GEC AUSTRALIA LIMITED
HEAVY ENGINEERING DIVISION
ROCKLEA WORKS
QUEENSLAND

OPERATION AND MAINTENANCE INSTRUCTION MANUAL

for

THREE OFF 1370MM DIA. HYDRAULIC OPERATED
BUTTERFLY VALVES

for

BRISBANE CITY COUNCIL (WATER SUPPLY AND SEWERAGE)
QUEENSLAND

(CONTRACT WS47/81/82)

STOCK CODE NUMBERS FOR 1350mm GEC BUTTERFLY VALVE

DESCRIPTION	STORES CODE NO.	VALVE
Actuator - To suit 1350mm GEC Butterfly Valve	13-A-7398-4	$2,281.00
Seal Ring - To suit 1350mm GEC Butterfly Valve	13-A-7404-0	$ 930.00
Spring Ring - To suit 1350mm GEC Butterfly Valve	13-A-7406-5	$ 757.00
Clamp Ring - To suit 1350mm GEC Butterfly Valve	13-A-7403-2	$1,814.00
Screws Socket Head Cap - 316SS M12x30	81-A-5962-6	$ 1.00
Screws Half Dog Point Soc. Head - 316SS M8 x 16	81-A-7250-4	$ 0.50
Seat Ring - To suit 1350mm GEC Butterfly Valve	13-A-7405-7	$ 804.00
Screws Flat Point Soc. Head - 316SS M8 x 16	81-A-7055-7	$ 0.30
Locking Pin and Chain - To suit 1350mm GEC Butterfly Valve	13-A-7402-4	$ 90.00
Bush Locking Pin - To suit 1350mm GEC Butterfly Valve	13-A-7400-9	$ 100.00
Trunnion Bearing - To suit 1350mm GEC Butterfly Valve	13-A-7399-2	$ 180.00
Centring Ring (Two Halves) - To suit 1350mm GEC Butterfly Valve	13-A7407-3	$ 153.00
Bearing Locking Pin (Set of 2) - To suit 1350mm GEC Butterfly Valve	13-A7408-1	$ 53.00

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- 1984 -

I N T R O D U C T I O N

This manual describes briefly the construction, operation and maintenance of GEC designed and manufactured Butterfly Valves, together with hydraulic actuators designed and manufactured by Pongrass Industries (Schroder Pongrass).

The valves and actuators have been fully designed and manufactured in Australia to meet the requirements of the Specification and the proven standards of the Company, from experience gained in the design and manufacture of similar units supplied to Water Supply and Irrigation Authorities in Australia, and model tests carried out in the laboratories of the (former) English Electric, Netherton, U.K., Valve Division Works.

For additional information regarding design and/or operation, or for ordering of spares and replacements, please direct enquiries, stating Contract Number and Works identification

21N2345 - 3 off 1370mm dia. Butterfly Valves

21N2346 - Spares

Contract - WS/47/81/82

Contracts Engineer - General Engineering,
GEC Australia Limited,
Heavy Engineering Division,
G.P.O. Box 406,
BRISBANE QLD 4001.
Telephone (07) 277 1611
Telex AA40167

C O N T E N T S

PART 'A'

BUTTERFLY VALVE

SECTION I - TECHNICAL DATA

1.1 BUTTERFLY VALVE - Arrangement Drawing B1-210-026

Nominal Bore - 1370mm Diameter
Working Pressure- 600kPa
Test Pressure - 1200kPa
Effort on Power Pak to Open - 22mpa
Seal Test Pressure 600kPa
Maximum Leakage Rate - 14ML/Minute
Maximum Flow - 4.8 metres/second
Approx. Weight - 3000kg all up

1.2 GENERAL DESCRIPTION OF VALVE

The arrangement drawing (B1-210-026) contained in the rear portion of this Manual shows the assembly of the valve, its actuator and major components, some of which are described briefly below.

1.2.1 VALVE BODY - B1-212-028 (2 Sheets)

The body is a fabricated construction with integral lifting points, support feet and actuator mounting brackets.

