	2.43	.48	2.705	1.470	2.218	2.200	2.180	2.152
2.500	F31325	2.70	.48	2.955	1.470	2.468	2.450	2.430	2.402
2.750	F31327	2.95	.48	3.205	1.470	2.718	2.700	2.680	2.652
3.000	F31330	3.20	.54	3.454	1.470	2.968	2.950	2.930	2.902
3.500	F31335	3.70	.54	3.954	1.470	3.468	3.450	3.430	3.402
4.000	F31340	4.20	.54	4.453	1.470	3.968	3.950	3.930	3.902
4.500	F31345	4.74	.54	5.002	1.470	4.468	4.450	4.430	4.402
5.00	F31350	5.24	.54	5.502	1.470	4.968	4.950	4.930	4.902



PART NUMBER CODE

F313 00 X – XXXX

BASIC PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL
- A = ALUMINUM 6061-T6
- C = STAINLESS STEEL 321/347 PASSIVATED PER QQ-P-35
- T = TITANIUM TI-CO-70
- –02 = INCONEL 625

③

REVISION	LTR	DESCRIPTION	DATE
	A	Deleted: F31355, F31360, Note 4. Added: "D" dim., –02 material.	8/22/84
	B	Added "A" material. Revised "–37" material.	12/17/84
	C	Added weights.	3/15/85
	D	Revised p/n code and Note 3, added "E" dia. Revised Note 4.	8/13/85
	E	"T" material code was "–37". Added weights.	9/11/85
	F	Revised p/n code and Note 3	9/25/85
	G	Revised wall thickness ranges. Deleted Note 4.	1/11/90

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

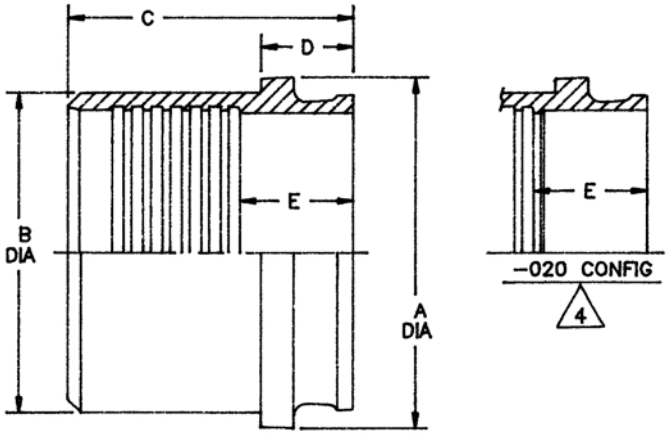
1. Tolerances: .XX = ± .010
2. Surface roughness 125

③ Dash no. = wall thickness range of tube and flange to be welded in thousandths of an inch. (Example: –1624 is for .016 thru .024 wall thickness range.)

F33100 Flange Swaged Fluorocarbon Seal Series 331

Revision Letter H

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	USE SWAGE BLOCK	WEIGHT (LB) T	C	–02	A
.500	F33105	.741	.63	.75	.25	.375	B20005	.010	.017	.018	.006
.750	F33107	1.036	.88	.92	.32	.418	B20007	.023	.04	.043	.014
1.000	F33110	1.287	1.16	1.08	.32	.418	B20010	.05	.08	.085	.028
1.250	F33112	1.537	1.41	.94	.34	.438	B20012	.05	.09	.096	.03
1.500	F33115	1.785	1.65	.94	.34	.438	B20015	.06	.10	.107	.03
1.750	F33117	2.035	1.90	.94	.34	.438	B20017	.07	.12	.130	.04
2.000	F33120	2.285	2.15	1.06	.34	.438	B20010	.09	.15	.160	.05
2.250	F33122	2.535	2.40	1.06	.34	.438	B20022	.10	.17	.181	.06
2.500	F33125	2.785	2.65	1.06	.35	.438	B20025	.11	.19	.203	.07
2.750	F33127	3.035	2.90	1.06	.36	.438	B20027	.12	.21	.224	.07
3.000	F33130	3.285	3.15	1.06	.36	.438	B20030	.13	.23	.245	.08



PART NUMBER CODE

F331 00 XX X

BASIC PART NO.

SIZE

MATERIAL
- C = STAINLESS STEEL 17-4PH (H1150) PASSIVATED
  STAINLESS STEEL 15-5PH (H1150) PASSIVATED
- A = ALUMINUM 2024 (AGED) (ANODIZED)
- –02 = INCONEL 625
- T = TITANIUM 6AL-4V

SPECIAL 4

REVISION	LTR	DESCRIPTION	DATE
	A	Revised swage blocks	12/21/83
	B	Added material description to "C"	5/2/84
	C	Added "A" material	4/12/85
	D	Added .750 inch size	11/6/85
	E	Added –02 material	2/13/86
	F	Added "T" material	3/26/86
	G	Added –020 configuration and Note 4	5/15/89
	H	Added F33105 size	6/4/92

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

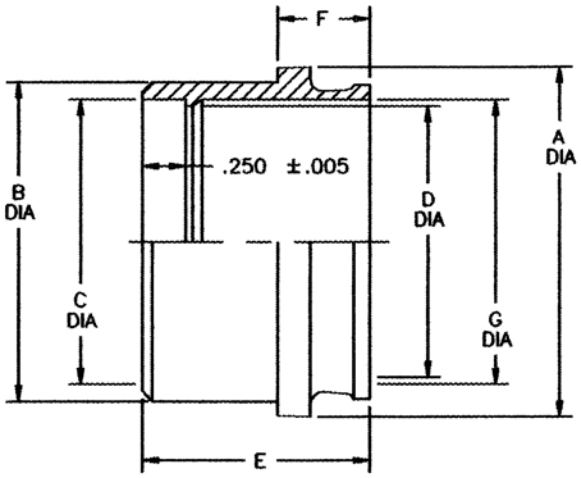
1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications.

4 The –020 configuration may be substituted for the basic configuration (mfrs option). Use only –020 flanges with tube wall thickness less that .028.

FW33200 Socket Welded Fluorocarbon Seal
Series 331

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	WEIGHT (LB) A	C	–02	T
.500	FW33205	.741	.62	.51	.44	.750	.25	.50	.008	.024	.025	.014
.750	FW33207	1.036	.88	.76	.69	.920	.32	.75	.014	.04	.043	.023
1.000	FW33210	1.287	1.16	1.01	.94	1.085	.32	1.00	.031	.09	.096	.05
1.250	FW33212	1.537	1.41	1.21	1.19	1.080	.34	1.25	.034	.10	.107	.06
1.500	FW33215	1.785	1.65	1.51	1.44	1.080	.34	1.50	.041	.12	.128	.07
1.750	FW33217	2.035	1.90	1.76	1.69	1.080	.34	1.75	.048	.14	.149	.08
2.000	FW33220	2.285	2.15	2.01	1.94	1.080	.34	2.00	.055	.16	.171	.09
2.250	FW33222	2.535	2.40	2.26	2.19	1.080	.34	2.25	.058	.17	.181	.10
2.500	FW33225	2.785	2.65	2.51	2.44	1.080	.35	2.50	.065	.19	.203	.11
2.750	FW33227	3.035	2.90	2.76	2.69	1.080	.36	2.75	.072	.21	.224	.12
3.000	FW33230	3.285	3.15	3.01	2.94	1.080	.36	3.00	.079	.23	.245	.13



PART NUMBER CODE

FW332 00 X X XX

PART NO.

SIZE

MATERIAL

C = STAINLESS STEEL 17-4PH (H1150) PASSIVATED
STAINLESS STEEL 15-5PH (H1150) PASSIVATED
–02 = INCONEL 625
T = TITANIUM TI-CO-70
4 A = ALUMINUM 2024 (AGED) (PASSIVATED)

OPTIONS

U = UNDERSIZE FOR PLATING AFTER WELDING

PLATING ALLOWANCE PER SURFACE IN TENTH THOUSANDTHS
(EXAMPLE: 15 = .0015 IN.)

REVISION	LTR	DESCRIPTION	DATE
	A	Added .750 inch size	11/6/85
	B	Revised tube stop, weights. Added "G" dia. and alternate configuration.	1/9/85
	C	Added –02 material	2/13/86
	D	Added "T" and "A" materials	3/26/86
	E	Added FW33205 size	6/4/92
	F	Added "U" option and Note 4	4/5/95

This issue supersedes all previously issued catalog sheets and drawings

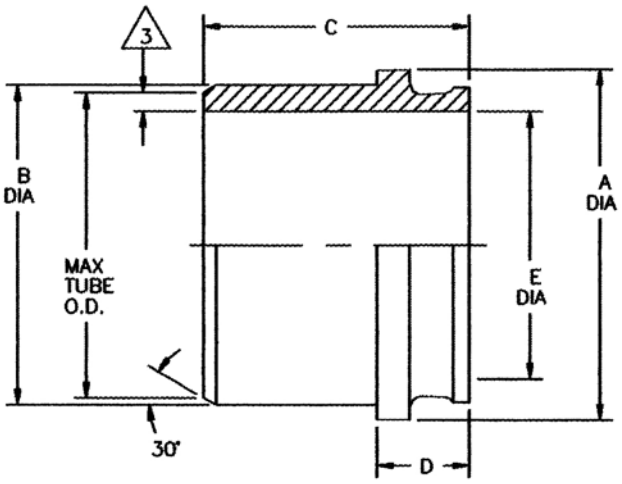
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications.
4. 500°F (260°C) maximum operating temperature for aluminum flanges.

FW33300 Flange, Butt Welded Fluorocarbon Seal
Series 331

Revision Letter H

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E DIA +.005/-.000 FOR —— TUBE WALL THICKNESS RANGE ——				——— WEIGHT (LB) ———			
						–1624	–2534	–3548	–4982	A	C	–02	T
.500	FW33305	.741	.625	.950	.25	.468	.450	.430	—	.015	.044	.047	.025
.750	FW33307	1.036	.875	1.042	.32	.726	.708	.688	.662	.023	.068	.073	.039
1.000	FW33310	1.287	1.156	1.211	.32	.976	.958	.938	.912	.041	.12	.12	.067
1.250	FW33312	1.537	1.406	1.182	.34	1.228	1.210	1.190	1.164	.048	.14	.15	.081
1.500	FW33315	1.785	1.654	1.182	.34	1.478	1.460	1.440	1.414	.058	.17	.18	.094
1.750	FW33317	2.035	1.904	1.182	.34	1.728	1.710	1.690	1.664	.065	.19	.21	.11
2.000	FW33320	2.285	2.154	1.182	.34	1.978	1.960	1.940	1.914	.075	.22	.24	.13
2.250	FW33322	2.535	2.404	1.182	.34	2.229	2.211	2.191	2.164	.086	.25	.26	.14
2.500	FW33325	2.785	2.654	1.179	.35	2.479	2.461	2.441	2.415	.092	.27	.29	.16
2.750	FW33327	3.035	2.904	1.179	.36	2.729	2.711	2.691	2.665	.10	.30	.32	.17
3.000	FW33330	3.285	3.154	1.164	.36	2.979	2.961	2.941	2.915	.11	.33	.35	.19



PART NUMBER CODE

FW333 00 X – XXXX X XX

PART NO.

SIZE

MATERIAL
C = STAINLESS STEEL 321, PASSIVATED
T = TITANIUM, COMM PURE
–02 = INCONEL 625
7 A = ALUMINUM 6061-T65**

3

OPTIONS
U = UNDERSIZE FOR PLATING AFTER WELDING

PLATING ALLOWANCE PER SURFACE IN TENTH THOUSANDTHS
(EXAMPLE: 15 = .0015 IN.)

REVISION	LTR	DESCRIPTION	DATE
	A	Revised p/n code and Note 3. Added "E" dim. and Note 5.	8/13/85
	B	Added .750 size. Revised Note 3 and tube wall thickness range.	11/6/85
	C	Added –02 material	2/13/86
	D	Added "T" material, weights and Note 6	3/31/86
	E	Added FW33305 size	6//4/92
	F	Added "A" material and options to p/n code, weight data, Note 7.	4/5/85

This issue supersedes all previously issued catalog sheets and drawings

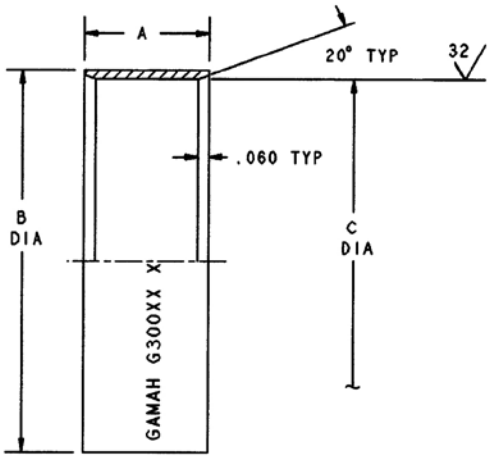
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Dash no. = wall thickness range of tube and flange to be welded in thousandths of an inch (example: –1624 for .016 thru .024 wall thickness range)
4. Consult Eaton for specific applications
5. Tube I.D. to be expanded to match "E" dia. prior to welding
6. Weights for –3458 tube wall thickness range
7. 500°F (260°C) maximum operating temperature for aluminum flanges

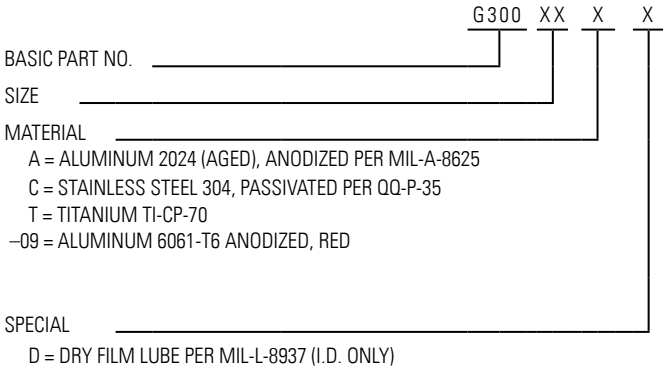
G30000 Sleeve
Series 30

Revision Letter J

NOM TUBE O D (IN)	PART NO.	A	B	C	WEIGHT (LB) A	C	T
.500	G30005	.809	.825	.744	.008	.022	.013
.750	G30007	.809	1.124	1.039	.012	.033	.019
1.000	G30010	1.059	1.375	1.290	.019	.054	.031
1.250	G30012	1.059	1.625	1.540	.022	.065	.037
1.500	G30015	1.059	1.875	1.788	.026	.077	.044
1.750	G30017	1.059	2.125	2.038	.030	.087	.049
2.000	G30020	1.059	2.375	2.288	.033	.098	.055
2.250	G30022	1.059	2.625	2.538	.037	.11	.061
2.500	G30025	1.059	2.875	2.788	.040	.12	.067
2.750	G30027	1.059	3.125	3.038	.044	.13	.073
3.000	G30030	1.059	3.375	3.288	.047	.14	.079
3.500	G30035	1.289	3.875	3.788	.066	.19	.11
4.000	G30040	1.289	4.375	4.288	.075	.22	.13
4.500	G30045	1.289	4.875	4.788	.084	.24	.14
5.000	G30050	1.289	5.375	5.288	.10	.27	.16
5.500	G30055	1.705	6.109	6.010	.16	.45	.26
6.000	G30060	1.705	6.609	6.510	.17	.48	.28



PART NUMBER CODE



REVISION	LTR	DESCRIPTION	DATE
	B	Redrawn. Revised notes and weights. Added p/n code.	3/30/80
	C	Deleted Note 3. "A" material now 2024 (aged).	1/29/82
	D	Added –09 material, Note 3	8/12/82
	E	Added G30007 size	7/20/84
	F	Revised "T" material	3/18/85
	G	Revised "A" material	4/21/86
	H	Added G30005 data.	2/4/92
	J	Revised "A" for G30055 and G30060 sizes	1/16/98

This issue supersedes all previously issued catalog sheets and drawings

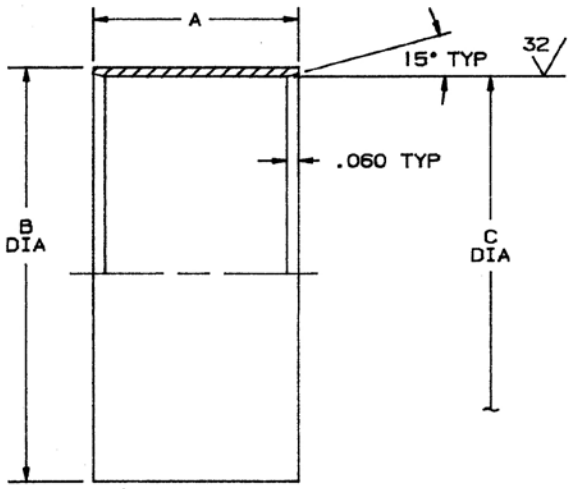
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications.

G31000 Sleeve
Series 34

Revision Letter E

NOM TUBE O D (IN)	PART NO.	A	B	C	WEIGHT (LB) –42	T	A	C
2.000	G31020	1.563	2.531	2.460	.14	.069	.042	.124
2.250	G31022	1.563	2.781	2.710	.16	.078	.048	.137
2.500	G31025	1.563	3.031	2.960	.17	.085	.052	.150
2.750	G31027	1.563	3.281	3.210	.18	.092	.057	.162
3.000	G31030	1.563	3.531	3.460	.19	.098	.060	.176
3.500	G31035	1.563	4.031	3.960	.22	.112	.068	.201
4.000	G31040	1.563	4.540	4.460	.28	.144	.088	.253
4.500	G31045	1.563	5.089	5.009	.32	.162	.099	.284
5.000	G31050	1.563	5.585	5.510	.33	.167	.102	.292
5.500	G31055	1.563	6.109	6.010	.48	.24	.15	.42



PART NUMBER CODE

G310 XX X X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED), ANODIZED PER MIL-A-8625

C = STAINLESS STEEL 304, PASSIVATED PER QQ-P-35

–09 = ALUMINUM 6061 (AGED), ANODIZED PER MIL-A-8625, COLOR RED

T = TITANIUM TI-CP-70

–42 = COPPER/NICKEL 70-30, ALLOY 24 PER MIL-C-15726

SPECIAL

D = DRY FILM LUBE PER MIL-L-8937 (I.D. ONLY)

REVISION	LTR	DESCRIPTION	DATE
	A	Added G31045 data, deleted G31025 data	12/10/82
	B	Added G31025, G31030 and G31035 data	8/8/83
	C	Added G31020 data	9/7/83
	D	Added "T" material and weights	3/15/85
	E	Added "–42" material and weights, added G31055 data	6/10/85

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications.

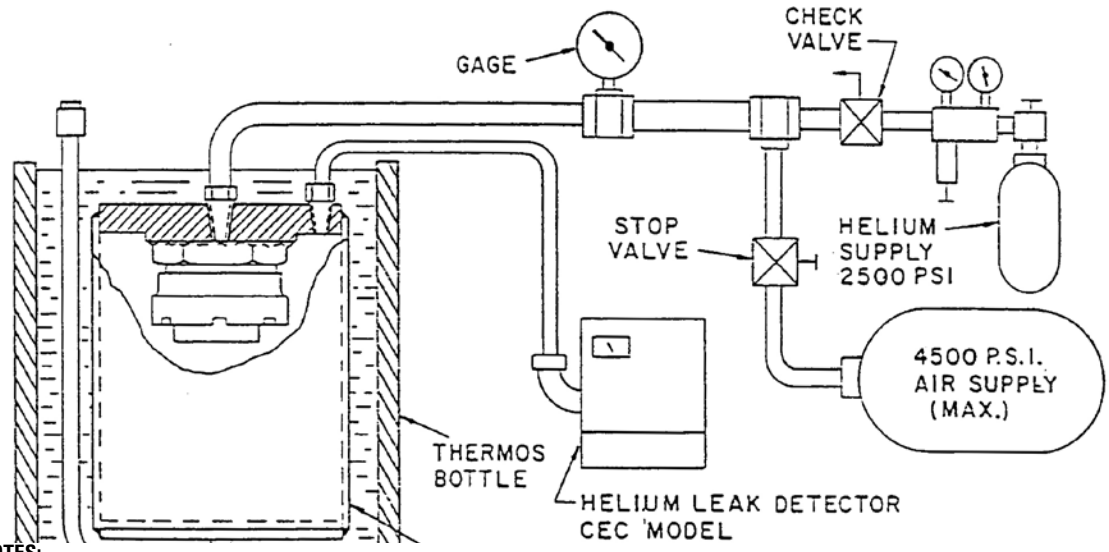
Threadless Flexible Coupling Unions and Adapters

PART NUMBER	DESCRIPTION	SERIES
K30000	Bulkhead Union Assembly, Threaded	30 & 33
KM33000	Bulkhead Union Assembly	33
KM34000	Bulkhead Union Assembly	34
N20500	Nut, Bulkhead	20 & 21
N30500	Nut, Bulkhead	30 & 33
T2236	Nut, Bulkhead	33 & JT315
U30000	Union, Bulkhead, Threaded	30 & 33
U30100	Union, Bulkhead, Bolted Flange	30 & 33
U31100	Union, Bulkhead, Threaded	34
UM33000	Union, Bulkhead, Threaded	33
U33200	Union Adapter, Bolted Flange	30 & 33
UM34000	Union, Bulkhead, Threaded	34

K30000 Threaded Bulkhead Union
Series 30/33

Revision Letter C

TUBE O D (IN)	ASSY PART NO.	BHD NUT PART NO. ⚠2	FLG SEAL ⚠1	BHD SEAL ⚠1	A (MAX)	B (MAX)	C	D (MAX)	E	F	G
1.000	K30010	N20510	–215	–031	6.27	2.96	.406	.282	2.12	2.13	1.645
1.250	K30012	N20510	–219	–031	5.89	2.77	.406	.282	2.12	2.13	1.645
1.500	K30015	N20512	–222	–032	5.96	2.77	.406	.352	2.35	2.42	1.895
1.750	K30017	N30517	–224	–034	6.02	2.77	.406	.412	2.71	2.71	2.145
2.000	K30020	N30520	–226	–036	6.32	2.90	.406	.462	3.00	3.00	2.395
2.250	K30022	N20517	–228	–038	6.32	2.90	.406	.462	3.29	3.29	2.645
2.500	K30025	N30525	–230	–040	6.31	2.89	.406	.462	3.30	3.44	2.895
2.750	K30027	N30527	–232	–041	6.27	2.87	.406	.462	3.55	3.69	3.145
3.000	K30020	N30530	–234	–042	6.25	2.86	.406	.462	3.80	3.94	3.395



NOTES:

⚠1 Seals are furnished. See S2 dwg. for materials.

⚠2 Available in aluminum and stainless steel only. Hex wrenching on K30010 thru K30022. Spanner wrenching (5/32 dia. holes) on K30025 thru K30050. Threads dry film lubed per MIL-L08937.

⚠3 Hex wrenching on K30010 thru K30022. Spanner wrenching (5/32 dia. holes) on K30025 thru K30050.

⚠4 For additional data on individual components, refer to component catalog sheets

⚠5 Swage per Technical Bulletin G2J-01

⚠6 Coupler halves are aluminum 2024 (aged) anodized (black) per MIL-A-8625. Coupler hinges are aluminum 6061-T6 anodized (black) per MIL-A-8625. All other parts are SST. 17-1PH, passivated per QQ-P-35.

⚠7 Coupler halves are alumimum 6061 (aged) anodized (red) per MIL-A-8625. Coupler hinges are aluminum 6061-T6 anodized (black) per MIL-A-8625. All other parts are SST 17-1PH passivated per QQ-P-35.

REVISION	LTR	DESCRIPTION	DATE
	A	Added K30010	6/18/82
	B	Redrawn. Revised C, D and E for K30025. Revised Notes 2 and 3. Added Note 7.	1/14/83
	C	Deleted K30035, K30040, K30045 and K30050 (sizes 3.5. 4.0, 4.5 and 5.0 inch)	5/20/83

This issue supersedes all previously issued catalog sheets and drawings

PART NUMBER CODE: K300 XX X X ⚠4

BASIC PART NO.

TUBE O.D. (TENTHS INCHES)

MATERIAL

A = ALUMINUM 2024 (AGED)

CA330XX ⚠6
F300XXA & U300XXA: CHEM. FILM TREATED PER MIL-C-5541, CLASS 3
N205XXA & N305XXA: ANODIZED (BLUE) PER MIL- A-8625
G300XXA: ANODIZED (DICHROMATE) MIL-A-8625

AW = SAME AS "A" MATERIAL EXCEPT F300XXAW ANODIZED (DICHROMATE) PER MIL-A-8625

C = STAINLESS STEEL
CA330XX-9
N205XXC, N305XXC, G300XXC, & U300XXC: 304 PASSIVATED PER QQ-P-35 ⚠7
F300XXC: 17-4PH OR 15-5PH PASSIVATED PER QQ-P-35

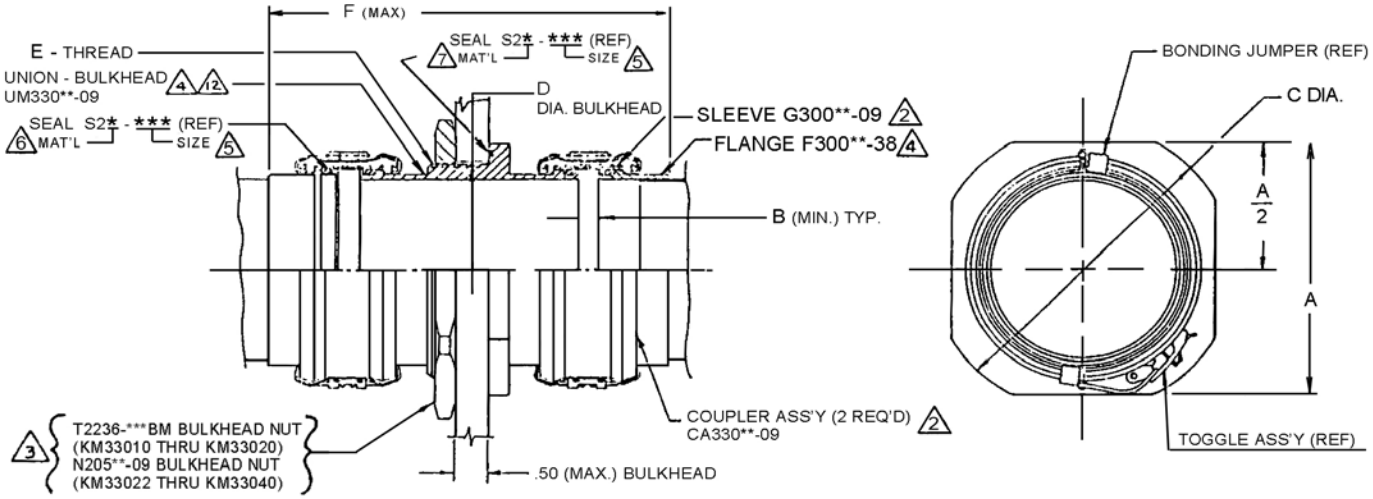
SPECIAL

D = DRY FILM LUBRICATED PER MIL-L-8937 (THREADS ONLY ON U300XX & I.D. ONLY ON G300XX

KM33000 Union, Bulkhead Assembly
Series 33

Revision Letter D

NOM TUBE O D (IN)	ASSY NO.	COUPLER ASSY	UNION BULK-HEAD	SLEEVE	FLANGE	NUT △3	— SEAL SIZE — △3△6	△5△7	A	B (MIN)	C	D +0.010 - 0.000	E-THREAD	F (MAX)	WEIGHT (LBS)
1.000	KM33010	CA33010	UM33010	G30010	△8	T2236-OT5	–215	–030	2.00	.38	2.45	1.438	1.375-16UN 2A	6.33	—
1.250	KM33012	CA33012	UM33012	G30012	F30012	T2236-100	–219	–032	2.19	.34	2.58	1.688	1.625-16UN 2A	6.18	—
1.500	KM33015	CA33015	UM33015	G30015	F30015	T2236-125	–222	–034	2.44	.34	2.95	1.938	1.875-16UN 2A	6.18	—
1.750	KM33017	CA33017	UM33017	G30017	F30017	T2236-150	–224	–036	2.81	.34	3.45	2.313	2.250-16UN 2A	6.18	—
2.000	KM33020	CA33020	UM33020	G30020	F30020	T2236-175	–226	–039	3.13	.34	3.70	2.563	2.500-16UN 2A	6.43	.95
2.250	KM33022	CA33022	UM33022	G30022	F30022	N20520	–228	–041	3.38	.34	3.95	2.813	2.750-16UN 2A	6.43	—
2.500	KM33025	CA33025	UM3025	G30025	F30025	N20522	–230	–042	3.75	.34	4.45	3.063	3.000-16UN 2A	6.42	—
2.750	KM33027	CA33027	UM33027	G30027	F30027	N20525	–232	–043	3.88	.32	4.45	3.313	3.250-16UN 2A	6.38	—
3.000	KM33030	CA33030	UM33030	G30030	F30030	N20527	–234	–044	4.13	.31	4.70	3.563	3.500-16UN 2A	6.36	—



NOTES:

1. Example of part no.: KM330XX
   Part no. — Size

△2 Coupler halves and sleeves are 6061 aluminum (aged), red anodized

△3 Bulkhead Nut 6061 aluminum (aged) anodized, dye black, followed by dry film lube on theads per MIL-L-8937

△4 Bulkhead Union and Flanges 6061 aluminum (aged), alodined △12

△5 Size per AS568

△6 Coupler Seal (not furnished) see S2 drawing for materials

△7 Bulkhead Seal (not furnished) see S2 drawing for materials

△8 For KM33010 use F30010 & L Flange only to provide bonding jumper contact

9 Swage per document 1882

10 "O" Ring lube to be compatible with system fluid

△12 UM33000 is available in stainless steel. See customer dwg.

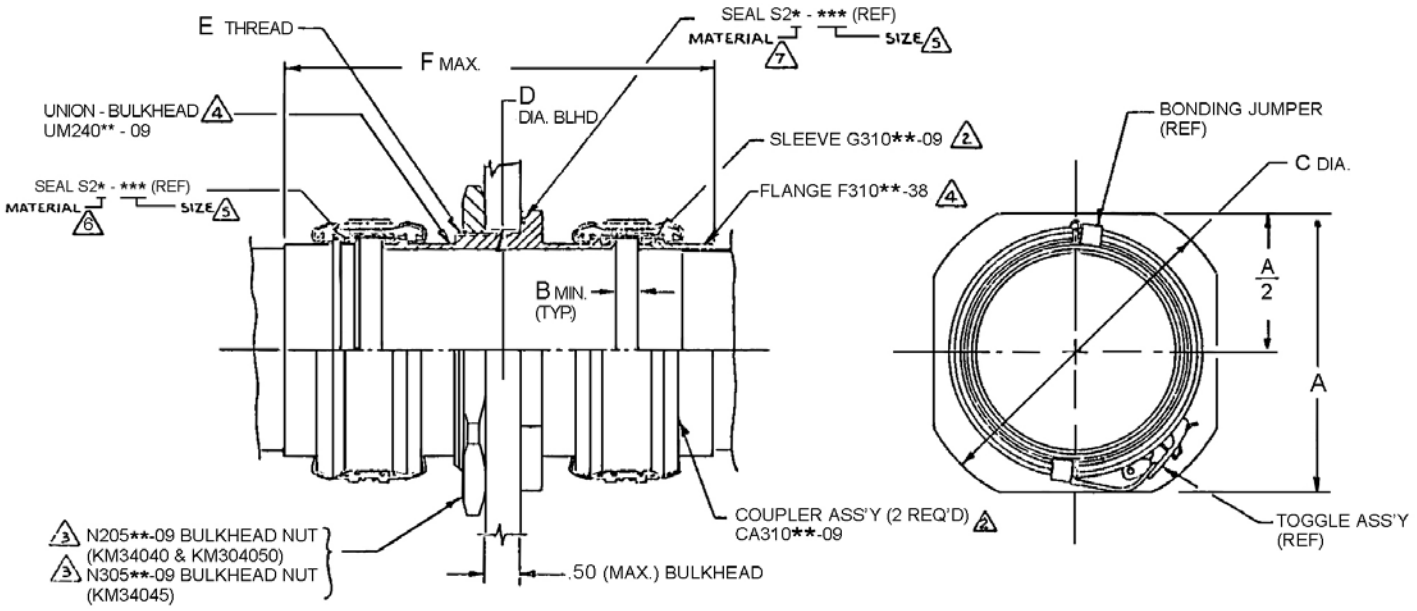
REVISION	LTR	DESCRIPTION	DATE
	B	Added 4 inch size, KM33040. Redrawn.	4/22/82
	C	Added Note 11, revised Note 2, deleted 4 inch size, added component numbers to drawing	8/12/82
	D	Added Note 12	1/19/93

This issue supersedes all previously issued catalog sheets and drawings

KM34000 Union, Bulkhead Assembly
Series 34

Revision Letter A

NOM TUBE O D (IN)	ASSY NO.	COUPLER ASSY	UNION BULKHEAD	SLEEVE	FLANGE	NUT △3	— SEAL SIZE — △5 △6	△5 △7	A	B (MIN)	C	D +0.010 - 0.000	E – THREAD	F (MAX)	WEIGHT (LBS)
4.000	KM34040	CA34040	UM34040	G31040	F31040	N20540	–346	–048	5.44	.45	6.45	4.813	4.750-16UN-2	7.91	2.96
4.500	KM34045	CA34045	UM34045	G31045	F31045	N30550	–350	–161	6.13	.45	7.27	5.438	5.375-16UN-2	8.20	3.67
5.000	KM34050	CA34050	UM34050	G31050	F31050	N20550	–354	–162	6.50	.45	7.72	5.813	5.750-16UN-2	8.20	4.03



NOTES:

1. Example of part no.: KM340XX
   Part no. — Size

△2 Coupler halves amd Sleeves are 6061 aluminum (aged) – red anodized

△3 Bulkhead Nut is 6061 aluminum (aged), black anodized, with dry film lube (MIL-L-8937) on theads

△4 Bulkhead Union and Flange are 6061 aluminum (aged), alodined

△5 Size per AS568

△6 Coupler Seal (not furnished) — see S2 drawing for materials

△7 Bulkhead Seal (not furnished) — see S2 drawing for materials

8. Swage per document 1882
9. Consult Eaton for specific applications

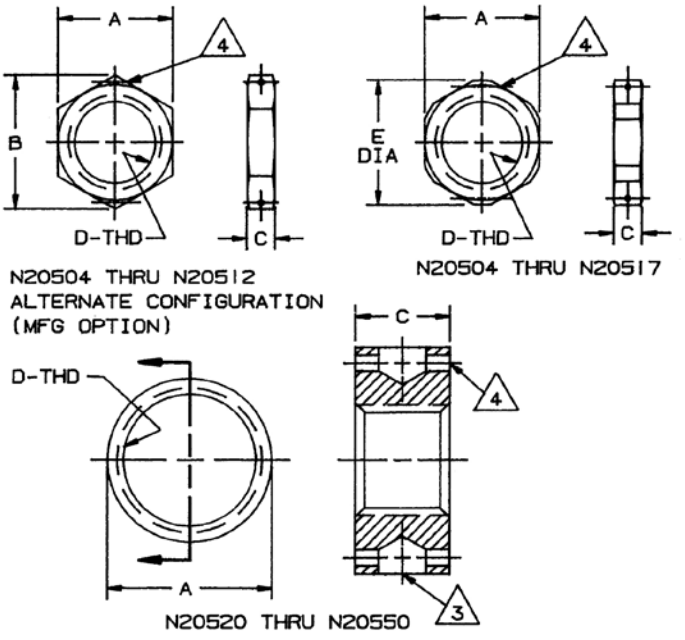
REVISION	LTR	DESCRIPTION	DATE
	A	Revised KM34050 data. Added KM34045 data.	12/10/82

This issue supersedes all previously issued catalog sheets and drawings

N20500 Nut, Bulkhead
Series 20 and 21

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B (MIN)	C	D THREAD	E DIA	WEIGHT (LB)		
							A	C	09
.375	N20504	1.13	1.27	.359	.875-14UNF-2B	1.24	.019	.054	.018
.500	N20505	1.38	1.56	.406	1.062-12UN-2B	1.47	.034	.098	.033
.625	N20506	1.63	1.83	.406	1.312-12UN-2B	1.76	.041	.12	.040
.750	N20507	1.63	1.83	.406	1.312-12UN-2B	1.76	.041	.12	.040
1.000	N20510	1.94	2.18	.406	1.625-12UN-2B	2.12	.053	.15	.052
1.250	N20512	2.19	2.47	.406	1.875-12UN-2B	2.35	.062	.18	.061
1.500	N20515	2.75	—	.406	2.313-16UNS-2B	3.00	.10	.29	.098
1.750	N20517	3.00	—	.406	2.625-16UN-2B	3.29	.10	.30	.098
2.000	N20520	3.19	—	.406	2.750-16UN-2B	—	.094	.27	.087
2.250	N20522	3.31	—	.406	3.000-16UN-2B	—	.069	.20	.068
2.500	N20525	3.56	—	.406	3.250-16UN-2B	—	.077	.22	.074
2.750	N20527	3.81	—	.406	3.500-16UN-2B	—	.080	.23	.078
3.000	N20530	4.12	—	.406	3.750-16UN-2B	—	.10	.20	.098
3.500	N20535	4.62	—	.406	4.250-16UN-2B	—	.104	.20	.102
4.000	N20540	5.25	—	.406	4.750-16UN-2B	—	.159	.45	.155
4.500	N20545	6.00	—	.406	5.500-16UN-2B	—	.183	.52	.179
5.000	N20550	6.25	—	.406	5.750-16UN-2B	—	.191	.54	.187



PART NUMBER CODE

N205 00 X – 6

PART NO.

NOM TUBE O.D. IN TENTHS OF AN INCH

MATERIAL/FINISH
- A = ALUMINUM 2024-T851, ANODIZE, DYE BLUE
- C = STAINLESS STEEL, PASSIVATED
- –09 = 6061-T6, ANODIZE, DYE BLACK

OPTION
- –6 = 6 LOCKWIRE HOLES REQUIRED ON HEX CONFIGURATION

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Spanner wrench hole (4 plc) provided in each nut.
4. Lockwire holes (2 plcs) provided in each nut
5. Threads are dry film lubed per MIL-L-8937
6. Eaton's Gamah Series 20/21 bulkhead nuts are used with U20000 and U21000 Series threaded union.
7. See spanner wrench M1015
8. This part supersedes: T1060–150, –175, –225 thru –450 only. T2236–200 thru –500 only. T2304 all sizes.

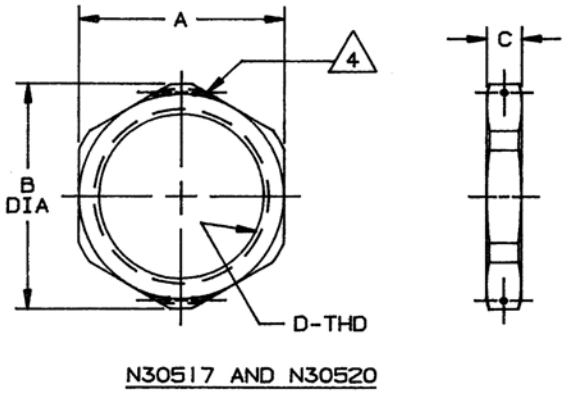
REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn. Revised views and "B" dim. Added "E" dia. Revised weights for N20504, N20520 and N20525. Revised thread series for N20520.	5/15/80
	E	Revised "E" for N20504 and N20512	11/3/81
	F	Added Note 8	12/8/81
	G	Added –6 option	2/5/92

This issue supersedes all previously issued catalog sheets and drawings

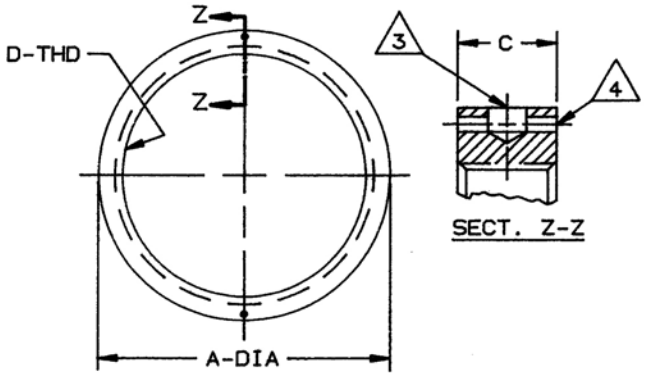
N30500 Nut, Bulkhead
Series 30/33

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A	B	C	D – THREAD	WEIGHT (LB) A, —09	WEIGHT (LB) C
1.750	N30517	2.50	2.71	.406	2.125-16UN-2B	.072	.205
2.000	N30520	2.75	3.00	.406	2.375-16UN-2B	.083	.237
2.500	N30525	3.30	—	.406	2.875-16UN-2B	.090	.256
2.750	N30527	3.55	—	.406	3.125-16UN-2B	.097	.277
3.000	N30530	3.80	—	.406	3.375-16UN-2B	.104	.298
3.500	N30535	4.30	—	.406	3.875-16UN-2B	.119	.340
4.000	N30540	4.80	—	.406	4.375-16UN-2B	.134	.382
4.500	N30545	5.30	—	.406	4.875-16UN-2B	.148	.424
5.000	N30550	5.80	—	.406	5.375-16UN-2B	.163	.466



N30517 AND N30520



N30525 THRU N30550

PART NUMBER CODE

N305 00 X

PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL/FINISH

A = ALUMINUM 2024 (AGED), ANODIZE, DYE BLUE

C = STAINLESS STEEL, PASSIVATED

–09 = 6061-T6, ANODIZE, DYE BLACK

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Spanner wrench hole (4 plc) 5/32 dia.
4. Lockwire holes (2 plcs) provided in each nut
5. Threads are dry film lubed per MIL-L-8937
6. Eaton's Gamah Series 30 bulkhead nuts are used with U30000 and K30000 union assembly
7. See spanner wrench M1015

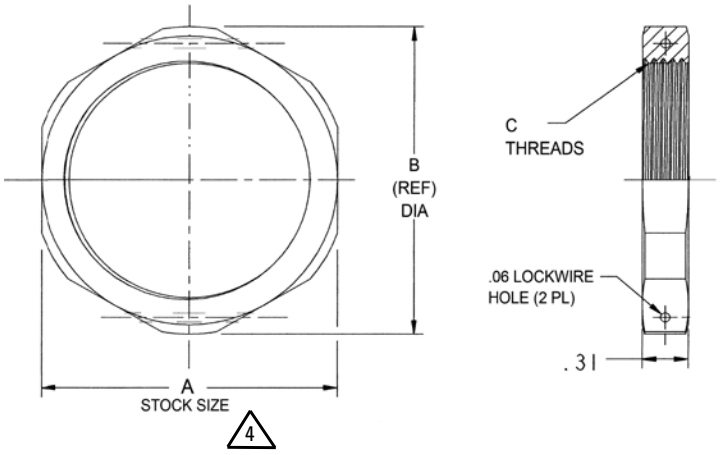
REVISION	LTR	DESCRIPTION	DATE
	A	Added N30524	12/16/82

This issue supersedes all previously issued catalog sheets and drawings

T2236 Nut
JT315 Bulkhead

Revision Letter F

NOM TUBE O D (IN)	PART NO. T2236	A ⚠4	B	C	MAX WEIGHT (LB) AL	MAX WEIGHT (LB) SST
.375	–038	1.25	1.32	15/16-16UN-2B	.006	.018
.500	–050	1.38	1.47	1-1/16-16UN-2B	.008	.024
.625	–063	1.50	1.61	1-3/16-16UN-2B	.009	.027
.750	–075	1.75	1.90	1-3/8-16UN-2B	.012	.036
1.000	–100	2.00	2.13	1-5/8-16UN-2B	.022	.068
1.250	–125	2.25	2.42	1-7/8-16UN-2B	.024	.073
1.500	–150	2.75	3.00	1-2/4-16UN-2B	.039	.118
1.750	–175	3.00	3.28	2½-16UN-2B	.041	.124



PART NUMBER CODE

T2236 X 000 X XX

BASIC PART NO.

SPECIAL REQUIREMENTS

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL
- B = 6061-T6 PER QQ-A-200/8
- D = STAINLESS STEEL 304 WITH 304L, 316, 316L 321 AS ALTERNATES
- C = ALUMINUM 2024-T351 PER QQ-A-225/6
  ALUMINUM 2024-T3510 PER QQ-A-200/3
  ALUMINUM 2024-T4 PER QQ-A-200/3 OR QQ-A-255/6

FINISH
- Y = PASSIVATE PER QQ-P-35, FOLLOWED BY DRY FILM LUBE, MIL-L-8937
- Z = ANODIZE PER MIL-A-8625, TYPE II, FOLLOWED BY DRY FILM LUBE, MIL- L-8937
- M = ANODIZE PER MIL-A-8625, TYPE II DYE BLACK

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn from "Customer Use Only"	2/15/79
	E	Added "B" material and "M" finish	12/8/81
	F	Deleted –200 thru –500 sizes. Revised "B" dims. for –038 thru –175.	8/03/95

This issue supersedes all previously issued catalog sheets and drawings

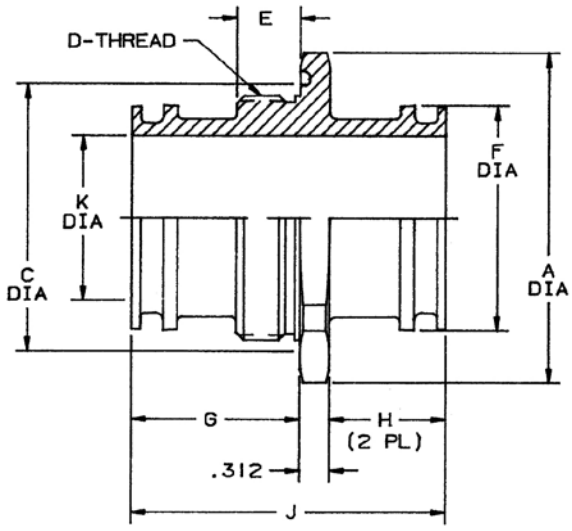
NOTES (UNLESS OTHERWISE SPECIFIED):

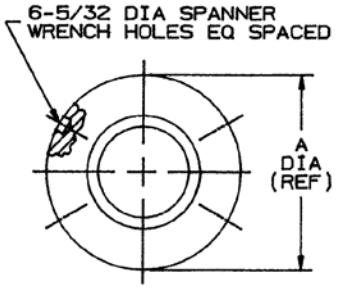
1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Dry film lube threads, other surfaces optional when specified by code
4. ⚠4 External surface not machined, surface finish per respective raw material specification
5. For sizes larger than 1/750 see N20500

U30000 Union, Bulkhead
Series 30 and 33

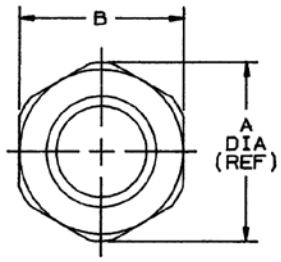
Revision Letter C

NOM TUBE O D (IN)	PART NO.	A	B	C	D – THREAD	E	F	G	H	J	K	WEIGHT (LB) A	C	T
1.000	U30010	2.13	2.00	1.750	1.625-12UN-2A	.69	1.287	1.73	1.04	3.08	.98	.22	.63	.36
1.250	U30012	2.13	2.00	1.750	1.625-12UN-2A	.69	1.537	1.73	1.04	3.08	1.23	.20	.59	.34
1.500	U30015	2.42	2.25	2.000	1.875-12UN-2A	.75	1.785	1.79	1.04	3.15	1.48	.24	.71	.40
1.750	U30017	2.71	2.50	2.250	2.125-12UN-2A	.81	2.035	1.85	1.04	3.20	1.73	.29	.85	.48
2.000	U30020	3.00	2.75	2.500	2.375-16UN-2A	.86	2.285	1.90	1.04	3.25	1.98	.33	.97	.55
2.250	U30022	3.29	3.00	2.750	2.625-16UN-2A	.86	2.535	1.90	1.04	3.25	2.23	.37	1.08	.62
2.500	U30025	3.44	—	3.000	2.875-16UN-2A	.86	2.785	1.90	1.04	3.25	2.48	.41	1.21	.69
2.750	U30027	3.69	—	3.250	3.125-16UN-2A	.86	3.035	1.90	1.04	3.25	2.73	.49	1.46	.83
3.000	U30030	3.94	—	3.500	3.375-16UN-2A	.86	3.285	1.90	1.04	3.25	2.98	.53	1.58	.90
3.500	U30035	4.44	—	4.000	3.875-16UN-2A	.86	3.785	2.02	1.16	3.49	3.48	.60	1.71	.97
4.000	U30040	4.94	—	4.500	4.375-16UN-2A	.86	4.285	2.02	1.16	3.49	3.98	.68	1.95	1.11
4.500	U30045	5.44	—	5.000	4.875-16UN-2A	.86	4.785	2.02	1.16	3.49	4.48	.77	2.19	1.25
5.000	U30050	5.94	—	5.500	5.375-16UN-2A	.86	5.285	2.02	1.16	3.49	4.98	.85	2.42	1.38





U30025 & UP



U30005 THRU U30022

PART NUMBER CODE

U300 00 X X

BASIC PART NO.