The seat support ring item 4, trunnion liners item 15 and the sleeve item 7, being constructed from stainless steel BS970/321, whereas the remaining components completing the fabrication being structural steel to AS1204-250; except the trunnion blocks item 14, which are cast steel to AS2074 Grade C3.

The seat support ring item 4, is machined to accommodate the seat which is secured with half/half grub screws.

The trunnion blocks item 14 are lined bored into which are fitted the trunnion bushes.

1.2.2 DISC (DOOR) - A1-213-028

The disc is a one piece slab design casting in stainless steel to AS2074 - H5C; the bosses being bored for the trunnions. A recess is machined around the circumference on the flat side of disc to accommodate a bronze seal which is secured by a stainless steel clamp ring and cap screws.

1.2.3 SEAT RING - A2-214-060

The seat ring material is stainless steel '316L' and machined to suit the body support ring item 4 and held in place with half/half '316' material grub screws, an 'O' ring is fitted at the back of the seat to prevent leakage between seat and valve body.

1.2.4 VALVE MAIN SEALING

The sealing is of the metal/metal design and consists of an adjustable seal A2-214-058, which is secured to the door by a clamping ring A1-214-053 and Cap Allen screws.

Adjustment and sealing between the door and the body seat ring is effected by means of a spring ring A2-214-059 and rubber forcing ring B1-210-026-IT5.

Since the sealing arrangement is situated on the downstream side of the valve door, adjustments may be made under normal working pressure.

Forcing Ring - B1-210-026 - Natural Rubber 70°-80° shore.
Clamping Ring - A1-214-053 - 316L Stainless Steel
Adjustable Seal - A2-214-058 - Bronze 905C
Spring Ring - A2-214-059 - 431 Stainless Steel

1.2.5 TRUNNION SEALING (DRIVE END) A2-662-6300-IT12
A2-662-6201-IT12

The trunnion is fitted with a flat section, solid synthetic rubber (nitrile) seal ring, which is maintained in close contact with the journal by means of a stainless steel clamping/adjusting plate. Adjustment may be carried out during service, without removal of the actuator torque arm, see section 3.1.1.

1.2.6 TRUNNION SEAL - NON DRIVE SIDE B1-210-026-IT15

The non-drive side trunnion is sealed by O-ring between the end-cap and valve body.

1.2.7 OPERATING LEVER ARM (TORQUE ARM) A1-216-111

To each drive trunnion is attached a fabricated lever arm, the boss of which is secured by three stainless steel half and half dowels (half in the trunnion, half in the boss). Each dowel is, in turn, secured by half and half grub screws.

Two bosses set at 90° with the trunnion centreline, are bored and fitted with self-lubricating bronze bushes, for locking pins. These align with a stainless steel boss on the valve body, for the purpose of securing the valve during maintenance. When not in use the locking pin can be 'parked' in a supplied lug.

1.2.8 POSITION INDICATOR A2-216-113

Relative position of the valve disc may be readily determined by a sector plate and pointer, attached to the torque arm.

1.3 OPERATING GEAR (HYDRAULIC CYLINDER)

The valve is operated by one hydraulic cylinder and integral with the valve body by a swivel type of design.

Cylinder Bore - 82.5 dia.
Rod Diameter - 34.92 dia.
Cylinder Stroke - 553mm
Closed centres between swivel and actuator pin bore for operating arm - 253mm

The cylinders are manually operated as described in Section II.

1.4 CORROSION PROTECTION

All surfaces not of stainless steel:

Prime Coats - Expandite Galvafroid E.V.
Zinc Rich Epoxy

Final Coats - Dimet Armador 910 two pack epoxy micaceous iron oxide (natural steel colour).

SECTION II - GENERAL OPERATION

Operation of the valves is by way of a hand pump with integral oil reservoir, hand valve with integral relief valve and a flow control valve to provide a restriction when the Butterfly Valve is closing.

OPERATION CLOSING OF BUTTERFLY VALVE

(a) Ensure isolating valves in cylinder ports are open.