SIZE

MATERIAL

A = AL 2024 (AGED). ALODINED/MIL-c-5541
C = SST 304 OR 304L. PASSIVATED/QQ-P-35
T = TITANIUM TI-CP-70

FINISH

D = DRY FILM LUBE, MIL-L-8937 OR MIL-L-46010 AS APPLICABLE (THREADS ONLY).

REVISION	LTR	DESCRIPTION	DATE
	A	Added U30010	6/1/8/82
	B	Revised "T" Material	1/30/85
	C	Revised "D" finish	7/21/86

This issue supersedes all previously issued catalog sheets and drawings

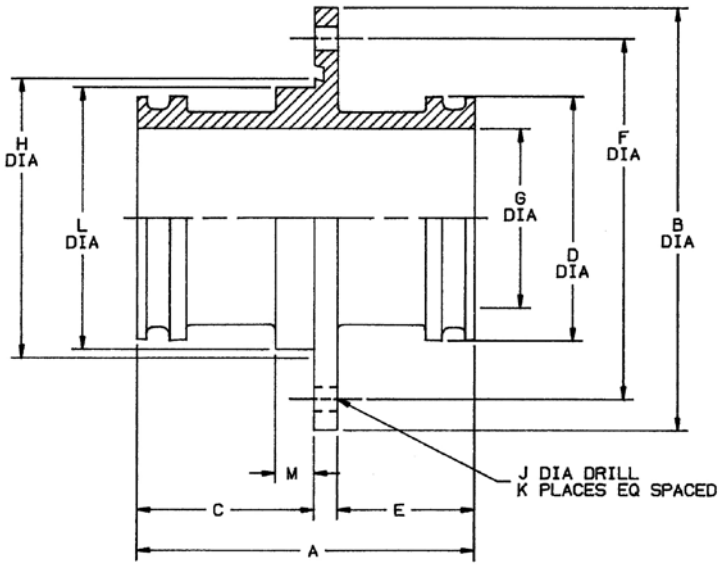
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± ..03, .XX = ± .010
2. Surface roughness 125

U30100 Union, Bulkhead, Bolted Flange
Series 30 and 33

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	H (MIN)	J	K	L	M	— WEIGHT (LB) — A	C	T
1.000	U30110	3.10	2.44	1.61	1.2887	1.37	2.024	.98	1.500	.206	4	1.332	.240	.15	.43	.24
1.250	U30112	3.10	2.88	1.61	1.537	1.37	2.342	1.23	1.750	.266	4	1.582	.240	.18	.52	.30
1.500	U30115	3.10	3.10	1.61	1.785	1.37	2.562	1.48	2.000	.266	4	1.830	.240	.21	.60	.34
1.750	U30117	3.14	3.35	1.65	2.035	1.37	2.813	1.73	2.250	.266	4	2.078	.280	.23	.68	.39
2.000	U30120	3.25	3.78	1.69	2.285	1.41	3.215	1.98	2.500	.328	4	2.328	.280	.28	.82	.47
2.250	U30122	3.25	4.03	1.69	2.535	1.41	3.375	2.23	2.750	.328	6	2.578	.280	.31	.91	.52
2.500	U30125	3.39	4.28	1.82	2.785	1.41	3.625	2.48	3.000	.328	6	2.828	.405	.36	1.05	.60
2.750	U30127	3.39	4.53	1.82	3.035	1.41	3.875	2.73	3.250	.328	6	3.078	.405	.39	1.15	.65
3.000	U30130	3.39	4.78	1.82	3.285	1.41	4.125	2.98	3.500	.328	6	3.328	.405	.42	1.25	.71



PART NUMBER CODE

U301 00 X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED) AND CHEMICAL FILMED PER MIL-C-5541
C = STAINLESS STEEL 304 PASSIVATED
T = TITANIUM TI-CP-70

REVISION	LTR	DESCRIPTION	DATE
	A	Revised "T" material	1/30/85

This issue supersedes all previously issued catalog sheets and drawings

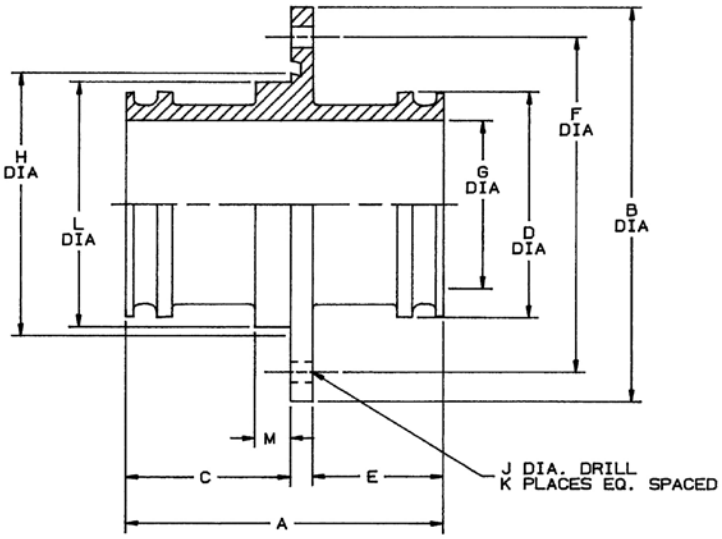
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

U31100 Union, Bulkhead, Bolted Flange
Series 34

Revision Letter N/C

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	H (MIN)	J	K	L	M	WEIGHT (LB) A	WEIGHT (LB) C
4.000	U31140	3.66	6.12	1.95	4.453	1.55	5.438	3.98	4.665	.328	8	4.496	.405	.80	2.34



PART NUMBER CODE

U311 00 X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED) AND CHEMICAL FILMED PER MIL-C-5541

C = STAINLESS STEEL 304 PASSIVATED

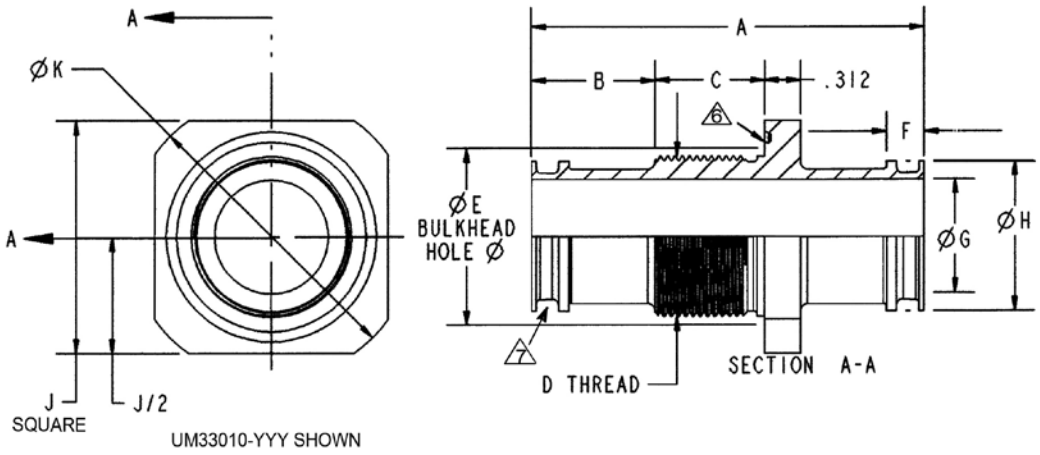
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

UM33000 Union, Bulkhead
Series 33

Revision Letter N/C

NOM TUBE O D (IN)	PART NO.	A	B	C	D – THREAD	E +.060 -.030	F	G	H	J	K	REF 6	REF 7	WEIGHT (LB) –38	WEIGHT (LB) C
1.000	UM33010	3.37	1.06	.937	1.375-16UN-2A	1.438	.322	.98	1.287	2.00	2.45	–030	–215	.21	.61
1.250	UM33012	—	—	—	1.625-16UN-2A	1.688	.342	1.23	1.537	2.19	2.58	–032	–219	—	—
1.500	UM33015	—	—	—	1.875-16UN-2A	1.938	.342	1.48	1.785	2.44	2.95	–034	–222	.30	.88
1.750	UM33017	—	—	—	2.250-16UN-2A	2.313	.342	1.73	2.035	2.81	3.45	–037	–224	—	—
2.000	UM33020	—	—	—	2.500-16UN-2A	2.563	.342	1.98	2.285	3.13	3.70	–039	–226	.46	1.34
2.250	UM33022	—	—	—	2.750-16UN-2A	2.813	.342	2.23	2.535	3.38	3.95	–041	–228	—	—
2.500	UM33025	—	—	—	3.000-16UN-2A	3.063	.345	2.48	2.785	3.75	4.45	–042	–230	.75	2.19
2.750	UM33027	—	—	—	3.250-16UN-2A	3.313	.355	2.73	3.035	3.88	4.45	–043	–232	—	—
3.000	UM33030	3.37	1.06	.937	3.500-16UN-2A	3.563	.360	2.98	3.285	4.13	4.70	–044	–234	.88	2.57



UM33010-YYY SHOWN

PART NUMBER CODE

UM330 00 X

BASIC PART NO.

SIZE

MATERIAL

5 C = STAINLESS STEEL 304

2 –38 = ALUMINUM 6061 (AGED)

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Chemical film treat per MIL-C-5541, Class 3
3. Consult Eaton for specific applications
4. Deleted
5. Passivated per QQ-P-35
6. Bulkhead seal
7. Seal — 2 required

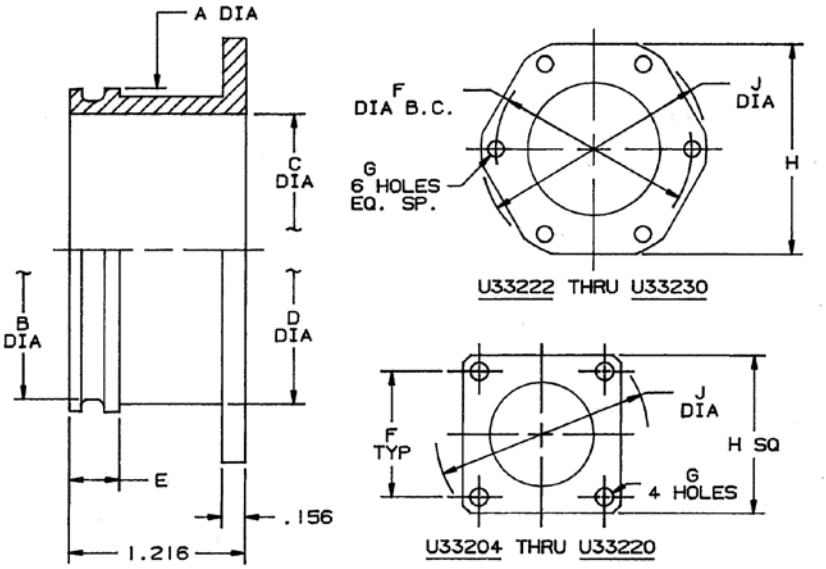
REVISION	LTR	DESCRIPTION	DATE
	J	Deleted 4 inch size	5/19/83
	K	Deleted Note 4 and –09 material	2/1/84
	L	Added "C" material	1/19/93
	M	Added Notes 6 and 7, seal data	6/29/93

This issue supersedes all previously issued catalog sheets and drawings

U33200 Union Adapter, Bolted
Series 30 & 33

Revision Letter D

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E REF	F	G REF	H	J ±.030	—— WEIGHT (LB) —— –38, A, –09	C
.375	U33024	—	—	—	—	—	—	—	—	—		
.500	U33205	—	—	—	—	—	—	—	—	—		
.625	U33206	—	—	—	—	—	—	—	—	—		
.750	U33207	—	—	—	—	—	—	—	—	—		
1.000	U33210	1.287	1.070	.975	1.156	3.22	1.312	.206	1.750	2.312	.06	.19
1.250	U33212	—	—	—	—	—	—	—	—	—		
1.500	U33215	1.785	1.568	1.475	1.654	.342	1.812	"H"	2.500	3.094	.90	.27
1.750	U33217	—	—	—	—	—	—	—	—	—		
2.000	U33220	2.285	2.068	1.975	2.154	3.42	2.375	21/64	3.000	3.953	.19	.55
2.250	U33222	—	—	—	—	—	—	—	—	—		
2.500	U33225	2.785	2.568	2.475	2.654	.345	3.812	21/64	4.000	4.500		
2.750	U33227	—	—	—	—	—	—	—	—	—		
3.000	U33230	3.285	3.068	2.975	3.154	.360	4.312	21/64	4.500	5.000		



PART NUMBER CODE

U332 00 X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED)
–38 = ALUMINUM 6061 (AGED), ALODINED
C = STAINLESS STEEL 304 PASSIVATED
–09 = ALUMINUM 6061 (AGED), ANODIZED BLACK

REVISION	LTR	DESCRIPTION	DATE
	A	Added Note 3	8/12/82
	B	Added weight column and –020, –09 weights	9/16/82
	C	Revised Code 6061 material and added U33210 data	1/3/83
	D	Revised dim. "J" tolerance	5/13/88

This issue supersedes all previously issued catalog sheets and drawings

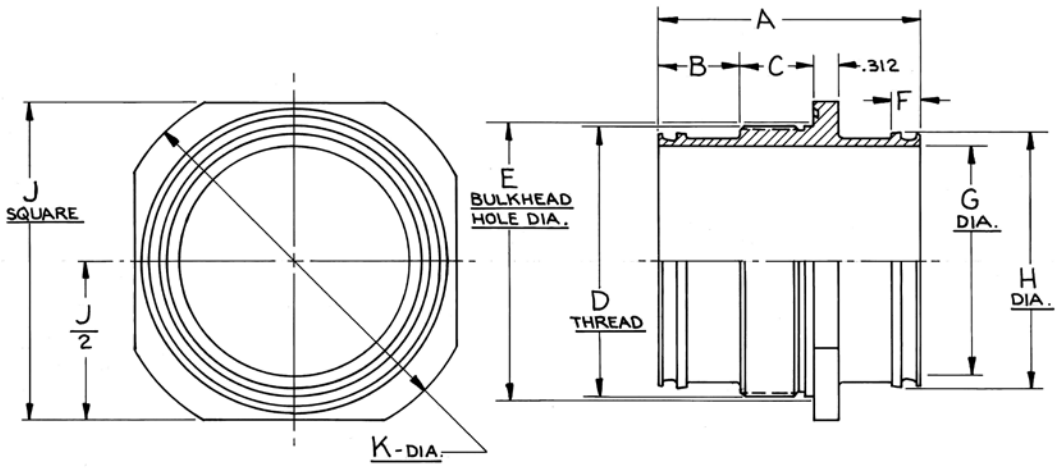
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

UM34000 Union, Bulkhead
Series 34

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A	B	C	D – THREAD	E +.060 -.030	F	G	H	J	K	WEIGHT (LB) –09
4.000	UM34040	4.01	1.38	.937	4.750-16UN-2A	4.813	.539	3.98	4.453	5.44	6.45	1.39
4.500	UM34045	4.01	1.38	.937	5.375-16UN-2A	5.438	.539	4.48	5.002	6.13	7.27	1.77
5.000	UM34050	4.01	1.38	.937	5.750-16UN-2A	5.813	.539	4.98	5.502	6.50	7.72	1.86



PART NUMBER CODE

U340 00 X

BASIC PART NO.

SIZE

MATERIAL

–38 = ALUMINUM 6061 (AGED), CHEM. FILM TREATED PER MIL-C-5541, CLASS 3

REVISION	LTR	DESCRIPTION	DATE
	A	Revised UM34050 data. Added UM34045 data, –038 material was –09	12/10/82

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications

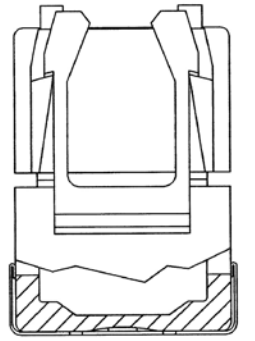
Threadless Flexible Composite Couplings

PART NUMBER	DESCRIPTION	SERIES
CA62000	Coupler Assembly	62
CA62020	Coupler Assembly	62
CA62100	Coupler Assembly	62
CG62000	Coupler/Sleeve Assembly	62
CG62020	Coupler/Sleeve Assembly	62
CG62100	Coupler/Sleeve Assembly	62
G62000	Sleeve	62

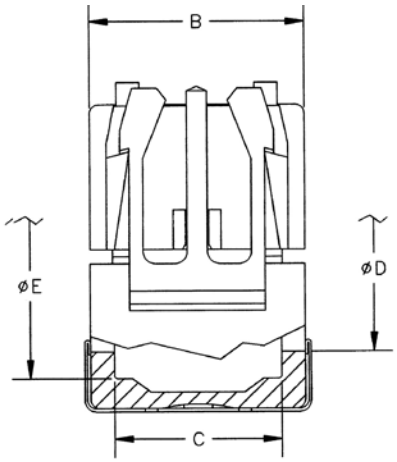
CA62000 Threadless Coupler Assembly Series 62

Revision Letter E

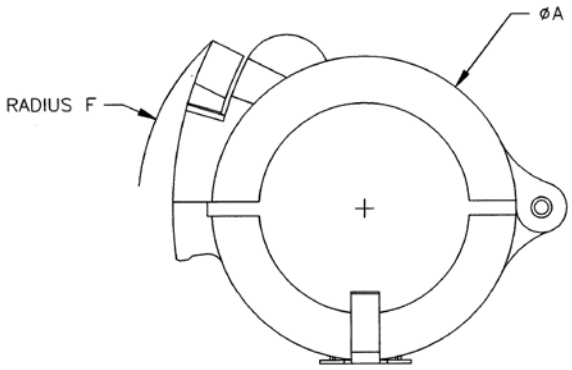
NOM TUBE O D (IN)	ASSY PART NO.	A	B	C ±.005	D ±.010	E ±.006	F	WEIGHT (LB)
.500	CA62005	.95	.73	.608	.636	.772	.84	.015
.625	CA62006	1.16	.78	.608	.762	.898	.92	.025
.750	CA62007	1.32	.94	.688	.920	1.076	.98	.031
1.000	CA62010	1.73	1.04	.768	1.180	1.358	1.20	.059



(5/16", 1/2" NOM. SZ.)



(5/8", 3/4", 1" NOM. SZ.)



PART NUMBER CODE

CA620 00 – XX XX

BASIC PART NO.

SIZE

MATERIAL

– 56 = NYLON 6/6, 30% CLASS FILLED (COLOR OPTIONAL). MEETS FAR 25.853 AND BMS 8–270A

COLOR CODE

BL = BLUE	GRN = GREEN
BR = BROWN	ORN = ORANGE
GY = GRAY	RED = RED

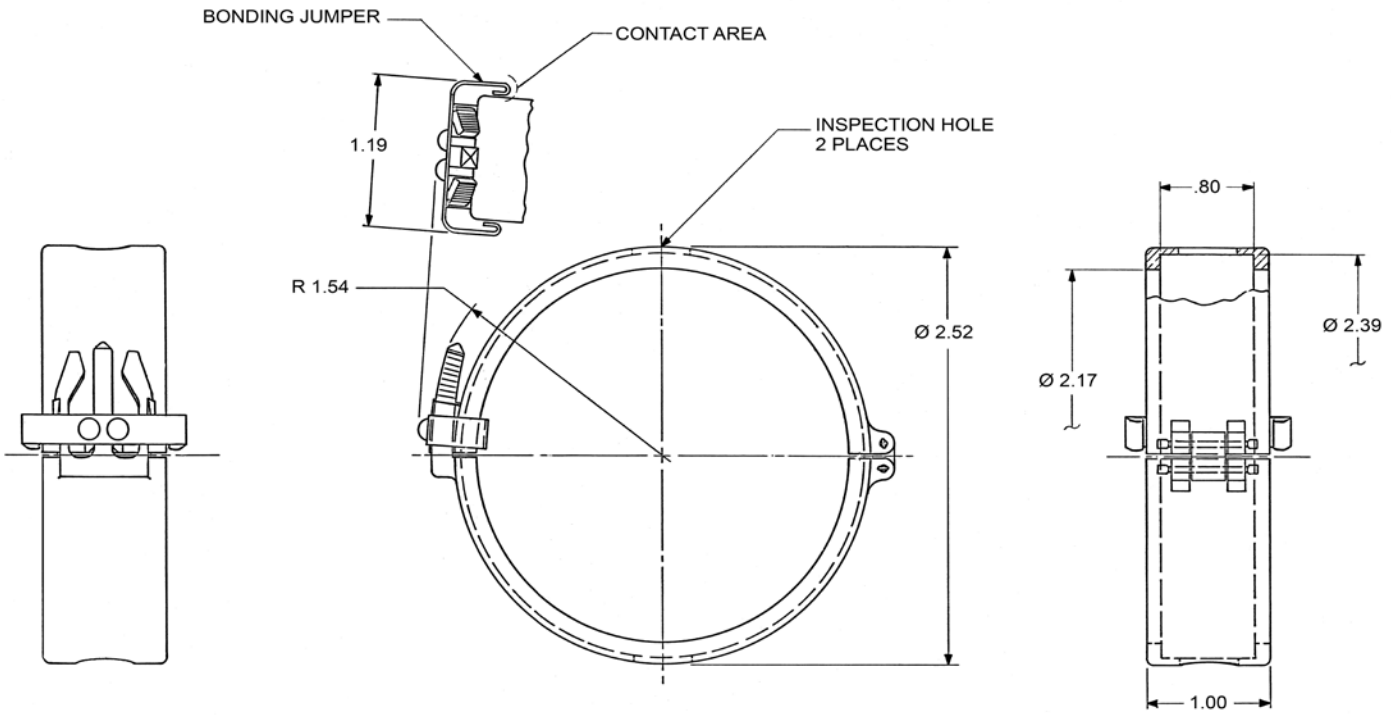
REVISION	LTR	DESCRIPTION	DATE
	A	Added 3/8 inch size	10/8/92
	B	Added color codes to p/n code	12/17/92
	C	Deleted "Boeing Use Only"	2/18/93
	D	Changed drawing to reflect Class 2 change	12/13/94
	E	Changed drawing to correct "B" 3/4 inch dimension	12/20/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5.M — 1982
2. Surface roughness $\sqrt{}^{125}$
3. Consult Eaton for specific applications
4. Coupler assembly meets requirements of AS1650 with water medium
5. Mates with AS1653 style flanges

CA62020 Coupler Assembly
Series 62



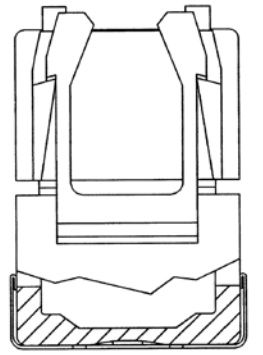
NOTES:

1. Material:
   Coupler halves/hinge link: Nylon 6/6, 30% glass filled (2)
   Bonding jumper/hinge pins: Stainless Steel
2. Complies with FAR 25.853 & BMS B-270A
3. Weight = .046 lbs
4. Permanently identified as "GAMAH CA62020"

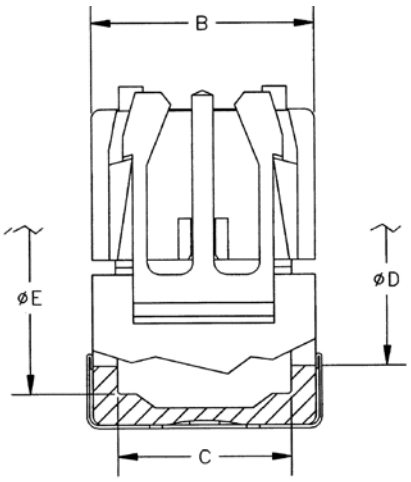
CA62100 Threadless Coupler Assembly
Series 62

Revision Letter F

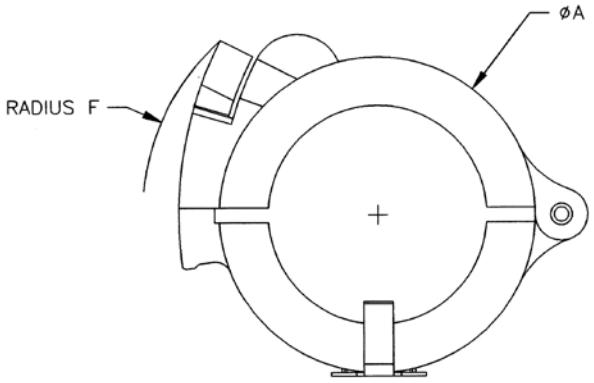
NOM TUBE O D (IN)	ASSY. PART NO.	A	B	C ±.005	D ±.010	E ±.006	F	WEIGHT (LB)
.313	CA62103	.78	.71	.608	.420	.566	.78	.010
.500	CA62005	.95	.73	.608	.636	.772	.84	.014
.625	CA62006	1.16	.78	.608	.762	.898	.92	.023
.750	CA62007	1.32	.94	.688	.920	1.076	.98	.030
1.000	CA62010	1.73	1.04	.768	1.180	1.358	1.20	.057



(5/16", 1/2" NOM. SZ.)



(5/8", 3/4", 1" NOM. SZ.)



PART NUMBER CODE

CG620 00 – X XX

BASIC PART NO.

SIZE

MATERIAL

–56 = NYLON 6/6, 30% CLASS FILLED (COLOR OPTIONAL). MEETS FAR 25.853 AND BMS 8–270A.

COLOR CODE

BL = BLUE GRN = GREEN
BR = BROWN ORN = ORANGE
GY = GRAY RED = RED

REVISION	LTR	DESCRIPTION	DATE
	A	Added 3/8 inch size	10/8/92
	B	Added color code to p/n code	12/17/92
	C	Deleted "Boeing Use Only"	02/18/93
	D	Changed Drawing to reflect Class change	12/13/94
	E	Changed drawing to correct weights and "B" dim.	12/14/94

This issue supersedes all previously issued catalog sheets and drawings

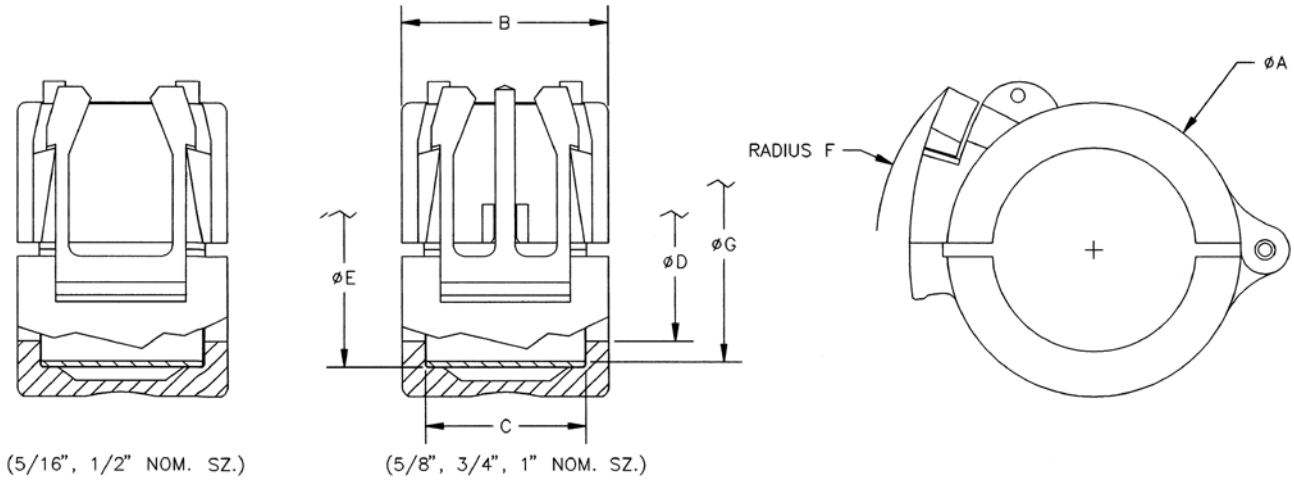
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
2. Surface roughness $\overset{125}{\vee}$. Surface texture per ANSI B46.1.
3. Consult Eaton for specific applications
4. Coupler assembly meets requirements of AS1650 with water medium
5. Mates with AS1653 style flanges

CG62000 Threadless Coupler/Sleeve Assembly Series 62

Revision Letter F

NOM TUBE O D (IN)	ASSY. PART NO.	A	B	C ±.005	D ±.010	E ±.006	F	G ±.006	WEIGHT (LB)
.500	CG62005	.95	.73	.608	.636	.772	.84	.692	.029
.625	CG62006	1.16	.78	.608	.762	.898	.92	.817	.036
.750	CG62007	1.32	.94	.688	.920	1.076	.98	.997	.045
1.000	CG62010	1.73	1.04	.768	1.180	1.358	1.20	1.273	.081



PART NUMBER CODE

CG620 00 – X XX

BASIC PART NO.

SIZE

MATERIAL

COUPLER: NYLON 6/6, 30% CLASS FILLED (COLOR OPTIONAL). MEETS FAR 25.853 AND BMS 8–270A

SLEEVE: –2 = G430XXC SLEEVE: CRES 300 SERIES, PASSIVATED

COLOR CODE

BL = BLUE
BR = BROWN
GY = GRAY
GRN = GREEN
ORN = ORANGE
RED = RED

REVISION	LTR	DESCRIPTION	DATE
	A	Added 3/8 inch size	10/8/92
	B	Added color code to p/n code	12/17/92
	C	Added Note 6	02/03/93
	D	Revised "G" for CA62004	12/14/93
	E	Changed sleeve code to –2. Deleted –1.	4/15/94
	F	Changed drawing to reflect class change	12/13/94

This issue supersedes all previously issued catalog sheets and drawings

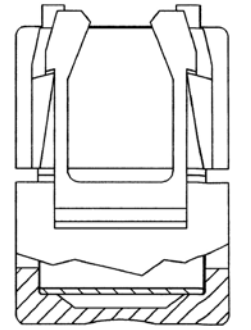
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
2. Surface roughness 125/. Surface texture per ANSI B46.1
3. Consult Eaton for specific applications
4. Coupler assembly meets requirements of AS1650 with water medium
5. Mates with AS1653 style flanges

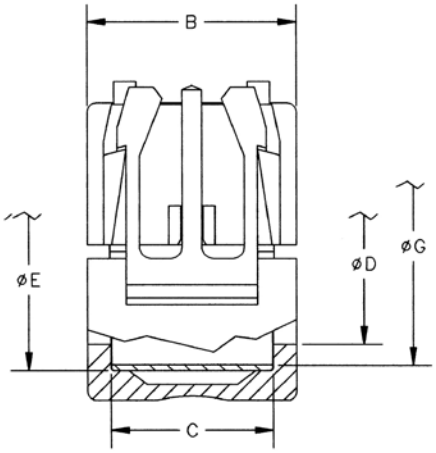
CG62100 Threadless Coupler/Sleeve Assembly Series 62

Revision Letter E

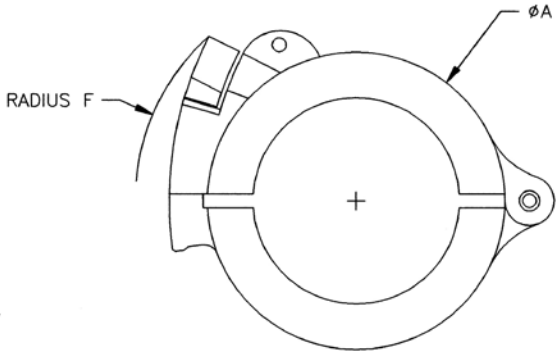
NOM TUBE O D (IN)	ASSY. PART NO.	A	B	C ±.005	D ±.010	E ±.006	F	G ±.002	WEIGHT (LB)
.313	CG62103	.78	.71	.608	.420	.566	.78	.485	.017
.500	CG62105	.95	.73	.608	.636	.772	.84	.692	.023
.625	CG62106	1.16	.78	.608	.762	.898	.92	.817	.034
.750	CG62107	1.32	.94	.688	.920	1.076	.98	.997	.045
1.000	CG62110	1.73	1.04	.768	1.180	1.358	1.20	1.273	.079



(5/16", 1/2" NOM. SZ.)



(5/8", 3/4", 1" NOM. SZ.)



PART NUMBER CODE

CG621 00 X – XX

PART NO.

SIZE

MATERIAL

COUPLER: NYLON 6/6, 30% CLASS FILLED (COLOR OPTIONAL). MEETS FAR 25.853 AND BMS 8–270A

SLEEVE: –2 = G430XXC SLEEVE: CRES 300 SERIES, PASSIVATED

COLOR CODE

BL = BLUE GRN = GREEN
BR = BROWN ORN = ORANGE
GY = GRAY RED = RED

REVISION	LTR	DESCRIPTION	DATE
	A	Added 3/8 inch size	10/8/92
	B	Added color code to p/n code	12/17/92
	C	Added Note 6	02/03/93
	D	Changed sleeve to –2. Deleted –1.	4/15/94
	E	Changed drawing to reflect Class change	12/13/94

This issue supersedes all previously issued catalog sheets and drawings

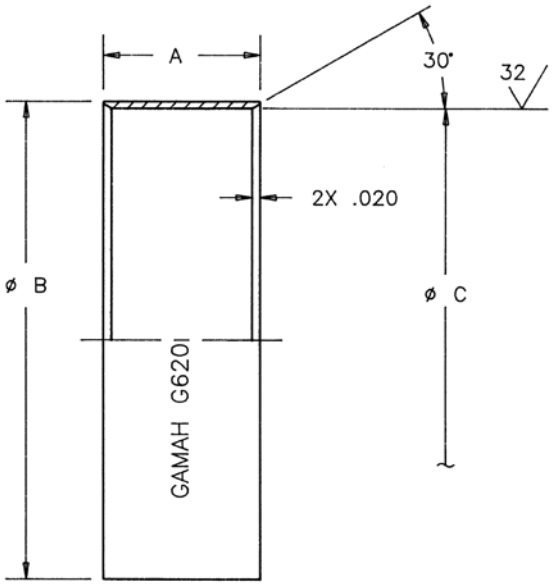
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M — 1982
2. Surface roughness $\sqrt{}^{125}$. Surface texture per ANSI B46.1
3. Consult Eaton for specific applications
4. Coupler assembly meets requirements of AS1650 with water medium
5. Mates with AS1653 style flanges

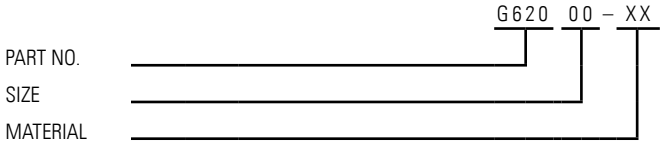
G62000 Sleeve Series 62

Revision Letter E

NOM TUBE O D (IN)	PART NO.	A ±.005	B ±.004	C ±.002		WEIGHT (LB)
.313	CG62103	.590	.555	.485		.002
.375	G62004	.590	.618	.547		.002
.500	CG62005	.590	.762	.692	6	.003
.625	CG62006	.590	.887	.817		.004
.750	CG62007	.670	1.067	.997		.006
1.000	G62110	.750	1.343	1.273		.006
1.250	G62012	.750	1.593	1.524		.007
2.000	G62020	.780	2.387	2.319		.011



PART NUMBER CODE



– 56 = NYLON 6/6, 30% GLASS FILLED. MEETS FAR 25.853

– 57 = RYTON R–4 POLYPHENYLENE SULFIDE. COMPLIES WITH NSF STANDARDS 14 & 51 FOR POTABLE WATER USAGE

REVISION	LTR	DESCRIPTION	DATE
	A	Added 3/8 inch size	10/8/92
	B	Added Note 6, G62102, G62020 and –56 material	12/18/93

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M–1982
2. Surface roughness 125√. Surface texture per ANSI B46.1
3. Consult Eaton for specific applications
4. Other materials available upon request
5. Mates with AS1653 style flanges

6 Not available in –56 material

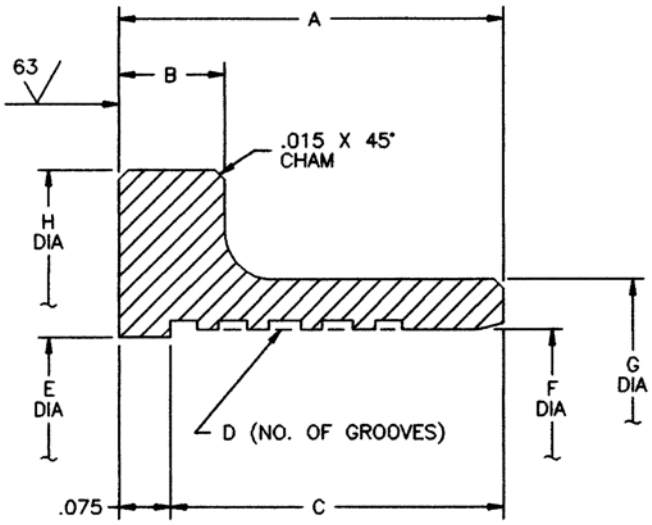
Miscellaneous Flexible Coupling Components

PART NUMBER	DESCRIPTION	SERIES
F10000	Flange, Swivel	10
F10B00	Flange,Swivel, Retaining	10
M1120	Plug, Aluminum	20 & 21
M1239	Plug, Aluminum	20
M33100	Plug, Fluorocarbon Seal	331
S2	O-Ring Seal	20, 21, 33, 34, 201 & 206
S33100	Fluorocarbon Seal	206
T1071	Plug	20 & 21
T1072	Cap	20 & 21
T2186	MS33656 Adapter	20 & 21
T3071	Plug	JT315
T3072	Cap	20
T20000	Tee	20

F10000 Flange, Swivel
Series 10

Revision Letter C

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F MIN	G	H	USE SWAGE BLOCK	— WEIGHT (LB) — A, AW, –09, –38	C
.500	F10005	.45	.156	.38	4	.485	.504	.67	.875	B10005 OR MB9-050	.011	.030
.625	F10006	.45	.156	.38	4	.610	.629	.79	1.000	B10006	.013	.036
.750	F10007	.57	.156	.50	5	.735	.755	.92	1.250	B10007 OR MB9-075	.021	.060
1.000	F10010	.75	.156	.68	5	.985	1.005	1.16	1.500	B10010	.030	.086
1.250	F10012	.75	.156	.68	5	1.235	1.255	1.41	1.844	B10012	.041	.12
1.500	F10015	.75	.188	.68	5	1.485	1.506	1.65	2.125	B10015	.053	.15
2.000	F10020	.80	.188	.73	6	1.985	2.006	2.23	2.750	B10020 OR MB9-200	.10	.28
2.500	F10025	.80	.188	.73	6	2.485	2.506	2.75	3.281	B10025 OR MB9-250	.13	.36
3.000	F10030	.80	.188	.73	6	2.985	3.006	3.27	3.781	B10030 OR MB9-300	.16	.45



PART NO. CODE

F100 00 – XX

PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED), ALODINED
AW = ALUMINUM 2024 (AGED), ANODIZED
– 43 = STAINLESS STEEL 15-5PH, PASSIVATED
– 09 = ALUMINUM 6061-T6, BLACK ANODIZED
–38 = ALUMINUM 6061-T6, BLACK ALODINED

REVISION	LTR	DESCRIPTION	DATE
	A	"–43" material was "C"	7/16/86
	B	Added 63	7/16/90
	C	Deleted "Dichromate Seal"	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

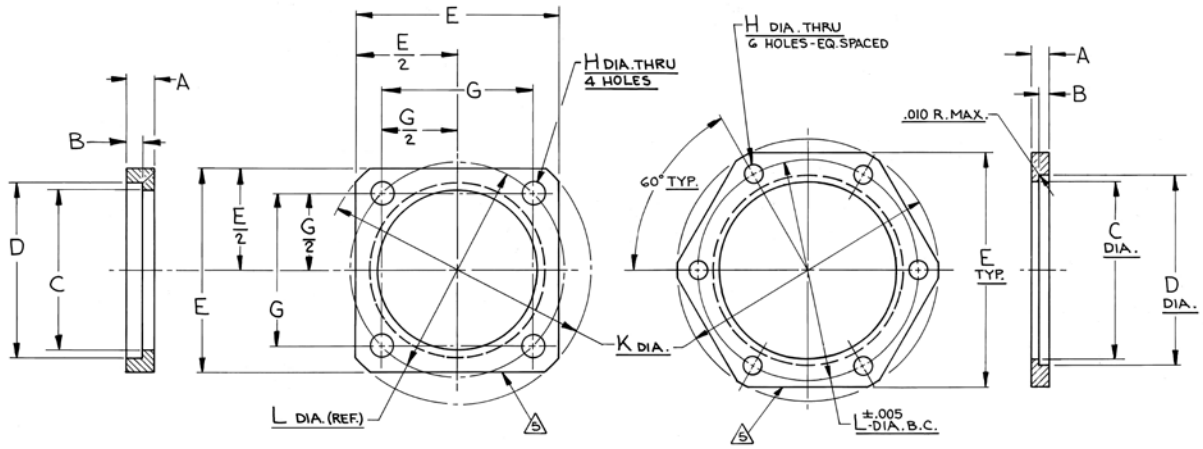
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. For use with MS20756 or F10B00 flange, swivel, retaining
3. Supersedes F1009 in all sizes, but not physically interchangeable with F1009–100, F1009–125 and F1009–150 sizes.

F10B00 Flange, Swivel, Retaining (use with F10000)

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A +.015 -.005	B +.005 -.000	C +.010 -.000	D +.005 -.000	E MAX/MIN	G ±.005	H +.010 -.000	K ±.015	L	WEIGHT (LBS) 6061	WEIGHT (LBS) C SST
.500	F10B05	.234	.136	.750	.885	1.406/1.374	.950	.205	1.782	1.344	.028	.081
.625	F10B06	.234	.136	.880	1.010	1.484/1.452	1.038	.205	1.906	1.468	.029	.086
.750	F10B07	.234	.136	1.125	1.260	1.610/1.578	1.156	.205	2.094	1.635	.029	.086
1.000	F10B10	.234	.136	1.375	1.510	1.766/1.734	1.312	.205	2.312	1.855	.029	.086
1.250	F10B12	.234	.136	1.688	1.854	2.208/2.168	1.656	.266	2.875	2.342	.046	.14
1.500	F10B15	.297	.168	1.938	2.135	2.395/2.355	1.812	.266	3.094	2.562	.059	.18
2.000	F10B20	.297	.168	2.562	2.760	3.020/2.980	2.375	.328	3.953	3.359	.086	.26
2.500	F10B25	.297	.168	3.062	3.291	4.020/3.980	—	.328	4.500	3.812	.15	.44
3.000	F10B30	.297	.168	3.562	3.791	4.520/4.480	—	.328	5.000	4.312	.18	.55



F10B05 THRU F10B20
F10B10 SHOWN AT 2/1

F10B25 THRU F10B30
F10B25 SHOWN AT 1/1

PART NO. CODE

F10B 00 – XX

PART NO.
SIZE
MATERIAL

C = STAINLESS STEEL 304 PER AMS5639

– 09 = ALUMINUM 6061-T6, PASSIVATED PER QQ-A-200/8 OR QQ-A-225/8, ANODIZE PER MIL-A-8625, TYPE II, CLASS 2, COLOR BLACK

–38 = ALUMINUM 6061-T6, PASSIVATED PER QQ-A-200/8 OR QQ-A-225/8, CHEMICAL FILM TREAT PER MIL-C-5541, CLASS 3

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Anodize per MIL-A-8625, Type II, Class 2, color black
2. Chemical film treated per MIL-C-5541, Class 3
3. Passivate QQ-P-SS (Stanley P.S. 9-5)
4. MS20756 swivel flange may be used in lieu of F10B00
5. Permanently identified with part no.: "GAMAH F10BXX-XX"

Size — Material

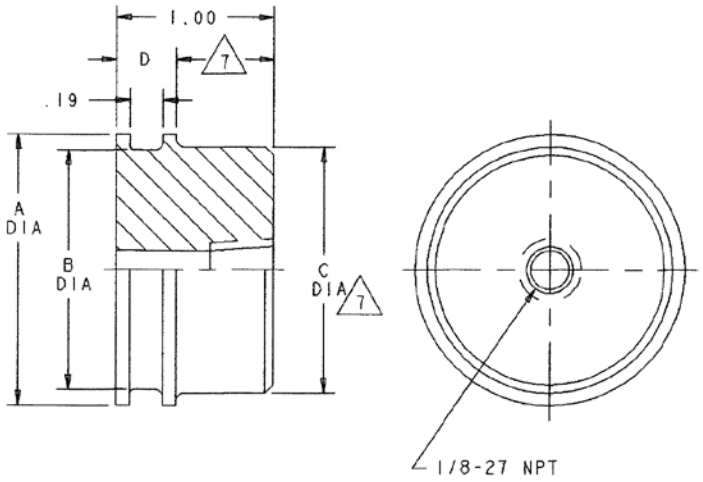
REVISION	LTR	DESCRIPTION	DATE
	A	Added "C" material. Revised Note 3, added Notes 4 and 5.	4/22/89

This issue supersedes all previously issued catalog sheets and drawings

M1120 Plug, Aluminum

Revision Letter J

NOM TUBE O D (IN)	PART NO. M1120	A	B	C	D	E	F	— APPLICATION (SERIES) 5 —	ARP568 SEAL SIZE	WEIGHT (LB)
.375	–038	.89	.39	.62	.14	.50	.44	20 30	111	.010
.500	–050	.89	.39	.74	.14	.63	.57		113	.021
.625	–063	.89	.39	.87	.14	.75	.69		115	.035
.750	–075	1.00	.50	1.04	.19	.88	.82	301	211	.057
1.000	–100	1.00	.50	1.29	.19	1.16	1.07	301	215	.13
1.250	–125	1.00	.50	1.54	.19	1.41	1.32	20 30 301	219	.20
1.500	–150	1.15	.65	1.96	.28	1.67	1.60	21	326	.27
1.750	–175	1.15	.65	2.21	.28	1.92	1.85		328	.36
2.000	–200	1.15	.65	2.46	.28	2.18	2.10	31	330	.45
2.250	–225	1.15	.65	2.71	.28	2.43	2.35	SEE	332	.56
2.500	–250	1.15	.65	2.96	.28	2.70	2.60	SEE SEE M1239	334	.68
2.750	–275	1.15	.69	3.21	.28	2.95	2.85	M1239 M1239	336	.84
3.000	–300	1.19	.69	3.45	.28	3.20	3.10		338	.99
3.500	–350	1.19	.69	3.95	.28	3.70	3.60	301	342	1.32
4.000	–400	1.19	.69	4.45	.28	4.20	4.10	21 301	346	1.69
4.500	–450	1.37	.86	5.11	.38	4.74	4.65	SEE	426	2.47
5.000	–500	1.37	.86	5.61	.38	5.24	5.15	31 FP31600	430	3.01



PART NO. CODE

M1120–XXX X X X

PART NO.

TUBE SIZE

MATERIAL
- C = STAINLESS STEEL 304 PER AMS5639
- B = ALUMINUM 6061-T6
- G = ALUMINUM 2024

FINISH
- (B)G = ANODIZED, EPOXY PRIMER
- (A)J = ANODIZED, DYE RED
- (B)Z = ANODIZED, DYE BLACK, DRY FILM LUBED
- (G)Z = ANODIZED, DRY FILM LUBED

PIPE THREAD OPTIONS
- NO CODE = 1/8–27 NPT PORT (AS SHOWN) 6
- –1 = NO NPT PORT

REVISION	LTR	DESCRIPTION	DATE
	F	Added (B)G code to finish	11/21/86
	G	Revised –450 and –500	2/2/89
	H	Added application and Note 5	12/21/86
	J	Added O-ring sizes and Note 6. Revised –450 and –500.	4/30/99

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. When specified, dry film lube on "B" dim. only
4. Test plug will withstand pressure up to failure of tube or coupling assembly

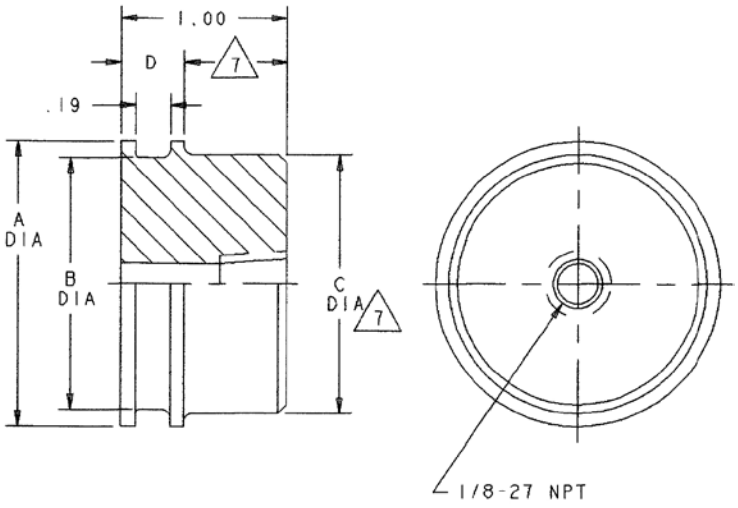
5 Mates with indicated series flanges

6 1/8–27 NPT port no available in –038 size

M1239 Test Plug

Revision Letter M

NOM TUBE O D (IN) △4	PART NO. M1239	A	B	C	D	O-RING SIZE △8	APPLICATION (SERIES) △6								WEIGHT (LB)
1.500	–150	1.785	1.57	1.65	.50	–222	20	30	33	301	351	353	50	511	.21
1.750	–175	2.035	1.82	1.90	.50	–224	↑	↑	↑	↑	↑	↑	↑	↑	.28
2.000	–200	2.285	2.07	2.15	.50	–226	↑	↑	↑	↓	↓	↓	↓	↓	.36
2.250	–225	2.535	2.32	2.40	.50	–228	↑	↑	↑	↓	↓	↓	↓	↓	.47
2.500	–250	2.785	2.57	2.65	.50	–230	↑	↑	↑	↓	↓	↓	↓	↓	.56
2.750	–275	3.025	2.82	2.90	.50	–232	↑	↑	↑	↓	↓	↓	↓	↓	.70
3.000	–300	3.285	3.07	3.15	.50	–234	↑	↑	↑	301	351	353	50	511	.79
3.500	–350	3.785	3.57	3.65	.50	–238	↑	↑	↑	↓	↓	↑	↓	↓	1.10
4.000	–400	4.285	4.07	4.15	.50	–242	↑	↑	↑	↓	↓	SEE M1120	↓	↓	1.49
4.500	–450	4.785	4.57	4.65	.50	–246	↓	↓	↓	↓	↓	↓	↓	↓	1.73
5.000	–500	5.285	5.07	5.15	.50	–250	20	30	33	↓	↓	↓	↓	↓	2.10



PART NO. CODE

M1239– XXX X X X

PART NO.

TUBE SIZE

MATERIAL
- C = STAINLESS STEEL 304 PER AMS5639
- B = ALUMINUM 6061-T6
- G = ALUMINUM 2024

FINISH
- (G)Z = ANODIZE MIL-A-8625, TYPE II, DRY FILM LUBE
- (B)Z = ANODIZE, DYE BLACK, DRY FILM LUBE
- (B)G = ANODIZE MIL-A-8625, TYPE II, FOLLOWED BY TWO COASTS OF EPOXY PRIMER PER MIL-P-23377, TYPE 1, CLASS C

PIPE THREAD OPTIONS
- NO CODE = 1/8–27 NPT PORT (AS SHOWN)
- –1 = NO NPT PORT
- –2 = 1/4–18 NPT PORT

REVISION	LTR	DESCRIPTION	DATE
	D	Revised and redrawn. Added "B" material code.	8/3/79
	E	Revised "B" for –175 and –450	3/16/82
	F	Added pipe thread option	12/18/84
	G	Added Note 5	10/25/86
	H	Added "G" finish	8/12/86
	J	Revised option code	2/19/91
	K	Added –2 port option	5/13/92
	L	Added application and Note 6	5/27/93
	M	Added applications and O-rings, Notes 7 and 8 and tempers	3/30/99

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Dry lube O.D. surfaces "D" length when specified by code

△4 For smaller sizes and sizes indicated see M1120

5. Test plug will withstand pressure up to failure of tube or coupling assembly

△6 Mates with indicated series couplers and sleeves

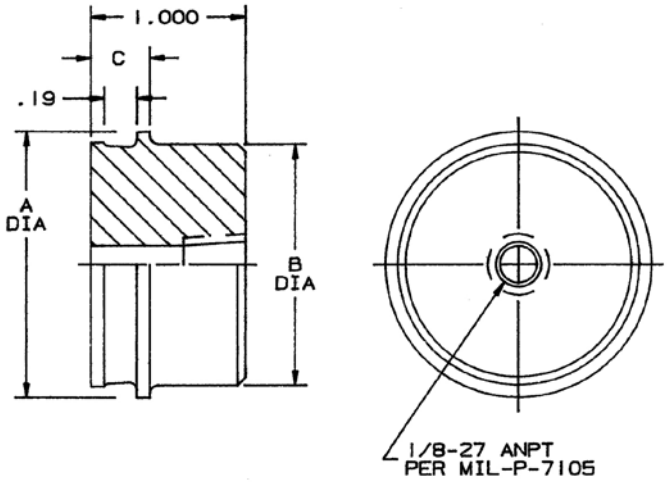
△7 Epoxy primer indicated surfaces only (BG finish only)

△8 O-ring size dash no. code per ARP568

M33100 Test Plug, Fluorocarbon Seal Series 331

Revision Letter N/C

NOM TUBE O D (IN)	PART NO.	A	B	C	S33100 SEAL SIZE	— WEIGHT (LB) — AW	C
1.500	M33115	1.785	1.65	.50	S33115	.21	.60
1.750	M33117	2.035	1.90	.50	S33117	.28	.80
2.000	M33120	2.285	2.15	.50	S33120	.36	1.03
2.250	M33122	2.535	2.40	.50	S33122	.46	1.32
2.500	M33125	2.785	2.65	.50	S33125	.54	1.54
2.750	M33127	3.035	2.90	.50	S33127	.67	1.92
3.000	M33130	3.285	3.15	.50	S33130	.79	2.26
3.500	M33135	3.785	3.65	.50	S33135	1.06	3.03
4.000	M33140	4.285	4.15	.50	S33140	1.35	3.85
4.500	M33145	4.785	4.65	.50	S33145	1.69	4.83
5.000	M33150	5.285	5.15	.50	S33150	2.08	5.94



PART NO. CODE

M331 XX XX – X

PART NO.

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL/FINISH

AW = ALUMINUM 2024 (AGED), ANODIZED PER MIL-A-8625, TYPE II, FOLLOWED BY DRY FILM LUBE

–09 = ALUMINUM 6061-T6, ANODIZED BLACK PER MIL-A-8625, TYPE II, FOLLOWED BY DRY FILM LUBE

C = STAINLESS STEEL 304 PASSIVATED, FOLLOWED BY DRY FILM LUBE

PIPE THREAD OPTIONS

NO CODE = 1/8–27 NPT PORT (AS SHOWN)

–1 = NO NPT PORT

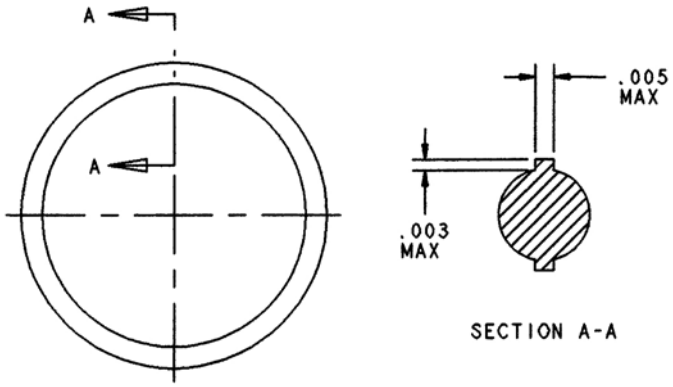
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Test plug will withstand pressure up to failure of tube or coupling assembly
5. Designed for use with S3310 Seal (high temp). See tabulation for size.

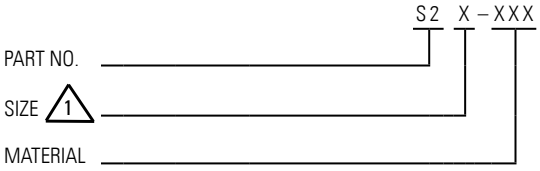
S2 Custom O-Ring Seal

Revision Letter F

MATL CODE	MATERIAL DESCRIPTION	SHELF LIFE YEARS	TEMP RANGE °F	TEMP RANGE °C	SHORE HARDNESS (+/- 5)
A	FLUOROSILICONE RUBBER PER MIL-R-25988 △3	20	–65/+450	–53/+232	70
B	FLOUROSILICONE RUBBER PER MIL-R-25988 △3	20	–65/+450	–53/+232	80
C △2	FLUOROCARBON (VITON) PER MIL-R-83248		–40/+400	–40/+232	70
D	SILICONE	20	–65/+550	–53/+287	65/80
F	NBR PER AMX7271	10	–65 /+300	–53/+148	70
J	SILICONE PER ZZ-R-765 △3	20	–65/+500	–53/+260	65
L	FLUOROCARBON (VITON) LOW COMPRESSION SET PER MIL-R-83248 △3	20	–40/+500	–40/+260	70
N	HYDROCARBON (NITRILE) FUEL RESISTANT PER MIL-P-5315 △4	10	–65/+200	–53/+93	65
P	ETHYLENE PROPYLENE PER NAS1611 △3	10	–65/+300	–53/+148	80
R	SILICONE PER AMS33337 △3 △5	20	–121/+446	–85/+230	70
T	TEFLON ENCAPSULATED SILICONE PER ZZ-T-765/GEN, CLASS 2 B, GRADE 70 △3 △6	20	–65/+500	–53/+260	70



PART NO. CODE



REVISION	LTR	DESCRIPTION	DATE
	A	Added Notes 3 & 4 and shelf life	10/22/90
	B	Added "P" material. Revised Note 1.	2/2/93
	C	Added "T" material, revised "C" material spec	7/18/95
	D	Added "D", "J" & "R" materials. Added Notes 5, 6 and 7.	5/15/96
	E	Hardness "N" material was 70	7/9/97
	F	Added "F" compound	6/19/98

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

△1 Size dash no. in accordance with current industrial and militray numbering systems (AS568 or applicable material specifications)

△2 Code "C" seals superseded by code "L" seals, code "C" seals will be supplied to depletion of stock

△3 Recommended shelf life per MIL-HDBK-695

△4 Age control per MIL-STD-1523

△5 Static use only

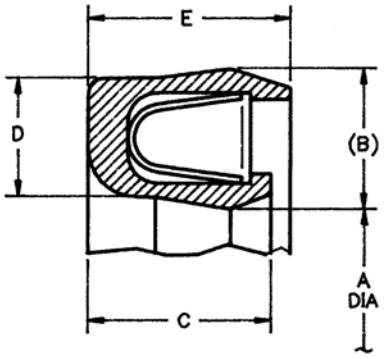
△6 Limited application — consult Eaton engineering

7. Determination of the suitability of a particular compound for any specific application is the user's responsibility

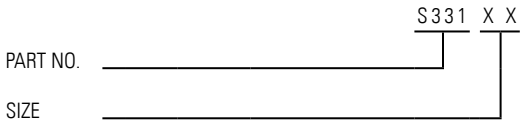
S33100 Seal, High Temperature
Series 206

Revision Letter D

NOM TUBE O D (IN)	PART NO.	A DIA	(B)	C	D	E
.500	S33105	.553	.102	—	.081	.166
.750	S33107	.800	.126	.167	.108	.185
1.000	S33110	1.050	.126	.167	.108	.185
1.250	S33112	1.300	.126	.167	.108	.185
1.500	S33115	1.550	.126	.167	.108	.185
1.750	S33117	1.800	.126	.167	.108	.185
2.000	S33120	2.050	.126	.167	.108	.185
2.250	S33122	2.300	.126	.167	.108	.185
2.500	S33125	2.550	.126	.167	.108	.185
2.750	S33127	2.800	.126	.167	.108	.185
3.000	S33130	3.050	.126	.167	.108	.185
3.500	S33135	3.550	.126	.167	.108	.185
4.000	S33140	4.050	.126	.167	.108	.185
4.500	S33145	4.550	.126	.167	.108	.185
5.000	S33150	5.050	.126	.167	.108	.185



PART NO. CODE



REVISION	LTR	DESCRIPTION	DATE
	A	Revise "A", "B", configuration. Added "E".	1/7/87
	B	(B) was "B"	11/11/88
	C	Added Notes 4 and 5.	12/16/91
	D	Added "05" size.	7/10/92

This issue supersedes all previously issued catalog sheets and drawings

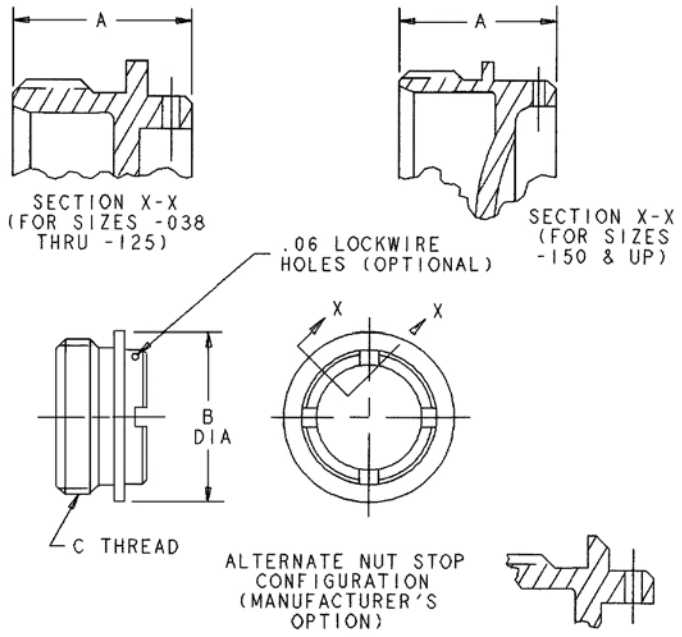
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness $\sqrt{125}$
3. Consult Eaton for specific applications
4. Use with F33XXX Series flanges
5. Operating pressure = 125 psi (8.61 bar)
   Proof pressure = 250 psi (17.23 bar)
   Burst pressure = 375 psi (25.78 bar)
   Temperature to 700°F (371°C)

T1071 Plug
Series 20 & 21

Revision Letter G

NOM TUBE O D (IN)	PART NO. T1071	A	B	C – THREAD	WEIGHT (LB)
.375	–038	.54	.91	.798-20NS-2A	.008
.500	–050	.54	1.04	.923-20NS-2A	.010
.625	–063	.54	1.16	1.048-20NS-2A	.016
.750	–075	.62	1.33	1.218-20NS-2A	.022
1.000	–100	.62	1.58	1.468-20NS-2A	.031
1.250	–125	.65	1.85	1.734-20NS-2A	.051
1.500	–150	.87	2.27	2.169-20NS-2A	.074
1.750	–175	.87	2.52	2.419-20NS-2A	.095
2.000	–200	.87	2.77	2.669-20NS-2A	.119
2.250	–225	.87	3.20	2.919-20NS-2A	.156
2.500	–250	.87	3.27	3.169-20NS-2A	.170
2.750	–275	.87	3.52	3.419-20NS-2A	.200
3.000	–300	.96	3.78	3.681-20NS-2A	.225
3.500	–350	.96	4.28	4.181-20NS-2A	.295
4.000	–400	.96	4.78	4.681-20NS-2A	.370



PART NO. CODE

T1071 –XXX– X X

PART NO.

NOM TUBE SIZE (HUNDREDTHS INCHES)

MATERIAL
ALUMINUM 2024-T6, -T851 OR -T8510

FINISH
ANODIZE PER MIL-A-8625, FOLLOWED BY DRY FILM LUBRICANT PER MIL-L-8937 ON THREADS AND I.D. BORE

SPECIAL REQUIREMENTS
–1 = NO LOCKWIRE HOLES
–2 = THREAD LOCKING INSERT (WITH LOCKWIRE HOLES AT MANUFACTURER'S OPTION)
NO CODE = LOCKWIRE HOLES, BUT NO THREAD LOCKING INSERT

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn from customer drawing	2/5/80
	E	Revised lockwire hole code requirement	9/2/81
	F	Added –2 special requirement configuration	7/19/83
	G	Revised lockwire hole code	6/11/90

This issue supersedes all previously issued catalog sheets and drawings

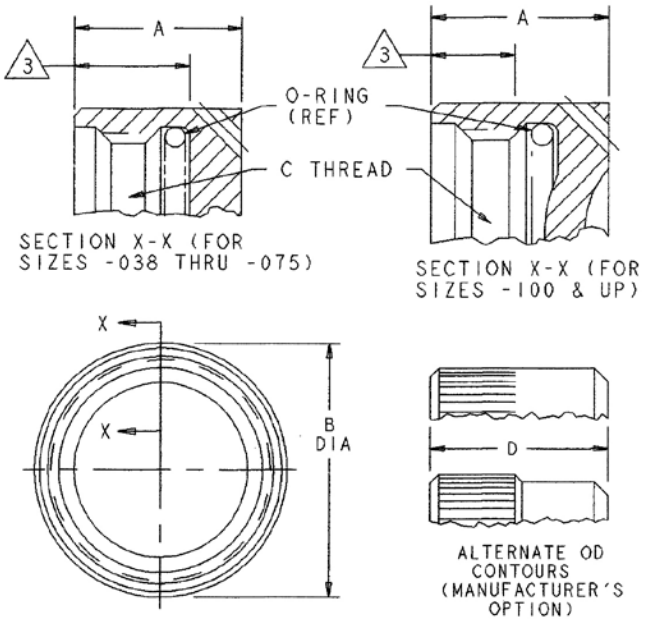
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

T1072 Cap
Series 20 & 21

Revision Letter D

NOM TUBE O D (IN)	PART NO. T1072	A	B	C – THREAD	D	TEST O-RING (REF) AS568-	WEIGHT (LB)
.375	–038	.55	.91	.798-20NS-2B	.45	–017	.011
.500	–050	.55	1.04	.923-20NS-2B	.45	–109	.014
.625	–063	.54	1.17	1.048-20NS-2B	.45	–021	.017
.750	–075	.54	1.35	1.218-20NS-2B	.46	–024	.021
1.000	–100	.54	1.60	1.468-20NS-2B	.46	–028	.029
1.250	–125	.53	1.88	1.734-20NS-2B	.46	–030	.040
1.500	–150	.68	2.33	2.169-20NS-2B	.63	–033	.073
1.750	–175	.68	2.58	2.419-20NS-2B	.63	–035	.088
2.000	–200	.67	2.84	2.669-20NS-2B	.63	–037	.103
2.250	–225	.67	3.09	2.919-20NS-2B	.65	–039	.122
2.500	–250	.66	3.35	3.169-20NS-2B	.65	–041	.150
2.750	–275	.66	3.62	3.419-20NS-2B	.65	–042	.170
3.000	–300	.64	3.92	3.681-20NS-2B	.67	–043	.214
3.500	–350	.64	4.40	4.181-20NS-2B	.67	–045	.269
4.000	–400	.64	4.92	4.681-20NS-2B	.67	–047	.334



PART NO. CODE

T1072 –XXX– 1

PART NO.

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL
ALUMINUM 2024-T6, -T851 OR -T8510

FINISH
ANODIZE PER MIL-A-8625, FOLLOWED BY DRY FILM LUBRICANT PER MIL-L-8937 ON THREADS AND I.D. BORE

INDICATES NO LOCKWIRE HOLES

REVISION	LTR	DESCRIPTION	DATE
	C	Redrawn from customer drawing	3/11/80
	D	Revised lockwire hole code requirement	9/2/81

This issue supersedes all previously issued catalog sheets and drawings

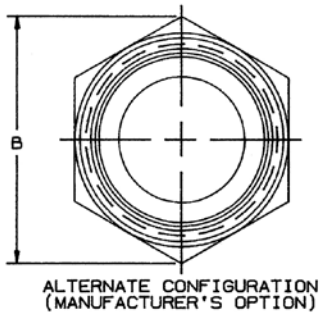
NOTES (UNLESS OTHERWISE SPECIFIED):

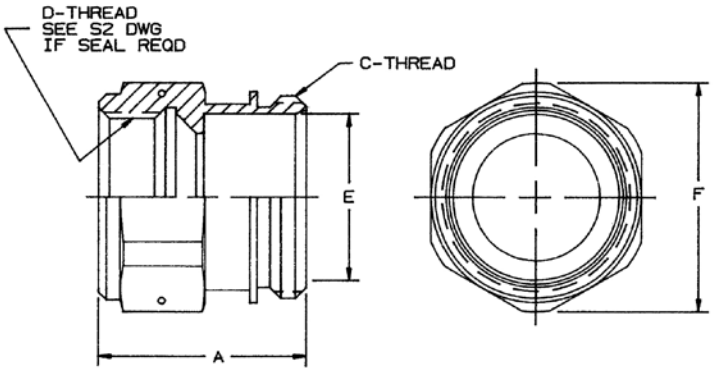
1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Knurled on O.D. surface.

T2186 Adapter, MS33656 to Series 20 & 21

Revision Letter G

NOM TUBE O D (IN)	PART NO. T2186	A	B	C – THREAD	D – THREAD	E	F	WEIGHT (LB)	MAX WEIGHT (LB)
.375	–038	1.13	1.01	.798-20UNS-2A	9/16-18UNF-2B	.619	.96	.077	.089
.500	–050	1.18	1.16	.923-20UNS-2A	3/4-16UNF-2B	.744	1.14	.108	.124
.625	–063	1.28	1.30	1.048-20UNS-2A	7/8-14UNF-2B	.869	1.25	.144	.166
.750	–075	1.48	1.59	1.218-20UNS-2A	1 1/16-12UN-2B	1.039	1.47	.188	.216
1.000	–100	1.55	1.88	1.468-20UNS-2A	1 5/16-12UN-2B	1.290	1.76	.282	.324
1.250	–125	1.65	2.17	1.734-20UNS-2A	1 5/8-12UN-2B	1.540	2.05	.412	.474
1.500	–150	2.05	2.60	2.169-20UNS-2A	1 7/8-12UN-2B	1.960	2.42	.549	.631
1.750	–175	2.14	2.89	2.419-20UNS-2A	2 1/4-12UN-2B	2.210	2.71	.638	.734
2.000	–200	2.29	3.18	2.669-20UNS-2A	2 1/2-12UN-2B	2.460	3.00	.728	.837





PART NO. CODE

T2186 – L –XXX– X

PART NO.

ADD "L" FOR NYLON LOCKING INSERT

NOM TUBE O.D. (HUNDREDTHS INCHES)

"X' INDICATES NO DRY FILM LUBRICANT

EXAMPLE: T2186–000 STD
T2186–L–200X ADAPTER WITH LOCKING INSERT AND NO DRY FILM LUBRICANT

MATERIAL
STAINLESS STEEL TYPE 304 OR 304l PASSIVATED PER QQ-P-35 AND (WHEN REQUIRED) DRY FILM LUBED (I.D. AND THREADS) PER MIL-L-8937

REVISION	LTR	DESCRIPTION	DATE
	G	Redrawn. Revised contour (hex).	7/22/80

This issue supersedes all previously issued catalog sheets and drawings

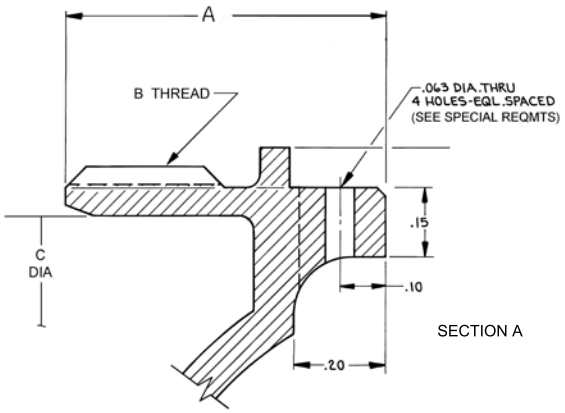
NOTES (UNLESS OTHERWISE SPECIFIED):

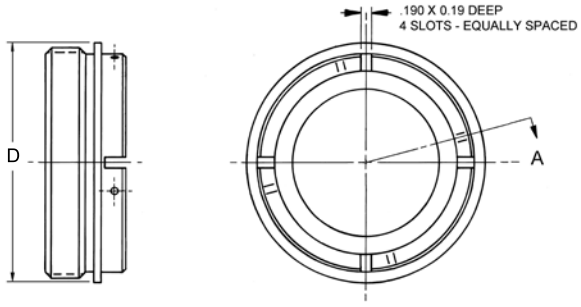
1. Tolerances: .XX = ± .010
2. Surface roughness 125

T3071 Plug
JT315 Series Nut

Revision Letter J

NOM TUBE O D (IN)	PART NO. T3071-	A	B – THREAD	C	D	WEIGHT (LB)
1.500	-150	.70	2.000-16UN-2A	1.788	2.08	.069
1.750	-175	.70	2.250-16UN-2A	2.038	2.33	.083
2.000	-200	.71	2.500-16UN-2A	2.288	2.58	.099
2.250	-225	.71	2.750-16UN-2A	2.538	2.83	.120
2.500	-250	.71	3.000-16UN-2A	2.788	3.08	.142
2.750	-275	.71	3.250-16UN-2A	3.038	3.33	.162
3.000	-300	.73	3.500-16UN-2A	3.288	3.58	.185
3.500	-350	.77	4.000-16UN-2A	3.788	4.10	.227
4.000	-400	.82	4.500-16UN-2A	4.288	4.60	.270
4.500	-450	.88	5.047-12UNS-3A	4.788	5.10	.455





PART NO. CODE

T3071 – 000 – X

PART NO.

SIZE

SPECIAL REQUIREMENTS

–1 = INDICATES NO LOCKWIRE HOLES

–2 = THREAD LOCKING INSERT WITH LOCKWIRE HOLES AT MANUFACTURE'S OPTION

NO DASH NO. INDICATES WITH LOCKWIRE HOLES

MATERIAL: 2024-T6, T851, T8510

FINISH:

ANODIZE PER MIL-A-8625 FOLLOWED BY DRY-FILM LUBRICANT PER MIL-L-8937 ON THREADS AND I.D. BORE

REVISION	LTR	DESCRIPTION	DATE
	E	Redrawn. Revised Notes.	8/8/80
	F	Revised lockwire hole code requirement	9/2/81
	G	Added –2 configuration	7/18/83
	H	Added 4.500 size	3/25/88
	J	Revised lockwire hole code requirement	10/28/88

This issue supersedes all previously issued catalog sheets and drawings

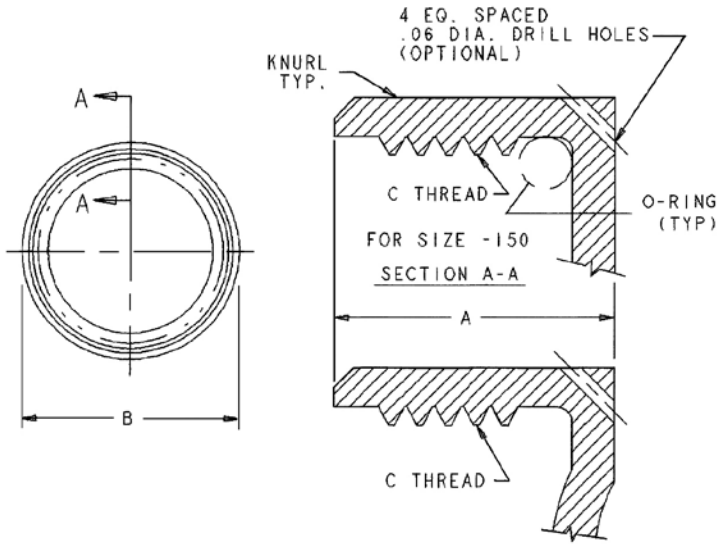
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Anodize per MIL-A-8625
4. Dry film lubricate threads and I.D. per MIL-L-8937 end option
5. See T1071 for sizes smaller than –150

T3072 Cap Series 20

Revision Letter F

NOM TUBE O D (IN)	PART NO. SIZE	A	B	C	TEST O-RING (REF)	WEIGHT (LB)
.375						
.500						
.625						
.750	△3					
1.000						
1.250						
1.500	-150	.58	2.18	2.000-16UNEF-2B	S2A-032	.061
1.750	-175	.58	2.44	2.250-16UN-2B	S2A-034	
2.000	-200	.57	2.70	2.500-16UN-2B	S2A-036	.096
2.250	-225	.57	2.96	2.750-16UN-2B	S2A-038	
2.500	-250	.56	3.22	3.000-16UN-2B	S2A-040	
2.750	-275	.56	3.48	3.250-16UN-2B	S2A-041	
3.000	-300	.59	3.67	3.500-16UN-2B	S2A-042	
3.500	-350	.64	4.25	4.000-16UN-2B	S2A-044	
4.000	-400	.70	4.76	4.500-16UN-2B	S2A-046	
4.500	-450	.76	5.31	5.047-12UNS-3B	S2A-049	



STANDARD PART NO. CODE

T3072 – XXX – 1

PART NO.
SIZE
INDICATES NO LOCKWIRE HOLES
MATERIAL: ALUMINUM 2024 △3 △4

SPECIAL PART NO. CODE

T3072 – XXX – B Z 1

PART NO.
SIZE
MATERIAL: ALUMINUM 6061-T6
FINISH △4
ANODIZED PER MIL-A-8625, COLOR OPTIONAL
INDICATES NO LOCKWIRE HOLES

REVISION	LTR	DESCRIPTION	DATE
	A	Revised "A" dim. Added O-ring sizes. Deleted Note 7 (duplicate of Note 5). Added –1 option.	6/20/79
	B	Added special part number code	5/12/80
	C	Revise special part number code	7/29/80
	D	Revised lockwire hole code requirement	9/2/81
	E	Added 4.500 size	3/25/88
	F	F/D and Note 6: –450 was –400	7/24/89

This issue supersedes all previously issued catalog sheets and drawings

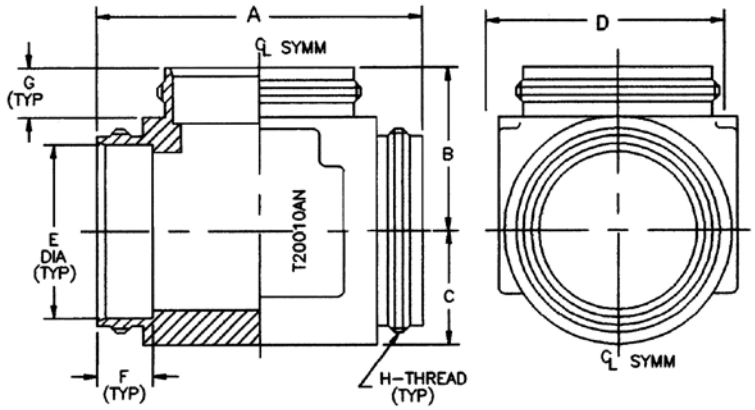
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125√
3. △3 Anodize per MIL-A-8625
4. △4 Dry film lubricate threads and I.D. per MIL-L-8937
5. △5 See T1072 for sizes smaller than –-150
6. Dished configuration –175 thru –450 only

T20000 Tee
Series 20

Revision Letter E

NOM TUBE O D (IN)	PART NO. SIZE	A	B	C	D	E +.200 -.000	F	G	H – THREAD	WEIGHT (LB) A	C	T
.375	T20004	1.61	.84	.53	1.06	.619	.292	.35	.798-20NS-2A	.079	.23	.13
.500	T20005	1.74	.90	.53	1.06	.744	.302	.35	.923-20NS-2A	.097	.28	.16
.625	T20006	1.86	.97	.58	1.16	.869	.311	.35	1.048-20NS-2A	.115	.33	.19
.750	T20007	2.03	1.05	.68	1.36	1.039	.391	.35	1.218-20NS-2A	.123	.35	.20
1.000	T20010	2.28	1.18	.84	1.68	1.290	.407	.35	1.468-20NS-2A	.172	.49	.28
1.250	T20012	2.55	1.31	1.05	2.09	1.540	.457	.35	1.734-20NS-2A	.181	.52	.30
2.000	T20020	3.45	1.78	1.30	2.60	2.288	.530	.42	2.500-16UN-2A	.49	1.39	.79



PART NO. CODE

T200 XX A D N

PART NO.

SIZE

MATERIAL
- A = ALUMINUM 2014-T6 (FORGING) OR 2024 (AGED) (BAR STOCK) ANODIZED
- C = STAINLESS STEEL 304
- T = TITANIUM TI-CP-70

FINISH:
- D = DRY LUBE PER MIL-L-46010 (THREADS AND "E' DIA.)

THREAD LOCKING INSERT (OPTIONAL)

REVISION	LTR	DESCRIPTION	DATE
	E	Redrawn. Revised Notes.	8/8/80
	F	Revised lockwire hole code requirement	9/2/81
	G	Added –2 configuration	7/18/83
	H	Added 4.500 size	3/25/88
	J	Revised lockwire hole code requirement	10/28/88

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Tee shown is made from forging. May be machined from bar stock — manufacturer's option.

Gamagrip Couplings

PART NUMBER	DESCRIPTION	SERIES
400849	Flexible Coupling Installation for Bulkhead and Deck Penetrations	—
J84200	Coupling Assembly, Copper-Nickel Coupler	842
J84300	Bulkhead Coupling Assembly, Threadless, Flexible	843
JA84200	Bulkhead Assembly, Aluminum Coupler	842
JA84300	Bulkhead Assembly, Aluminum Coupler	—
JBR84700	Coupling Transition Assembly, Cast Bronze Coupler	847
A84300	Adapter Assembly	—
C84200	Coupler, Copper-Nickel	—
C84300	Coupler, Aluminum	843
C84400	Coupler, Titanium	844
C84700	Coupler, Bronze	847
F84200	Flange	—
FBR84700	Flange, Brazed	
FW84200	Flange, Welded	84
G84200	Sleeve	

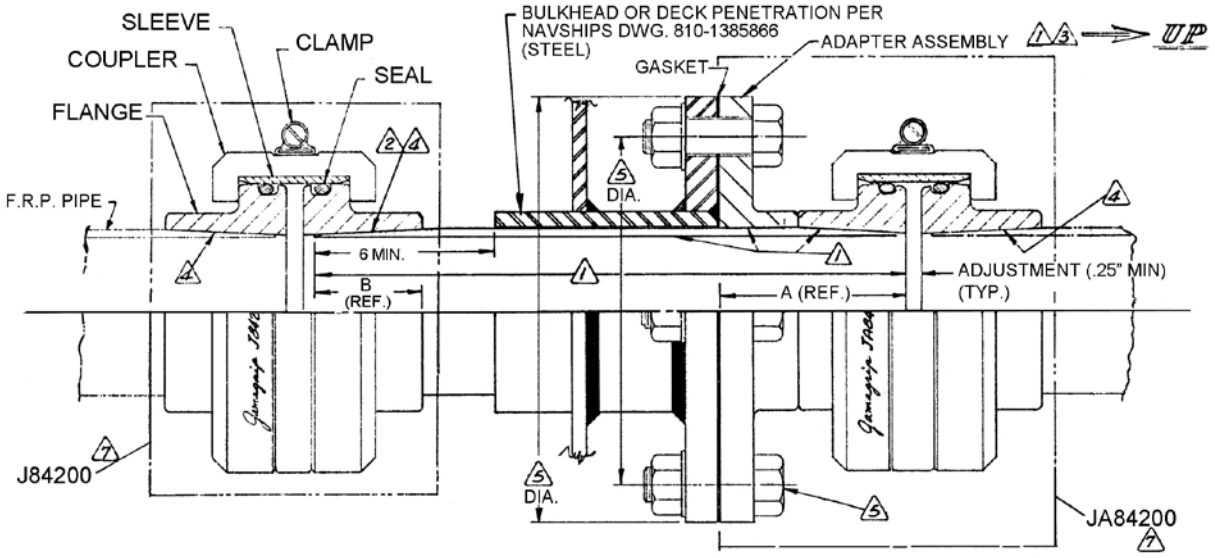
400849
Gamagrip Flexible Coupling Installation for Bulkhead and Deck Penetrations, Photo-Chemical Processing Drain System

Revision Letter D

J84200 COUPLING ASSEMBLY CONSISTS OF:
(1) ea. C84200 Coupler
(1) ea. G84200 Sleeve
(2) ea. F64200 Flanges
(2) ea. Seals
(1) ea. Clamp

JA84200 COUPLING ASSEMBLY CONSISTS OF:
(1) ea. C84200 Coupler
(1) ea. G84200 Sleeve
(1) ea. A84300 Adapter Assy
(1) ea. F64200 Flange
(2) ea. Seals
(1) ea. Clamp

PIPE SIZE (IN)	A (REF.) (IN)	B (REF.) (IN)
1	3½	1-3/4
1½	3½	1-3/4
2	4-1/4	2-1/8
3	4-1/4	2-5/8
4	5-1/4	2-5/8
5	6	3



NOTES:

1. To permit skiving pipe in place, the overall length of assy is determined by length of steel penetration and "A" dimension. Length to be designated by suffix to part no., ie. A64300-15 (15 inches long)
   Adapter assy consists of:
   (1) ea. Fiberglass reinforced pipe
   (1) ea. Flange, bolted
   (1) ea. Flange, flexible
   (Both flanges bonded on pipe as shown)
2. This flange attached to pipe at time of installation after adapter assembly is in place thru penetration
3. On vertical installations, the adapter assembly must be mounted as shown on top side of the penetration. Horizontal installations may be mounted either way.
4. Flanges bonded to FRP pipe by customer.
5. Adapter and flange O.D. bolt size, quantity and pattern per ANSI 16.5 (150 lb)
6. Material: Flanges and sleeves – Molded FR Epoxy
   Couplers – Copper-Nickel 70:30
   Clamps – 302 Stainless Steel
7. Example of part no.: Gamagrip J842XX
   i.e. J84220 (F.R.P. pipe size)
   or JA84220

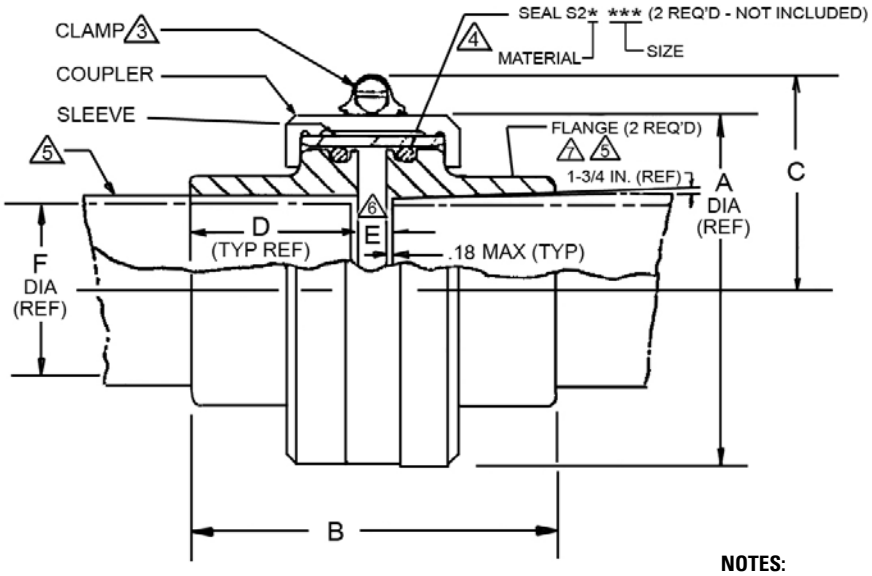
REVISION	LTR	DESCRIPTION	DATE
	A	General revision to clarify	12/12/71
	B	Revised title and changed Note 5	1/5/72
	C	Revised Note 1. Added table for "A" & "B".	4/4/72
	D	Adapter was A84200. Revised "A" dim.	3/12/82

This issue supersedes all previously issued catalog sheets and drawings

J84200 Gamagrip Threadless, Flexible Coupling Assembly Series 842

Revision Letter J

SPLIT COUPLING ASSY (1)	FLANGE (2 REQ'D) (5)	SLEEVE (1 REQ'D)	SEAL SIZE (REF) (4)	COUPLER SPLIT (1 REQ'D)	CLAMP (1 REQ'D) (3)	A (REF)	B	C	D (REF)	E (6)	F (REF.)	WEIGHT (LBS) –42	WEIGHT (LBS) C
J84210	F84210	G84210	–327	C84210	–44	2.95	3.77	1.97	1.75	.272	1.19	2.4	2.2
J84215	F84215	G84215	–334	C84215	–60	3.95	3.79	2.47	1.75	.293	1.76	4.3	3.9
J84220	F84220	G84220	–339	C84220	–80	4.85	4.56	2.98	2.13	.334	2.15	7.4	6.7
J84230	F84230	G84230	–348	C84230	–96	5.94	5.64	3.55	2.63	.410	3.28	11.7	10.6
J84240	F84240	G84240	–431	C84240	–128	7.50	5.72	4.30	2.63	.492	4.28	23.1	21.0
J84260	F84260	G84260	–444	C84260	–188	10.50	6.64	5.80	3.00	.668	6.35	53.7	48.8



NOTES:

1. Example of part no.: GAMAGRIP J842XX X
   - Material
   - Pipe Size

   Materials:
   - Coupler Halves: –42 = Copper–Nickel (70-30) Alloy 24 / MIL-G-15345
     C = Stainless Steel 304
   - Flanges and Sleeve: Fiberglass reinforced epoxy resin
   - Clamp: 300 series stainless steel

2. Deleted

3. Clamp assembly purchased from Breeze Corp. Inc. Breeze Clamp Co.
   100 Aero Seal Drive, Saltsburg, PA 15681

   Non-magnetic series QS300M
   Example part no.: QS300M-XXX H or S
   - Size
   - Hex (preferred)
   - Collared slot (acceptable substitute)

4. See drawing S2 for material sizes per AS568A

5. For use with A.O. Smith "green thread" pipe or equivalent up to 150°F (65.5°C) and 200 psig (14.80 bar) with coupling angulation up to 4°, and 400 psig (28.59 bar) proof and 800 psig (56.17 bar) burst pressure with the coupling aligned.

6. Coupling assembly provides: 4° relative angulation or "E" axial motion

7. Flanges to be bonded to skived pipe ends using A.O. Smith adhesive DS8024 per the recommended procedures

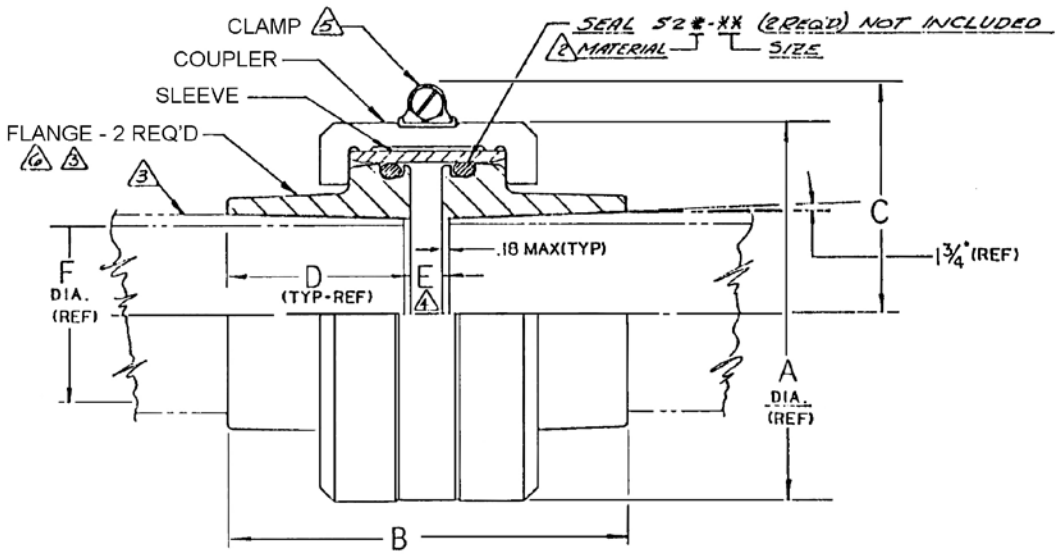
REVISION	LTR	DESCRIPTION	DATE
	F	Redrawn. Added "S" option. Revised notes. Added .18 MAX (TYP).	?/?/79
	G	Deleted all references to and views of segmented coupling. Deleted Note 2. Revised Note 1 incorporating	3/10/82
	H	Revised Note 1	8/30/89
	J	Revised clamps for J84240 and J84260	10/16/90

This issue supersedes all previously issued catalog sheets and drawings

J84300 Gamagrip Threadless Coupling Assembly – Flexible Series 843

Revision Letter H

PIPE SIZE (IN)	ASSY NO ⚠1	CLAMP ⚠5	SLEEVE	FLANGE ⚠3	COUPLER SPLIT	SEAL SIZE ⚠2	A (REF)	B	C	D (REF.)	E	F (REF)	WEIGHT (LBS) ⚠4
1	J84310	-44	G84210	F84210	C84310	-327	2.70	3.77	1.86	1.75	.272	1.19	.72
1½	J84315	-60	G84215	F84215	C84315	-334	3.65	3.79	2.33	1.75	.293	1.76	1.28
2	J84320	-72	G84220	F84220	C84320	-339	4.35	4.36	2.68	2.13	.334	2.15	1.85
3	J84330	-96	G84230	F84230	C84330	-348	5.85	5.64	3.43	2.63	.410	3.28	2.92
4	J84340	-104	G84240	F884240	C84340	-431	6.85	5.72	3.93	2.63	.492	4.28	5.43
6	J84360	-152	G84260	F84260	C84360	-444	9.70	6.64	5.35	3.00	.668	6.35	12.77



REVISION	LTR	DESCRIPTION	DATE
	A	Revised "A", "C" and weight	10/9/73
	B	Revised "A", "C" and weight. Revised seal sizes for 3 inch size coupling . –425 was –347.	10/19/78
	C	Revised clamp assy p/n – was "8" designator and dash no. for 2, 4 and 6 inch sizes. Revised Note 5.	11/27/78
	D	Revised seal size for 3 and 6 inch sizes, revised "E" dim.	12/5/78
	E	Revised skive tool and skive adaptor callouts	5/7/79
	F	Added "anodized and dyed black" to coupler material callout	6/27/79
	G	Revised Notes 3 & 5, "F" and Note 2. Made A, D and F "(REF)", added ".18 MAX". Removed skive tool and adaptor callouts.	8/15/79
	H	Revised Note 3	9/10/80

NOTES:

⚠1 Example of part no.: GAMAGRIP JA84320

Materials:
Coupler: 6061-T6 aluminum (anodized and dyed black)
Flanges amd Sleeves: Fiberglass reinforced epoxy resin
Clamp: 300 series Stainless Steel

⚠2 See drawing S2 for material sizes per AS568A. Sizes per AS568A.