(b) Close by-pass valve on hand pump by turning clockwise.

(c) Move hand valve to the 'close' position.

(d) Reciprocate hand pump lever until operation is complete.

(e) Move hand valve lever to the neutral 'off' position.

OPENING OPERATION

Operation as above only in (c) select the 'open' position.

SECTION III - MAINTENANCE AND REPLACEMENT

Ref. General Arrangement Drawings B1-210-026

3.1 BUTTERFLY VALVE MAINTENANCE/SPARES

Due to the robust construction and relatively few moving parts, maintenance of the valves is restricted to:-

(a) Periodic inspection of trunnion seals for leakage.

(b) Lubrication of swivel bushes and hydraulic cylinder 'eye' bush by means of 3 off grease nipples IT, 12 and 24 with "ALVANIA EP2" grease.

(c) Check for obvious corrosion about valve.

3.1.1 TRUNNION SEAL DRIVE END - ADJUSTMENT/REPLACEMENT

Adjustment of the trunnion seal is possible without removal of operating lever arm and effected by tightening 8 off Hex. Nuts IT19 on Gland Ring - A2-662-6201-IT12.
To replace seal however, it is necessary to remove the operating lever arm as follows:-

(a) Ensure valve disc (door) is in the closed position.

(b) Locking pin in parked position.

(c) Take weight of hydraulic cylinder and remove lock strip and actuator pin A2-216-033 from cylinder eye.

(d) Remove pointer from indicator.

(e) Remove 3 off grub screws and taper dowels A2-273-012 from lever arm.

(f) Take weight of lever arm (approx. 95kgs) and remove from trunnion.

(g) Remove gland ring A2-662-6201 and damaged or worn trunnion seal A2-662-6300 by unscrewing 8 off nuts.

(h) Fit new trunnion seal and assemble using the reverse of above procedure.

TAKE CARE NOT TO OVERTIGHTEN NUTS.

3.1.2 MAIN SEAL ADJUSTMENT/REPLACEMENT

The valves are delivered in the fully assembled and tested condition with no further adjustments required. However, after a long period of continuous use the seal may require (a) adjustment or (b) replacement due to damage or wear.

ADJUSTMENT OF SEAL Ref. Drawing B1-210-026

In cases where it is possible to gain access to the seal insitu in the valve, the grub screws, item 6 (60 off) are simply tightened with Allen key to just stop the leakage with a working pressure on the other side of the (disc) door.

If access to the seal through the adjacent piping is not provided, it will be necessary to remove valve from pipeline.

Overtightening of grub screws may result in permanent setting - only one quarter of a turn applied to each screw is advised.

REPLACEMENT OF SEAL

It is advisable to remove the valve from the pipe line to replace the seal.

(a) Remove valve from pipe line with disc (door) in the closed position and land on suitable supports.

(b) Loosen evenly and remove grub screws - item 6.

(c) Remove Cap Allen screws - item 7 and lift clamp ring A1-214-053 clear.

(d) Remove spring ring A2-214-059 - forcing ring item 5 and seal A2-214-058.

Note - Disc (door) may have to be opened slightly to remove seal.

(e) Ensure disc (door) spigot is clean and replace new or re-faced seal, together with new forcing ring.

(f) Assemble spring ring, making sure the recess fits squarely into spigot on disc (door).

(g) Assemble clamp ring and secure with Cap Allen screws.

(h) Re-assemble grub screws item 6 to clamp ring and tighten until contact is made with spring ring.

(j) Move door to 'closed' position and check between faces of seal A2-214-058 and seat A2-214-060 with feeler gauges, adjusting the grub screws item 6 until seal is obtained.

OVERTIGHTENING OF GRUB SCREWS MAY RESULT IN PERMANENT SETTING OR DAMAGE.

Should the body seat ring require attention or replacement, remove grub screws item 3 and remove seat ring and 'O' ring cord IT4.

Replace new or repaired seat ring into body recess making sure that the 'O' ring cord is new or good condition.