⚠3 For use with A.O. Smith "Green Thread" Pipe or equivalent up to 150°F (65.5°C) and 200 psig (14.80 bar) with coupling angulation up to 4°, and 400 psig (28.59 bar) proof and 600 psig (42.38 bar) burst pressure with the coupling aligned

⚠4 Coupling assembly provides: 4° relative angulation or "E" axial motion

⚠5 Clamp: A product of Breeze Corp. Inc. Breeze Clamp Co.
100 Aero Seal Drive, Saltsburg, PA 15681

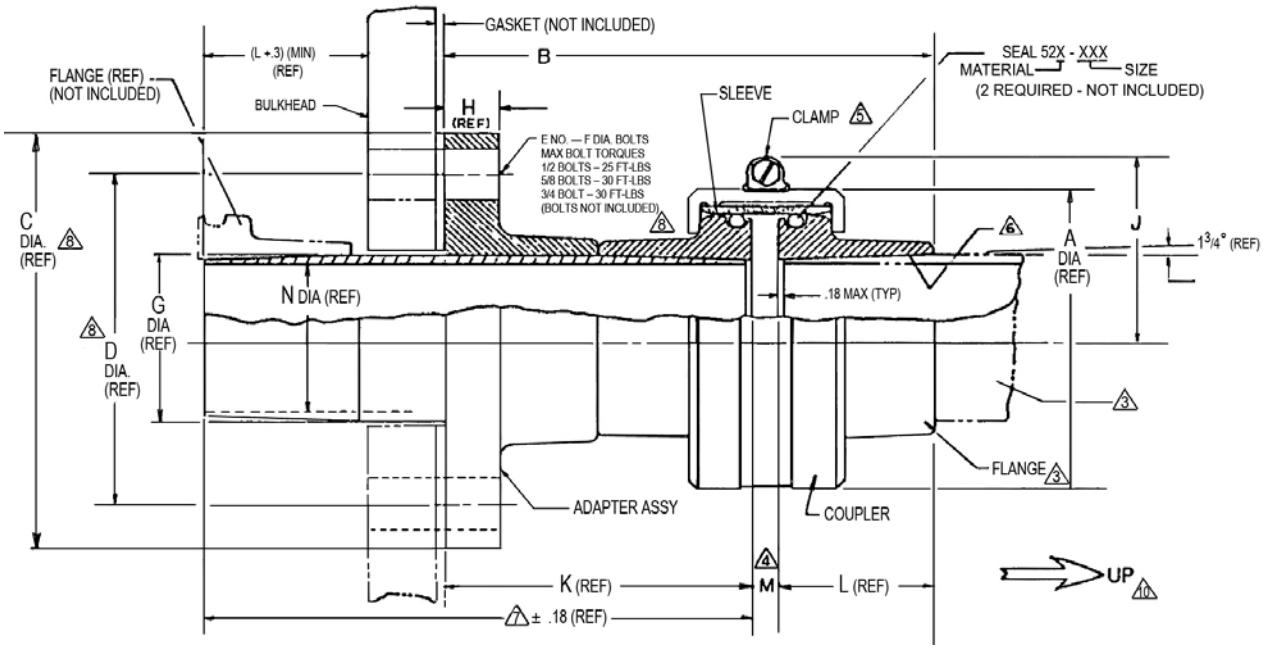
Example of part no.: QS-300M-72 H or S
- Non-magnetic series
- Size
- Hex (preferred)
- Collared slot (acceptable substitute)

⚠6 Flanges to be bonded to skived pipe ends using A.O. Smith adhesive DS8024 per the recommended procedures

JA84200
Gamagrip Threadless, Flexible Bulkhead Coupling Assembly Series 842

Revision Letter D

NOM PIPE SIZE (IN)	BKHD SPLIT COUPLING ASSY △1	ADAPTER ASSY (1 REQ'D)	FLANGE (1 REQ'D) △3	SLEEVE (1 REQ'D)	SEAL SIZE (REF.) △2	COUPLER SPLIT (1 REQ'D)	CLAMP (1 REQ'D) △5	A (REF)	B	C (REF)	D (REF)	E	F	G (REF)	H (REF)	J	K (REF)	L (REF)	M △4	N (REF)
1	JA84210	A84310	F84210	G84210	–327	C84210	–44	2.95	5.52	4.25	3.12	4	½	1.35	.75	1.97	3.50	1.75	.272	1.19
1½	JA84215	A84315	F84215	G84215	–334	C84215	–60	3.95	5.54	5.00	3.87	4	½	1.92	.75	2.47	3.50	1.75	.293	1.76
2	JA84220	A84320	F84220	G84220	–339	C84220	–80	4.85	6.68	6.00	4.75	4	5/8	2.40	.75	2.98	4.25	2.13	.334	2.15
3	JA84230	A84330	F84230	G84230	–348	C84230	–96	5.94	8.26	7.50	6.00	4	5/8	3.51	1.38	3.55	5.25	2.63	.410	3.28
4	JA84240	A84340	F84240	G84240	–431	C84240	–128	7.50	8.34	9.00	7.50	8	5/8	4.51	1.38	4.30	5.25	2.63	.492	4.28
6	JA84260	A84360	F84260	G84260	–444	C84260	–188	10.50	9.64	11.00	9.50	8	¾	6.63	1.50	5.80	6.00	3.00	.668	6.35



NOTES:

△1 Example of part no.: JA842XX - XX - X
Series
Size
Material
Adapter assy length
(i.e. –7 = 7" long; –13 = 13" long

△2 See drawing S2 for material sizes per AS568A

△3 For use with A.O. Smith "Green Thread"Pipe or equivalent up to 150°F (65.5°C) and 200 psig (14.80 bar) with coupling angulation up to 4°, and 400 psig (28.59 bar) proof and 800 psig (56.17 bar) burst pressure with the coupling aligned

△4 Coupling assembly provides: 4° relative angulation or "M" axial motion.

△5 Clamp assembly purchased from Breeze Corp. Inc. Breeze Clamp Co.
100 Aero Seal Drive, Saltsburg, PA 15681
Non-magnetic series QS300M:
Example of part no.: QS300M-XXX H or S
Size
Collared slot (acceptable substitute)
Hex (preferred)

△6 Flanges to be bonded to skived pipe ends using A.O. Smith adhesive DS8024 per the recommended procedures

△7 Length specified by customer; determined by bulkhead thickness and penetration desired by customer (maximum 30 inches length)

△8 Per ANSI B16 5-150 lbs

9. Deleted

△10 On vertical installations, the assembly must be mounted as shown on top side of penetration. Horizontal installations may be mounted either way.

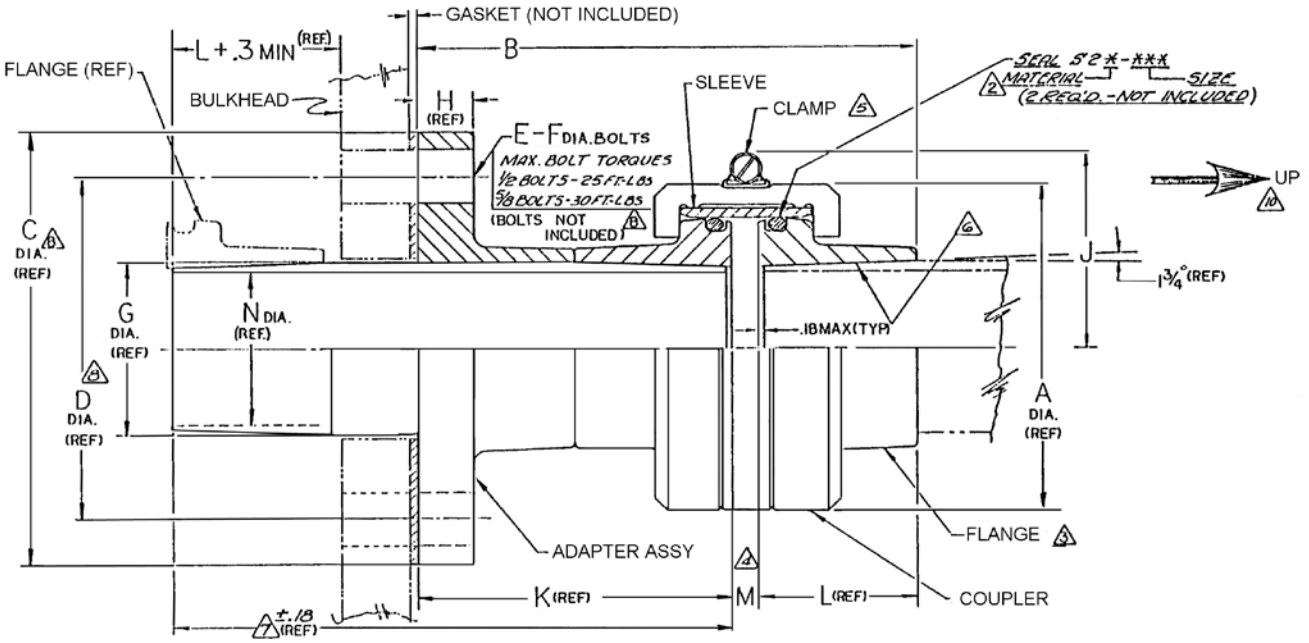
REVISION	LTR	DESCRIPTION	DATE
	A	Revised Note 2. Added .18 MAX (TYP). Added 1 3/4° (REF). Revised Note 7. Revised "G" dim.	2/8/79
	B	Deleted all references to and views of segmented coupling assembly. Deleted Note 9. Revised Note 1.	3/10/82
	C	Revised Note 1	3/30/89
	D	Revised clamps for JA84240 and JA84260	10/16/90

This issue supersedes all previously issued catalog sheets and drawings

JA84300
Gamagrip Threadless Flexible Coupling Assembly For Bulkhead and Deck Penetrations

Revision Letter E

PIPE SIZE (IN)	ASSY NO.	CLAMP ⑤	ADAPTER ASSY	FLANGE	SLEEVE	COUPLER ②	SEAL SIZE	A (REF)	B	C (REF)	D (REF)	E	F	G (REF)	H (REF)	J	K (REF)	L (REF)	M ④	N (REF)
1	JA84310	–44	A84310	F84210	G84210	C84310	–327	2.70	5.52	4.25	3.12	4	½	1.35	.75	1.86	3.50	1.75	.272	1.19
1½	JA84315	–60	A84315	F84215	G84215	C84315	–334	3.65	5.54	5.00	3.87	4	½	1.92	.75	2.33	3.50	1.75	.293	1.76
2	JA84320	–72	A84320	F84220	G84220	C84320	–339	4.35	6.68	6.00	4.75	4	5/8	2.40	.75	2.68	4.25	2.13	.334	2.15
3	JA84330	–96	A84330	F84230	G84230	C84330	–348	5.85	8.26	7.50	6.00	4	5/8	3.51	1.38	3.43	5.25	2.63	.410	3.28
4	JA84340	–104	A84340	F84240	G84240	C84340	–431	6.85	8.34	9.00	7.50	8	5/8	4.51	1.38	3.93	5.25	2.63	.492	4.28
6	JA84360	–152	A84360	F84260	G84260	C84360	–444	9.70	9.67	11.00	9.50	8	¾	6.63	1.50	5.35	6.00	3.00	.668	6.35



NOTES:

① Example of part no.: Gamagrip JA84300 - XX
Series — Pipe Size — Adapter assy length (i.e. –7 = 7" long; –13 = 13" long

Materials:
Coupler: 6061-T6 aluminum (anodized and dyed black)
Flanges and Sleeves: Fiberglass reinforced epoxy resin

② See drawing S2 for material sizes per AS568A. Sizes per AS568A.

③ For use with A.O. Smith "Green Thread" Pipe or equivalent up to 150°F (65.5°C) and 200 psig (14.80 bar) with coupling angulation up to 4°, and 400 psig (28.59 bar) proof and 600 psig (42.38 bar) burst pressure with the coupling aligned

④ Coupling assembly provides: 4° relative angulation or "M" axial motion

⑤ Clamp: A product of Breeze Corp. Inc. Breeze Clamp Co.
100 Aero Seal Drive, Saltsburg, PA 15681
Example of part no.: QS-300M-72 H or S
Non-magnetic series — Size — Hex (preferred) — Collared slot (acceptable substitute)

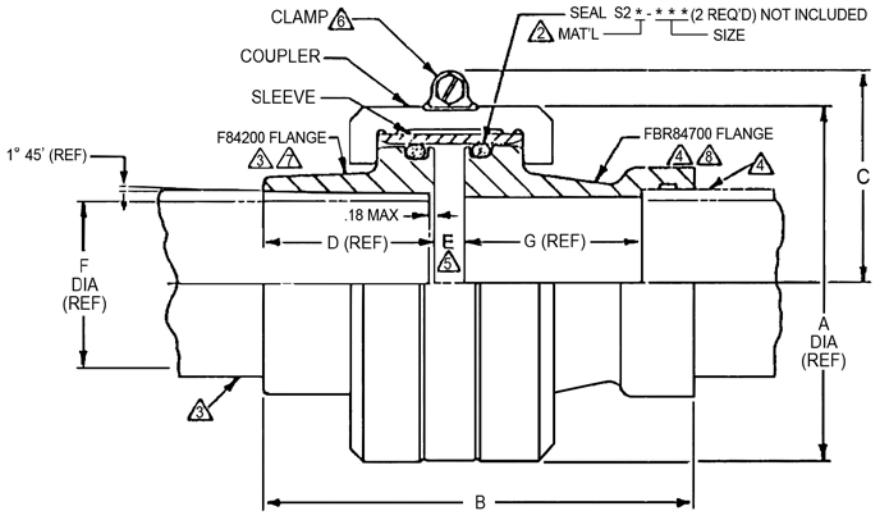
REVISION	LTR	DESCRIPTION	DATE
	A	Revised length designation in part number. Was in 1-inch increments – now in tenths of an inch.	2/2/79
	B	Added max. length to Note 7 and ± .18 tolerance. Added bolt sizes and torque values.	3/12/79
	C	Added "anodize and dyed black" to coupler material callout	6/27/79
	D	Revised Notes 2, 3 & 5 and dimension "N". Added "(REF)" to "A", "C", "D", "G", "H", "K" & "L". Added ".18 MAX TYP". Revised Note 7, added 6 inch size.	8/16/79
	E	Revised Note 3	9/10/80

This issue supersedes all previously issued catalog sheets and drawings

JBR84700 Gamagrip Threadless Coupling Assembly, Flexible Transition Series 847

Revision Letter N/C

PIPE SIZE (IN)	ASSY NO 1	CLAMP 6	SLEEVE	FLANGE 3	FLANGE 4	COUPLER SPLIT	SEAL SIZE 2	A (REF)	B	C	D (REF)	E 5	F (REF)	G (REF)	WEIGHT (LBS)
1	JBR84710	-44	G84210	F84210	FBR84710	C84710	-327	2.70	3.77	1.36	1.75	.272	1.19	1.80	2.0
1½	JBR84715	-60	G84215	F84215	FBR84715	C84715	-334	3.65	3.79	2.33	1.75	.293	1.76	1.87	3.8
2	JBR84720	-72	G84220	F84220	FBR84720	C84720	-339	4.35	4.56	2.68	2.13	.334	2.15	2.21	5.6
3	JBR84730	-96	G84230	F84230	FBR84730	C84730	-348	5.85	5.64	3.43	2.63	.410	3.28	2.66	10.8
4	JBR84740	-104	G84240	F84240	FBR84740	C84740	-431	6.85	5.72	3.93	2.63	.492	4.28	2.71	17.1



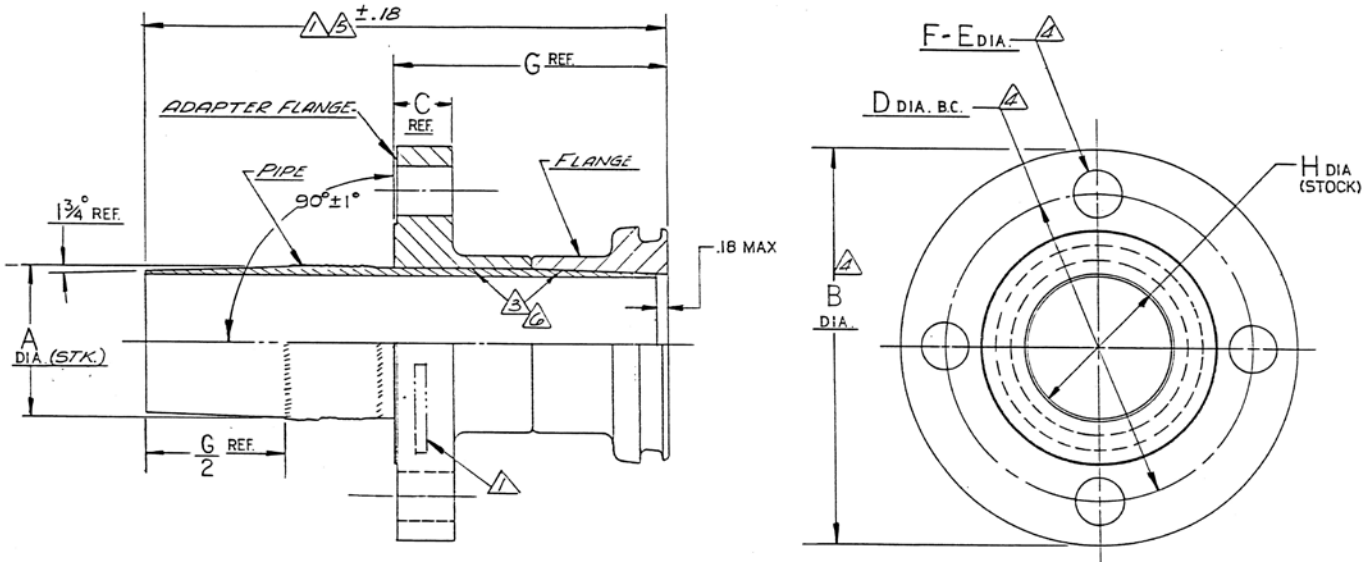
NOTES:

1. Example of part no.: Gamagrip JBR84700 (Series — Pipe Size)
   Materials:
   Coupler: Cast Bronze, ASTM-B271 or B505, alloy 954
   F84200 Flange and Sleeve: Fiberglass reinforced epoxy resin
   FBR84700 Flange: Cast Bronze, ASTM-B271, alloy 903
2. See drawing S2 for material sizes per AS568A. Sizes per AS568A.
3. For use with A.O. Smith "Green Thread" Pipe or equivalent up to 150°F (65.5°C) and 200 psig (14.80 bar) with coupling angulation up to 4°, and 400 psig (28.59 bar) proof and 600 psig (42.38 bar)burst pressure with the coupling aligned
4. For use with copper-nickel tube (of same outside diameter as fiberglass pipe) per MIL-T-16420
5. Coupling assembly provides: 4° relative angulation or "E" axial motion
6. Clamp: A product of Breeze Corp. Inc. Breeze Clamp Co.
   100 Aero Seal Drive, Saltsburg, PA 15681
   Example of part no.: QS-300M-72 H or S
   (Non-magnetic series — Size — Hex (preferred) — Collared slot (acceptable substitute))
7. F84200 flange to be bonded to kived pipe end using A.O. Smith adhesive DS8024 per the recommended procedures
8. FBR84700 flange to be brazed to MIL-T-16420 tube using silver brazing ring per MIL-F-1183, Figure 3
9. See Gamah dwg J84700 for coupling to join fiberglass pipes

JA84300 Flange Adapter Assembly for Bulkhead and Deck Penetrations

Revision Letter F

NOM PIPE SIZE (IN)	ASSEMBLY PART NO. ⚠1	ADAPTER FLANGE	FLANGE	ADAPTER PIPE	A (STR)	B	C	D	E	F	G (REF)	BOLT DIA (REF)	H (STK)	J ⚠5
1	A84310	FA84310	F84210	PA84310	1.35	4.25	.75	3.12	.62	4	3.5	½	1.19	6
1½	A84315	FA84315	F84215	PA84315	1.92	5.00	.75	3.87	.62	4	3.5	½	1.76	6
2	A84320	FA84320	F84220	PA84320	2.40	6.00	.75	4.75	.75	4	4.2	5/8	2.15	7
3	A84330	FA84330	F84230	PA84330	3.51	7.50	1.38	6.00	.75	4	5.2	5/8	3.28	8
4	A84340	FA84340	F84240	PA84340	4.51	9.00	1.38	7.50	.75	8	5.2	5/8	4.28	8
6	A84360	FA84360	F84260	PA84360	6.63	11.00	1.50	9.50	.88	8	6.0	¾	6.35	9



REVISION	LTR	DESCRIPTION	DATE
	A	Revised all letter designations and 3 and 4 inch C	12/3/78
	B	Revised length designation. Was in 1-inch increments. Now in tenths of an inch increments.	2/2/79
	C	Revised Note 3. Revised "A" dia. to stock. Clarified dwg — pipe end and flange face, area of pipe stock O.D. Added 90° ±1°.	3/9/79
	D	Revised Note 3, added Note 6	4/27/79
	E	Added 6 inch size. Revised Note 5. Revised "A" dimension, added "H" dimension.	8/13/79
	F	Added min. length "J"	3/10/80

This issue supersedes all previously issued catalog sheets and drawings

NOTES:

⚠1 Example of part no.: Gamagrip A84300 - XX Assy
Pipe Size — ⚠5 — Total assy length in inches, i.e. –7 = 7" long; –13 = 13" long

2. Material:
Pipe: Fiberglass reinforced epoxy resin (A.O. Smith Green Thread)
Flanges: Molded fiberglass reinforced epoxy resin

⚠3 Cleaning and bonding of components to be accomplished as outlined in P.S. 7-16, para. 4.2 thru 4.6. Use adhesive DS-8024.

⚠4 Per ANSI B16.5 150 lb

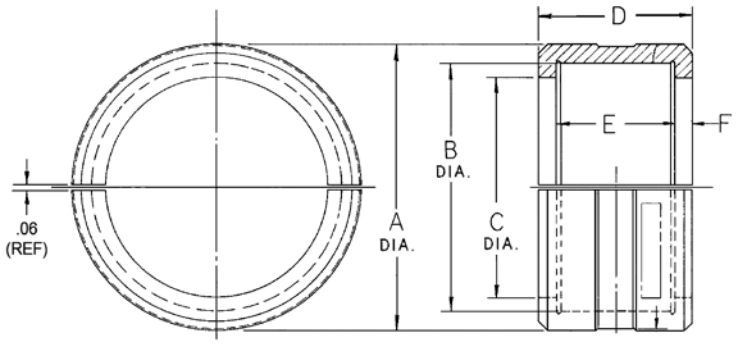
⚠5 Length to be specified by customer.
Maximum length = 30 inches
Minimum length = "J"

⚠6 No adhesive residue allowed on pipe I.D.

C84200 Coupler, Split Threadless, for Pipe

Revision Letter F

PIPE SIZE (IN)	PART NO.	A	B	C	D (REF)	E	F	— WEIGHT (LBS) — –56	–42
1	C84210	2.96	2.38	1.75	2.25	1.75	.25	.33	2.0
1½	C84215	3.96	3.30	2.35	2.37	1.77	.30	.55	3.5
2	C84220	4.86	3.83	3.05	2.51	1.81	.35	.99	6.3
3	C84230	5.94	4.83	4.00	3.04	2.25	.40	1.19	7.6
4	C83240	7.51	6.17	5.15	3.82	2.82	.50	3.03	19.3
6	C84260	10.51	8.68	7.50	4.79	3.62	.59	7.37	47



PART NO. CODE

C842 XX – XX

PART NO.
PIPE SIZE
MATERIAL
FINISH
–42 = COPPER-NICKEL ALLOY 24 PER MIL-C-15345
–56 = NYLON 6/6, 30% GLASS FILLED 3

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn from "Customer Use" drawing. No data change.	7/31/81
	E	Revised weights	10/6/81
	F	Added –56 material	6/18/92

This issue supersedes all previously issued catalog sheets and drawings

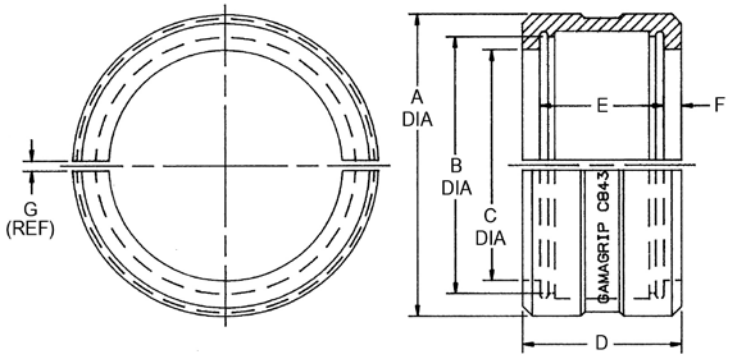
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125
3. Burst pressure for –56 material = 50 psi (3.44 bar)

C84300 Coupler, Split Threadless, for Pipe Series 843

Revision Letter E

PIPE SIZE (IN)	PART NO.	A	B	C	D	E	F	G	WEIGHT (LB)
1	C84310	2.70	2.31	1.77	2.00	1.75	.12	.06	.26
1½	C84315	3.65	3.19	2.50	2.07	1.77	.15	.06	.47
2	C84320	4.35	3.80	3.05	2.16	1.81	.18	.06	.75
3	C84330	5.85	5.17	4.35	2.65	2.25	.20	.06	1.51
4	C84340	6.85	6.14	5.28	3.32	2.82	.25	.06	2.38
6	C84360	9.70	8.78	7.75	4.37	3.62	.38	.06	6.07



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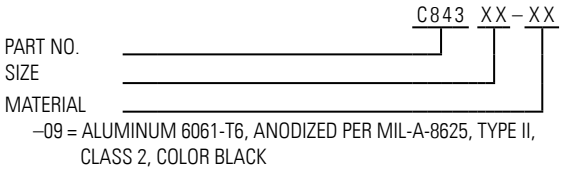


–09 = ALUMINUM 6061-T6, ANODIZED PER MIL-A-8625, TYPE II, CLASS 2, COLOR BLACK

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn from "Customer Use" drawing	8/6/81
	E	Revised weights	10/6/81

This issue supersedes all previously issued catalog sheets and drawings

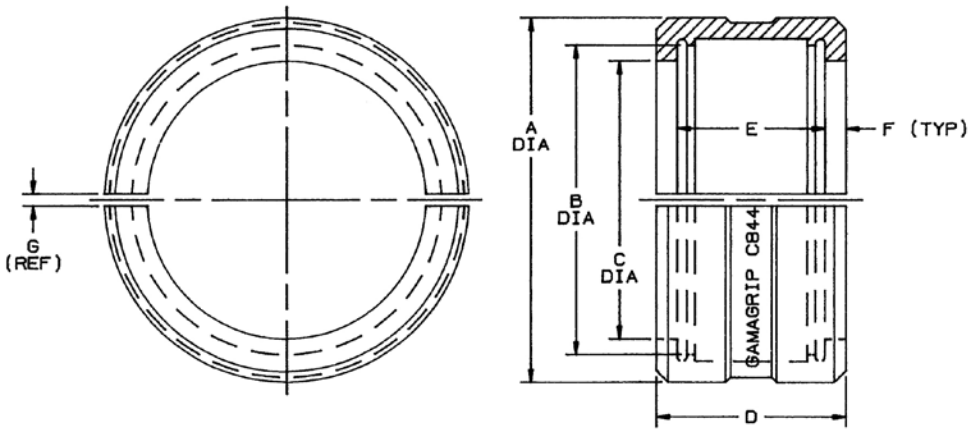
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

C84400 Coupler, Split Threadless for Pipe Series 844

Revision Letter D

PIPE SIZE (IN)	PART NO.	A	B	C	D (REF)	E	F	G	WEIGHT (LB)
1	C84410	2.70	2.31	1.77	2.00	1.75	.12	.06	.43
1½	C84415	3.65	3.19	2.50	2.07	1.77	.15	.06	.90
2	C84420	4.35	3.80	3.05	2.16	1.81	.18	.06	1.25
3	C84430	5.85	5.17	4.35	2.65	2.25	.20	.06	2.51
4	C84440	6.85	6.14	5.28	3.32	2.82	.25	.06	3.96
6	C84460	9.70	8.78	7.75	4.37	3.62	.38	.06	10.1



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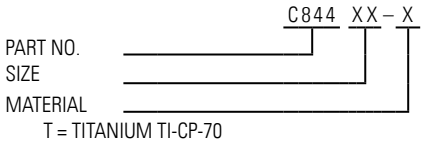


REVISION	LTR	DESCRIPTION	DATE
	C	Redrawn from "Customer Use" drawing	8/14/81
	D	Revised "T" material	1/30/85

This issue supersedes all previously issued catalog sheets and drawings

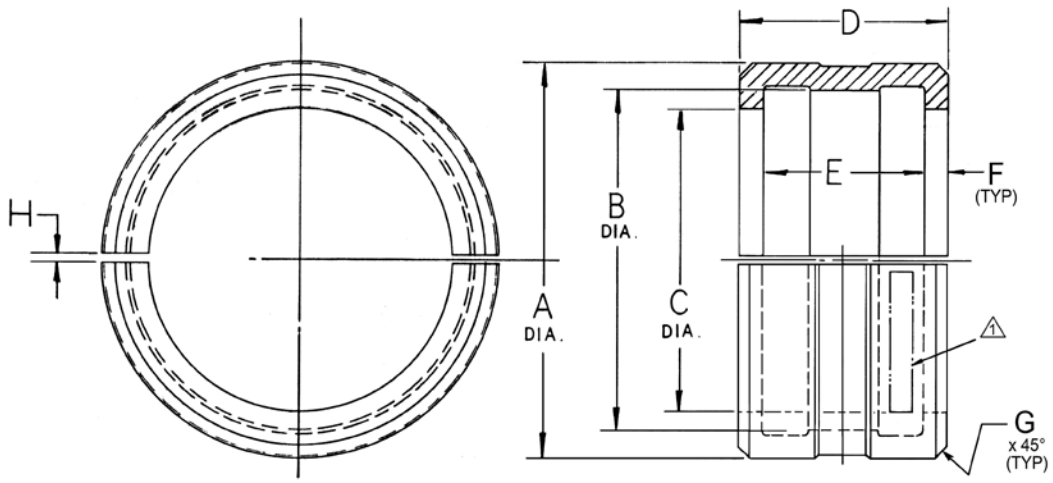
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

C84700 Split Coupler, Threadless Coupling
Cast Bronze
Series 847

Revision Letter A

PIPE SIZE (IN)	PART NO.	A	B	C	D (REF)	E ±.03	F ±.03	G ±.03	H	WEIGHT (LB)
1	C84710	2.700	2.311	1.77	2.00	1.752	.125	.090	.06	.70
1½	C84715	3.650	3.191	2.50	2.07	1.173	.150	.125	.06	1.46
2	C84720	4.350	3.803	3.05	2.16	1.814	.175	.125	.06	2.03
3	C84730	5.850	5.173	4.35	2.65	2.352	.200	.190	.06	4.09
4	C84740	6.850	6.140	5.27	3.32	2.816	.250	.190	.06	6.44



Material: Bronze Alloy 954 per ASTM-B271

Substitute Material for	
ASTM-B505	ASTM-B271

REVISION	LTR	DESCRIPTION	DATE
	A	Added weights. Deleted 6 inch size.	8/17/81

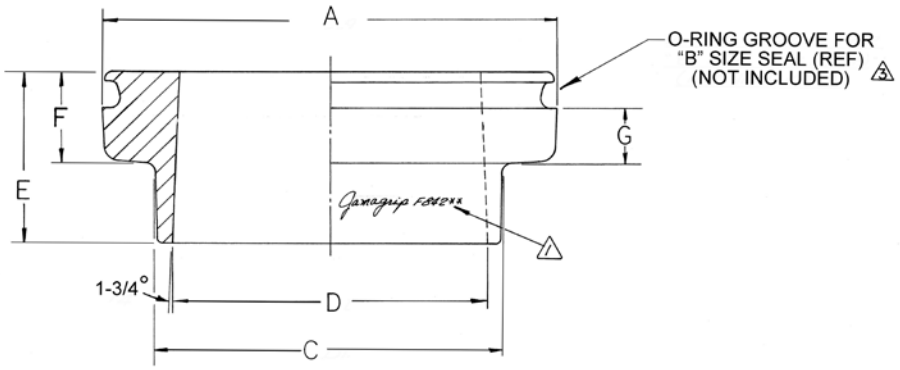
This issue supersedes all previously issued catalog sheets and drawings

NOTES:

1. Permanently identify part no. "Gamagrip C847XX" (both halves)
   Pipe size

F84200 Flange , Threadless Coupling

PIPE SIZE (IN)	PART NO. 1	A	B 3	C	D	E	F	G	WEIGHT (LB)
1	F84210	2.16	–327	1.69	1.36	1.75	.73	.36	.15
1½	F84215	3.00	–334	2.31	1.96	1.75	.73	.36	.27
2	F84220	3.59	–339	2.88	2.38	2.13	.73	.36	.46
3	F84230	4.91	–348	4.20	3.53	2.63	.91	.50	1.05
4	F84240	5.85	–431	5.13	4.54	2.63	1.15	.65	1.23
6	F84260	8.36	–444	7.60	6.65	3.00	1.47	.90	2.75



REVISION	LTR	DESCRIPTION	DATE
	A	Revised "A". Added "B" size seal.	1/29/79
	B	Revised Note 2. Added Note 3.	13/8/79
	C	Revised weights.	12/4/79
	D	Added –56 material and Note 4. Revised Note 1.	8/20/92

This issue supersedes all previously issued catalog sheets and drawings

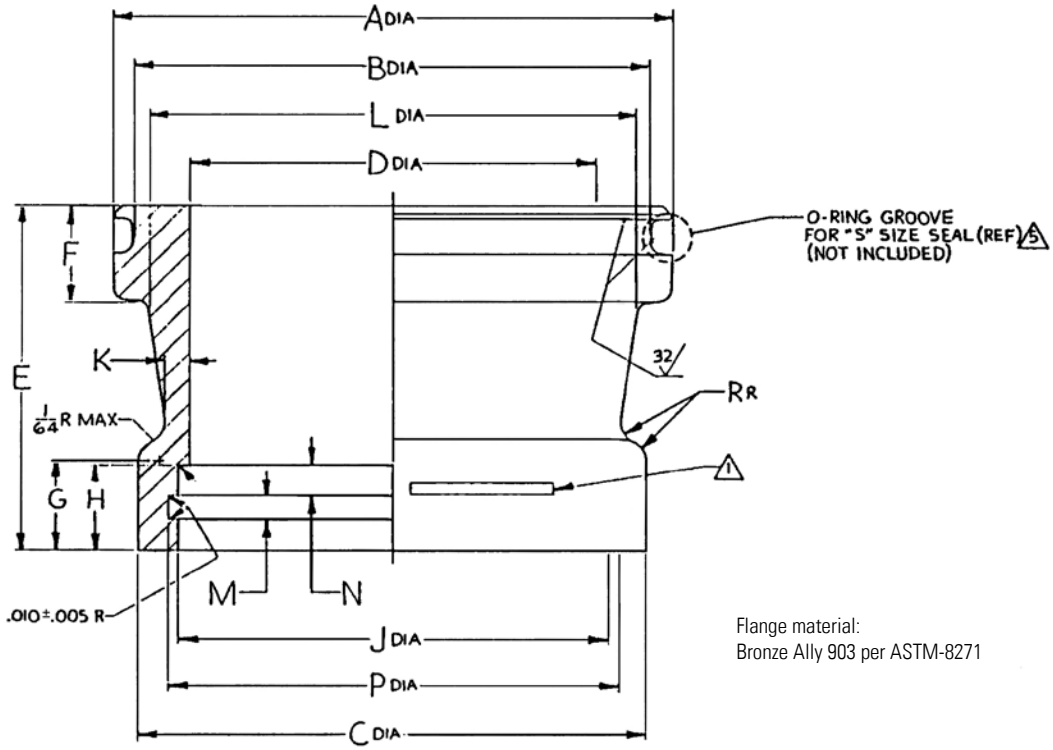
NOTES:

1. Example of part no.: "GAMAGRIP F842XX–XX"
   Pipe Size — Material
   2 = No suffix
   4 = –56
2. Flanges are fabricated from fiberglass reinforced molded epoxy resin and are for bonding to A.O. Smith "Green Thread" pipe or equivalent.
3. Seal size per AS568A
4. Nylon 6/6, 30% glass filled

FBR84700
Flange, Cast Bronze Tube, Brazed
Series 847

Revision Letter B

PIPE SIZE (IN)	PART NO.	A	B	C	D	E	F	G	H	J	K	L	M ±005	N	P	R	O-RING SIZE S ⚠5	WEIGHT (LBS)
1	FBR84710	2.157	1.807	1.75	1.196/1.146	2.25	.73	.478	.447	1.315	.13	1.69	.135	.154	1.434	.14	–327	1.0
1 ½	FBR84715	2.997	2.647	2.41	1.772/1.712	2.50	.73	.666	.635	1.900	.15	2.31	.197	.217	2.021	.16	–334	1.9
2	FBR84720	3.589	3.239	2.95	2.216/2.156	2.88	.73	.697	.666	2.375	.17	2.88	.197	.232	2.496	.19	–339	2.9
3	FBR84730	4.909	4.559	4.23	3.321/3.251	3.50	.91	.869	.838	3.500	.20	4.20	.260	.287	3.623	.22	–348	6.3
4	FBR84740	5.845	5.391	5.34	4.292/4.212	3.63	1.15	.947	.916	4.500	.23	5.13	.260	.326	4.683	.25	–431	8.8



Flange material:
Bronze Ally 903 per ASTM-8271

NOTES (UNLESS OTHERWISE SPECIFIED):

⚠1 Permanently identified with part no.: GAMAGRIP FBR84700
Series
Size

2. Tube socket end configuration per MIL-F-1183, FIG 1-B to accept silver brazing
3. Centrifugally-cast, machined all over
4. This part mates with Eaton's Gamah P/N G842XX sleeve and C847XX coupler to provide transition from tube to F842XX flange on FRP pipe of the same nominal size

⚠5 See Gamah drawing "52" for o-ring materials

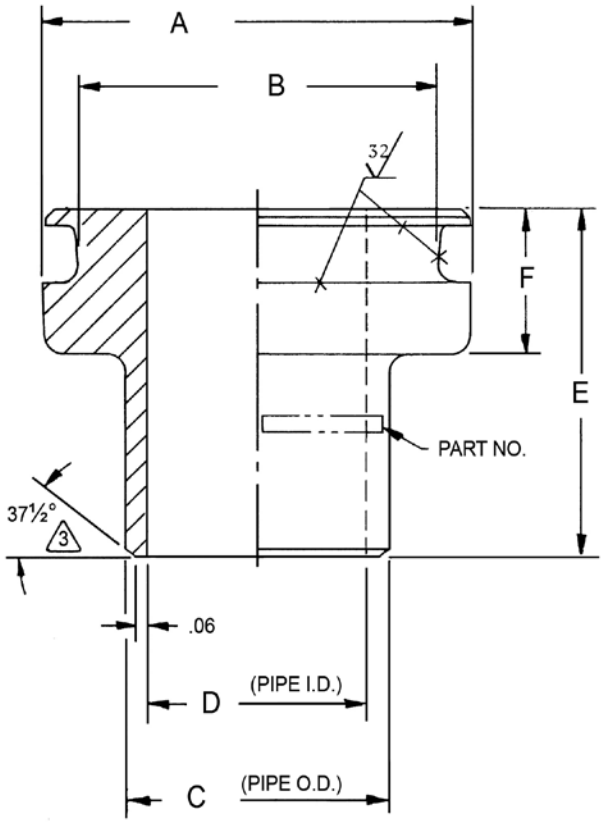
REVISION	LTR	DESCRIPTION	DATE
	A	Changed Note 3, changed material	8/11/81
	B	Added weights	9/25/81

This issue supersedes all previously issued catalog sheets and drawings

FW84200 Flange, Butt Welded Gamagrip Coupling Series 84

Revision Letter A

PIPE SIZE (IN)	PART NO.	A	B	C	D			E	F	WEIGHT (LBS) (SCH. 5)	
					SCH. 5	SCH. 10	SCH. 40			–09	–C
1	FW84210	2.157	1.807	1.32	1.19	1.10	1.05	1.75	.73	.19	.54
1½	FW84215	—	—	—	—	—	—	—	—	—	—
2	FW84220	3.589	3.239	2.38	2.25	2.16	2.07	2.13	.73	.47	1.37
3	FW84230	4.909	4.559	3.50	3.33	3.26	3.07	2.63	.91	.99	2.85
4	FW84240	5.845	5.391	4.50	4.33	4.26	4.03	2.63	1.15	1.38	3.99
6	FW84260	8.360	7.906	6.63	6.41	6.36	6.07	3.00	1.47	3.36	9.71



PART NUMBER CODE:

FW842 00 XX – XX

PART NO.

SIZE

MATERIAL

–C = STAINLESS STEEL 304L/AMS5647 OR 316 OR 321, PASSIVATED PER QQ-P-35

–09 = ALUMINUM 6061-T6/QQ-A-225/8

SCHEDULE PIPE:

–05 = SCH. 5

–10 = SCH. 10

–40 = SCH. 40

REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn from "Customer Use" drawing	9/11/81

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

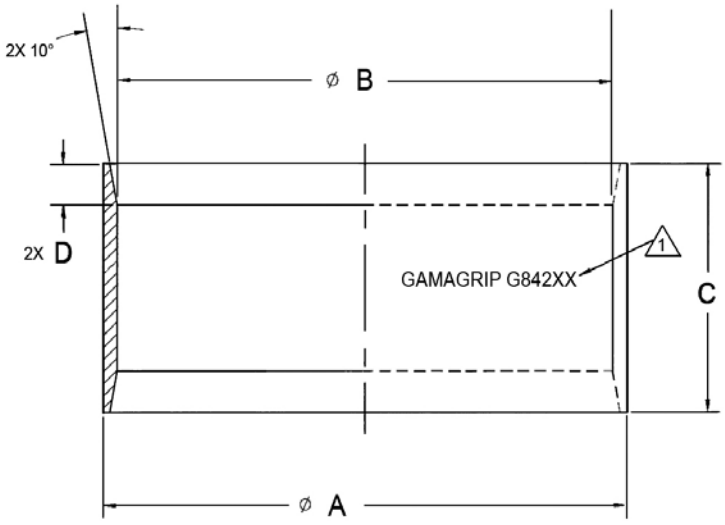
1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125

3 Chamfer not required on schedule 5 pipe flanges up thru 2-inch pipe size

G84200 Sleeve
Gamagrip Threadless Coupling

Revision Letter F

NOM PIPE SIZE (IN)	PART NO.	A	B	C	D	WEIGHT (LBS) ②	WEIGHT (LBS) ③	WEIGHT (LBS) ④
1	G84210	2.31	2.16	1.75	.30	.05	.09	.05
1½	G84215	3.19	3.00	1.77	.30	.09	.16	.09
2	G84220	3.80	3.59	1.81	.30	.12	.21	.12
3	G84230	5.17	4.91	2.25	.30	.26	.45	.26
4	G84240	6.14	5.85	2.81	.40	.44	.75	.44
6	G84260	8.75	8.36	3.62	.40	1.08	1.84	1.08



PART NO.	Description	Material/Specification
G842XX	Sleeve	④
G842XX-09	Sleeve	③
G842XX-56	Sleeve	②

REVISION	LTR	DESCRIPTION	DATE
	F	Redrawn with changes	6/18/92

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Example of part no.: "GAMAGRIP G842XX XX"
   Pipe Size — Material
2. Made from fiberglass filament wound epoxy resin sleeve stock
3. Made from 6061 aluminum, anodized, color: black
4. Made from nylon 6/6, 30% glass filled. Burst pressure: 50 psi (3.44 bar).
5. Interpret dimensions and tolerances per ANSI Y14.5M–1982
6. Surface roughness $\sqrt{125}$. Surface texture per ANSI B46.01

Metal Seal Couplings Design

Table of Contents

References

Eaton has been engaged in the design, development and manufacturing of various types of fluid line connections for over 20 years. Eaton's Gamah product line of metal edge seals and couplings were conceived and developed as a solution to provide reliable tube or pipe connections for advanced high performance fluid systems that required zero leak performance over a wide range of environmental conditions.

Metal edge seal couplings are suitable for use in nuclear and high vacuum systems. Leak rates of 2.5 X 10 -10 scc/sec. helium or less have been achieved with standard Gamah components. The low setting loads to energize the seal are particularly attractive for use in remotely operated disconnects and similar devices such as special form containers.

The design principle of the Gamah metal edge seal is sufficiently flexible to permit variations in configuration which will emphasize features that a specific installation may require.

GAMAH METAL EDGE SEAL CONCEPT

Eaton's Gamah sealing concept offers a unique design which provides unprecedented reliability and service life to meet the demanding requirements of advanced technology fluid systems. The metal edge seal is superior to any in modern design in its sealing effectiveness and adaptability to a broad spectrum of pressures, temperatures and materials.

Sealing Mechanism

Figure 1 shows the seal mechanism. In the pre-assembled condition, Figure 1A, the separable seal is essentially a flat annular-disc spring, rectangular in cross section. Axial compression of the flanges, shown in Figure 1B, imparts a rotation to the seal through the angle (α-β). Initially, there is a predetermined clearance on the inside and outside diameters of the seal. However, since the seal is radially constrained during rotation by the cavity diameters, an additional force is imposed by the couple $F_r a$. This containment ensures self-alignment of the seal. Unlike the Belleville configuration, the seal is not prone to buckle or bow. Stress distribution is not uniform. The greatest stress concentration is at the diagonally opposite edges in contact with the converging surfaces of the cavity. As Figure 1C illustrates, sealing is accomplished by plastic yielding at the apexes, as the bulk of the structure deforms elastically maintaining the stress at these points. Another significant feature of the concept is the mechanical advantage of the toggle mechanism. The axial force required to energize the seal is only a fraction of the radial force utilized for sealing the interface. This permits a low axial load for assembling the connector, a requirement often essential in the confined areas resulting from maximized space utilization.

Interface Geometry

The interface is a wedge or knife-edge contact. In ordinary seal designs, a wedge is mated with a flat sealing surface. However, as shown in Figure 1, in Eaton's design the wedge is mated with an internal corner. This has the advantage of compounding the deformations of the cavity substrate so that leak paths are not formed with repeated usage. Damage sensitivity is very low since sealing takes place in these well-protected corners. A microscopic examination of the interface shows a definite contact width, A1 in Figure 1C, and consequently an apparent area. To control this area, the angle of the cavity is dimensioned so that the cavity sides slope away from the sides of the seal, shown as angle β in Figure B. This clearance may also slightly increase in operation by a separation of the joint due to the internal pressure. However, as shown in Figure 1D, axial separation does not significantly alter the radial loading in the assembled position because the magnitude of the radial displacement is relatively incremental during the final phase of rotation. The slight clearance also establishes a rapport between the seal and cavity by allowing the cavity to support the seal in the event the modulus of elasticity of the seal material is reduced by time and temperature.

Pressure and Thermal Actuation

It should be further noted that, as shown in Figure 1B, the seal diagonal does not rotate through dead center. This further allows the internal pressure to act upon the area of the annulus diagonally through the cross section and boost the sealing stress. Hence, the seal is also pressure-actuated. Thermal actuation can also be provided by selecting materials for the male and female sides of the cavity that have appropriate differential expansion coefficients for the particular application.

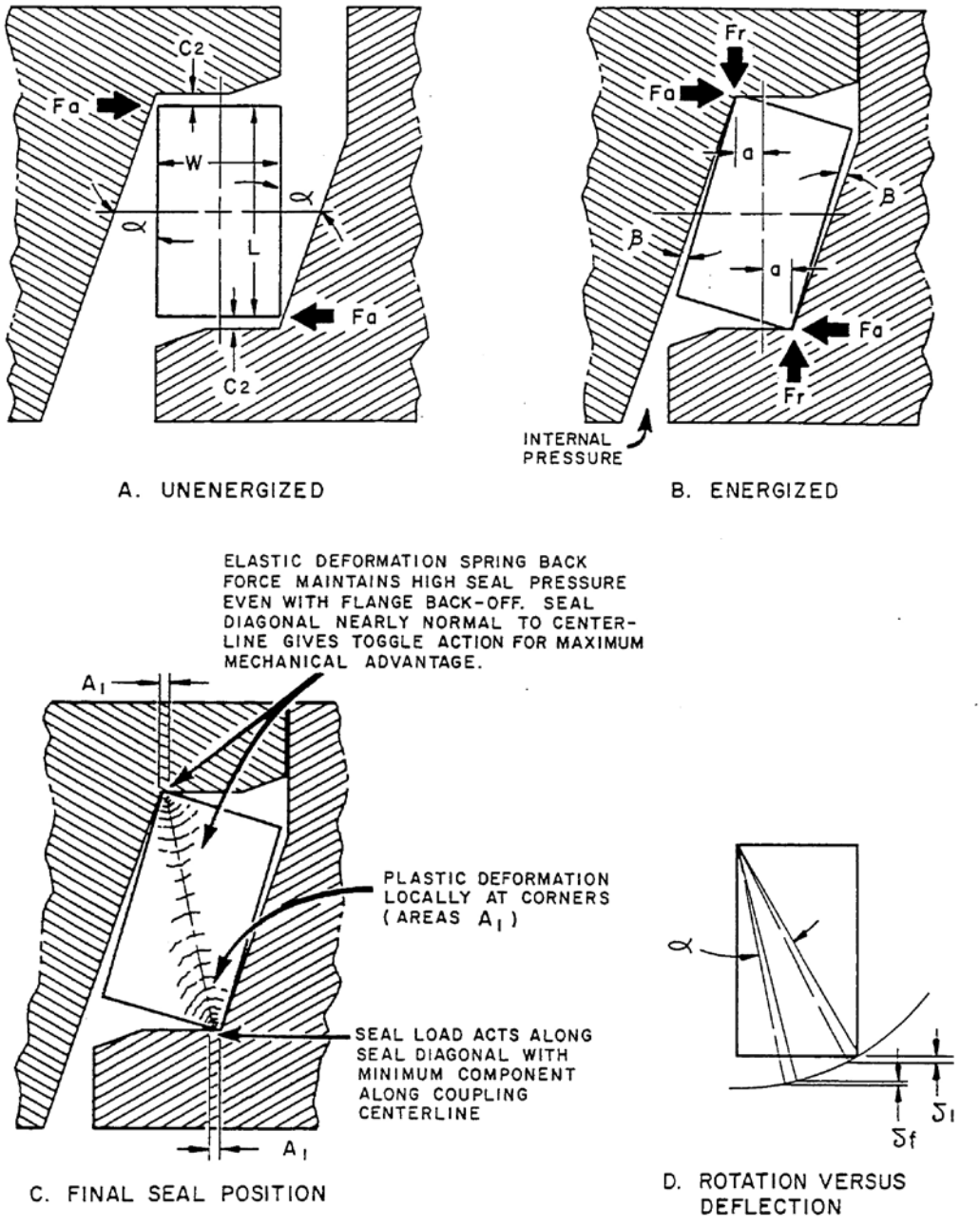


Figure 1 — Gamah Metal Seal

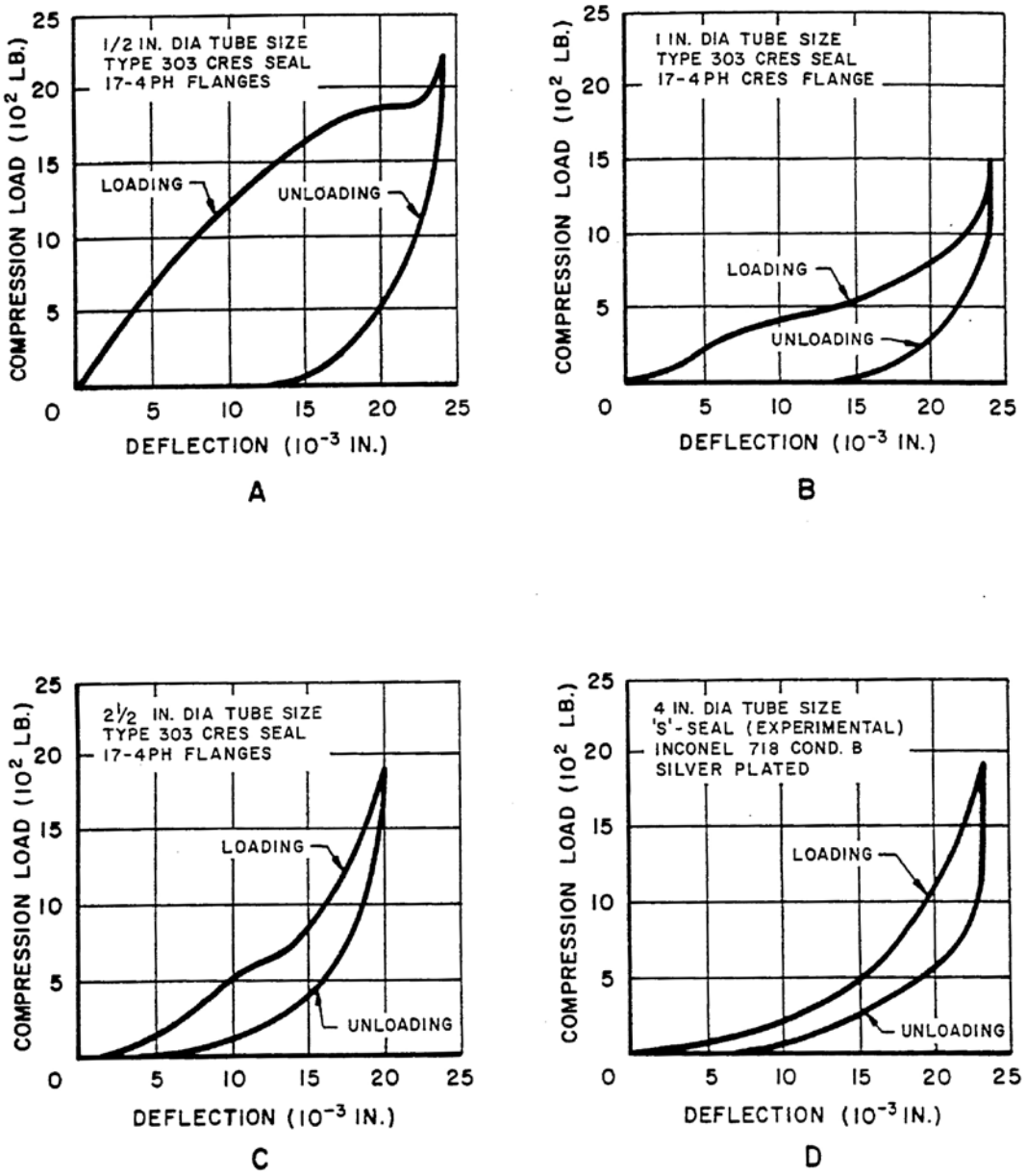


Figure 2 — Typical Load-Deflection Curves

Seal Spring-Back Principle

It is not the assembly force that is most effective in elastically sealing the interface; rather it is the unloading, or "spring-back" force. This mechanism not only provides the necessary sealing stress at the interface for sealing, but maintains it, even with some degree of flange rolling or separation. If the spring-back of the metal seal is reduced for any reason, such as over-temperature, the shoulders in both halves of the fitting will hold it in place and provide the sealing force.

Typical load-deflection characteristics of various seal configurations are shown in Figures 2A, B and C. Relative to other type seals, the hysteresis is exceptionally low. The high spring-back is unusual, considering the small cross section and the low strength of Type 304 stainless steel material. These characteristics can be considerably altered by the OD/ID ratio and the width to deflection ratio, among other variables, and can be tailored for specific applications. Figure 2D exemplifies how the characteristics have been altered by an experimental "S" configuration cross section which was silver plated. Figure 3, shown below, is a comparison of the flange load of this seal with one which was not plated, and also an equivalent solid design.

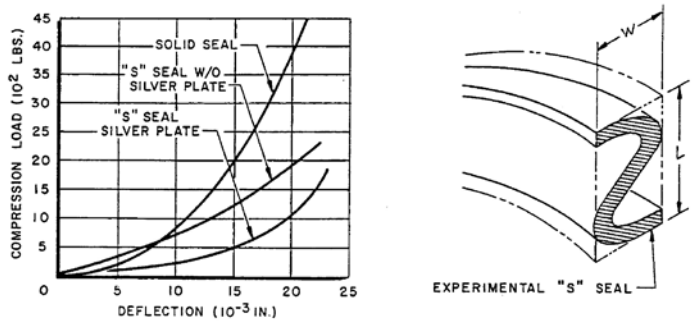


Figure 3 — Comparison of Flange Loads

Interface Surface Requirements

It should be pointed out that, aside from the mode of loading the interface, the degree to which leakage is eliminated is very much a function of the relative hardness of the mating surfaces of the interface, as well as the surface roughness and topography. The metal edge seal concept is not sensitive to these latter factors, and is not ordinarily plated or coated. A cavity finish of 32 RMS is all that is necessary for proper sealing. Since the sealing occurs only in the corners of the cavity, which are protected from damage, nicks and scratches on the interface have no adverse effect on the sealing function of the coupling. Eaton's Gamah product line seal design permits the seal to conform to slight variations in the cavity flatness, thus eliminating the need for rework of coupling flanges after welding or brazing operations.

Design Advantages

Eaton's Gamah seal concept may be adapted to joints as small as ¼ inch and is readily adaptable to diameters in excess of 50 inches. The sealing principle is identical and performance characteristics are comparable between small and large diameters. The metal edge seal concept is easily suited to couplings employing threaded couplings or bolted flanges. Methods of attachment to the tubing include swaging, bonding, welding and brazing.

The most common modes of failures, which result in excessive leakage in a separable coupling or fitting, occur either in the seal or in the threads. The seal problem can be easily remedied in any Gamah-designed coupling by simply replacing the damaged seal. Under emergency circumstances, where a replacement is not available, the original seal can be turned over and used again. Figure 4 shows the basic components of a threaded coupling in their assembly sequence.

Thread failure, due to stripping galling, can be a serious problem if a back-up solution is not available. The Stub Acme thread is recognized as one way to reduce thread failure. Eaton's Gamah coupling design uses the Stub Acme thread, rather than the V- thread, because it is almost impossible to cross thread and is easily started even if not visible to the assembler.

As another back-up solution to thread failures, the metal edge seal concept can be readily adapted to a coupling design that employs a replaceable nut and split retainer ring for disassembly purposes. To ensure that thread failure occurs in the replaceable nut, the threaded female flange would be made of a harder material than the nut.

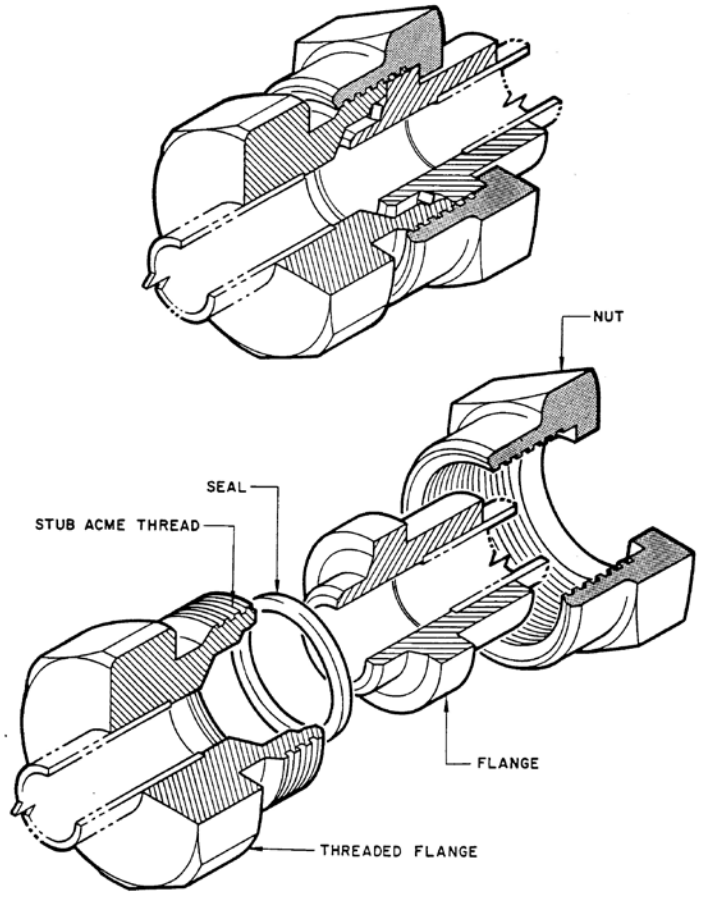


Figure 4 — Gamah Metal Edge Seal Coupling

DEMONSTRATED PERFORMANCE

Performance of Eaton's Gamah metal edge seal is unequaled by any seal in use today. The metal edge seal has met the demanding requirements of advanced aerospace, nuclear, cryogenic and similar fluid systems. Extensive testing on Eaton's Gamah couplings conducted by non-partisan agencies as well as by Eaton's engineering team has demonstrated the superior performance of the sealing concept, including zero leak performance at temperatures from -320°F to 3200°F (-195.5°C to 1760°C), and through a pressure range of 10-8 Torr to over 16,000 psi (1103 bar). As a result of this extensive product development and testing, Eaton's Gamah metal edge seal couplings have been chosen by many of this nation's leading manufacturing and research firms as part of their advanced technology fluid systems.

Grumman Lunar Excursion Module

Prior to selecting Eaton's Gamah fittings for the Lunar Excursion Module (LEM) Program, the Grumman Aircraft Engineering Corporation (GAEC) conducted a series of tests to evaluate tubing and tube connectors for the LEM's fluid pressure systems.

In the area of mechanically attached threaded couplings, GAEC test engineers had at their disposal 54 different aluminum and stainless steel coupling models ranging in the tube sizes from ¼ to 2-½ inches in diameter. Four types of connectors were represented in these 54 different models: the Wiggins "DL" connector, Resistoflex Corporation's Dyna-Tube connector, Harrison Manufacturing Company's Astro-Weight connector and Eaton's Gamah metal edge seal connector. Each connector was joined to two pieces of tubing, each tube being two feet long. Each type of connector to be tested consisted of ten such test assemblies plus four spares for each size and material (aluminum or steel). The nature and sequencing of the various tests are delineated in Figure 5 which is based on the procedure outlined in GAEC Test Plan LTP-269-001 (ref. 1)

During the early phases of testing, it became apparent to the evaluation team that the Eaton Gamah metal edge coupling easily out-performed the other connectors. The flared and flareless tube connectors were eliminated from the program due to their weight and the problems of sealing helium. The Wiggins "DL" Connector was included in the torque evaluation tests in order to obtain some data in this area as a basis for comparison to the metal edge seal. Helium leakage checks on the few Wiggins "DL" connectors that evidenced even moderate sealing sowed leak rates in the 10, 20 and 30 cc/min. range at only a fraction of the proposed operating pressures. The majority of these connectors had leakages greater than this. Based on these findings, further testing for this connector was also cancelled.

In comparison, a majority of Eaton's Gamah connectors showed no measurable leakage during the torque evaluation tests. In many of the sizes, in both stainless steel and aluminum versions, all 14 coupling assemblies successfully passed the stringent requirements of the helium leakage check. Those couplings that failed to pass did so solely because of incorrect swaging and torque data. At no time was any significant leakage detected through the metal edge seal.

In support of their findings, the evaluation team devised two special tests not included in the original test plan. One aluminum and one stainless steel quarter inch Gamah metal edge seal connector were assembled minus the seal rings using normal torque for the coupling nuts. The connectors were subjected to a maximum pressure of 5000 psi (344 bar) with water. No leakage was detected. At 5000 psi (344 bar) helium the steel connector had no leakage; the aluminum connector gave an indication of leakage at approximately 500 psi (34 bar).

In a comparison test, 1-½ inch steel Wiggins "DL" Connectors and the Eaton Gamah metal edge seal connectors were vibration tested. On the eight acceptable Wiggins assemblies, the tubing failed at the base of the flare bend at 1,000 vibration cycles or less in a 13G vibration environment. Of the four Gamah samples tested, two achieved better than 850,000 cycles and two better than 670,000 cycles; all in a 13G environment. In each case, tubing failure occurred in the area of swaging to the connector because the wall was too thin for the size of the tubing and the pressure. There was no indication of connector failure.

Because of the structural integrity and performance reliability demonstrated in this series of tests, standard Eaton Gamah metal edge couplings were selected by Grumman for use in the ECS, RCS, Life Support and Propulsion Systems on the NASA/Grumman Lunar Module. Each time a Lunar Module touched down on the surface of the moon, 462 Eaton Gamah couplings had helped make the trip possible.

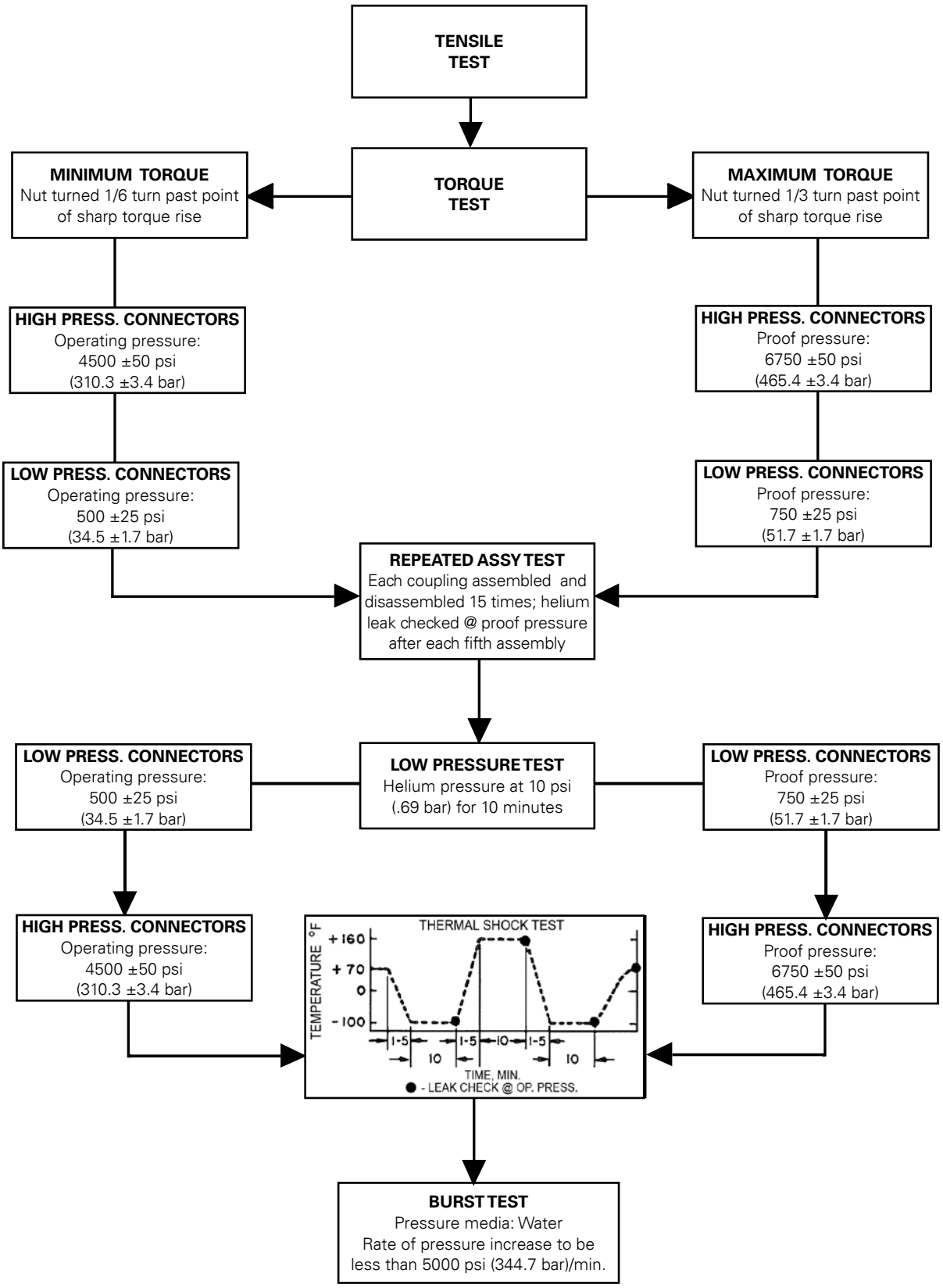


Figure 5 — Grumman Tube Connector Evaluation Program

Convair Tube Coupling Evaluation Program

In their development program on high-temperature, nuclear-radiation-resistant pneumatic power systems for future space vehicles, Convair Division of General Dynamics also chose to evaluate available tube couplings. This evaluation was required to supplement the meager test data and experience available on tubing and tube fittings potentially suitable for use at 1500°F (815°C) and 2000 psig (138.9 bar).

During the experimental test program, reported under Report AFAPL-TR-66-24 (ref. 2), detachable tube couplings were subjected to testing which included proof pressure, leakage, assembly, disassembly (in conjunction with thermal cycling from room temperature to 1000°F [537.7°C] and room temperature to 1500°F [815°C]), and pressure cycling.

While both permanent and reusable type tube couplings were considered for use in the high-temperature pneumatic system, only three reusable couplings — Astro-Weight, Conoseal and Eaton's Gamah metal edge seal couplings — were carried into the experimental test phase. Flareless (MS) and brazed couplings were considered but were ruled out in the early stages of the program. The flareless tube coupling was not considered adequate because of the anticipated relaxation of the sleeve following thermal cycling. It was also feared that the available brazing alloys would not be acceptable for long term exposure at 1500°F (815°C). Welded tube couplings were also investigated but it was decided a detachable type coupling was preferred from a maintenance standpoint.

All three of the 3/8 inch tube couplings to be evaluated were manufactured from Inconel Alloy X-750 with the seals being made from a variety of materials (see (Table I). The Astro-Weight and the Conoseal couplings were designed to be welded to the tubing; the Gamah coupling was swage-attached.

Each coupling was subjected to a proof pressure test at 4000 psi (275.7 bar) at room temperature. Following this, an anti-seize compound was applied to the threads and the coupling was assembled using the manufacturer's recommended torque value. The test coupling was installed in an induction heater test unit and an operating pressure of 2000 psig (138.9 bar) was applied. The room temperature leakage was then determined. The coupling temperature was then increased to 1000°F (537.7°C) followed by a second leakage check. A third leakage check was made after reducing the coupling temperature to room temperature. This procedure was repeated for a total of five thermal cycles from room temperature to 1000°F (537.7°C) and five thermal cycles from room temperature to 1500°F (815°C). Only Eaton's Gamah coupling used the same seal for cycles 1 through 9 before installing a new seal prior to the 10th cycle. The other two test couplings used a new seal for each cycle.

For the pressure cycling test, each test coupling was assembled with a new seal; an operating pressure of 2000 psig (138.9 bar) was applied and the external leakage measured. Using an induction heater, the coupling temperature was then increased from room temperature to 1500°F (815°C), and a series of 5000 pressure cycles was applied to the coupling while at the elevated temperature. Each pressure cycle consisted of increasing the pressure from 0 to 2000 to 0 psig (1 to 138.9 to 1 bar), at a cycling rate of approximately 15 cpm. Upon completion of 5000 pressure cycles, the leakage at both 1500°F (815°C) and room temperature was recorded. This procedure was then repeated until failure of the test coupler occurred.

The results of the assembly/disassembly test are presented in Figure 6. Although all tube couplings were considered acceptable for use at 1000°F (537.7°C), only the Gamah metal edge seal coupling completed the 1500°F (815°C) test without failure. Further, this coupling demonstrated superior performance during the pressure cycling test (see Table I).

Because Eaton's Gamah metal edge seal coupling demonstrated the best performance in all planned tests, it was subject to still another rigorous test. In a sustained temperature test, the coupling was pressurized to 2000 psig (138.9 bar) while the temperature was maintained at 1500°F (815°C) for seven hours. After completing the sustained temperature test, the external leakage at 1500°F (815°C) was 0.00123 lb./min. Essentially zero leakage was recorded for the first five hours of this test.

Based on its outstanding performance in the evaluation program, the metal edge seal coupling was selected as the most suitable for use in Convair's high-temperature pneumatic system.

	Seal Material	No. Pressure Cycles at 1500°F (815.5°C) Maximum	Final Room Temperature Leakage lb/min
Astro-Weight	Inconel Alloy X-750	14	0.11
	Rene' 41	80	0.16
Conoseal (Model B)	Inconel Alloy 600	379	0.13
Gamah Model A	Inconel Alloy X-750	174	—
Gamah Model B	Inconel Alloy X-750	2700	0.090
Gamah Model C	Haynes Alloy No 25	1451	0.0034

Table 1 - Pressure Cycling Test of Tube Couplings

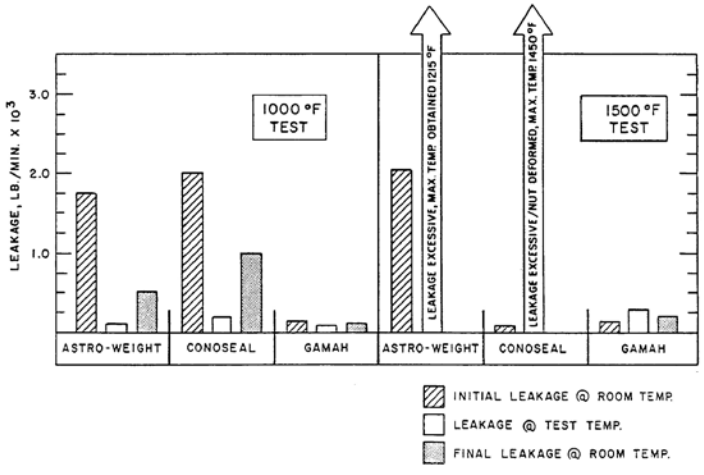


Figure 6 - Evaluation of Tube Couplings Assembly and Disassembly Test Results

MIL-F-18280C Qualification Tests

Confidence that your product will perform successfully in an evaluation program requires knowledge of its strengths and weaknesses. Eaton's Gamah product line has gained this confidence in the metal edge seal concept through an ongoing series of test programs intended to push the Gamah coupling to the extremes of its capabilities.

A series of tests were conducted to determine if the Gamah metal edge seal coupling was suitable for the high-pressure fluid systems requirements established in the Military Specification MIL-F-18280C. This specification establishes the requirements for flareless tube connection fittings, nuts, and sleeves for use in fluid systems and is mandatory for use by all departments and agencies of the Department of Defense. Results of the tests are reported in Gamah Test Report No. T158-1 (ref. 3).

For the tests, a 1-inch stainless steel coupling was swaged to a 1-inch O.D. x 0.083 wall Type 304 CRES annealed tube. The test coupling was then subjected to the flexural strength, impulse pressure and repeated assembly tests specified by MIL-F-18280C.

Flexural strength testing (per MIL-F-18280C, paragraph 4.7.7 and 4.7.7.2) used the simple beam method of mounting. The coupling and holding fixture were installed on a Calidyne vibration machine and vibrated at 500 Hz for 5 hours, 40 minutes. The force was sufficient to produce a measured stress level of 20,000 psi (1378.9 bar). With the system pressurized at 3000 psi (206.8 bar), 10,200,000 cycles were conducted without failure. Following the vibration test, the coupler was subjected to a proof pressure of 6000 psi (413.6 bar) for 5 minutes with no leaks being detected.

For impulse pressure testing (per MIL-F-18280C, paragraph 4.7.3), the test coupling was mounted on the panel of a high pressure pneumatic console where the pressure was alternately applied and vented by a rotating cam/limit switch control to the console solenoid valve. An accumulation of 200,352 impulse cycles were documented over a total test period of 50 hours, 8 minutes — an average of 66.61 cycles per minute. Peak pressures during the test series varied from 4100 psi (282.6 bar) (137% of working pressure) to 5100 psi (351.6 bar) (170% of working pressure) for any one particular cycle the average being around 4400 psi (303.3 bar). A reproduction of a typical oscillograph recording of pressure taken during the impulse test sequence superimposed on the desired curve of MIL-F-18280C (page 142, Figure 2) is shown in Figure 7. The pressure rise and fall times, peak pressures, damping time and back pressure all fell within the desired curve. Upon completion of the desired number of impulse cycles, the coupling was again subjected to proof pressure of 6000 psi (413.6 bar) for five minutes. No leakage was detected.

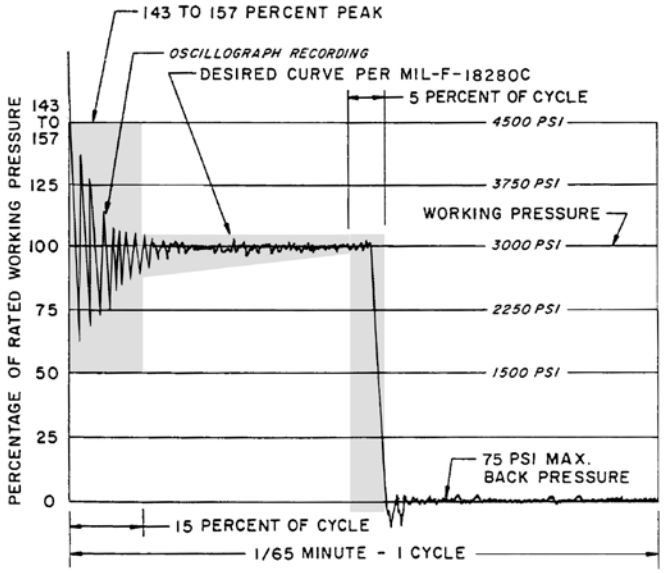


Figure 7 — Comparison of Dynamic Pressure Impulses

Following the procedures outlined in MIL-F-18280C, paragraph 4.7.8.2, for repeated assembly testing, the coupling was completely disassembled and reassembled eight times. Prior to each reassembly, one of the tube assemblies was rotated out of the previous flange to flange relationship. After the third, and after the final assembly, the coupling was subjected to proof pressure of 6000 psi (413.6 bar) for five minutes. No leakage was evident during these checks. After the seventh disassembly, the mating surfaces, seal and tubes were closely examined for anomalies — none were detected. Upon completion of the last proof pressure test (as stipulated in MIL-F-18280C, paragraphs 4.7.2.7 and 4.7.8.1), pressure was raised to the burst pressure level of 12,000 psi (827.3 bar) and held for five minutes. The tubing developed a bulge but the coupling remained intact, and no leakage or other anomaly was detected on the coupling. In this instance, Eaton's Gamah coupling proved to be much stronger than the tubing itself.

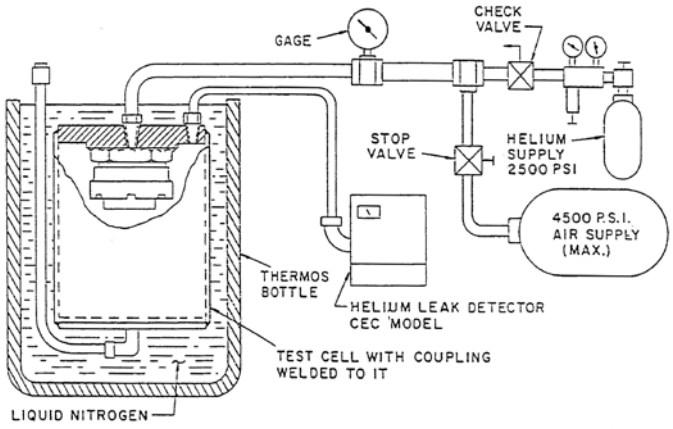


Figure 8 — Cryogenic Testing Set-Up

Cryogenic Temperature Testing

Previously stated performance information on Eaton's Gamah metal edge seal coupling has stressed its reliability to seal in moderately low to high (-100°F to + 1500°F) (-73.3°C to + 815.5°C) temperature ranges. Substantial testing has also been conducted by Eaton and independent agencies to demonstrate its capabilities under extremely low temperatures.

Using a standard J14 Series stainless steel coupling, which employed an Inconel seal, tests were conducted in June 1973 at Eaton's Gamah test laboratory to determine the sealing capabilities of the metal edge seal at -320°F (-195.5°C) and at pressures in excess of 4000 psi (276.8 bar). The test set-up used is shown in Figure 8 and a complete description of the test procedure can be found in Gamah Test Report T275 (ref. 4).

A thermocouple was placed in the center of the test coupling, a standard J14 series stainless steel coupling incorporating an Inconel seal, to monitor temperature. To ensure that the coupling did reach -320°F (-195.5°C), the entire test cell was submerged in and also filled with liquid nitrogen. The temperature was allowed to stabilize for approximately 30 minutes, after which the cell was evacuated and left submerged for another hour in the liquid nitrogen before conducting the pressure-leak check.

The test coupling was then pressurized to 4500 psi (311.2 bar) and checked for leakage using a highly sensitive CEC helium leak detector. Test results indicated no helium leakage up to approximately 3000 psi (206.8 bar); thereafter, leakage became evident, increasing slowly up to a rate of 0.246 x 10-5 atm cc/s. Following the extreme low temperature test, another pressure-leak test was conducted at 125°F. (51.6°C).

In a similar test program, following closely the previously mentioned test, Eaton demonstrated the capability of the metal edge seal coupling to meet the structural and sealing requirements of the Freon sub-system for the Rockwell Space Shuttle Environmental Control life Support System (ECLSS).

The test coupling was of bimetallic configuration, composed of 6061-T6 aluminum flange tube swaged to a 2024 aluminum flange and a Type 304 CRES tube swaged to a 15-5 PH stainless steel flange. The seal was of 6061-T6 aluminum.

Using a test set-up similar to the one shown in Figure 8, the coupling assembly with 300 psig (21.6 bar) internal helium pressure showed no leakage at any time during the test at -320°F (-195.5°C). Indications were still zero leakage with 300 psig (21.6 bar) internal helium pressure after the cell was allowed to warm to room temperature.

In view of the results of these low temperature tests, it is not difficult to envision the same remarkable performance of the metal edge seal at still lower temperatures. Eaton is confident the metal edge seal coupling could be employed in the transmission of liquid helium at -452°F (-253.8°C), with leakage rates well within acceptable limits.

High Temperature Qualification Tests

Elevated temperature presents the severest requirement for any connector. As pointed out earlier, the Gamah metal edge seal coupling successfully passed thermal cycling tests to the 1000°F (537.7°C) and 1500°F (815.5°C) levels and sustained temperature tests at 1500°F (815.5°C). Probably the most severe high temperature tests ever given any separable connector have been those conducted by the Lockheed Missiles and Space Company (LMSC) on the Hot Gas Post-Boost Control Systems (PBCS) for the Trident C-4 missile.

The primary purpose behind the tests performed at Lockheed was to determine the compatibility of system components at the expected generator exit gas temperatures of approximately 3200°F (1760°C), and pressure cycling to 600 psi (41.3 bar).

Standard metals could not be used at these ultra-high temperatures because of their relatively low melting points. Therefore, special refractory metals, with melting points well in excess of 3000°F, were used in the fabrication of all couplings, tube and manifold assemblies. A Tantalum-Tungsten alloy was chosen for all tube and manifold assemblies because of its high tensile, yield and creep properties at high temperatures. This alloy, known as 90TA10W, provides higher mechanical properties than unalloyed Tantalum and has a melting point well over 5000°F (2760°C). Since most refractory metals experience accelerated oxidation in air at relatively low temperatures, all components were coated with silicide in an effort to retard any corrosion.

The couplings, specially designed by Eaton for the Trident hot gas system, were made from the molybdenum-based TZM alloy and incorporated a pure molybdenum seal. The titanium-zirconium-molybdenum alloy (TZM) offers a higher recrystallization temperature and better hot strength characteristics than unalloyed molybdenum. Its melting point is 4750°F (2621.1°C). Special techniques were required in machining TZM because of its hardness (BHN-235) and the tendency for it to chip out during turning and milling operations. Acceptable surface finishes and cutting tool life were achieved only after considerable experimentation in Eaton's prototype shop.

The combination of the TA-W alloy tubing and the TZM Gamah flanges is ideal for the swaging process; which is normally used by Eaton on metal seal applications. The ductility of the 90-10 tubing and the hardness of the TZM flanges provide for a very strong attachment. System tests, proof tests, and burst tests have all proven the strength of the swage far exceeds the burst pressure of the system. The swage is also a very economical attachment as it is a mechanical operation requiring very little skill.

The necessity of a silicide coating on the tubing of the system requires that the assembled components be exposed to a cure cycle in excess of the transition temperature of TZM. Therefore, this coupling has been designed so that the nut can be removed from the tubing for this curing process. The incorporation of a split retainer allows for the removal or installation of the nut after attachment of the flanges. This removable feature of the nut also eliminates possible damage to the nuts, flanges or coated tubing

during the many steps of the fabrication of the system. Figures 9 and 10 respectively show the TZM Gamah configuration in the hand tight and sealed position.

Figure 9 — Seal in Hand-Tight Position

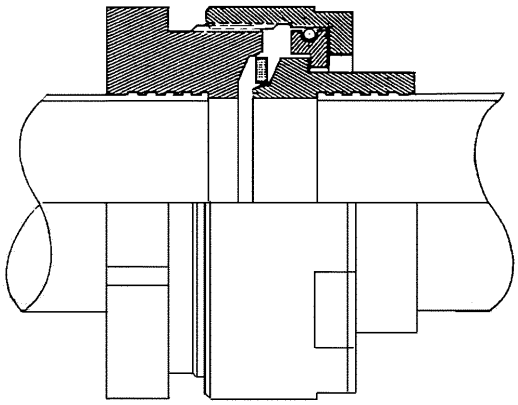
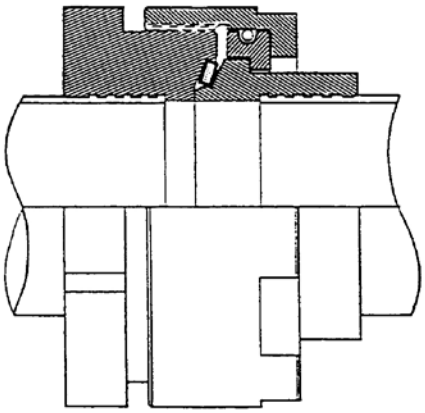


Figure 10 — Seal in Actuated Position



In the LMSC test set-ups system components were connected with Gamah couplings torqued to 600 in.-lbs., and leak checked at 150 psig (10.3 bar) using ambient temperature nitrogen gas. All connections between coupling TZM flanges and 90TA10W tube assemblies were made using the economical and highly reliable swaging technique. Temperatures on the two 1-inch Gamah J46010-10 couplings were monitored by thermocouples attached to the coupling nuts. Gas stream temperature measurements were made at the entrances to the manifold using special high temperature thermocouple probes inserted into the gas stream.

Measurements indicate that the test couplings were subjected to a peak gas stream temperature of 3000°F (1648.8°C) and pressures ranging from approximately 150 to 450 psig (10.3 to 31 bar). The maximum temperature measured at the outer surface of a Gamah coupling nut was 2650°F (1454°C).

No gas leakage was detected from the test couplings using the water displacement method of monitoring. As part of the post-test inspection, a visual examination of the sectioned couplings indicated clean molybdenum seals with no evidence of gas flow past the seals.

This coupling and its attachment have been successfully tested in several systems and performed very well. Consequently, it has been designated for the separable fittings on the Trident C4 Post Boost Control System.

Similar testing for high temperature applications was performed by Stanley Aviation for the oak Ridge National Laboratory. (Gamah Test Report T146, Ref. 5). The testing consisted of attaching stainless steel flanges to pure molybdenum tubing. The test was performed to examine the feasibility of swaging fittings to the molybdenum tubing. For the sake of economics, stainless steel flanges were used that were of similar mechanical properties to the TZM. The testing consisted of demonstrating that the molybdenum tubing could be swaged without producing cracks in the moly; also, that the swage attachment could withstand a 400 psi (27.5 bar) helium leak check after a seven hour exposure to 1300°F (704°C). The testing also was to demonstrate the feasibility of using molybdenum seals in this application without producing cracks in the seal. All the aims of this test were successful and it was clearly demonstrated that swaged attachments could be made of pure moly tubing.

Low and High Pressure Capabilities

The ability to seal efficiently against fluid leakage at low or high pressures is the major consideration in the selection of any connector or fitting. Pressure testing is the never-ending exercise that makes up a considerable portion of any fitting development program. Eaton's Gamah couplings with metal edge seals have been evaluated under a wide range of pressures in a variety of sizes and configurations.

MT 363-10 Qualification Tests

In a recent qualification program Gamah metal edge seal couplings have demonstrated a performance level acceptable for TOKAMAK Reactor requirements for diagnostic penetrations.

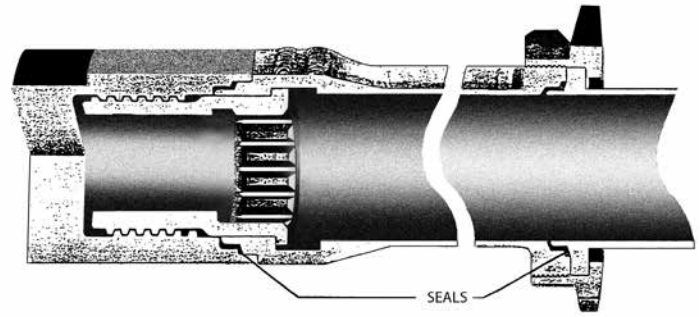


Figure 11 — Test Cell 400744

A test cell was fabricated which consisted of two couplings butt welded to 2" schedule 10 stainless pipe. Standard Gamah seals (S14022) made from 300 series stainless were copper plated due to the very low leak rate requirement of the TOKAMAK (2.7 c 10-10 scc/sec. at 10-8 Torr.)

The test cell was subjected to 50 thermal cycles from room temperature up to 572°F (300°C). The thermal cycles were performed with a 4 hour heat up, 12 hour soak and 8 hour cool down. During the entire thermal cycle leakage was continuously monitored. There was no detectable leakage at a sensitivity 2.7 x 10-10 scc/sec helium.

Thermal shock and thermal gradient tests were also conducted. Temperature gradients as high as 244°F (118°C) across the coupling were recorded. No detectable leakage was recorded.

High Pressure Testing

It would take considerable space to enumerate the many test and installations in which Eaton's Gamah metal edge seal concept has successfully performed at high pressures. Therefore, only a few prominent case histories are presented here.

A two-phase test program was initiated by Gamah to evaluate the metal edge seal and the mechanical integrity of a swaged joint when exposed to an internal pressure of 6,000 psi (413.6 bar). The first test phase (reported in Gamah Test Report T133, Ref. 8) was conducted primarily to determine if the Gamah flange could be satisfactorily swaged to a thick wall pipe. Considerable speculation existed as to the possible success of such an operation due to the lack of available information and experiences dealing with heavy-walled tubing. For the tests, two Gamah threaded flanges, made of AISI 4340 steel, were to be swaged to a 2.375 inch O.D. x ¼ inch wall steel elbow.

Initial efforts indicated that swage torquing values determined from earlier thin-walled swaging experimentation would not suffice, as shown by flange-tubing separations at relatively low pressures. Sectioning of the swaged joint showed inadequate swage groove fitting. Successful swaging was accomplished only after the flanges were heat treated for additional hardness and the swage torquing levels were increased to approximately twice the initial values. The final assembly easily withstood the 6,000 psi (413.6 bar) pressure, showing no leakage past the seal or through the swage joint.

The second test phase (reported in Gamah Test Report T133-1, Ref. 9) carried the initial pressure testing one step further by subjecting the same elbow assembly to 12,000 psi (827 bar) internal pressure. Again, both flanges performed flawlessly, showing no leaks or anomalies of any kind.

Airborne Laser Laboratory (A.L.L.) Fluid System

In discussing the remarkable performance of the metal edge seal at extremely high pressures, the testing conducted on couplings designed by Eaton's Gamah product line engineers for the Pratt & Whitney Aircraft Airborne Laser Laboratory (A.L.L.) Fluid Systems cannot be disregarded.

Gamah was solicited by the Florida Research and Development Center of Pratt & Whitney Aircraft for assistance in their search for a suitable connector to be used in the prototype version of the Airborne Laser Laboratory. The disappointing results of their fitting evaluation program to that point showed that none of the major proprietary couplings tested were suitable to meet the leakage requirements for the A.L.L. systems under the combined stresses of high internal pressure and cryogenic temperature, coupled with high bending moment. After receiving assurance from technical staff on the capabilities of the metal edge seal concept, Pratt & Whitney submitted a request for demonstration performance testing. Under P&W Test Plan No. FR-6012A (ref. 10) Eaton was asked to demonstrate the sealing and structural capabilities of a 2-inch hybrid (bimetallic) bolted flange coupling employing a metal edge seal. The final test results, based on procedures stipulated in the referenced test plan, are recorded in Gamah document No. 881 (ref. 11).

The test coupling, shown in its bending test fixture in Figure 12 below, incorporated a female flange, simulating a 6AL-4V Titanium tank outlet, mating to a Type 347 stainless steel male line flange.

This combination represented the most critical A.L.L. system flange combination from the standpoint of disparate thermal expansion coefficients. The stainless steel male flange was butt welded to a section of 2-inch, Schedule 160, Type 347 CRES stainless steel pipe which was capped at the end. Design pressure of the assembly was 4200 psi (289.5 bar) with a burst pressure requirement of four times design pressure, or 16,800 psi (1158.3 bar).

Following a hydrostatic proof pressure test at 8400 psi (579.1 bar), the test coupling was disassembled, examined and then reassembled using the same seal and seal orientation. The assembly was then pressurized to 4200 psi (289 bar) with helium. No leaks were found using the Model 24-120B CED Helium Leak Detector.

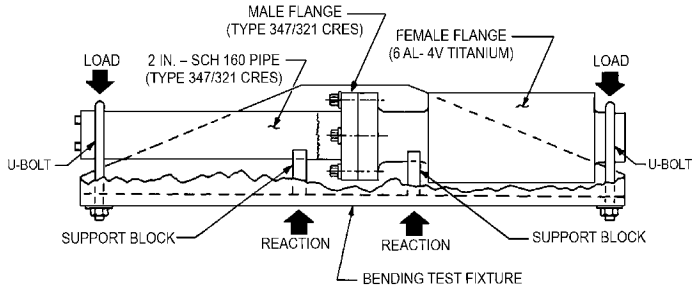


Figure 12 — Test Coupling in Bending Test Fixture

In simulating a situation very possible under actual operating conditions, a combined bending and internal pressure test was devised in which the entire fixture and coupling (shown earlier in Figure 12) were placed in a Tinius-Olsen test machine. By supporting the coupling at two points near its center and applying equal 1,500 lb. loads at both ends, a bending moment equivalent to 9900 in.-lb. was induced in the coupling seal region. The bending moment was "locked" in the coupling by tightening the U-Bolts at each end of the bending test fixture until the load on the Tinius-Olsen just read zero. Following pressurization to 4200 psig (290.5 bar) with helium, the entire assembly was placed in the leak detector bell jar. After 15 minutes exposure, it was concluded that there were no detectable leaks.

Temperature variations, as a result of the different fluid media used throughout the A.L.L. subsystems required that considerable emphasis be placed on the coupling's sealing capabilities through a temperature range of 125°F (51.6°C) down to -320°F (-195.5° C).

After welding the coupling assembly into a vacuum container, the container was filled with, and submerged in, liquid nitrogen. After twenty minutes in liquid nitrogen, the coupling temperature stabilized at -320°F (-195.5° C). At this time, the liquid nitrogen was expelled and a vacuum applied to the volume between the container and the coupling assembly. The coupling was internally pressurized to 4,200 psi (289.5 bar) with helium and a leakage check was made. No leakage was detected. After allowing the assembly to return to room temperature, the thermal cycle was repeated with a final leak check being made after the coupling attained room temperature. Again it was determined there were no leaks in any of the coupling components. It should be noted that the sensitivity of the leak detector to helium is 1.96 x 10-10 scc/sec.

As a finale to the test, the coupling assembly was hydrostatically burst pressure tested to 16,800 psi (1158.3 bar). There was no damage to the coupling components or fasteners and, most important, there was no measurable leakage at this very high pressure level.

In conclusion, the above test was quite severe, but did clearly demonstrate the sealing capabilities of an Eaton Gamah coupling. Based on the results of this demonstrative performance testing, Pratt & Whitney Aircraft chose to incorporate over 80 Gamah metal edge seal couplings in the prototype version of their Airborne Laser Laboratory.

Transportation of Radioactive Materials

The preceding pages have pointed out how each aspect of the metal edge seal design has been thoroughly examined and tested to ensure a high degree of reliable service for its users. In the transportation of radioactive materials, reliability of equipment is paramount because of the obvious danger of personnel contamination.

Shielded containers used in the transportation of radioactive materials consist of an internal vessel holding the material and an outer vessel which contains the shielding. The internal vessel is usually cooled by jacketing to remove the heat generated by the radioactivity. Under normal conditions pressures and temperatures remain near ambient as long as the cooling system is functioning. Should the cooling system become inoperative, however, the radioactive material will begin to heat up causing an increase in pressure as well as temperature. Pressures of 1000 psi (537.7 bar) and temperatures of 1100°F to 1200°F (593.3°C to 648.8°C) can be reached in a matter of minutes. Not only must the internal vessel seal maintain its integrity during the thermal and pressure shock loading, but also its reliability during the cool-down phase required to bring the system back to equilibrium.

There also exists the possibility of an accident occurring during the transportation of the container which might subject it to high impact loads. A situation of this nature brings forth the added problem of designing a closure seal that can withstand the loads imposed by the heavy transportation cask being dropped or possibly thrown from a moving vehicle.

Even if no catastrophic events occur, the closure seal must be opened and its contents removed a significant number of times during the lifetime of the container.

All of these potential problem areas were considered in the evaluation of Gamah metal edge seals for the purpose of optimizing a configuration for sealing an access port in a large experimental cask intended for transporting radioactive fuels.

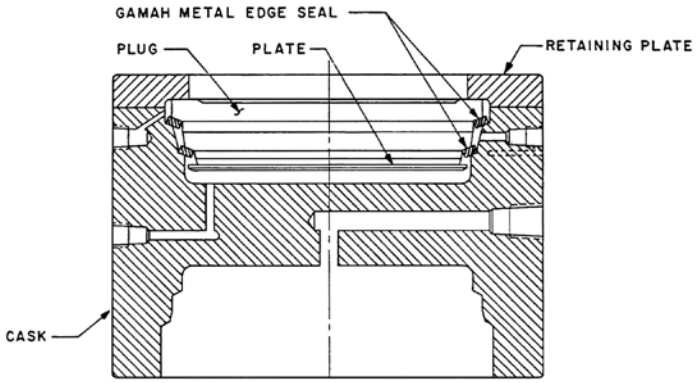


Figure 13 — Test Block for Radioactive Material Transportation Vessel

In a report prepared for the Oak Ridge National Laboratory (Gamah Test Report T-131A, Ref. 12) a total of twenty-three tests were conducted with twelve seal samples to establish an optimum sealing configuration. The test block employed to simulate the seal installation (shown in Figure 13) consisted of a double cavity cask, plug assembly and retainer plate.

Ports were provided in the smaller cavity on either side of both seals and between the seals for applying gas pressure and monitoring leakage as required. All parts were made from 17-4 PH stainless steel in condition H1075. Seals, also of 17-4 PH, were evaluated with minimum and maximum interference for a complete range of manufacturing tolerances. Evaluation of varying the material condition from the H1075 condition to a softer and lower strength material, the H1150M condition, was included in the testing. Table II provides a description of the seals used in the test program in order to arrive at the optimum configuration.

Leakage was measured using a water displacement apparatus, made up of small diameter stainless steel tubing; one end connected to the port in the test block, with the other end routed to an inverted and submerged graduate containing water.

A 120,000 pound Tinius-Olsen test machine was used to obtain seal load/deflection data. The load was applied at a rate of 0.010 inch per minute. Load/deflection data for both upper and lower seals in both the maximum and minimum tolerance conditions were obtained.

High temperature tests were conducted using a small 1500°F (815.5°C) Lindberg heat treat oven as the environmental chamber. Thermocouple junctions were attached at various locations within the test block to measure the temperature of the assembly. The test block was then subjected to an ambient temperature of 1000°F (537.7°C) until the seal temperature stabilized at this reading. Nitrogen gas was introduced between the seals through a small diameter stainless steel tube connected to the pres-

sure supply port. Stainless steel tubing was also connected to the monitoring ports on either side of the seal for determining leakage using the water displacement method. Pressure was increased in 200 psi (13.7 bar) increments up to 1000 psi (537.7 bar) with leakage being determined at each increment.

Drop tests were made on the vessel from a height of 30 feet onto a flat, horizontal, concrete surface. A pilot parachute was used to orient the fall such that the cask hit on the top-face corner. Upon completion of each drop, the assembly was again subjected to leakage tests and the performance compared to results taken prior to the drop.

The results demonstrated Eaton's Gamah metal edge seal performance that easily complies with the requirements called out for vessels used in the transportation of highly radioactive materials. The metal edge seal design demonstrated reliability at relatively low pressures and the capability of withstanding rapid pressurization and temperature increase without leaking or plastically deforming such that they would not seal upon depressurization. The seal demonstrated resistance to deformation or loss in loading due to severe axial and radial impact loads. And finally, the seal was able to achieve a number of assemblies and disassemblies without damage to the seal surfaces on the container.

Bi-Metallic Separable Couplings

Eaton's Gamah metal edge seal couplings are ideal candidates for providing reliable leak tight connections between stainless and aluminum pipe and tube assemblies. Connections between titanium and stainless can also be made up with zero leak performance. (See A.L.L. Test report page 18)

Aluminum to stainless connections have been tested from -320°F (-195.5°C) up to 250°F (121.1°C) and provide leak rates less than 1 x 10 -9 scc/sec. helium at pressure. The test report for A.L.L. (page 18) covers a titanium/ stainless bi-metallic connection. There was no detectable leakage at pressures of 8200 psig (566.3 bar).

SERVICE APPLICATIONS

Eaton's Gamah metal edge seal coupling should be considered for all application where any or all of the following are requirements:

a. Cryogenic temperatures
B. Elevated temperatures requiring refractory metals
C. Extreme pressures (in excess of 20,000 psi [1379 bar])
D. Hard vacuum (10 -8 Torr)
E. Zero leakage
F. Large mechanical loads across coupling
G. Corrosive fluids
H. Minimum weight
I. Large diameter sealing circle
J. Minimum assembly forces
K. Minimum envelope (for given seal diameter)
L. Limited access for assembly
M. Reusable seal
N. Protected sealing surfaces
O. Leak rate less than 1 x 10-9 scc/sec helium
P. Rapid variations in temperature and pressure

Some specific applications for the gamah coupling are listed below:

Commercial Service Applications:

- Petro-chemical industries (process lines, hydraulic control systems)
- Heavy equipment manufacturers (hydraulic lines)
- Industrial machinery (hydraulic control systems)
- Vacuum industries (line connectors, cover plates, component parts)
- Nuclear power plants (liquid metal loops, gas lines)
- Cryogenic industries (process lines)
- Shipboard (lng tankers, high temperature steam lines)
- Gas field drilling (high pressure systems for hydraulic fracturing)

Aerospace Service Applications:

- Propulsion systems (propellant lines, hot gas lines)
- Thrust vector control systems (hot gas lines, hydraulic control systems)
- Environmental control systems (hot gas lines, refrigerant lines)
- Fire extinguishing systems (cryogenic and cold gas lines)
- Fuel tank inerting systems (cryogenic and cold gas lines)
- Ground support equipment (cryogenic, refrigerant, hydraulic)

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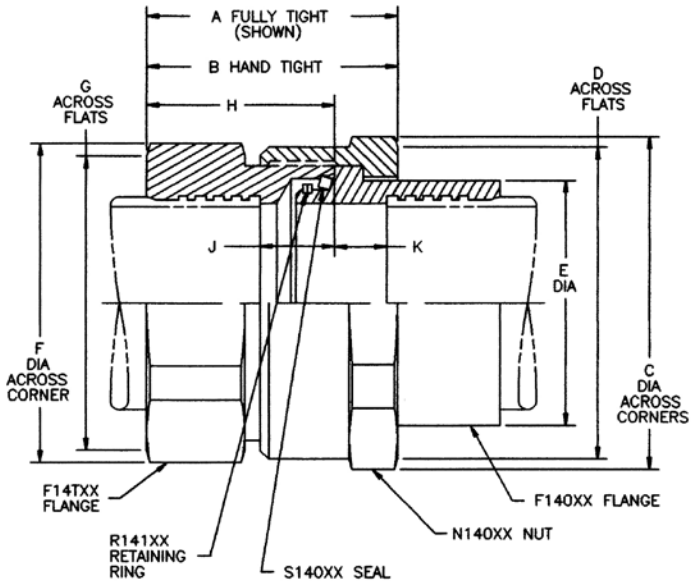
S14200	Seal, Metal	142
T2189	Nut, Bulkhead	14 & 141
T14000	Tee	14
U14000	Union, Threaded	14
U14100	Union, Bolted	14

J14000 Metal Seal Coupling, Hex Configuration
Series 14

Revision Letter L

NOM TUBE O D (IN)	ASSY PART NO.	A	B	C	D	E	F	G	H	J	K	WEIGHT (LB) T	WEIGHT (LB) A	WEIGHT (LB) C
.250	J14002	1.22	1.24	.73	.69	.39	.72	.69	.67	.328	.198	.044	.027	.082
.375	J14004	1.22	1.24	.95	.88	.54	.92	.88	.67	.328	.198	.071	.043	.13
.500	J14005	1.52	1.54	1.10	1.00	.67	1.04	1.00	.82	.348	.240	.10	.061	.18
.625	J14006	1.53	1.55	1.24	1.13	.81	1.19	1.06	.82	.364	.227	.12	.073	.22
.750	J14007	1.53	1.55	1.47	1.38	.94	1.40	1.25	.84	.370	.226	.18	.11	.33
1.000	J14010	1.54	1.56	1.76	1.63	1.20	1.67	1.50	.84	.376	.220	.21	.13	.41
1.250	J14012	1.86	1.88	2.13	2.00	1.46	2.10	1.88	.99	.390	.286	.39	.24	.73
1.500	J14015	1.87	1.89	2.24	2.25	1.72	2.38	2.13	1.00	.402	.279	.51	.31	.92
1.750	J14017	1.87	1.89	2.71	2.50	1.98	2.80	2.50	1.01	.414	.267	.57	.35	1.06
2.000	J14020	1.88	1.90	3.14	2.88	2.24	3.08	2.75	1.03	.432	.258	.75	.46	1.38
2.250	J14022	2.13	2.16	3.57	3.25	2.50	3.36	3.00	1.12	.446	.342	1.05	.64	1.90
2.500	J14025	2.13	2.16	3.86	3.50	2.76	3.63	3.25	1.13	.458	.330	1.18	.72	2.17
2.750	J14027	2.15	2.18	4.44	4.00	3.02	4.06	3.63	1.16	.488	.320	1.43	.87	2.62
3.000	J14030	2.15	2.18	4.75	4.25	3.28	4.34	3.88	1.17	.494	.311	1.69	1.03	3.10



PART NUMBER CODE

J140 00 X X

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 2024 (AGED) ANODIZED

C = STAINLESS STEEL 17-4PH (15-5PH) FLANGES, AND 304 NUT, PASSIVATED

–20 = STAINLESS STEEL 17-4PH (15-5PH) PASSIVATED. J14010 AND UP.

–43 = STAINLESS STEEL 15-5PH (NO SUB) PASSIVATED

T = TITANIUM TI-CP-70 FLANGES AND TI-6AL-4V NUT

SPECIAL

D = DRY FILM LUBE PER MIL-L-46010

REVISION	LTR	DESCRIPTION	DATE
	G	Revised "C" dimension, weights, configurations	7/24/81
	H	Added "–43" material	4/25/86
	J	Revised "A" materials, weights	8/24/88
	K	Added "T" weights and "T" material	10/29/91
	L	Updated specs	4/13/99

This issue supersedes all previously issued catalog sheets and drawings

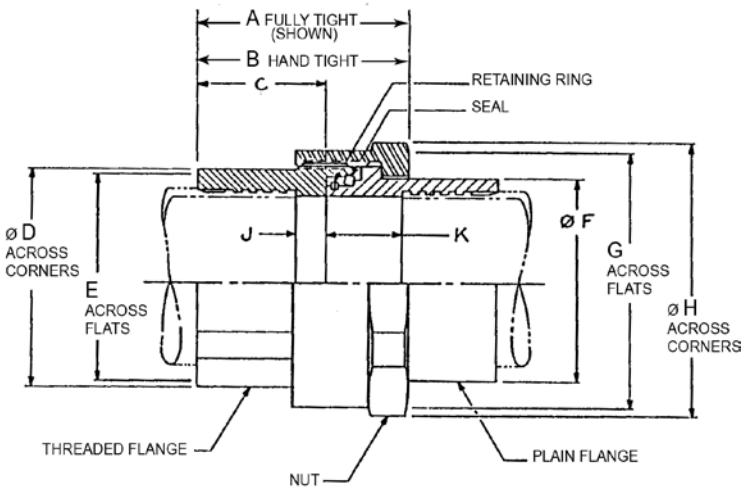
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Burst pressure: "T", "A" and "C": 6000 psi (413.68 bar)
4. Other materials available upon request

J14100 Metal Seal Coupling, Hex Configuration
Series 141

Revision Letter G

NOM TUBE DIA (IN)	ASSY PART NO.	A	B	C	ØD	E	ØF	G	ØH	J	K		COMPONENT PART NUMBERS THD FLANGE	NUT	PLAIN FLANGE	SEAL	RTNG RING	WEIGHT (LBS) ALUM	SST	TI	
.250	J14102	.88	.90	.49	.59	.56	.54	.88	.97	.111	.340		F514T02	N14104	F514102	514004	R14104C	.049	.14	.080	
.312	J14103	.88	.90	.49	.59	.56	.54	.88	.97	.111	.340		F514T03	N14104	F514103	514004	R14104C	.045	.12	.073	4
.375	J14104	.88	.90	.49	.59	.56	.54	.88	.97	.111	.340	4	F514T04	N14104	F514014	514004	R14104C	.041	.11	.067	
.500	J14105	1.07	1.09	.62	.73	.69	.67	1.00	1.10	.117	.396		F514T05	N14005	F514105	514005	R14015C	.053	.15	.087	
.625	J14106	1.08	1.10	.62	.88	.81	.81	1.13	1.24	.120	.396		F514T06	N14006	F514106	514006	R14106C	.067	.19	.11	
.750	J14107	1.09	1.11	.62	1.10	1.00	.94	1.38	1.47	.123	.398		F514T07	N14007	F514107	514007	R14107C	.095	.27	.16	
1.000	J14110	1.09	1.11	.62	1.32	1.25	1.20	1.63	1.76	.126	.395		F514T10	N14010	F514110	514010	R14110C	.13	.35	.21	



PART NUMBER CODE

J 1 4 1 0 0 X X

BASIC PART NO.

SIZE

MATERIAL/FINISH

AW = FS14T00AW THD. FLANGE, N14X00A(W) NUT, FS14100AW PLAIN FLANGE: ALUMINUM 2024 (AGED) ANODIZED

S14000A SEAL: ALUMINUM 6061 (AGED), CHEM FILM TREATED

R14100C RETAINING RING: 316 STAINLESS STEEL, PASSIVATED

–43 = FS14T00-43 THD. FLANGE, N14X00–43 NUT AND FS14100–43 PLAIN FLANGE: 15-5 PH (H1150), PASSIVATED

S14000C SEAL: 304 STAINLESS STEEL, PASSIVATED

R14100C RETAINING RING: 316 STAINLESS STEEL, PASSIVATED

REVISION	LTR	DESCRIPTION	DATE
	D	Redrawn	12/11/87
	E	Added Note 4. Revised data for J14102.	1/29/88
	F	Revised weights for J14102 thru J14110. "AW" material was "A".	8/24/88
	G	Added titanium weights	10/29/91

This issue supersedes all previously issued catalog sheets and drawings

NOTES:

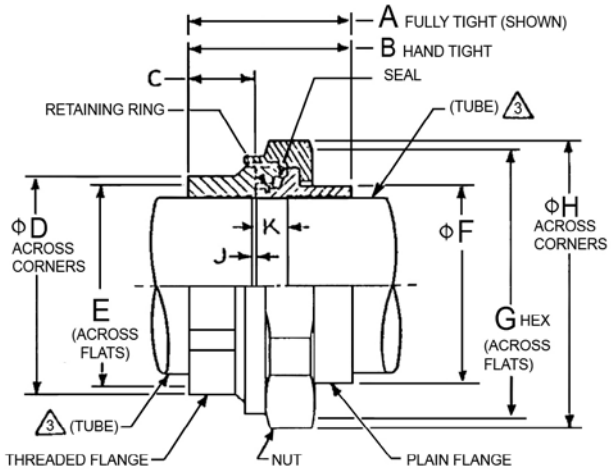
1. See individual component catalog sheets for additional information
2. Other material/finish combinations available upon request
3. Minimum burst pressure:
   AW material = 6000 psi (413.68 bar)
   –43 material = 12000 psi (827.37 bar)

4 J14102 thru J14104 may be used with tubing having a minimum nominal wall thickness of .016

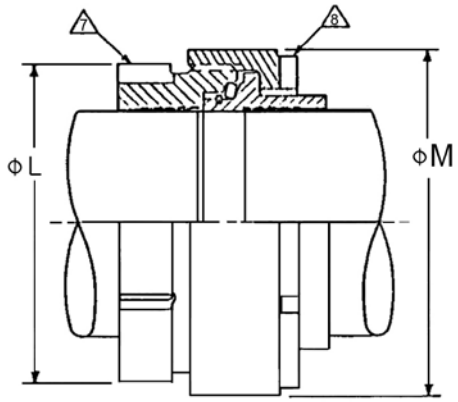
J14200 Metal Seal Coupling, Lightweight, Low Pressure Series 142

Revision Letter H

NOM TUBE O D (IN)	ASSY PART NO.	— COMPONENT PART NUMBERS —					A	B	C	D	E	F	G	H	J	K	L	M	WEIGHT (LBS)		
		THD FLANGE	NUT	PLAIN FLANGE	SEAL	RETAIN. RING													Ti	AL.	SST
1.000	J14210	FT14210	N14210	F514210	514010	R14110	1.25	1.27	.53	1.28	1.19	1.16	1.63	1.75	.03	.22	—	—	.15	.09	.26
1.500	J14215	FT14215	N14215	F514215	514015	R14115	1.27	1.29	.53	1.83	1.69	1.65	2.25	2.42	.03	.25	—	—	.26	.16	.46
2.000	J14220	FT14220	N14220	F514220	514020	R14120	1.30	1.33	.53	2.42	2.25	2.15	2.88	3.14	.03	.27	—	—	.41	.25	.72
2.500	J14225	FT14225	N14225	F514225	514025	R14125	1.72	1.75	.68	—	—	2.70	—	—	.05	.42	3.00	3.22	.57	.35	1.00
3.000	J14230	FT14230	N14230	F514230	514030	R14130	1.72	1.75	.68	—	—	2.70	—	—	.05	.42	3.50	3.72	.71	.43	1.23
3.500	J14235	FT14235	N14235	F514235	514035	R14135	1.72	1.75	.68	—	—	2.70	—	—	.05	.42	4.00	4.22	.82	.50	1.43



HEX CONFIGURATION J14210 THRU J14220



SPANNER CONFIGURATION J14225 THRU J14235 (SAME AS J14210 EXCEPT AS SHOWN)

PART NO. CODE

J142 00 X

SERIES

NOM TUBE O.D. (TENTHS INCHES)

MATERIAL/FINISH COMBINATION

A = FS142XXA FLANGE, FT142XXA FLANGE, & N124XXA NUT: ALUMINUM 2024 (AGED), CHEM FILM TREATED

R141XXC: STAINLESS STEEL 316/302, PASSIVATED, SIZES J14210 THRU 14220
STAINLESS STEEL 17-1, PASSIVATED, SIZES J14225 THRU J14235

REVISION	LTR	DESCRIPTION	DATE
	F	Revised "A", "B", "F", "K" and weights (J14225 thru J14235).	11/30/89
	G	Revised R14XXX material	4/16/90
	H	Added titanmium and stainless steel weights	10/29/91

This issue supersedes all previously issued catalog sheets and drawings

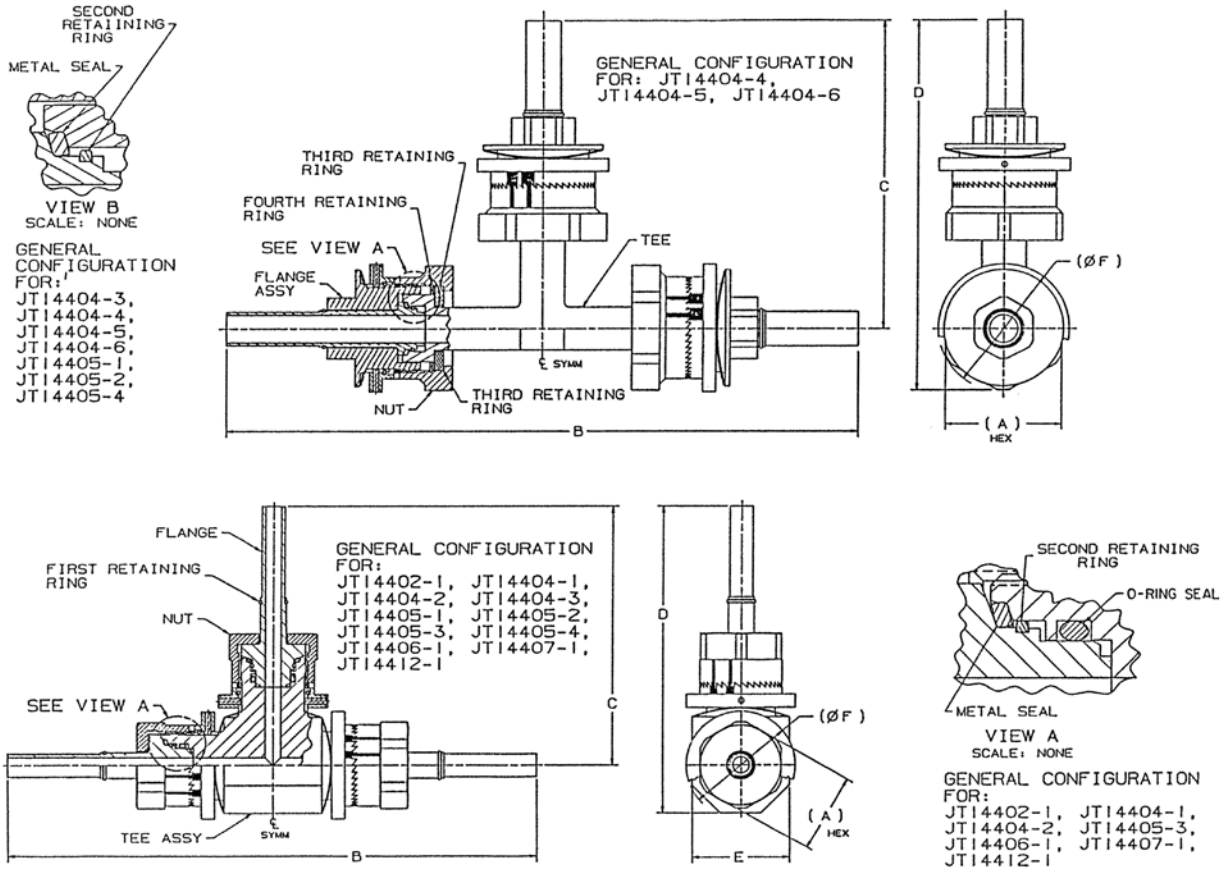
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Deleted
2. Operating temperatuer: -60°F to +250°F (-51°C to +121°C)
3. Electrical resistance, tube to tube: <1 ohm
4. Other materials available upon request
5. Consult Eaton for specific applications
6. See individual component catalog sheets for additional details
7. Use spanner wrench WFT142XX (Size)
8. Use spanner wrench WN142XX (Size)
9. Ref. General Dynamics SCD C100064
10. Qualification test per Gamah document 2171

JT14400 Tee, Metal Seal Coupling, Butt Welded Flanges
Series 144

Revision Letter A

NOM TUBE O D (IN)	ASSY PART NO.	TEE OR TEE ASSY PART NO.	FLANGE OR FLANGE ASSY PART NO.	NUT PART NO.	METAL SEAL P/N	O-RING SEAL P/N	1st RET RING P/N	2nd RET RINGP/N	3rd RET RING P/N	4th RET RING P/N	WEIGHT (LBS) AL	SST	MONEL	DESIGN CRITERIA SYST FLUID	PRESS — PSI	(A) HEX	B	C	D	E	F
.250	JT14402-1	TA14402-1	FT14402-1A	N14402-1A	S14402-1-52	NAS1611-012	R14402-1-094	R14402-2-094	—	—	.28	—	—	AMMONIA	70–133	.88	5.70	2.85	3.38	1.06	1.18
.375	JT14404-1	TA14404-1	FT14404-1-19	N14404-1-32	S14404-1-19	NAS1611-013	R14404-1-51	R14404-2-51	—	—	—	.83	—	HYDROGEN	500–3000	1.00	5.91	2.96	3.47	1.03	1.15
.375	JT14404-2	TA14404-2	FT14404-2-49	N14404-2-32	S14404-2-49	NAS1611-013	R14404-1-51	R14404-3-51	—	—	—	—	.99	OXYGEN	500–3000	1.00	6.24	3.21	3.74	1.07	1.19
.375	JT14404-3	TA14404-3	FT14404-3-19	N14404-3-32	S14404-3-19	—	R14404-1-51	R14404-4-51	—	—	—	2.39	—	NITROGEN	6000	1.50	6.50	3.25	3.96	1.42	1.65
.375	JT14404-4	T4404-4-19	FTA14404-4	NT14404-32	S14404-1-19	—	—	R14404-2-51	RH14404-1-32	UR-935	—	1.04	—	MIXED WASTE	20–120	1.25	6.82	3.41	4.10	—	1.41
.375	JT14404-5	T14404-5-19	FTA14404-5	NT14404-32	S14404-2-19	—	—	R14404-3-51	RH14404-1-32	UR-935	—	1.02	—	NITROGEN	600	1.25	6.82	3.41	4.10	—	1.41
.375	JT14404-6	T14404-6-19	FTA14404-6	NT14404-32	S14404-3-19	—	—	R14404-4-51	RH14404-1-32	UR-935	—	1.02	—	MIXED WASTE	20–120	1.25	6.82	3.42	4.10	—	1.41
.500	JT14405-1	TA14405-1	FT14405-1-19	N14405-1-32	S14405-1-19	—	R14405-1-51	R14405-2-51	—	—	—	1.06	—	MIXED WASTE	50–120	1.13	5.67	2.83	3.45	1.23	1.35
.500	JT14405-2	TA14405-2	FT14405-2-19	N14405-2-32	S14405-2-19	—	R14405-1-51	R14405-3-51	—	—	—	1.12	—	NITROGEN	600	1.13	5.73	2.86	3.50	1.27	1.39
.500	JT14405-3	TA14405-3	FT14405-3-19	N14405-3-32	S14405-3-19	NAS1611-015	R14405-1-51	R14405-3-51	—	—	—	1.32	—	HYDROGEN	400–600	1.25	5.77	2.88	3.54	1.31	1.43
.500	JT14405-4	TA14405-4	FT14405-4-19	N14405-4-32	S14405-4-19	—	R14405-1-51	R14405-5-51	—	—	—	1.37	—	WATER	10–60	1.25	5.81	2.90	3.58	1.35	1.47
.625	JT14406-1	TA14406-1	FT14406-1-19	N14406-1-32	S14406-1-19	NAS1611-017	R14406-1-51	R14406-2-51	—	—	—	1.22	—	OXYGEN	400–600	1.13	6.17	3.08	3.74	1.31	1.43
.750	JT14407-1	TA14407-1	FT14407-1A	N14407-1A	S14407-1-52	NAS1611-019	R14407-1-094	R14407-2-094	—	—	.60	—	—	AMMONIA	70–133	1.38	6.38	3.19	3.94	1.49	1.62
1.250	JT14412-1	TA14412-1	FT14412-1A	N14412-1A	S14412-1-52	NAS1611-027	R14412-1-094	R14412-2-094	—	—	1.24	—	—	AMMONIA	70–133	2.00	7.09	3.54	4.58	2.08	2.20



REVISION	LTR	DESCRIPTION	DATE
	A	O-Ring seal was C seal. Revised second retaining ring for JT14405-3	1/21/93

This issue supersedes all previously issued catalog sheets and drawings

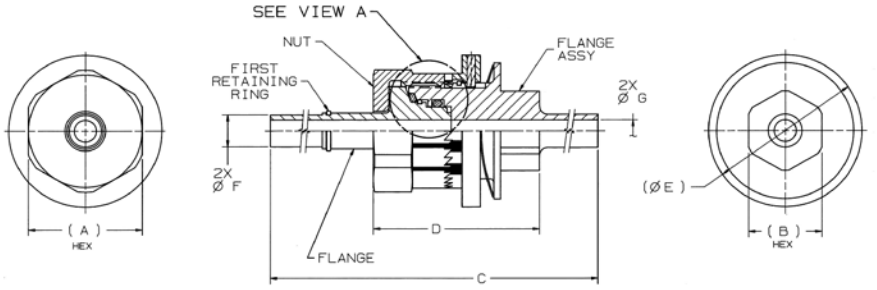
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M—1982
2. Assemble per Stanley Aviation document 2205
3 Shipped as kit per MIL-STD-794
4. Consult Eaton for specific applications

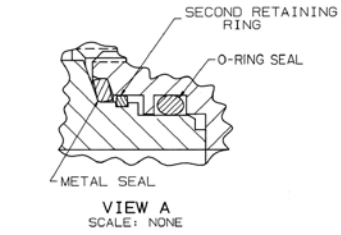
JW14400 Metal Seal Coupling, Butt Welded Flanges Series 144

Revision Letter A

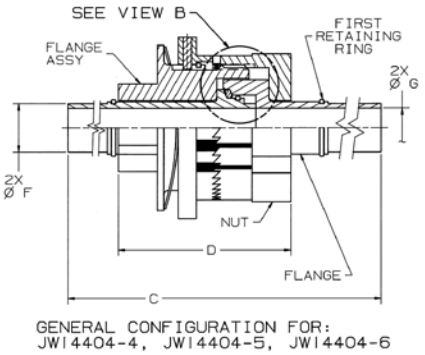
NOM TUBE O D (IN)	ASSY PART NO.	FLANGE PART NO.	FLANGE ASSY PART NO.	NUT PART NO.	METAL SEAL P/N	O-RING SEAL P/N	1st RET. RING P/N	2nd RET. RING P/N	ASSY WT (LB) AL	SST	MO-NEL	DESIGN CRITERIA SYST. FLUID	PRESS. (PSI)	(A) HEX	(B) HEX	C	D	E	F	G
.250	JW14402-1	FS14402-1A	FA14402-1	N14402-1A	S14402-1-52	NAS1611-012	R14402-1-094	R14402-2-094	.074	—	—	AMMONIA	70–133	.88	.56	3.67	1.28	1.18	.25	.18
.375	JW14404-1	FS14404-1-19	FA14404-1	N14404-1-32	S14404-1-19	NAS1611-013	R14404-1-51	R14404-2-51	—	.25	—	HYDROGEN	500–3000	1.00	.75	3.79	1.27	1.15	.38	.28
.375	JW14404-2	FS14404-2-49	FA14404-2	N14404-2-32	S14404-2-49	NAS1611-013	R14404-1-51	R14404-3-51	—	—	.30	OXYGEN	500–3000	1.00	.75	4.03	1.39	1.19	.38	.28
.375	JW14404-3	FS14404-3-19	FA14404-3	N14404-3-32	S14404-3-19	—	R14404-1-51	R14404-4-51	—	.70	—	NITROGEN	6000	1.50	1.13	3.89	1.53	1.64	.38	.19
.375	JW14404-4	FFB14404-4-19	FSA14404-4	N14404-4-32	S14404-1-19	—	R14404-1-51	R14404-2-51	—	.30	—	MIXED WASTE	20–120	.63	1.06	3.70	1.33	1.41	.38	.31
.375	JW14404-5	FFB14404-5-19	FSA14404-5	N14404-4-32	S14404-2-19	—	R14404-1-51	R14404-3-51	—	.30	—	NITROGEN	600	.63	1.06	3.70	1.33	1.41	.38	.31
.375	JW14404-6	FFB14404-6-19	FSA14404-6	N14404-4-32	S14404-3-19	—	R14404-1-51	R14404-4-51	—	.30	—	MIXED WASTE	20–120	.63	1.06	3.41	1.33	1.41	.38	.31
.500	JW14405-1	FS14405-1-19	FA14405-1	N14405-1-32	S14405-1-19	—	R14405-1-51	R14405-2-51	—	.30	—	MIXED WASTE	50–120	1.13	.88	3.57	1.20	1.35	.50	.43
.500	JW14405-2	FS14405-2-19	FA14405-2	N14405-2-32	S14405-2-19	—	R14405-1-51	R14405-3-51	—	.30	—	NITROGEN	600	1.13	.88	3.58	1.21	1.39	.50	.43
.500	JW14405-3	FS14405-3-19	FA14405-3	N14405-3-32	S14405-3-19	NAS1611-015	R14405-1-51	R14405-3-51	—	.35	—	HYDROGEN	400–600	1.25	.88	3.58	1.21	1.43	.50	.43
.500	JW14405-4	FS14405-4-19	FA14405-4	N14405-4-32	S14405-4-19	—	R14405-1-51	R14405-5-51	—	.35	—	WATER	10–60	1.25	.88	3.58	1.21	1.47	.50	.43
.625	JW14406-1	FS14406-1-19	FA14406-1	N14406-1-32	S14406-1-19	NAS1611-017	R14406-1-51	R14406-2-51	—	.32	—	OXYGEN	400–600	1.13	.81	3.78	1.36	1.43	.63	.56
.750	JW14407-1	FS14407-1A	FA14407-1	N14407-1A	S14404-1-52	NAS1611-019	R14407-1-094	R14407-2-094	.16	—	—	AMMONIA	70–133	1.38	1.00	3.79	1.37	1.62	.75	.65
1.250	JW14402-1	FS14402-1A	FA14402-1	N14402-1A	S14402-1-52	NAS1611-027	R14412-1-094	R14412-2-094	.29	—	—	AMMONIA	70–133	2.00	1.50	3.86	1.41	2.28	1.25	1.18



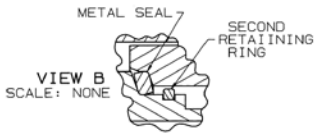
GENERAL CONFIGURATION FOR:
JW14402-1, JW14404-1, JW14404-2, JW14404-3, JW14405-1, JW14405-2, JW14405-3, JW14405-4, JW14406-1, JW14407-1, JW14412-1



GENERAL CONFIGURATION FOR: JW14402-1, JW14404-1, JW14404-2, JW14405-3, JW14406-1, JW14407-1, JW14412-1



GENERAL CONFIGURATION FOR: JW14404-4, JW14404-5, JW14404-6



GENERAL CONFIGURATION FOR: JW14404-3, JW14404-4, JW14404-5, JW14404-6, JW14405-1, JW14405-2, JW14405-4

REVISION	LTR	DESCRIPTION	DATE
	A	O-Ring seal was C Seal. Revised second retaining ring for JW14405-3	10/17/94

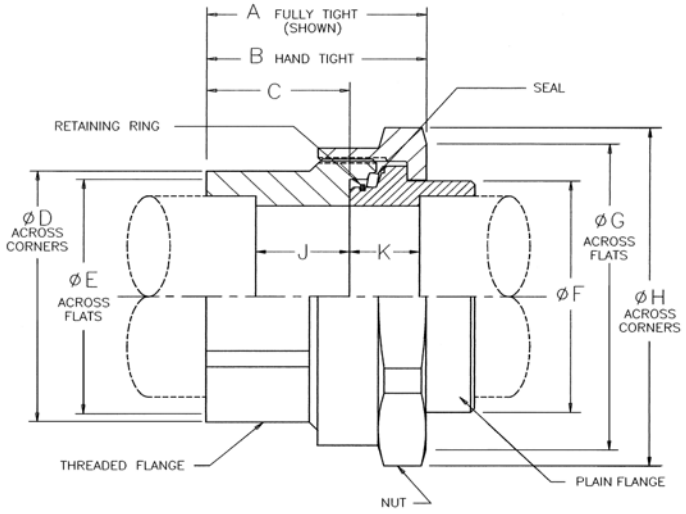
This issue supersedes all previously issued catalog sheets and drawings

NOTES:

1. Interpret dimensions and tolerances per ANSI y14, 5M-1983
2. Assemble per Stanley Aviation document 2205
3. Shipped as kit per MIL-STD-794
4. Consult Eaton for specific applications

JWS14100 Metal Seal Coupling, Hex Configuration
Socket Welded Flanges
Series 141

NOM TUBE O D (IN)	ASSY PART NUMBER	A	B	C	Ø D	E	Ø F	G	Ø H	J	K	COMPONENT PART NUMBERS					WEIGHT (LB)	
												THREADED FLANGE	NUT	PLAIN FLANGE	SEAL	RET. RING	AL	SST
.250	JWS14102	.88	.90	.49	.63	.56	.41	.88	.97	.236	.340	FWS141T02	N14104	FWS14102	S14004	R14104	.041	.12
.312	JWS14103	.88	.90	.49	.63	.56	.47	.88	.97	.236	.340	FWS141T03	N14104	FWS14103	S14004	R14104	.039	.11
.375	JWS14104	.88	.99	.49	.63	.56	.54	.88	.97	.236	.340	FWS141T04	N14104	FWS14104	S14004	R14104	.037	.11
.500	JWS14105	.90	1.01	.54	.76	.69	.67	1.00	1.10	.285	.396	FWS141T05	N14005	FWS14105	S14005	R14105	.048	.14
.625	JWS14106	1.01	1.03	.54	.88	.81	.81	1.13	1.24	.293	.396	FWS141T06	N14006	FWS14106	S14006	R14106	.059	.17
.750	JWS14107	1.09	1.11	.62	1.08	.94	.94	1.38	1.47	.372	.398	FWS141T07	N14007	FWS14107	S14007	R14107	.093	.27
1.000	JWS14110	1.0	1.11	.62	1.32	1.20	1.20	1.63	1.76	.375	.395	FWS141T10	N14010	FWS14110	S14010	R14110	.12	.34
1.500	JWS14115	1.29	1.31	.74	1.95	1.72	1.72	2.25	2.42	.490	.474	FWS141T15	N14015	FWS14115	S14015	R14115	.24	.70
2.000	JWS14120	1.42	1.44	.81	2.50	2.24	2.24	2.88	3.14	.563	.479	FWS141T20	N14020	FWS14120	S14020	R14120	.40	1.15



PART NUMBER CODE:

JWS 1 4 1 — 0 0 — X

BASIC PART NO.
SIZE
MATERIAL / FINISH

A = FWS14TXXA THREADED FLANGE & FWS141XXA PLAIN FLANGE: ALUMINUM 6061-T6
N14XXXA (W) NUT: ALUMINUM 2024 (AGED) ANODIZED
S140XXA SEAL: ALUMINUM 6061-T6, CHEMICAL FILM TREATED
R141XXC RETAINING RING: STAINLESS STEEL 316 PASSIVATED

C = FSW14TXXC THREADED FLANGE & FWS141XXC PLAIN FLANGE: STAINLESS STEEL 321/347 PASSIVATED
N14XXX-43 NUT: STAINLESS STEEL 15-5 PH (H1150) PASSIVATED
S140XXC SEAL: STAINLESS STEEL 304 PASSIVATED
R141XXC RETAINING RING: STAINLESS STEEL 316 PASSIVATED

REVISION	LTR	DESCRIPTION	DATE
	A	Revised Ø D dimensions	10/17/94

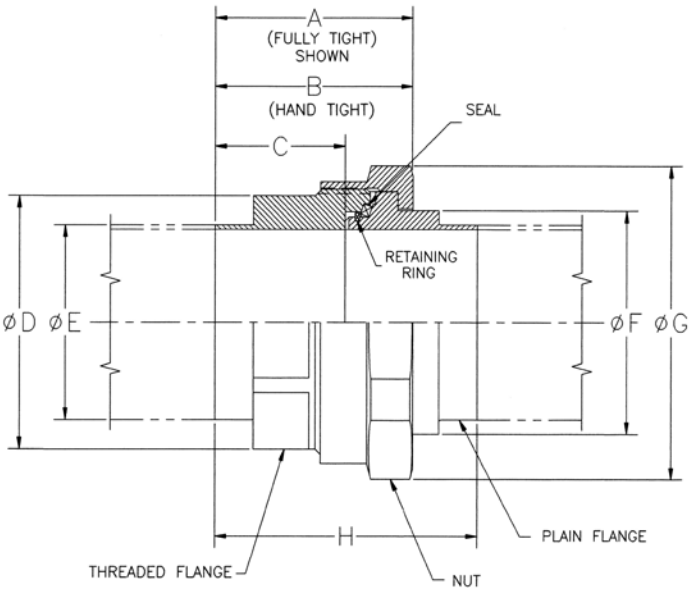
This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Consult Eaton for specific applications
2. See individual component catalog sheets for additional information
3. Other material/finish combinations available upon request
4. Minimum burst pressure:
   A Material = 6000 psi (413.68 bar)
   C Material = 12000 psi (827.37 bar)

JWB14100 Metal Seal Coupling, Hex Configuration
Butt Welded Flanges
Series 141

NOM TUBE O D (IN)	PART NO.	A	B	C	ØD	ØE	ØF	ØG	COMPONENT PART NUMBERS					WEIGHT		
									THREADED FLANGE	NUT	PLAIN FLANGE	SEAL	RET RING	AL	TI	SST
.250	JWB14102	1.19	1.21	.80	.59	.250	.41	.97	FWB141T02	N14104	FWB14102	S14004	R14104	.043	.051	.104
.312	JWB14103	1.19	1.21	.80	.59	.312	.47	.97	FWB141T03	N14104	FWB14103	S14004	R14104	.045	.067	.114
.375	JWB14104	1.19	1.21	.80	.59	.375	.54	.97	FWB141T04	N14104	FWB14104	S14004	R14104	.050	.074	.125
.500	JWB14105	1.30	1.32	.85	.73	.500	.67	1.10	FWB141T05	N14005	FWB14105	S14005	R14105	.057	.093	.163
.625	JWB14106	1.32	1.34	.85	.88	.625	.81	1.24	FWB141T06	N14006	FWB14106	S14006	R14106	.068	.111	.196
.750	JWB14107	1.40	1.42	.93	1.10	.750	.94	1.47	FWB141T07	N14007	FWB14107	S14007	R14107	.115	.191	.294
1.000	JWB14110	1.40	1.42	.93	1.32	1.000	1.20	1.76	FWB141T10	N14010	FWB14110	S14010	R14110	.134	.270	.476
1.500	JWB14115	1.60	1.62	1.05	1.90	1.500	1.72	2.42	FWB141T15	N14015	FWB14115	S14015	R14115	.264	.460	.798
2.000	JWB14120	1.73	1.75	1.12	2.42	2.00	2.24	3.14	FWB141T20	N14020	FWB14120	S14020	R14120	.449	.740	1.300



PART NUMBER CODE:

JB141 00 – XX – XX

BASIC PART NO.

SIZE

TUBE WALL THICKNESS

–16 = .016	–42 = .042	–83 = .083
–20 = .020	–49 = .049	
–35 = .035	–65 = .065	

MATERIAL / FINISH

A = ALUMINUM 6061-T6 FOR PLAIN AND THREADED FLANGE
ALUMINUM 2024 (AGED), ANODIZED FOR NUT
ALUMINUM 6061-T6, CHEMICAL CONVERSION COATED FOR SEAL
STAINLESS STEEL 316, PASSIVATED FOR RETAINING RING

C = STAINLESS STEEL 321L/347L, PASSIVATED FOR PLAIN AND THREADED FLANGE
STAINLESS STEEL 15-5PH (H1150), PASSIVATED FOR NUT
STAINLESS STEEL 304, PASSIVATED FOR SEAL
STAINLESS STEEL 316, PASSIVATED FOR RETAINING RING

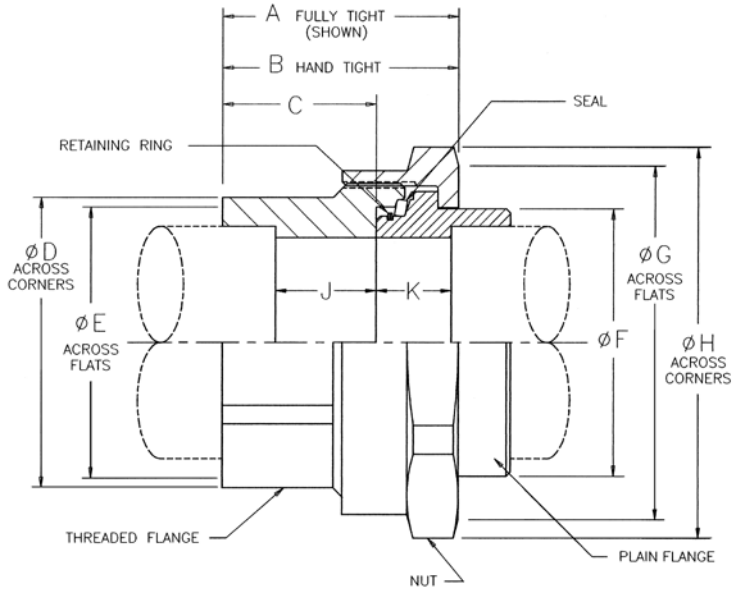
T = TITANIUM T1-CP-70 PER MIL-T-9047

NOTES:

1. Consult Eaton for specific applications
2. See individual drawings for additional information

JWS14100 Metal Seal Coupling, Hex Configuration
Socket Welded Flanges
Series 141

NOM TUBE O D (IN)	PART NO.	A	B	C	ØD	ØE	ØF	ØG	COMPONENT PART NUMBERS					WEIGHT (LB)		
									THREADED FLANGE	NUT	PLAIN FLANGE	SEAL	RET. RING	AL	TI	SST
.250	JWS14102	1.19	1.21	.80	.59	.250	.41	.97	FWB141T02	N14104	FWB14102	S14004	R14104	.043	.051	.104
.312	JWS14103	1.19	1.21	.80	.59	.312	.47	.97	FWB141T03	N14104	FWB14103	S14004	R14104	.045	.067	.114
.375	JWS14104	1.19	1.21	.80	.59	.375	.54	.97	FWB141T04	N14104	FWB14104	S14004	R14104	.050	.074	.125
.500	JWS14105	1.30	1.32	.85	.73	.500	.67	1.10	FWB141T05	N14005	FWB14105	S14005	R14105	.057	.093	163
.625	JWS14106	1.32	1.34	.85	.88	.625	.81	1.24	FWB141T06	N14006	FWB14106	S14006	R14106	.068	.111	.196
.750	JWS14107	1.40	1.42	.93	1.10	.750	.94	1.47	FWB141T07	N14007	FWB14107	S14007	R14107	.115	.191	.294
1.000	JWS14110	1.40	1.42	.93	1.32	1.000	1.20	1.76	FWB141T10	N14010	FWB14110	S14010	R14110	.134	.270	.476
1.500	JWS14115	1.60	1.62	1.05	1.90	1.500	1.72	2.42	FWB141T15	N14015	FWB14115	S14015	R14115	.264	.460	.798
2.000	JWS14120	1.73	1.75	1.12	2.42	2.000	2.24	3.14	FWB141T20	N14020	FWB14120	S14020	R14120	.449	.740	1.30



PART NUMBER CODE:

JWS141 00 – XX – X

BASIC PART NO.

SIZE

TUBE WALL THICKNESS

MATERIAL / FINISH

A = FWS14TXXA THREADED FLANGE & FWS141XXA PLAIN FLANGE: ALUMINUM 6061-T6

N14XXA (W) NUT: ALUMINUM 2024 (AGED), ANODIZED

R141XXC RETAINING RING: STAINLESS STEEL 315 PASSIVATED

C = FWS14TXXC THREADED FLANGE & FWS141XXC PLAIN FLANGE: STAINLESS STEEL 321/347 PASSIVATED

N14XXX–43 NUT: STAINLESS STEEL 304 PASSIVATED

R141XXC RETAINING RING: STAINLESS STEEL 316 PASSIVATED

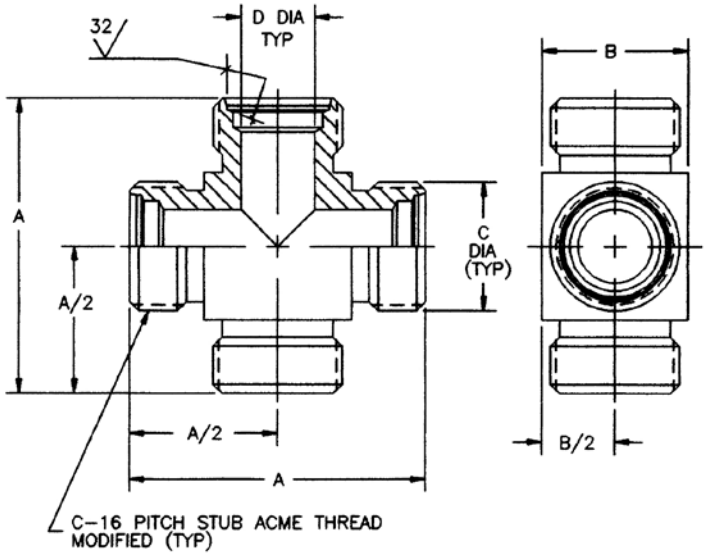
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Consult Eaton for specific applications
2. See individual drawings for additional information

C14000 Cross
Series 14

Revision Letter D

NOM TUBE O D (IN)	PART NO.	A	B	C	D	WEIGHT (LB) A	C	T
.250	C14002	1.19	.63	.553	.38	.030	.084	.049
.375	C14004	1.37	.75	.740	.50	.045	.128	.073
.500	C14005	1.75	1.00	.865	.63	.071	.200	.113
.625	C14006	1.87	1.00	.990	.75	.086	.243	.138
.750	C14007	2.18	1.25	1.178	.94	.145	.410	.233
1.000	C14010	2.43	1.50	1.428	1.13	.289	.816	.463
1.250	C14012	2.94	1.75	1.740	1.31	.434	1.22	.694
1.500	C14015	3.25	2.13	2.052	1.56	.683	1.93	1.09
1.750	C14017	3.53	2.50	2.334	1.75	1.02	2.87	1.63
2.000	C14020	3.94	2.75	2.615	2.00	1.35	3.80	2.16
2.250	C14022	4.31	3.00	2.928	2.25	1.59	4.48	2.53
2.500	C14025	4.55	3.25	3.178	2.44	2.16	6.10	3.46
2.750	C14027	4.91	3.50	3.490	2.75	3.47	9.79	5.56
3.000	C14030	5.27	4.00	3.740	3.00	3.60	10.15	5.76



PART NUMBER CODE:

C140 00 X X

SERIES

SIZE

MATERIAL

4 A = ALUMINUM 2024 (AGED), ANODIZED

5 C = STAINLESS STEEL (15-5PH) PASSIVATED

5 T = TITANIUM TI-CP-70 (FLANGES TI-6AL-4V)

SPECIAL

D = DRY FILM LUBE THREADS ONLY PER MIL-L-46010

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Other materials and finishes available upon request

4 Pressure rating (psi) for "A" material:
Operating:1,500 psi (103.42 bar) max
Proof: 3,000 psi (206.85 bar)
Burst: 6,000 psi (413.68 bar)

5 Pressure rating (psi) for "C" & "T" material:
Operating: 3,000 psi (206.85 bar) max
Proof: 6,000 psi (413.68 bar)
Burst: 12,000 psi (827.37 bar)

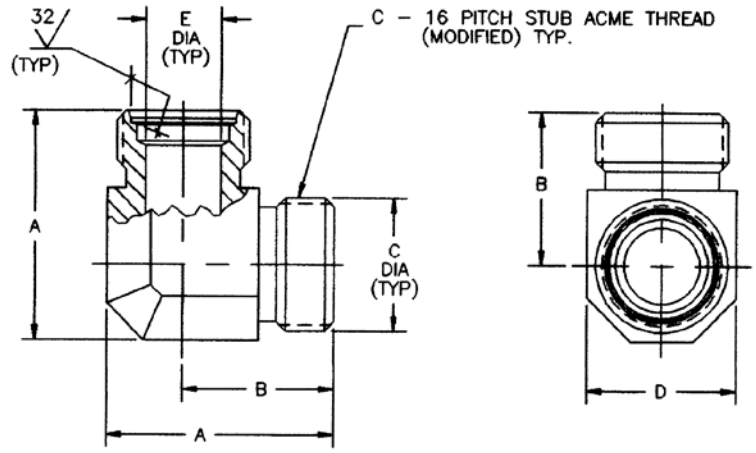
REVISION	LTR	DESCRIPTION	DATE
	A	Revised and redrawn	3/1/79
	B	Revised "A", "B", "D" and weights. Added Notes 4 & 5.	6/7/79
	C	Revised "D" special	5/14/86
	D	Updated material/finish specs	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

E14000 90° Elbow

Revision Letter C

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	WEIGHT (LB) A	WEIGHT (LB) C	WEIGHT (LB) T
.250	E14002	.91	.59	.553	.63	.38	.017	.048	.027
.375	E14004	1.06	.69	.740	.75	.50	.026	.073	.042
.500	E14005	1.37	.87	.865	1.00	.63	.040	.113	.064
.625	E14006	1.44	.94	.990	1.00	.75	.049	.138	.078
.750	E14007	1.72	1.09	1.178	1.25	.94	.083	.234	.133
1.000	E14010	1.97	1.22	1.428	1.50	1.13	.165	.465	.264
1.250	E14012	2.34	1.47	1.740	1.75	1.31	.247	.697	.395
1.500	E14015	2.69	1.62	2.052	2.13	1.56	.389	1.09	.622
1.750	E14017	3.02	1.77	2.334	2.50	1.75	.580	1.64	.928
2.000	E14020	3.34	1.97	2.615	2.75	2.00	.768	2.17	1.23
2.250	E14022	3.66	2.16	2.928	3.00	2.25	.905	2.55	1.45
2.500	E14025	3.90	2.27	3.178	3.25	2.44	1.23	3.47	1.97
2.750	E14027	4.21	2.46	3.490	3.50	2.75	1.98	5.58	3.17
3.000	E14030	4.63	2.63	3.740	4.00	3.00	2.05	5.78	3.28



PART NUMBER CODE:

E140 00 X X

SERIES

SIZE

MATERIAL

4 A = ALUMINUM 2024-T8, ANODIZED

5 C = STAINLESS STEEL 17-4PH (15-5PH), PASSIVATED

5 T = TITANIUM TI-6AL-4V

SPECIAL

D = DRY FILM LUBE THREADS ONLY PER MIL-L-46010

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Other materials and finishes available upon request

4 Pressure rating (psi) for "A" material:
Operating:1,500 psi (103.42 bar) max
Proof: 3,000 psi (206.85 bar)
Burst: 6,000 psi (413.68 bar)

5 Pressure rating (psi) for "C" & "T" material:
Operating: 3,000 psi (206.85 bar) max
Proof: 6,000 psi (413.68 bar)
Burst: 12,000 psi (827.37 bar)

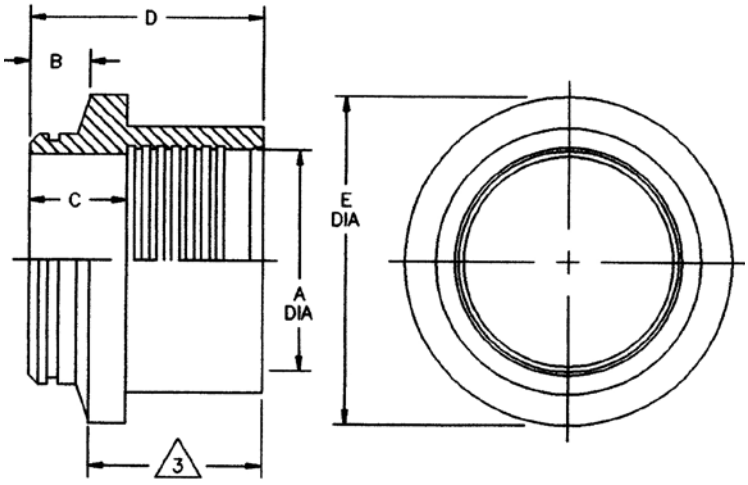
REVISION	LTR	DESCRIPTION	DATE
	A	Revised and redrawn	3/1/79
	B	Revised "A", "B", "D", "E" and weights. Added Notes 4 & 5	6/4/79
	D	Updated material/finish specs	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

F14000 Plain Flange
Series 14

Revision Letter K

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	SWAGE BLOCK	NOM WEIGHT (LB) MATL A	MATL C	MATL T	MATL –02, –06
.250	F14002	.254	.17	.34	.72	.51	B14002	.004	.015	.009	.018
.375	F14004	.379	.17	.34	.72	.69	B14004	.011	.029	.015	.031
.500	F14005	.504	.19	.40	.90	.82	B14005	.013	.042	.022	.044
.625	F14006	.629	.20	.40	.90	.94	B14006	.020	.055	.033	.062
.750	F14007	.755	.20	.40	.90	1.13	B14007	.024	.071	.040	.077
1.000	F14010	1.005	.21	.40	.90	1.38	B14010	.033	.095	.055	.10
1.250	F14012	1.255	.22	.47	1.10	1.69	B14012	.053	.16	.088	.17
1.500	F14015	1.506	.23	.47	1.10	2.00	B14015	.068	.21	.12	.22
1.750	F14017	1.756	.24	.47	1.10	2.25	B14017	.079	.24	.13	.25
2.000	F14020	2.006	.25	.48	1.10	2.50	B14020	.099	.30	.17	.32
2.250	F14022	2.256	.26	.57	1.27	2.88	B14022	.14	.43	.24	.46
2.500	F14025	2.506	.27	.57	1.27	3.13	B14025	.16	.49	.28	.52
2.750	F14027	2.756	.27	.56	1.26	3.38	B14027	.19	.58	.33	.62
3.000	F14030	3.008	.27	.55	1.25	3.62	B14030	.22	.64	.36	.69



PART NUMBER CODE:

F140 00 X X

SERIES

SIZE

MATERIAL
- A = ALUMINUM 2024-T8, ANODIZED
- C = STAINLESS STEEL 17-4PH (15-5PH) PASSIVATED
- T = TITANIUM TI-6AL-4V
- –02 = INCONEL 625
- –06 = COLUMIUM
- –12 = RA333
- –43 = STAINLESS STEEL 15-5PH (NO SUB) PASSIVATED

SPECIAL

3 D = DRY FILM LUBE THREADS ONLY PER MIL-L-46010

REVISION	LTR	DESCRIPTION	DATE
	F	Redrawn. Revised "B", "C", "D", "E" dims. Revised weights (were in gms).	1/29/80
	G	Added –12 material	3/9/81
	H	Revised "T" material	1/30/85
	J	Added "–43" material	4/25/86
	K	Deleted "dichromate" from material	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

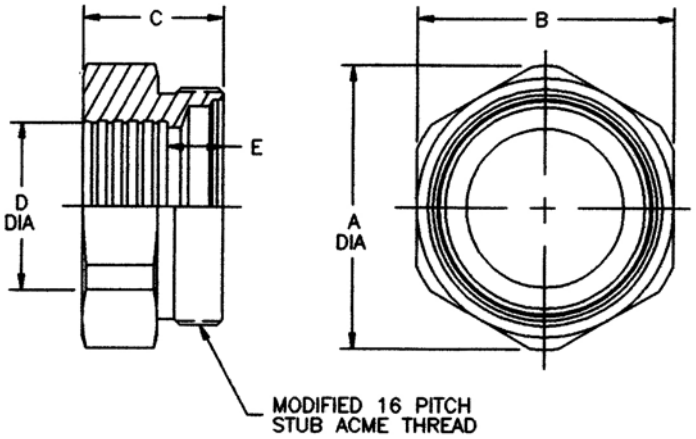
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125
3. Dry film lube O.D. surfaces only in area noted

F14T00 Threaded Flanges

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A	B ±.05	C	D	E	SWAGE BLOCKS	WEIGHT (GRAMS) A	C	T	–02, – 06
.250	F14T02	.72	.69	.67	.254	.30	B14T02	7	20	12	22
.375	F14T04	.92	.88	.67	.379	.30	B14T04	11	34	19	36
.500	F14T05	1.04	1.00	.82	.504	.32	B14T05	15	44	25	45
.625	F14T06	1.19	1.06	.83	.629	.33	B14T06	16	50	27	50
.750	F14T07	1.40	1.25	.84	.755	.34	B14T07	24	73	40	77
1.000	F14T10	1.67	1.50	.85	1.005	.35	B14T10	30	91	50	95
1.250	F14T12	2.10	1.88	.99	1.255	.36	B14T12	54	163	91	173
1.500	F14T15	2.38	2.13	1.00	1.506	.37	B14T15	68	204	114	218
1.750	F14T17	2.80	2.50	1.01	1.756	.38	B14T17	91	268	150	286
2.000	F14T20	3.08	2.75	1.03	2.006	.40	B14T20	100	300	168	322
2.250	F14T22	3.36	3.00	1.12	2.256	.42	B14T22	136	400	227	431
2.500	F14T25	3.63	3.25	1.13	2.506	.43	B14T25	150	449	254	481
2.750	F14T27	4.06	3.63	1.16	2.756	.46	B14T27	186	558	313	599
3.000	F14T30	4.34	3.88	1.17	3.008	.46	B14T30	204	604	341	649



PART NUMBER CODE:

F14T 00 X – X

SERIES

SIZE

MATERIAL

A = ALUMINUM 2024-T6, -T81, -T851, -T8510 OR -T8511, ANODIZED
C = STAINLESS STEEL (17-4PH) PASSIVATED
T = TITANIUM TI-6AL-4V)
–02 = INCONEL 625
–06 = COLUMIUM
–43 = STAINLESS STEEL 15-5PH (NO SUB) PASSIVATED

SPECIAL

D = DRY FILM LUBE THREADS ONLY PER MIL-L-46010 OR MIL-L-22398 AS APPLICABLE

REVISION	LTR	DESCRIPTION	DATE
	A	Defined materil "C". Removed "S"	10/26/78
	B	Remove "Across Hex" from "A" dim.	12/6/78
	C	Redrawn on "new" format. Revised tempers of "A" material. Revied "D" dim. F14T30.	4/24/80
	D	Revised "T" mateiral and thread	4/25/86
	E	Added "–43" material	4/25/86
	F	Deleted "dichromate" from anodize	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

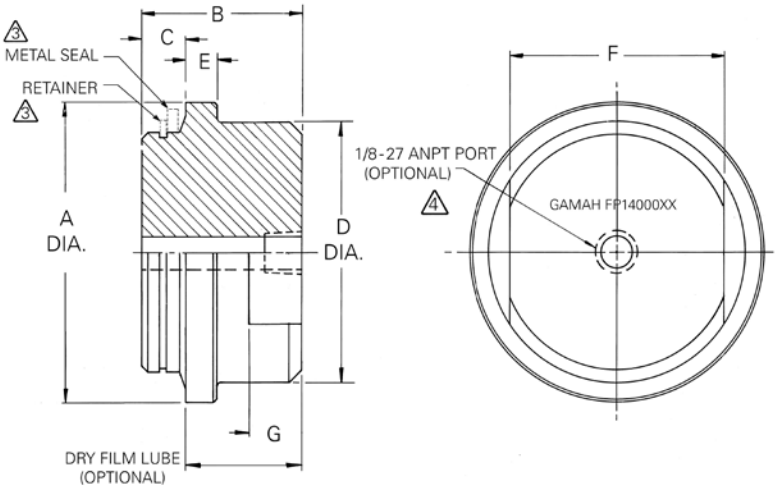
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

FP14000 Plug
Series 14

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	SEAL ③	RETAINER ③
.250	FP14002	.505	.62	.17	.390	.12	.250	.25	S14002	R14102
.375	FP14004	.692	.62	.17	.535	.12	.375	.25	S14004	R14104
.500	FP14005	.817	.70	.18	.670	.14	.500	.25	S14005	R14105
.625	FP14006	.942	.75	.20	.805	.14	.625	.25	S14006	R14106
.750	FP14007	1.130	.75	.20	.940	.14	.750	.25	S14007	R14107
1.000	FP14010	1.380	.75	.20	1.200	.15	1.000	.25	S14010	R14110
1.250	FP14012	1.692	.81	.21	1.460	.17	1.250	.25	S14012	R14112
1.500	FP14015	2.000	.81	.22	1.720	.18	1.375	.25	S14015	R14115
1.750	FP14017	2.250	.87	.23	1.980	.18	1.500	.25	S14017	R14117
2.000	FP14020	2.500	1.00	.25	2.240	.18	1.750	.37	S14020	R14120
2.250	FP14022	2.875	1.12	.26	2.500	.23	2.000	.37	S14022	R14122
2.500	FP14025	3.125	1.12	.27	2.760	.23	2.250	.37	S14025	R14125
2.750	FP14027	3.375	1.10	.27	3.020	.24	2.500	.37	S14027	R14127
3.000	FP14030	3.625	1.22	.27	3.280	.24	2.750	.37	S14030	R14130



PART NUMBER CODE:

FP140 00 X X – X

BASIC PART NO.

SIZE

MATERIAL
A = ALUMINUM 2024 (AGED), ANODIZED
C = STAINLESS STEEL 17-4PH (H1150) OR 15-5PH (H1150) PASSIVATED

SPECIALS
D = DRY FILM LUB/MIL-L-46010 ON AREA INDICATED

–1 = WITHOUT 1/8 ANPT PORT (IF –1 OMITTED, PLUG WILL BE FURNISHED WITH ANPT PORT)

REVISION	LTR	DESCRIPTION	DATE
	G	Deleted "dichromate" from anodize. Added Note 4.	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

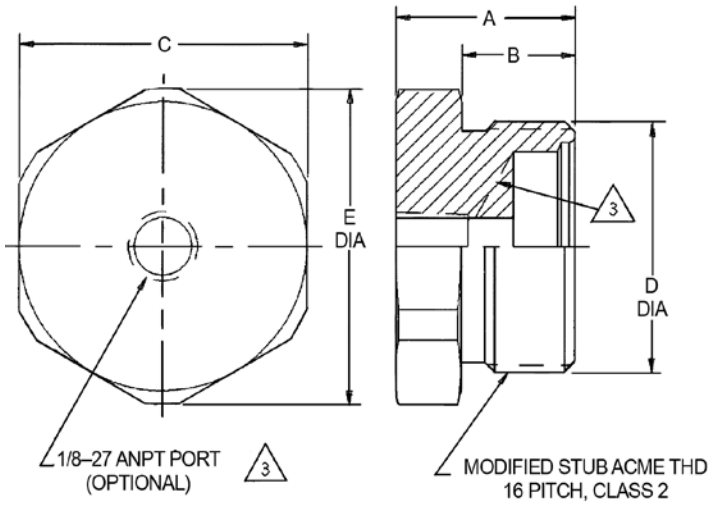
③ Seal and retainer not included. They must be ordered separately

④ Port not available in .250 and .375 sizes

FP14T00 Plug, Threaded
Series 14

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	— WEIGHT (LB) — A	C
.250	FP14T02	.50	.25	.688	.553	.73	.013	.036
.375	FP14T04	.50	.25	.875	.740	.95	.016	.044
.500	FP14T05	.62	.40	1.000	.865	1.10	.031	.088
.625	FP14T06	.65	.40	1.063	.990	1.17	.040	.111
.750	FP14T07	.82	.46	1.250	1.178	1.32	.077	.22
1.000	FP1T010	.82	.46	1.500	1.428	1.61	.11	.31
1.250	FP1T012	.94	.56	1.875	1.740	2.05	.20	.55
1.500	FP1T015	.94	.56	2.125	2.052	2.28	.26	.74
1.750	FP1T017	.94	.56	2.500	2.334	2.71	.35	.98
2.000	FP1T020	1.00	.62	2.750	2.615	3.00	.46	1.27
2.250	FP1T022	1.00	.62	3.000	2.928	3.29	.55	1.54
2.500	FP1T025	1.00	.62	3.250	3.178	3.57	.63	1.77
2.750	FP1T027	1.00	.62	3.625	3.490	4.01	.77	2.15
3.000	FP1T030	1.00	.62	3.875	3.740	4.29	.87	2.44



PART NUMBER CODE:

FP14T 00 X X – X

BASIC PART NO.

SIZE

MATERIAL
A = ALUMINUM 2024 (AGED), ANODIZED
C = STAINLESS STEEL 17-4PH (H1150) OR15-5PH (H1150) PASSIVATED

SPECIALS
D = DRY FILM LUBE PER MIL-L-46010 (THREADS ONLY)

–1 = WITHOUT 1/8 ANPT PORT (IF –1 OMITTED, PLUG WILL BE FURNISHED WITH ANPT PORT)

REVISION	LTR	DESCRIPTION	DATE
	E	Redrawn from "Customer Use" draw. No design change.	7/30/80
	F	Revised thread, added weights and drill point option	7/1/85
	G	Deleted "dichromate" from anodize. Added Note 4.	4/12/99

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .03 .XXX = ± .010
2. Surface roughness 125

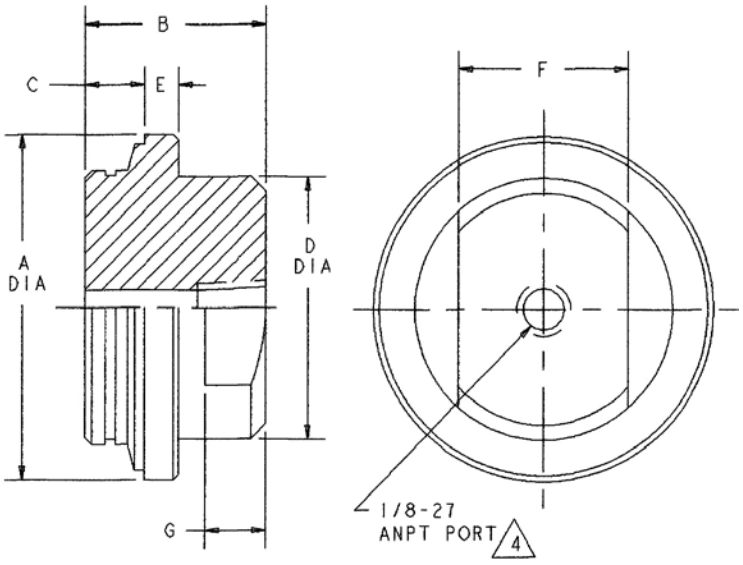
3 Standard SAE twist drill point (manufacture's option)

4 Port not available in .250 and .375 sizes

FPS14100 Plug
Series 141

Revision Letter C

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G	—— WEIGHT (LB) —— Al	SST
.250 ⚠5	FPS14104	—	—	—	—	—	—	—	—	—
.312 ⚠5	FPS14104	—	—	—	—	—	—	—	—	—
.375	FPS14104	.692	.63	.20	.535	.12	.375	.25	.014	.039
.500	FPS14105	.817	.70	.21	.670	.14	.500	.25	.025	.069
.625	PFPS14106	.942	.75	.22	.805	.14	.625	.25	.038	.11
.750	FPS14107	1.130	.75	.22	.940	.14	.750	.25	.053	.15
1.000	FPS14110	1.380	.75	.22	1.200	.15	1.000	.25	.085	.24



PART NUMBER CODE:

FPS141 00 XX - X

BASIC PART NO.

SIZE

MATERIAL/FINISH

AW = ALUMINUM 2024 (AGED) PER QQ-A-225/6, OR QQ-A-200/3, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

–43 = STAINLESS STEEL 15-5PH(H1150) PER AMS 5659 (NO SUBSTITUTE), PASSIVATED PER QQ-P-35

–18 = STAINLESS STEEL 304L PER AMS5647 (NO SUBSTITUTE), PASSIVATED PER QQ-P-35

SPECIALS

⚠4 –1 = WITHOUT 1/8 ANPT PORT (IF –1 OMITTED, PLUG WILL BE FURNISHED WITH ANPT PORT) PORT NOT AVAILABLE IN 04 & 05 SIZES

REVISION	LTR	DESCRIPTION	DATE
	A	Added –18 material	7/27/92

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications

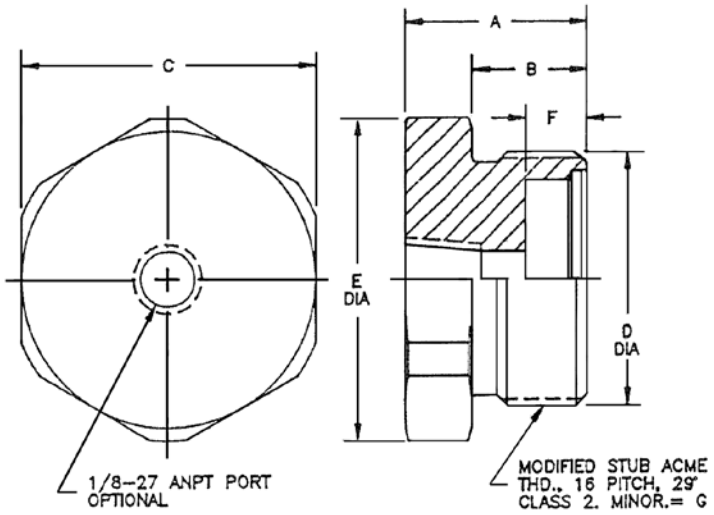
⚠4 Port is optional on FPS14106–FSP14110 only. FPS14104 & FPS14105 will be furnished in solid configuration only (–1)

⚠5 For .250 & .312 O.D. tube, use FPS14104

FPS14T00 Plug, Flange, Threaded
Series 141

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A	B	C	D MAJOR DIA	E	F	G MINOR DIA	WEIGHT (LB) AW	WEIGHT (LB) –43
.250 ⚠5	FPS14T04	—	—	—	—	—	—	—	—	—
.312 ⚠5	FPS14T04	—	—	—	—	—	—	—	—	—
.375	FPS14T04	.63	.41	.875	.740	.95	1.74	.686	.026	.074
.500	FPS14T05	.63	.41	1.000	.865	1.13	1.84	.810	.034	.096
.625	PFPS14T06	.66	.41	1.063	.990	1.17	1.95	.934	.043	.12
.750	FPS14T07	.82	.47	1.250	1.178	1.32	1.96	1.122	.081	.23
1.000	FPS14T10	.82	.47	1.500	1.428	1.61	1.97	1.370	.12	.33



PART NUMBER CODE:

FPS14T 00 XX - X

BASIC PART NO.

SIZE

MATERIAL/FINISH

AW = ALUMINUM 2024 (AGED) PER QQ-A-225/6, OR QQ-A-200/3, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

–43 = STAINLESS STEEL 15-5PH(H1150) PER AMS 5659 (NO SUBSTITUTE), PASSIVATED PER QQ-P-35

–18 = STAINLESS STEEL 304L PER AMS5647 (NO SUBSTITUTE) PASSIVATED PER QQ-P-35

–1 = WITHOUT 1/8 ANPT PORT
(IF –1 OMITTED, PLUG WILL BE FURNISHED WITH ANPT PORT)

REVISION	LTR	DESCRIPTION	DATE
	A	Added –18 material	7/27/92

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

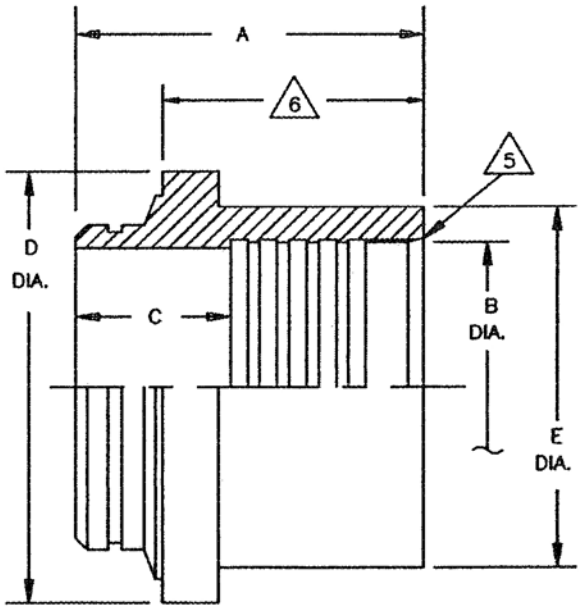
1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

⚠5 Plug for .250 dia. & .3123 dia. is same as .375 dia. plug

FS14100 Flange, Plain, Swaged
Series 141

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	SWAGE BLOCK	— WEIGHT (LB) — AW	–43
.250	FS14102	.72	.254	.340	.69	.54	B141T04	.019	.054
.312	FS14103	.72	.316	.340	.69	.54	B141T04	.017	.048
.375	FS14104	.72	.379	.340	.69	.54	B141T04	.015	.042
.500	FS14105	.90	.504	.396	.82	.67	B141T05	.023	.066
.625	FS14106	.90	.629	.396	.94	.81	B141T06	.028	.079
.750	FS14107	.90	.755	.398	1.13	.94	B141T07	.041	.115
1.000	FS14110	.89	1.005	.394	1.38	1.20	B141T10	.052	.147



FS14105 THRU FS14110

PART NUMBER CODE:

FPS141 00 XX X

BASIC PART NO.

SIZE

MATERIAL/FINISH

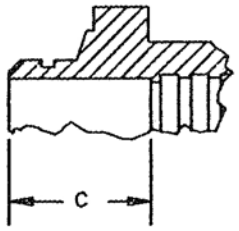
AW = ALUMINUM 2024 (AGED) PER QQ-A-200/3 OR QQ-A-225/6, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

–43 = STAINLESS STEEL 15-5PH (H1150) PER AMS 5659, PASSIVATED PER QQ-P-35

–48 = TITANIUM TI-6AL-4V PER MIL-T-9047

OPTIONS

DICRONITE DRY FILM LUBE PER DOD-L-85645 ON INDICATED SURFACES



FS14102 THRU FS14104
(FOR .016 MIN. WALL TUBE)

REVISION	LTR	DESCRIPTION	DATE
	A	Incorporated broach grooves, revised "B" dim.	9/14/87
	B	Revised "C" dim. to shoulder	9/21/87
	C	Revised "C" dim. and materials. Added "E", swage blocks and weights.	12/11/87
	D	Revised .250 size and configuration	1/28/88
	E	Revised Note 5	6/24/88
	F	Revised swage blocks	8/8/89
	G	Added "–48" and option "B" to part no. code and Note 6	2/8/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

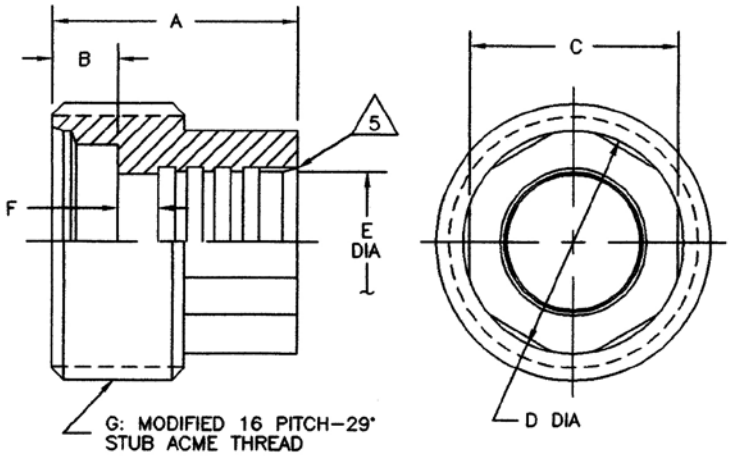
△5 8 broached grooves .250 size, 4 broached grroves .312 thru .625 sizes

△6 Dicronite on these surfaces only

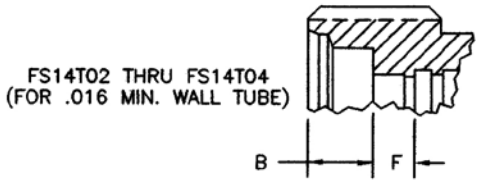
FS14T00 Flange, Threaded, Swaged, Hex Configuration
Series 141

Revision Letter G

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G THREAD MAJOR DIA	G THREAD MINOR DIA	SWAGE BLOCK	WEIGHT (LB) AW	WEIGHT (LB) –43
.250	FS14T02	.66	.174	.56	.59	.254	.111	.740	.685	B141T04	.019	.054
.312	FS14T03	.66	.174	.56	.59	.316	.111	.740	.685	B141T04	.017	.048
.375	FS14T04	.66	.174	.56	.59	.379	.111	.740	.685	B141T04	.015	.042
.500	FS14T05	.80	.184	.69	.73	.504	.117	.865	.809	B141T05	.023	.066
.625	FS14T06	.81	.195	.81	.88	.629	.120	.990	.934	B141T06	.028	.079
.750	FS14T07	.82	.196	1.00	1.10	.755	.123	1.178	1.121	B141T07	.041	.115
1.000	FS14T10	.82	.197	1.25	1.32	1.005	.126	1.428	1.370	B141T10	.052	.147



FS14T05 THRU FS14T10



PART NUMBER CODE:

FS14T 00 XX X

BASIC PART NO.

SIZE

MATERIAL/FINISH

AW = ALUMINUM 2024 (AGED) PER QQ-A-200/3 OR QQ-A-225/6, ANODIZED PER MIL-A-8625, TYPE II, CLASS 1

–43 = STAINLESS STEEL 15-5PH (H1150) PER AMS 5659, PASSIVATED PER QQ-P-35

–18 = STAINLESS STEEL 304L PER AMS5647, PASSIVATED PER QQ-P-35

–48 = TITANIUM TI-6AL-4V PER MIL-T-9047

–54 = STAINLESS STEEL 316L PER AMS5653, PASSIVATED PER QQ-P-35

OPTIONS

D = DRY FILM LUBRICATNT PER MIL-L-46010 (THREADS ONLY)

B = DICRONITE DRY FILM LUBE PER DOD-L-85645 (THREADS ONLY)

REVISION	LTR	DESCRIPTION	DATE
	A	Incorporated broach grooves	9/14/87
	B	Revised "B" dim., changed "A" dim. for .750 size, added "F" dim.	9/21/87
	C	Revised "A", "D" and "F". Added "G", swage block, weight, material specs and 03 data.	12/11/87
	D	Revised .250 size and configuration	1/28/88
	E	Revised Note 5	6/24/88
	F	Added –18 material and D option	7/17/91
	G	Added option B to p/n code. Added –48, –54 material.	10/31/94

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

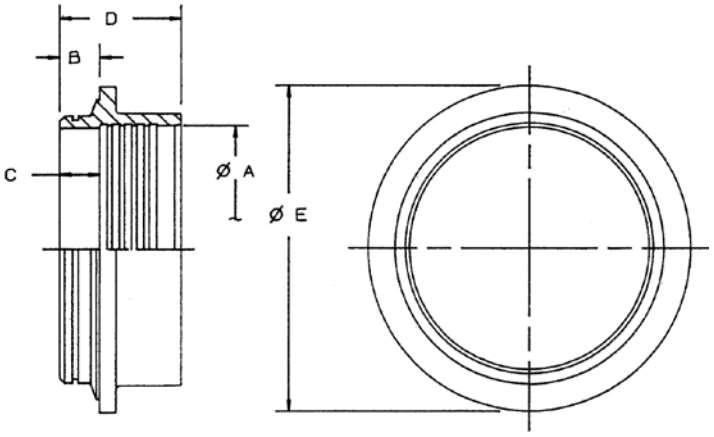
1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

5 8 broached grooves .250 size, 4 broached grroves .312 thru .625 sizes

FS14200 Flange, Plain
Series 142

Revision Letter C

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	SWAGE BLOCK	WEIGHT (LB) A
1.000	FS14210	1.005	.22	.222	.72	1.38	B14210	.025
1.500	FS14215	1.506	.25	.245	.74	1.98	B14215	.036
2.000	FS14220	2.006	.27	.271	.77	2.50	B14220	.054
2.500	FS14225	2.506	.20	.415	1.04	2.89	B14225	.073
3.000	FS14230	3.008	.20	.415	1.04	3.39	B14230	.097
3.500	FS14235	3.508	.20	.415	1.04	3.89	B14235	.11



PART NUMBER CODE:

FS142 00 XX

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 2024-T6, -T81, -T851, -T8510 OR -T8511 PER QQ-A-200/3 OR QQ-A-225/6, CHEMICAL FILM TREATED PER MIL-C-5541, CLASS IA

REVISION	LTR	DESCRIPTION	DATE
	A	Added FS14210 And FS14225	7/10/89
	B	Added material specs and finish, Note 5. Revised "C" and "D" (FS14225 – FS14235.	11/30/89
	C	Deleted Note 5	11/30/89

This issue supersedes all previously issued catalog sheets and drawings

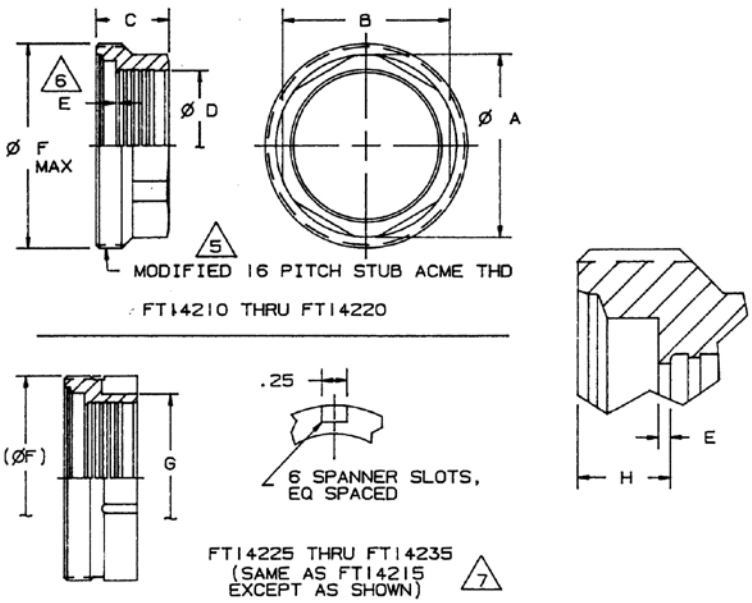
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

FT14200 Flange, Threaded
Series 142

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B ± .05	C	D	E	F MAX	SWAGE BLOCK	G	INSTL WRENCH	H	WEIGHT (LB) A
1.000	FT14210	1.28	1.19	.73	1.005	.030	1.438	BT14210	—	—	.23	.033
1.500	FT14215	1.83	1.69	.73	1.506	.030	2.062	BT14215	—	—	.23	.060
2.000	FT14220	2.42	2.25	.74	2.006	.030	2.625	BT14220	—	—	.24	.091
2.500	FT14225	—	—	.86	2.506	.051	3.010	BT14225	2.63	WFT14225	.23	.15
3.000	FT14230	—	—	.86	3.008	.051	3.510	BT14230	3.13	WFT14230	.23	.18
3.500	FT14235	—	—	.86	3.508	.051	4.010	BT14235	3.63	WFT14235	.23	.21



PART NUMBER CODE:

FT142 00 XX

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 2024-T6, -T851, -T8510 OR -T8511 PER QQ-A-200/3 OR QQ-A-225/6, CHEMICAL FILM TREATED PER MIL-C-5541, CLASS IA

REVISION	LTR	DESCRIPTION	DATE
	A	Added FT14210 and FT14225	7/10/89
	B	Revised "E" dim. and 2.5 thru 3.5 sizes. Added material and finish specs, "H"	10/3/89

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

5 Thread is modified on minor dia.

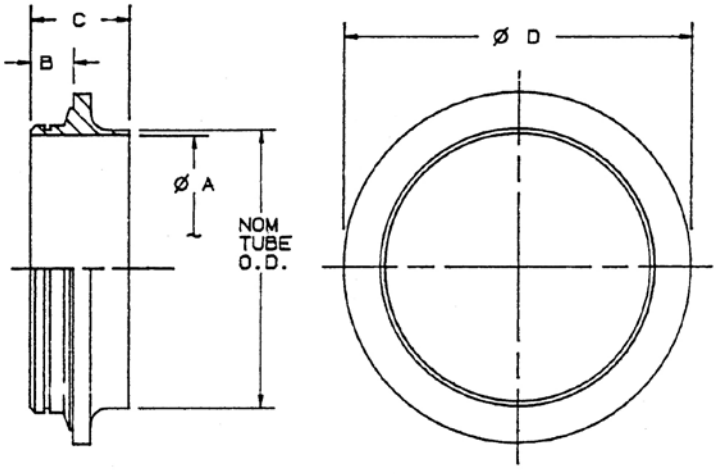
6 E is length from mating surface with plain flange to tube stop

7 For installation use spanner wrench WFT142XX Size

FW14200 Flange, Plain, Butt Welded
Series 142

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B	C	D	WEIGHT (LB) A
1.000	FW14210	.930	.22	.557	1.38	.016
1.500	FW14215	1.430	.25	.595	1.98	.032
2.000	FW14220	1.930	.27	.636	2.50	.050
2.500	FW14225	2.430	.20	.566	2.89	.044
3.000	FW14230	2.930	.20	.566	3.39	.052
3.500	FW14235	3.430	.20	.566	3.89	.061



PART NUMBER CODE:

FW142 00 XX

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 2024-T6, -T651, -T6510 OR -T6511 PER QQ-A-200/8 OR QQ-A-225/8, NO FINISH

REVISION	LTR	DESCRIPTION	DATE
	A	Added FW14210 and FW14225	7/10/89
	B	Added material specs	10/2/89

This issue supersedes all previously issued catalog sheets and drawings

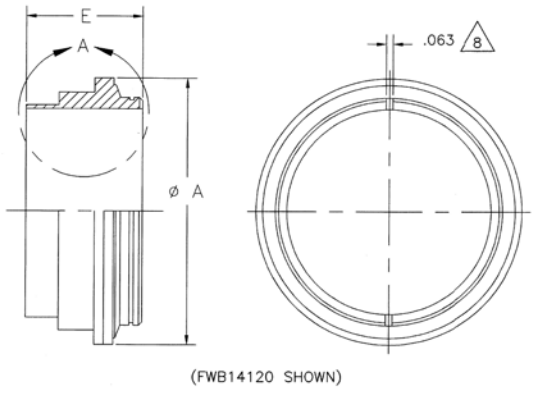
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

FWB14100 Flange, Plain, Butt Welded Metal Seal Series 141

Revision Letter F

NOM TUBE O D (IN)	PART NO.	— Ø A — MAX	Ø A — MIN	Ø B +.000 -.010	Ø C ± .005 TUBE WALL THICKNESS 6 –16	–20	–35	–42	–49	–52	–65	–83	–95	Ø D ± .005	E	F	G	H	J	K	WEIGHT (LB) AL	TI	SST
.250	FWB14102	.692	.687	.582	.218	.210	.180	.166	.152	1.46	.120	—	—	.250	.961	.117	.199	.410	.651	.025	.011	.016	.028
.312	FWB14103	.692	.687	.582	.280	.272	.242	.228	.214	.209	.182	—	—	.312	.961	.117	.199	.472	.651	.025	.011	.017	.031
.375	FWB14104	.692	.687	.582	.343	.335	.305	.291	.277	.271	.245	.209	—	.375	.961	.117	.199	.535	.651	.025	.012	.019	.034
.500	FWB14105	.817	.812	.721	.568	.460	.430	.416	.402	.396	.370	.334	.310	.500	.997	.143	.209	.670	.687	.025	.017	.028	.049
.625	FWB14106	.942	.937	.860	.593	.585	.555	.541	.527	.521	.495	.459	.435	.625	1.009	.144	.220	.805	.699	.030	.021	.035	.062
.750	FWB14107	1.130	1.125	.999	.718	.710	.680	.666	.652	.646	.620	.584	.560	.750	1.011	.145	.221	.940	.701	.030	.028	.046	.081
1.000	FWB14110	1.380	1.375	1.263	.968	.960	.930	.916	.902	.896	.870	.834	.810	1.000	1.013	.146	.222	1.200	.703	.030	.037	.062	.108
1.250	FWB14112	1.692	1.687	1.543	1.218	1.210	1.180	1.166	1.152	1.146	1.120	1.084	1.060	1.250	1.041	.173	.223	1.460	.731	.030	.051	.085	.149
1.500	FWB14115	2.010	1.985	1.825	1.468	1.460	1.430	1.416	1.402	1.396	1.370	1.334	1.310	1.500	1.071	.181	.245	1.720	.761	.030	.071	.118	.207
1.750	FWB14117	2.250	2.245	2.103	1.718	1.710	1.680	1.666	1.652	1.646	1.620	1.584	1.560	1.750	1.054	.179	.265	1.980	.744	.030	.076	.127	.222
2.000	FWB14120	2.512	2.488	2.385	1.968	1.960	1.930	1.916	1.902	1.896	1.870	1.834	1.810	2.000	1.097	.181	.271	2.240	.787	.030	.096	.156	.280



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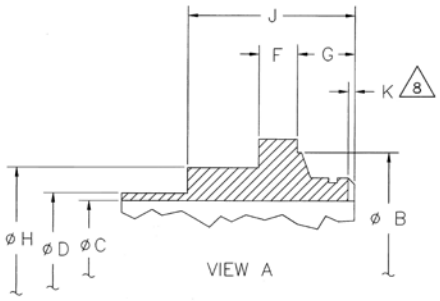
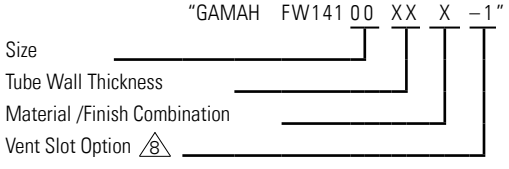


REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn	8/7/92
	B	Added –18 material	3/19/93
	C	Added –54 and –17 material, –52 tube wall thickness	2/18/94
	D	Added data for FWB14112 & FWB117; next assy JWBL14100; –02 material. Added tube wall thickness: .016, .049, .052, .065.	3/24/94
	E	Revised "T" material code spec in Note 2	6/16/95
	F	Added –95 wall thickness	7/9/98

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M –1982
2. Material Code:
   T = Titanium TI-CP-70 per MIL-T-9047 or ASTM 8348 GR4
   C = Stainless steel 321 per AMS5645 or 347 per AMS5646
   A = Aluminum 6061-T651 per QQ-A-225/8 or T6510, -T651 per QQ-A-200/8
   – 20 = Inconel 625 per AMS5666
   – 17 = Inconel 718 per AMS5662
   – 18 = Stainless steel 304L per AMS5647
   – 54 = Stainless steel 316L per AMS5653
3. Stainless steel passivated per QQ-P-35
4. Deleted
5. Surface roughness 125 √. Surface texture per ANSI B46.1
6. For tube wall thickness:
   – 16 = .016 – 42 = .042 – 65 = .065
   – 20 = .020 – 49 = .029 – 83 = .083
   – 35 = .035 – 52 = .052 – 95 = .095
7. Permanently identified with part no.:

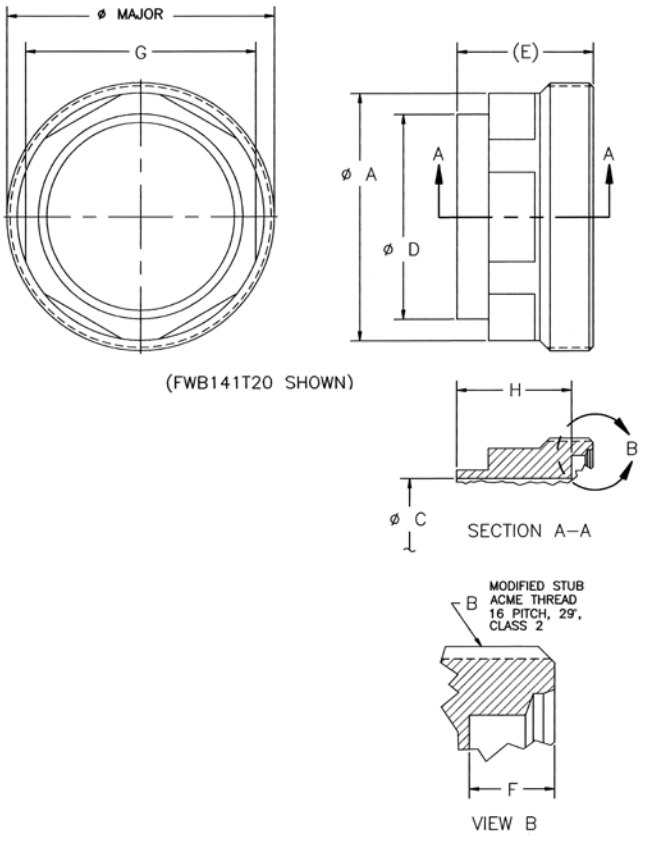


8. Customer optional pressure equalization vent slot. Option to be specified as –1 in part number. See note 7.

FWB141T00 Flange, Threaded, Butt Welded Metal Seal Series 141

Revision Letter F

NOM TUBE O D (IN)	PART NO.	Ø A	Ø B			Ø C ± .005 ⚠7 — TUBE WALL THICKNESS —					Ø D ± .005	(E)	F	G	H	WEIGHT (LB)		
			Ø MAJOR	Ø PITCH	Ø MINOR	–20	–35	–42	–52	–83						AL	TI	SST
.250	FWB141T02	.630	.740 / .737	.714/.701	.683/.675	.210	.180	.166	1.46	—	.250	.970	.174	.563	.796	.016	.024	.035
.312	FWB141T03	.630	.740 / .737	.714/.701	.683/.675	.272	.242	.228	.209	—	.312	.970	.174	.563	.796	.017	.028	.042
.375	FWB141T04	.630	.740 / .737	.714/.701	.683 .675	.335	.305	.291	.271	.209	.375	.970	.174	.563	.796	.019	.032	.050
.500	FWB141T05	.765	.865 / .862	.838/.799	.810/.799	.460	.430	.416	.396	.334	.500	1.029	.184	.688	.845	.023	.037	.066
.625	FWB141T06	.880	.990 / .987	.963/.949	.934/.924	.585	.555	.541	.521	.459	.625	1.048	.195	.813	.853	.028	.046	.080
.750	FWB141T07	1.085	1.178 / 1.175	1.159/1.136	1.122/1.111	.710	.680	.666	.646	.584	.750	1.128	.196	1.000	.932	.057	.096	.129
1.000	FWB141T10	1.320	1.428 / 1.425	1.399/1.385	1.371/1.360	.960	.930	.916	.896	.834	1.000	1.132	.197	1.250	.935	.058	.095	.173
1.250	FWB141T12	1.640	1.740 / 1.737	1.710/1.695	1.682/1.671	1.210	1.180	1.166	1.146	1.084	1.250	1.262	.198	1.500	1.064	.082	.140	.245
1.500	FWB141T15	1.950	2.052 / 2.049	2.021 /2.005	1.993/1.982	1.460	1.430	1.416	1.396	1.334	1.500	1.253	.203	1.750	1.050	.123	.205	.360
2.000	FWB141T20	2.500	2.615 / 2.612	2.538/2.566	2.554/ .544	1.960	1.930	1.916	1.896	1.834	2.000	1.331	.208	2.250	1.123	.223	.370	.650



REVISION	LTR	DESCRIPTION	DATE
	A	Redrawn	7/29/92
	B	Added –18 material.	3/18/93
	C	Revised Notes 2 & 7 and table (added –17 and –54 material, –52 tube wall thickness)	3/11/94
	D	Revised Ø A dims. Added option B to p/n code.	10/28/94
	E	Revised "T" material code callout in Note 2, added FWB141T12 part number	6/16/95
	F	See ECN 374-2041 for changes	11/10/95

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Interpret dimensions and tolerances per ANSI Y14.5M –1982
2. Material Code: T = Titanium TI-CP-70 per MIL-T-9047 or ASTM 8348 GR4
   C = Stainless Steel 321 per AMS5645 or 347 per AMS5646
   A = Aluminum 6061-T651 per QQ-A-225/8 or T6510, -T651 per QQ-A-200/8
   – 17 = Inconel 718 per AMS5662
   – 18 = Stainless Steel 304L per AMS5647
   – 54 = Stainless Steel 316L per AMS5653
3. Stainless Steel passivated per QQ-P-35
4. Deleted
5. Surface roughness 125 √ Surface texture per ANSI B46.1
6. Permanently identified with part no.:

"GAMAH FWB141T 00 XX –X –1"

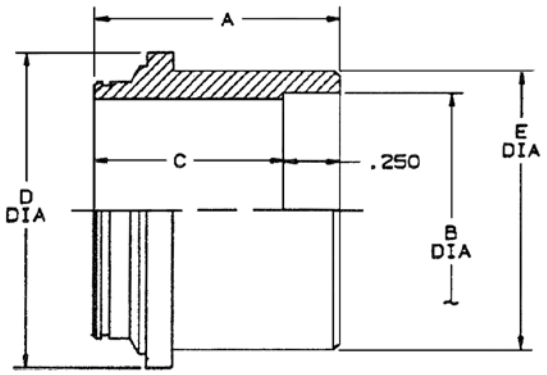
Size
Tube Wall Thickness
Material /Finish Combination
Options
B = Dicronite dry film lubricant per DOD-L-85645 (threads only)
D = Dry film lubricant per MIL-L-46010 (threads only)

⚠7 For tube wall thickness:
–20 = .020 –42 = .042 –83 = .083
–35 = .035 –52 = .052

FWS14100 Flange, Plain, Socket Welded
Series 141

Revision Letter A

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	WEIGHT (LB)		
							T	A	C
.250	FWS14102	.59	.254	.340	.69	.41	.016	.009	.027
.312	FWS14103	.59	.316	.340	.69	.47	.015	.009	.026
.375	FWS14104	.59	.379	.340	.69	.54	.014	.008	.024
.500	FWS14105	.65	.504	.396	.82	.67	.021	.012	.036
.625	FWS14106	.65	.629	.396	.94	.81	.026	.016	.045
.750	FWS14107	.65	.755	.398	1.13	.94	.034	.020	.059
1.000	FWS14110	.65	1.005	.395	1.38	1.20	.044	.027	.078
1.500	FWS14115	.72	1.506	.474	2.01	1.72	.092	.055	.16
2.000	FWS14120	.73	2.006	.479	2.51	2.24	.13	.076	.22



PART NUMBER CODE:

FS14T 00 X

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 6061 (AGED)
C = STAINLESS STEEL 321/347, PASSIVATED PER QQ-P-35.
T = TITANIUM TI-CP-70

REVISION	LTR	DESCRIPTION	DATE
	A	Added 1½ inch and 2-inch sizes, "T" material. Revised 1/ inch thru 1-inch sizes.	1/4/89

This issue supersedes all previously issued catalog sheets and drawings

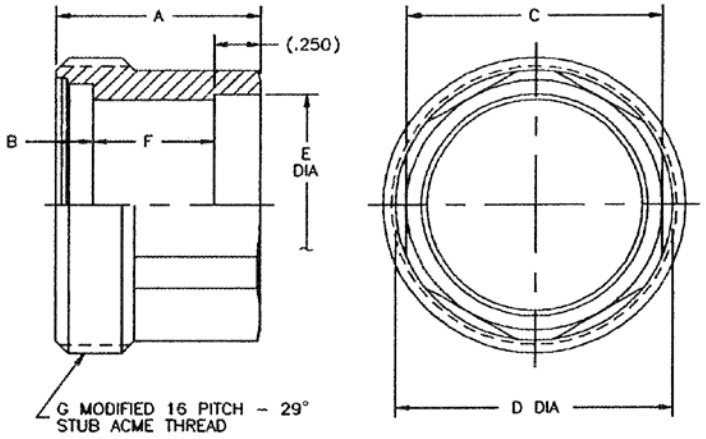
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

FWS14T00 Flange, Plain, Socket Welded
Series 141

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	F	G THREAD		WEIGHT (LB)		
								MAJOR DIA	MINOR DIA	T	A	C
.250	FWS14T02	.66	.174	.56	.63	.254	.236	.740	.685	.026	.015	.043
.312	FWS14T03	.66	.174	.56	.63	.316	.236	.740	.685	.024	.014	.040
.375	FWS14T04	.66	.174	.56	.63	.379	.236	.740	.685	.021	.012	.034
.500	FWS14T05	.72	.184	.69	.76	.504	.285	.865	.809	.029	.016	.047
.625	FWS14T06	.74	.195	.81	.88	.629	.293	.990	.934	.037	.020	.058
.750	FWS14T07	.82	.196	1.00	1.08	.755	.372	1.178	1.121	.066	.035	.10
1.000	FWS14T10	.82	.197	1.25	1.32	1.005	.375	1.428	1.370	.079	.044	.13
1.500	FWS14T15	.94	.203	1.75	1.95	1.506	.490	2.052	1.993	.18	.11	.31
2.000	FWS14T20	1.02	2.08	2.25	2.50	2.006	.563	2.615	2.555	.26	.16	.46



PART NUMBER CODE:

FWS14T 00 XX X

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 6061 (AGED)
C = STAINLESS STEEL 321/347, PASSIVATED PER QQ-P-35.
T = TITANIUM TI-CP-70

OPTIONS

B = DICRONITE DRY FILM LUBE PER DOD-L-85645 (THREADS ONLY)

REVISION	LTR	DESCRIPTION	DATE
	A	Added 1½ inch and 2-inch sizes, "T" material	1/4/89
	B	Added options to part number code. Revised Ø dimensions	10/28/94

This issue supersedes all previously issued catalog sheets and drawings

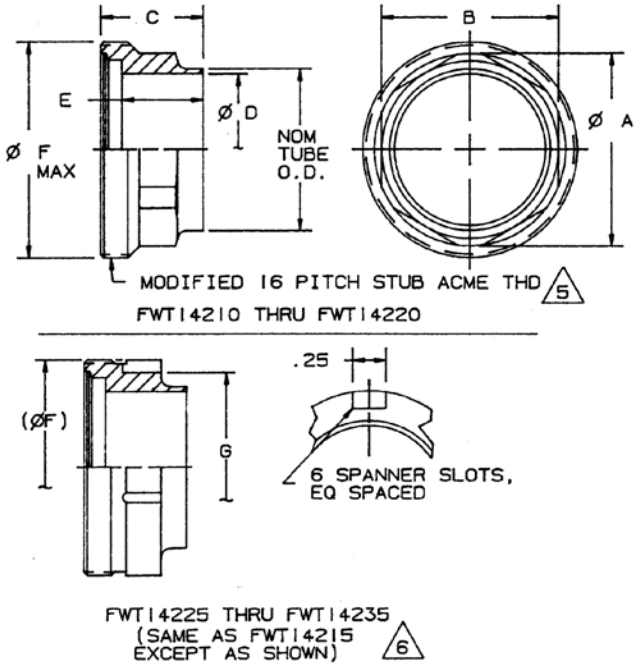
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

FWT14200 Flange, Threaded, Butt Welded
Series 142

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B ±.05	C	D	E	F MAX	G	INSTL WRENCH	WEIGHT (LB) A
1.000	FWT14210	1.28	1.19	.98	.930	.779	1.438	—	—	.042
1.500	FWT14215	1.83	1.69	.98	1.430	.779	2.062	—	—	.074
2.000	FWT14220	2.42	2.25	.99	1.930	.779	2.625	—	—	.11
2.500	FWT14225	3.00	—	1.09	2.430	.906	3.010	2.63	WFT14225	.18
3.000	FWT14230	3.50	—	1.09	2.930	.906	3.510	3.13	WFT14230	.21
3.500	FWT14235	4.00	—	1.09	3.430	.906	4.010	3.63	WFT14235	.24



PART NUMBER CODE:

FWT142 00 X X

BASIC PART NO.

SIZE

MATERIAL/FINISH

A = ALUMINUM 6061-T6, -T651, -T6510, CR-T6511 PER QQ-A-200/8 OR QQ-A-225/8 (NO FINISH)

REVISION	LTR	DESCRIPTION	DATE
	A	Added 1½ inch and 2-inch sizes, "T" material. Revised 1/ inch thru 1-inch sizes.	1/4/89
	B	Revised 2.5 thru 3.5 sizes and "C" dim. Added material specs	10/3/89

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

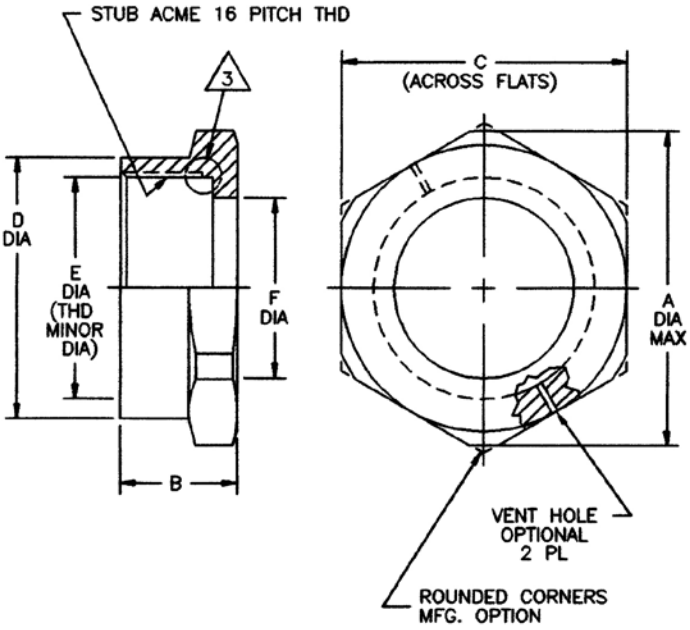
5 Thread is modified on minor dia.

6 For installation use spanner wrench WFT142XX.
Size

N14000 Nut

Revision Letter V

NOM TUBE O D (IN)	PART NO.	A MAX	B	C	D MAX	E	F	WEIGHT (LB) A	C, –12, –20 –43	T	–02, –06, –17
.250	N14002	.74	.40	.69	.650	.515	.42	.008	.021	.013	.023
.375	N14004	.96	.40	.88	.880	.702	.57	.010	.030	.017	.032
.500	N14005	1.10	.57	1.00	.990	.827	.70	.015	.045	.026	.048
.625	N14006	1.25	.57	1.13	1.105	.952	.84	.017	.051	.028	.054
.750	N14007	1.48	.63	1.37	1.325	1.140	.97	.028	.080	.046	.085
1.000	N14010	1.77	.63	1.63	1.575	1.390	1.23	.037	.10	.060	.11
1.250	N14012	2.14	.75	2.00	1.935	1.702	1.49	.067	.19	.11	.21
1.500	N14015	2.43	.75	2.25	2.220	2.014	1.75	.067	.19	.11	.21
1.750	N14017	2.72	.75	2.50	2.490	2.296	2.01	.077	.22	.13	.24
2.000	N14020	3.15	.85	2.88	2.815	2.577	2.27	.12	.35	.20	.38
2.250	N14022	3.58	.92	3.25	3.210	2.890	2.53	.17	.49	.28	.52
2.500	N14025	3.87	.94	3.50	3.490	3.140	2.79	.19	.55	.32	.59
2.750	N14027	4.45	.94	4.00	3.875	3.452	3.05	.27	.82	.44	.87
3.000	N14030	4.74	.94	4.25	4.165	3.702	3.31	.36	1.02	.58	1.09



PART NUMBER CODE:

N140 00 XX X X

BASIC PART NO.

SIZE

MATERIAL/FINISH
- A = ALUMINUM 2024 (AGED)
- C = STAINLESS STEEL TYPE 304 PASSIVATED
- T = TITANIUM TI-6AL-4V
- –02 = INCONEL 625
- –06 = COLUMIUM
- –12 = STAINLESS STEEL TYPE RA333
- –17 = INCONEL 718
- –20 = STAINLESS STEEL 17-4PH (15-5PH) PASSIVATED (N14010 AND LARGER ONLY)
- –43 = STAINLESS STEEL 15-5PH (NO SUB) PASSIVATED

SPECIAL
- B = DICRONITE DL-5 DRY FILM LUBRICANT PER DOD-L-85645 (INTERNAL SURFACES ONLY)
- E = DRY FILM LUBE PER MIL-L-46010 (INTERNAL SURFACES ONLY)
- S = SILVERPLATE PER QQ-S-365 (INTERNAL SURFACES ONLY)

–1 = CUSTOMER OPTIONAL PRESSURE EQUALIZATION VENT HOLE. OPTION TO BE SPECIFIED AS –1 IN P/N.

REVISION	LTR	DESCRIPTION	DATE
	M	Added –43 material	7/27/92
	N	Revised "D" special	6/4/86
	P	Revised weights	8/24/88
	R	Added "B" special and –1 option. Revised "D" special.	4/1/93
	T	Added –17 material	3/11/94
	U	Revised "T" material callout	6/19/95
	V	Deleted dichromate	5/13/99

This issue supersedes all previously issued catalog sheets and drawings

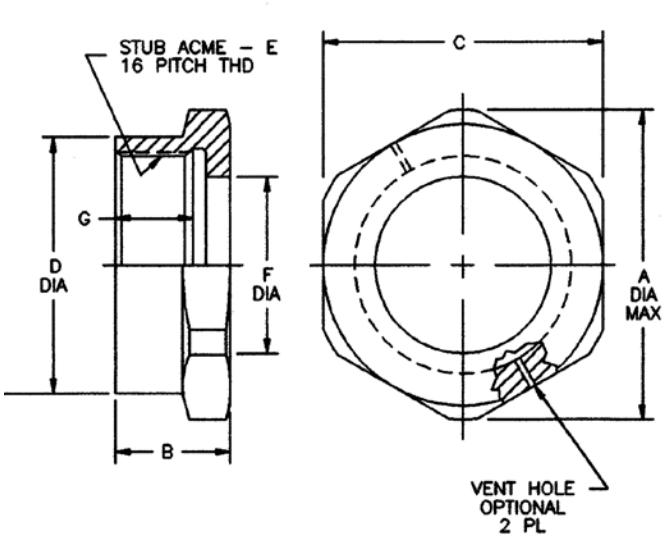
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. N14002 thru N14012 have thread relief
4. N14025A nuts are acceptable with either 3.380, 3.420 or 3.475 dia.
5. N14022 nuts have a non-standard stub Acme thread which must be checked with gauge P/N N14022–1-THGA.

N14100 Nut, Special

Revision Letter F

NOM TUBE O D (IN)		PART NO.	A MAX	B	C	D MAX	E THREAD MAJOR DIA	E THREAD MINOR DIA	F	G	WEIGHT (LB) AL	WEIGHT (LB) SST
.250	4	N14104	—	—	—	—	—	—	—	—	—	—
.312	4	N14104	—	—	—	—	—	—	—	—	—	—
.375		N14104	.98	.53	.88	.885	.750	.702	.57	.35	.015	.04



PART NUMBER CODE:

N140 00 XX X X

BASIC PART NO.

SIZE

MATERIAL/FINISH

- AW = ALUMINUM 2024 (AGED) PER QQ-A-200/3 OR QQ-A-225/6 ANODIZED PER MIL-A-8625, TYPE II, CLASS 1
- C = STAINLESS STEEL TYPE 304 PER AMS5639 OR AMS5647, PASSIVATED PER QQ-P-35.
- –20 = STAINLESS STEEL 17-4PH (H1150) PER AMS5643 OR 15-5PH PER AMS5659, PASSIVATED PER QQ-P-35
- –43 = STAINLESS STEEL 15-5PH (H1150) PER AMS5659 (NO SUB) PASSIVATED PER QQ-P-35.
- T = TITANIUM TI-6AL-4V PER MIL-T-9047 OR ASTM 8348 GR5

SPECIAL

- B = DICRONITE DL-5 DRY FILM LUBRICANT PER DOD-L-85645 (INTERNAL SURFACES ONLY)
- D = DRY FILM LUBE PER MIL–L–46010 (INTERNAL SURFACE ONLY)

–1 = CUSTOMER OPTIONAL PRESSURE EQUALIZATION VENT HOLE. OPTION TO BE SPECIFIED AS –1 IN PART NUMBER

REVISION	LTR	DESCRIPTION	DATE
	A	Added thread data, Note 4, material specs, –43 material and "G" data.	12/7/87
	B	Deleted .250 data	1/29/88
	C	Revised 2024 material code and weight	8/3/88
	D	Added –1 option to part number	7/8/92
	E	Added "B" special. Revised "D" special.	4/1/93
	F	Added "T" material to part number code	6/20/95

This issue supersedes all previously issued catalog sheets and drawings

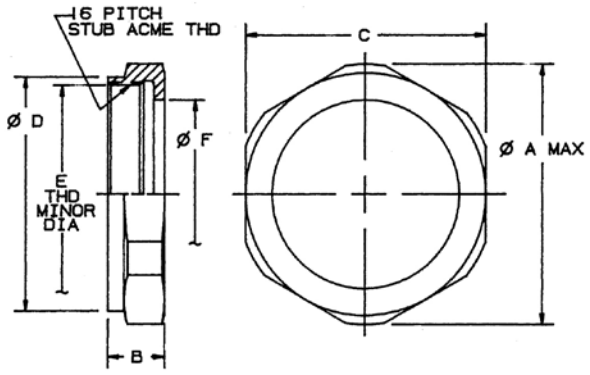
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Nut for .250 and .312 size same as .375

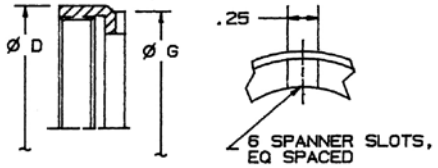
N14200 Nut
Series 142

Revision Letter F

NOM TUBE O D (IN)	PART NO.	A MAX	B	C	D MAX	E	F	G	INSTL WRENCH (5)	WEIGHT (LB) A
1.000	N14210	1.77	.52	1.63	1.57	1.391	1.23	—	—	.029
1.500	N14215	2.43	.53	2.25	2.18	2.014	1.75	—	—	.052
2.000	N14220	3.15	.56	2.88	2.81	2.577	2.27	—	—	.095
2.500	N14225	—	.93	—	3.23	2.963	2.72	3.12	WN14225	.12
3.000	N14230	—	.93	—	3.73	3.453	3.22	3.62	WN14230	.15
3.500	N14235	—	.93	—	4.23	3.963	3.72	4.12	WN14235	.17



N14210 THRU N14220



N14225 THRU N14235
(SAME AS N14215
EXCEPT AS SHOWN) (5)

PART NUMBER CODE:

N142 00 XX

BASIC PART NO.
SIZE
MATERIAL/FINISH

A = ALUMINUM 2024-T6, -T851, -T8510, CR-T8511 PER QQ-A-200/3 OR QQ-A-225/6, ANODIZED PER MIL-A-8625, TYPE II, CLASS I. DRY FILM LUBE ON I.D. ONLY.

REVISION	LTR	DESCRIPTION	DATE
	A	Added 1½ inch and 2-inch sizes, "T" material. Revised 1/ inch thru 1-inch sizes.	1/4/89
	B	Revised 2.5 thru 3.5 sizes and "C" dim. Added material specs.	10/3/89

This issue supersedes all previously issued catalog sheets and drawings

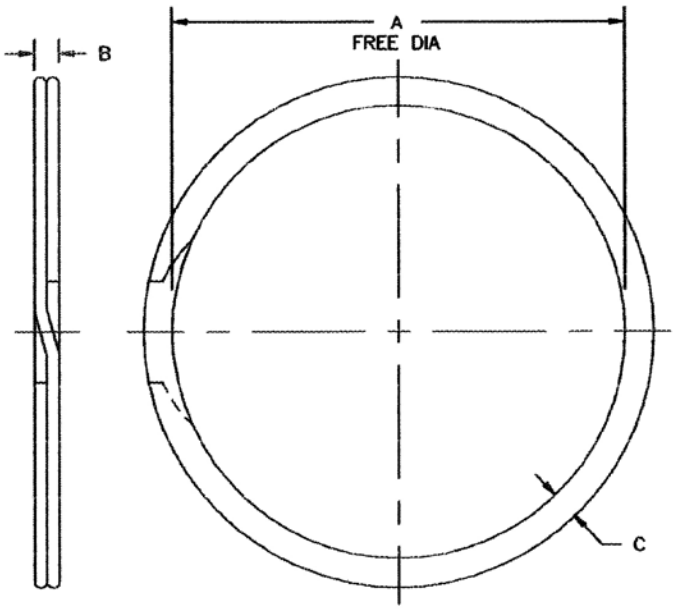
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request
5. for installation use spanner wrench WFT142XX.
   Size

R14100 Retaining Ring
Series 14, 141 & 147

Revision Letter E

NOM TUBE O D (IN)	PART NO.	A	B	C	WEIGHT (LB)
.250	R14102C	.271	.025	.035	.0003
.375	R14104C	.417	.025	.035	.0004
.500	R14105C	.547	.025	.045	.0006
.625	R14104C	.675	.025	.045	.0007
.750	R14105C	.807	.025	.045	.0009
1.000	R14110C	1.056	.025	.045	.0011
1.250	R14112C	1.310	.025	.045	.0014
1.500	R14115C	1.563	.025	.045	.0017
1.750	R14117C	1.816	.025	.045	.0019
2.000	R14120C	2.073	.031	.065	.0040
2.250	R14122C	2.321	.031	.065	.0044
2.500	R14125C	2.580	.031	.065	.0049
2.750	R14127C	2.835	.031	.065	.0054
3.000	R14130C	3.095	.031	.065	.0060



PART NUMBER CODE:

R141 00 X

BASIC PART NO.

SIZE

MATERIAL/FINISH

C = STAINLESS STEEL 302/315 PER MIL-S-5029, ASTM A240, A313, A580, OR A666

REVISION	LTR	DESCRIPTION	DATE
	A	Revised Mil-Spec number	11/22/82
	B	Revised material	9/4/87
	C	Added 02 size	12/10/87
	D	Added 302 as altenate material	7/28/88
	E	Revised "C" material	2/18/94

This issue supersedes all previously issued catalog sheets and drawings

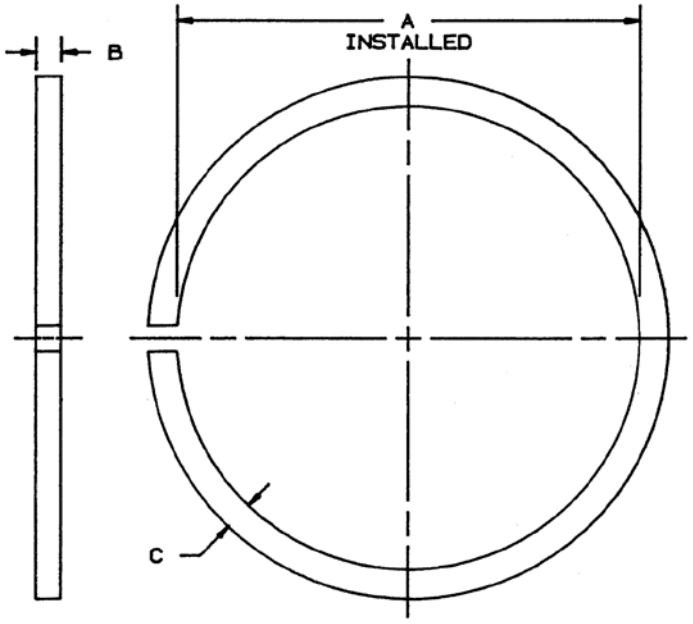
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Passivate per QQ-P-35
4. R14100 supersedes and replaces R14000 retaining ring

R14300 Retaining Ring
Series 142

Revision Letter C

NOM TUBE O D (IN)	PART NO.	A MAX	B	C	WEIGHT (LB)
2.500	R14325C	2.553	.031	.031	.0020
3.000	R14330C	3.053	.031	.031	.0024
3.500	R14335C	3.553	.031	.031	.0029



PART NUMBER CODE:

R143 00 X

BASIC PART NO.

SIZE

MATERIAL/FINISH

C = STAINLESS STEEL 17–7PH PER AMS5678, PASSIVATED

REVISION	LTR	DESCRIPTION	DATE
	A	Added R14325C	7/10/89
	B	Revised configuration and "A" dim.	10/3/89
	C	Revised "B" and "C" dims. and material	1/9/90

This issue supersedes all previously issued catalog sheets and drawings

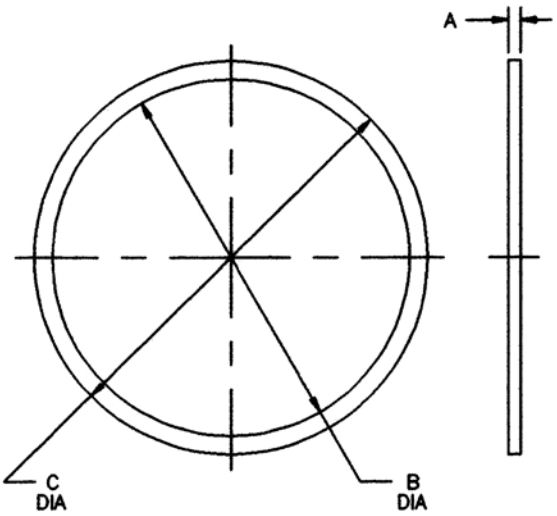
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness $\sqrt{125}$
3. Consult Eaton for specific applications

S14000 Series Metal Seal

Revision Letter C

NOM TUBE O D (IN)	PART NO.	A MAX	B	C	NOM WEIGHT (LB) –04	C, –11, –18	–02	A	T
.250	S14002	.038	.310	.430	.001	.001	.001	.0003	.0004
.375	S14004	.042	.451	.583	.001	.001	.001	.0004	.001
.500	S14005	.044	.584	.722	.002	.002	.002	.001	.001
.625	S14006	.046	.717	.861	.003	.002	.003	.001	.001
.750	S14007	.048	.850	1.000	.003	.003	.003	.001	.002
1.000	S14010	.050	1.108	1.261	.004	.004	.004	.001	.002
1.250	S14012	.056	1.369	1.541	.008	.006	.007	.002	.004
1.500	S14015	.062	1.629	1.821	.011	.009	.010	.003	.005
1.750	S14017	.069	1.889	2.101	.015	.013	.014	.005	.007
2.000	S14020	.075	2.149	2.381	.021	.018	.019	.006	.010
2.250	S14022	.081	2.409	2.661	.027	.024	.025	.008	.013
2.500	S14025	.088	2.669	2.941	.035	.031	.032	.010	.017
2.750	S14027	.072	2.929	3.221	.034	.030	.031	.010	.016
3.000	S14030	.072	3.189	3.501	.039	.034	.036	.012	.019
4.000	S14040	.080	4.213	4.536	.058	.051	.054	.017	.028
6.000	S14060	.085	6.205	6.574	.104	.091	.096	.031	.050
8.000	S14080	.090	8.015	8.410	.151	.133	.140	.045	.073



PART NUMBER CODE:

N140 00 X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 6061-T6511 PER QQ-A-200/8 (4) (5)

C = STAINLESS STEEL TYPE 304 PER AMS5639 WITH TYPES 315, 315L AND 321 STAINLESS STEEL AS ALTERNATES. (3)

T = TITANIUM TI-6AL-4V PER MIL-T-9047 OR ASTM B348 GR5

–02 = INCONEL 625 PER AMS5666

–18 = STAINLESS STEEL TYPE 304L OER ANS5647 (3)

–11 = RA330 CORROSION AND HEAT RESISTANT STEEL PER AMS5716 (3)

–04 = HAYNES 25 PER AMS5759

–37 = TITANIUM, COMMERCIALLY PURE (CP-70)

–36 = MOLYBDENUM, PER ASTM B387, ALLOY 365

–70 = TITANIUM, COMMERCIALLY PURE (CP-40)

REVISION	LTR	DESCRIPTION	DATE
	G	Added 11 and 18 material weights	6/1/81
	H	Added 04 material code	8/20/81
	J	Revised "A" material code. Added 37 material code	11/9/81
	K	Deleted S14011	2/12/82
	L	Added 36 material	11/27/85
	M	Revised "T" material code. Added –70 material and Note 5.	6/19/95

This issue supersedes all previously issued catalog sheets and drawings

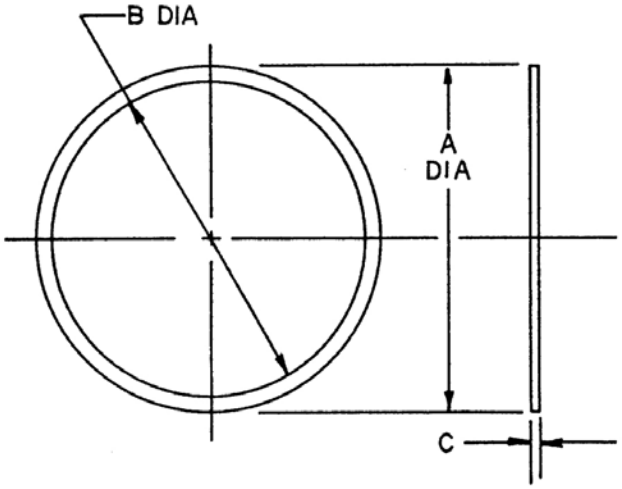
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Passivate per QQ-P-35
4. Chemical film treat per MIL-C-5541, Class 1
5. 6061-T6510 per QQ-A-200/8 or 6061-T651 per QQ-A-225/8 may be substituted

S14100 Metal Seal For Pipe
Series 14

Revision Letter A

NOM PIPE SIZE (IN)	PART NO.	A	B	C	WEIGHT (LB)	
					A	C
3	S14130	3.871	3.568	.075	.013	.038
4	S14140	4.924	4.589	.080	.020	.057
6	S14160	6.980	6.612	.085	.032	.096
8	S14180	9.095	8.662	.090	.060	.173



PART NUMBER CODE:

S141 00 X

BASIC PART NO.

SIZE

MATERIAL

C = STAINLESS STEEL 304

A = ALUMINUM 6061-T6511, CHEMICAL FILM TREAT PER MIL-C-5541, CLASS 1

REVISION	LTR	DESCRIPTION	DATE
	A	General revision	9/8/80

This issue supersedes all previously issued catalog sheets and drawings

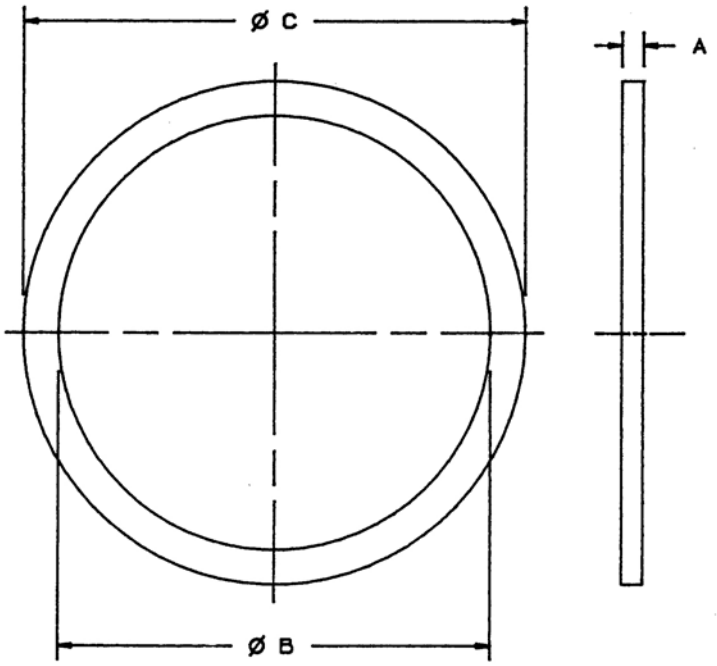
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Passivate per QQ-P-35

S14200 Metal Seal Series 142

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B	C	WEIGHT (LB) A
2.500	S14225	.035	2.598	2.724	.002
3.000	S14230	.035	3.098	3.224	.002
3.500	S14235	.035	3.598	3.724	.003



PART NUMBER CODE:

S142 00 X

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 6061-T6, -T651, -T6510 or -T6511 PER QQ-A-200/8 OR QQ-A-225/8. CHEMICAL FILM TREAT PER MIL-C-5541, CLASS 1A

REVISION	LTR	DESCRIPTION	DATE
	A	Added S14225	7/10/89
	B	Revised material spec	10/2/89

This issue supersedes all previously issued catalog sheets and drawings

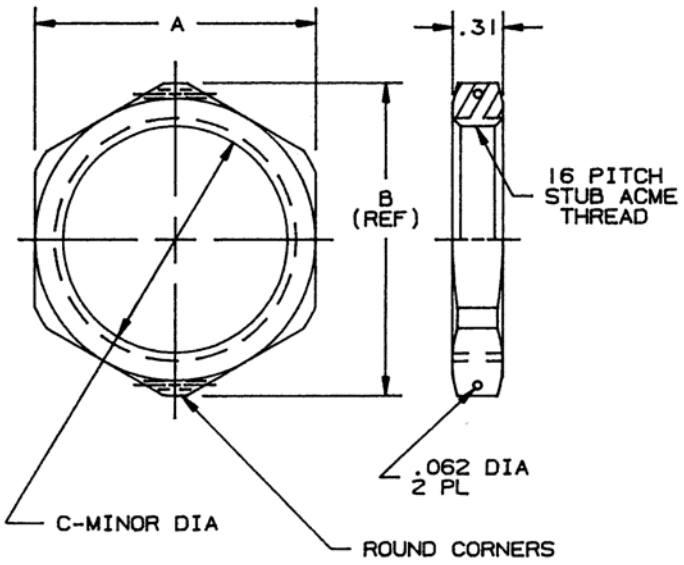
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Consult Eaton for specific applications
4. Other materials available upon request

T2189 Bulkhead Nut
Series 14 & 141

Revision Letter R

NOM TUBE O D (IN)	PART NO. T2189	A	B (REF)	C	WEIGHT (LB) AL	WEIGHT (LB) SST
.250	–025	.88	.95	.515	.013	.036
.312	–031	1.00	1.09	.608	.017	.046
.375	–038	1.13	1.24	.702	.021	.058
.500	–050	1.25	1.32	.827	.024	.066
.625	–063	1.38	1.47	.952	.025	.070
.750	–075	1.50	1.61	1.140	.027	.075
1.000	–100	1.75	1.90	1.390	.045	.13
1.250	–125	2.25	2.42	1.702	.063	.17
1.500	–150	2.50	2.71	2.014	.065	.18
1.750	–175	2.75	3.00	2.296	.071	.20
2.000	–200	3.00	3.29	2.577	.074	.21
2.250	–225	3.25	3.57	2.890	.076	.22
2.500	–250	3.50	3.86	3.140	.081	.23
2.750	–275	4.00	4.44	3.452	.11	.32
3.000	–300	4.25	4.73	3.702	.14	.40



PART NUMBER CODE:

T2189 – 000 X X

BASIC PART NO.

NOM TUBE O.D. (HUNDREDTHS INCHES)

MATERIAL/FINISH

A = ALUMINUM 2024-T851 PER QQ-A-225/6
ALUMINUM 2024-T8510 PER QQ-A-200/3

D = STAINLESS STEEL TYPE 304 (OR 304L) PER AMS5639 OR AMS5647

FINISH

L = ALODINE 1200 PER MIL-C-5541 (ALUMINUM)
PASSIVATE PER QQ-P-35 (STAINLESS STEEL)

W = ANODIZE PER MIL-A-8625, TYPE II, CLASS I

Y = PASSIVATE PER QQ-P-35 AND DRY FILM LUBE PER MIL-L-46010

Z = ANODIZE PER MIL-A-8625, TYPE II, CLASS 1 AND DRY FILM LUBE PER MIL-L-8937

REVISION	LTR	DESCRIPTION	DATE
	M	Redrawn. Revised "B" dim. and weights. Revised material "D", revised finishes.	1/29/80
	N	Added Note 3	12/7/87
	P	Revised "Y" finish	8/04/88
	R	Revised "B"	7/19/90

This issue supersedes all previously issued catalog sheets and drawings

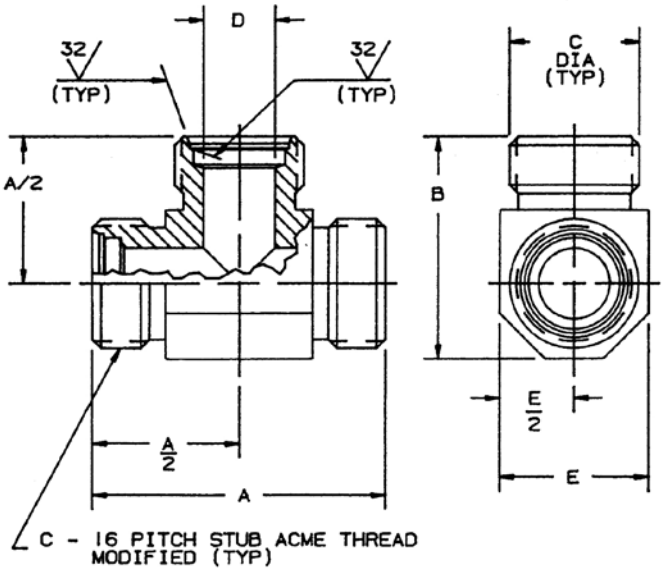
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Bulkhead nut to mate with Eaton's Gamah Series 14 and 141 bulkhead unions

T14200 Tee
Series 14

Revision Letter B

NOM TUBE O D (IN)	PART NO.	A	B	C	D	E	WEIGHT (LB) A	C	T
.250	T14002	1.19	.91	.553	.38	.63	.023	.065	.037
.375	T14004	1.37	1.06	.740	.50	.75	.035	.099	.056
.500	T14005	1.75	1.37	.865	.63	1.00	.055	.155	.088
.625	T14006	1.87	1.44	.990	.75	1.00	.066	.186	.106
.750	T14007	2.18	1.72	1.178	.94	1.25	.112	.316	.179
1.000	T14010	2.43	1.97	1.428	1.13	1.50	.223	.629	.357
1.250	T14012	2.94	2.34	1.740	1.31	1.75	.334	.942	534
1.500	T14015	3.25	2.69	2.052	1.56	2.13	.526	1.48	.842
1.750	T14017	3.53	3.02	2.334	1.75	2.50	.785	2.21	1.26
2.000	T14020	3.94	3.34	2.615	2.00	2.75	1.04	2.92	1.66
2.250	T14022	4.31	3.66	2.928	2.25	3.00	1.22	3.45	1.96
2.500	T14025	4.55	3.90	3.178	2.44	3.25	1.67	4.71	2.67
2.750	T14027	4.91	4.21	3.490	2.75	3.50	2.67	7.53	4.27
3.000	T14030	5.27	4.63	3.740	3.00	4.00	2.77	7.81	4.43



PART NUMBER CODE:

T140 00 –X X

BASIC PART NO.

SIZE

MATERIAL

4 A = ALUMINUM 2024-T8, ANODIZE AND DICHROMATE

5 C = STAINLESS STEEL 17-4PH (15-5PH) PASSIVATED

5 T = TITANIUM TI-6AL-4V

SPECIAL

D = DRY FILM LUBE, THREADS ONLY, PER MIL-L-8937

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX=±.03, .XXX = ±.010
2. Surface roughness 125
3. Other materials and finishes available upon request

4 Pressure rating (psi) for "A" material:
Operating: 1500 psi (103.42 bar) max
Proof: 3000 psi (206.84 bar)
Burst: 6000 psi (413.68 bar)

5 Pressure rating (psi) for "C" and "T" material:
Operating: 3000 psi (206.84 bar) max
Proof: 6000 psi (413.68 bar)
Burst: 12000 psi (827.37 bar)

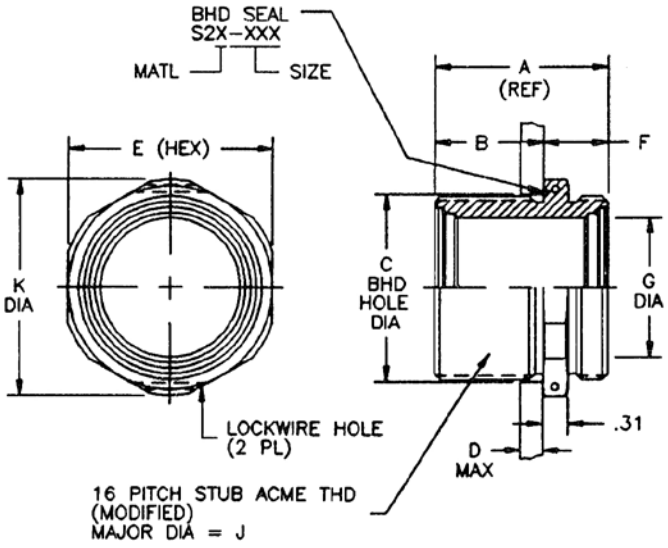
REVISION	LTR	DESCRIPTION	DATE
	A	Revised and redrawn	3/1/79
	B	Revised "A", "B", "D", and "E" dims. and weights. Added notes.	6/4/79

This issue supersedes all previously issued catalog sheets and drawings

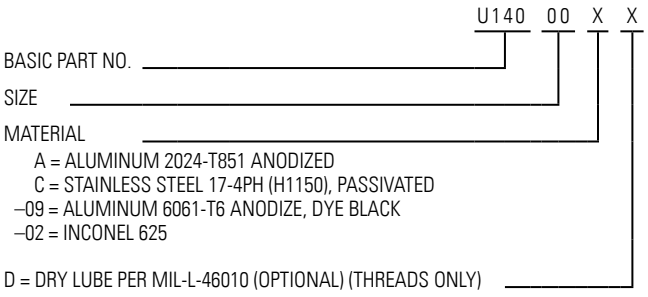
U14000 Union
Series 14

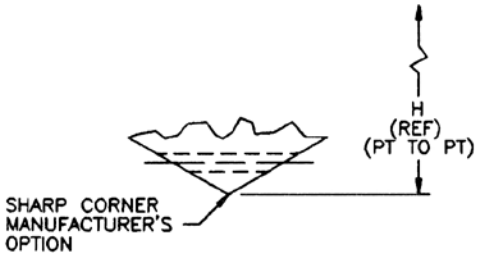
Revision Letter F

NOM TUBE O D (IN)	PART NO.	A REF	B	C MAX	D MAX	E ±.042	F	G	H REF	J	BHD SEAL SIZE	K	WEIGHT (LB) A	WEIGHT (LB) C
.250	U14002	1.44	.84	.563	.25	.88	.59	.27	1.01	.553	–016	.95	.031	.088
.375	U14004	1.44	.84	.750	.25	1.06	.59	.42	1.23	.740	–019	1.11	.045	.133
.500	U14005	1.69	.97	.875	.25	1.19	.72	.57	1.37	.865	–021	1.25	.061	.174
.625	U14006	1.69	.97	1.000	.25	1.31	.72	.70	1.52	.990	–023	1.40	.067	.192
.750	U14007	1.81	1.03	1.188	.25	1.50	.78	.83	1.73	1.178	–026	1.61	.101	.288
1.000	U14010	1.81	1.03	1.438	.25	1.75	.78	1.08	2.02	1.428	–029	1.90	.129	.369
1.250	U14012	2.25	1.38	1.750	.50	2.13	.87	1.35	2.45	1.740	–031	2.28	.23	.641
1.500	U14015	2.25	1.38	2.063	.50	2.38	.87	1.60	2.74	2.052	–034	2.56	.30	.83
1.750	U14017	2.25	1.38	2.344	.50	2.63	.87	1.86	3.03	2.334	–036	2.85	.34	.96
2.000	U14020	2.38	1.44	2.625	.50	3.00	.94	2.14	3.46	2.615	–038	3.29	.42	1.20
2.250	U14022	2.38	1.44	2.938	.50	3.25	.94	2.41	3.75	2.928	–041	3.57	.46	1.31
2.500	U14025	2.38	1.44	3.188	.50	3.50	.94	2.73	4.04	3.178	–042	3.86	.49	1.39
2.750	U14027	2.38	1.44	3.500	.50	4.00	.94	2.95	4.62	3.490	–043	4.44	.64	1.81
3.000	U14030	2.38	1.44	3.750	.50	4.25	.94	3.20	4.91	3.740	–044	4.73	.73	2.06



PART NUMBER CODE





REVISION	LTR	DESCRIPTION	DATE
	A	Increased "D" to .500 on sizes 1.25 – 2.00. Increased "A" to match.	4/23/79
	B	Redrawn and updated to new slanted O-ring cavity	4/23/79
	C	Revised dry lube note and weights	2/28/80
	D	Added "D" dia.	7/28/80
	E	Revised thread callout	3/8/85
	F	Deleted dichromate	5/13/99

This issue supersedes all previously issued catalog sheets and drawings

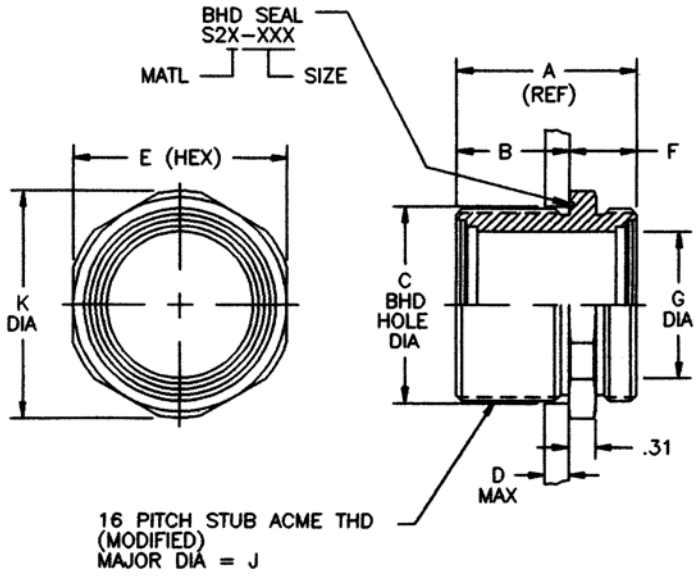
NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

U14100 Union
Series 141

Revision Letter A

NOM TUBE. O D (IN)	PART NO.	A REF	B	C MAX	D MAX	E ±.042	F	G	J	BHD SEAL SIZE	K	WEIGHT (LB) A	C
.375	U14104	1.44	.84	.750	.25	1.06	.59	.319	.740	–019	1.11	.045	.133
.500	U14105	1.69	.97	.875	.25	1.19	.72	.444	.865	–021	1.25	.061	.174
.750	U14107	1.81	1.03	1.188	.25	1.50	.78	.694	1.178	–026	1.61	.101	.288
1.000	U14110	1.81	1.03	1.438	.25	1.75	.78	.944	1.428	–029	1.90	.129	.369



PART NUMBER CODE

U141 00 XX

BASIC PART NO.

SIZE

MATERIAL

A = ALUMINUM 2024 (AGED) ANODIZED
C = STAINLESS STEEL 17-4PH (H1150), PASSIVATED
–43 = STAINLESS STEEL 15-5PH (H1150), PASSIVATED
–48 = TITANIUM TI-6AL-4V

REVISION	LTR	DESCRIPTION	DATE
	A	Deleted dichromate	5/13/99

This issue supersedes all previously issued catalog sheets and drawings

NOTES (UNLESS OTHERWISE SPECIFIED):

1. Tolerances: .XX = ± .010
2. Surface roughness 125

Eaton's Gamah™ Product Line

Application Information Request Form

To request special application information, please fill out the form below and fax it to (360) 460 8965.

Name _____

Company _____

Address _____

_____

_____

Phone _____

Fax _____

E-mail _____

Application Description:

_____

_____

_____

_____

_____

_____

_____

_____

Application Characteristics:

Primary

Line size(s) _____

System operating temperatures _____

System operating pressures _____

Fluid mediums _____

Maximum allowable leak rate _____

Weight requirements _____

Flange configuration ☐ Swaged ☐ Welded (butt/socket)

Material requirements ☐ Aluminum ☐ Stainless Steel ☐ Titanium ☐ Other

Secondary

Environmental conditions (i.e. ambient, etc.) _____

_____

_____

Special conditions (i.e. rapid variation in pressure, temperature, etc.)

_____

_____

_____

Operating cycle ☐ Continuous ☐ Intermittent

(Rate _____)

Applicable specifications _____

_____

_____

Location parameters ☐ Fit & forget ☐ Bkhd hole size ☐ Other

Other Important Information

_____

_____

_____

_____

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_____

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_____

_____

_____

_____

Qualification Requirements

(enclose documents if applicable)

_____

_____

_____

Requirements:

Quantity per system required (by size) _____

Required need dates _____

Tooling requirements ☐ Swage tooling

Material: _____

Tube size: _____

Wall thickness: _____

Special adapters (union, bulkhead, etc.) _____

Removable components required? (circle one) Yes No

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Powering Business Worldwide

If you have questions or require additional information, please contact one of our customer support representatives — Ph: (303) 340 5200 or (517) 787 8121

Notes

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Powering Business Worldwide

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