Replace grub screws - item 3 and lock with centre punch.

Proceed to check sealing as described earlier in this section.

3.1.3 TRUNNION BUSHES A2-215-066, Item 4

The bushes are self lubricating, of 'Novabestos' material, pre-swelled and pressed into the valve body trunnion bosses.

Excessive wear may take place over long periods of activity or by the ingress of foreign matter transported by the water. Indication of this condition may be given by the dropping of the door centre line and resultant excessive leakage past the door seal after adjustment as described in 3.1.1.

Replacement of the trunnion bushes is a major undertaking not recommended to be carried out in the field, replacement should be completed in a heavy engineering workshop as follows:-

(a) Set up valve on suitable supports, support body and disc (door).

(b) Repeat operation described in section 3.1.1(a) to (g) to remove operating lever and gland seal.

(c) Remove taper dowel grub screws Item 3 from door.

(d) Remove non drive endplate A2-215-078.

(e) Extract taper dowels (it is advised to match mark)

(f) Extract worn bushes.

(g) Fit new bushes - flush with inside face of liners on trunnion bosses B1-212-028-IT15.

(h) Re-assemble - reverse above procedure.

3.1.4 DISC (DOOR) CENTRALISING (Drg. B1-210-026 Detail 'A')

The valve disc is centralised in the body during assembly, no further adjustments are necessary. However, following any dismantling of valve, centralising of the disc is carried out by machining or 'shimming' centering ring A2-215-005 to suit.

3.1.5 SUPPLIED SPARES (Butterfly Valve)

2 off Seal Ring - A2-214-058
2 off Spring Ring - A2-214-059
2 off Clamp Ring - A1-214-053
2 off Seat Rings - A2-214-060
2 off Complete Locking Pin - A2-215-077-C10
2 off Bushes (Locking Pin) - A2-215-077 - It.9

3.1.5 SUPPLIED SPARES (Cont'd)

2 off Bushes (Locking Pin) - B1-210-026-IT17
2 off Bushes (Locking Pin) - B1-210-026-IT18
2 off Trunnion Bushes - A2-215-066-IT4
2 off Centering Ring - A2-215-005-IT9
120 off M12 x 30 Cap Screws - B1-210-026-IT7
(clamp ring to disc)
120 off M8 x 16 half dog point grub screws - B1-210-026-IT6
(adjustment of seal)
122 off M8 x 16 Flat Point Grub Screws - B1-210-026-IT3
(seat to body)

3.2 OPERATING GEAR MAINTENANCE

Brochures contained in the rear of this manual give information on maintenance - care and service to the operating gear.

SECTION IV - ENCLOSURES

Butterfly Valve Arrangement - B1-210-026

Hydraulic Cylinder Brochure

Hydraulic Hand Pump Brochure

Flexible Hose Brochure

Drawing Schedule

Paint Suppliers' Brochure

PART 'B'

OPERATING GEAR

C O N T E N T S

1.1 TECHNICAL SPECIFICATION

(Pongrass) Hydraulic Cylinder -
SH7-32-A1-DACE-IT-553 Stroke
Front Trunnion Mounted - TD (Swivel) Diameter - 44.45mm dia.
Cylinder Bore - 82.5mm dia.
Stroke - 553mm
Rod Diameter - 34.92mm dia.
Rod End Bore - 25.4mm dia.
Working Pressure - 17mPa
Hydraulic Oil - Amoco Stanoil 32
Relief Valve Setting - 18mPa

1.2 LUBRICATION

As mentioned in 3.1(b) the only lubrication for the operating gear and valve is to the swivel bushes and cylinder 'eye' bush, by means of 3 off grease nipples item 12 and 24, B1-210-026 with ALVANIA 'EP2' grease.

1.3 REMOVAL OF ACTUATOR (CYLINDER)

To remove actuator proceed as follows:-

(a) Position disc (door) in the closed position and close isolating valves on ports also remove flexible hoses.

(b) Insert locking pin A2-215-077 in position through operating lever arm and valve body.

(c) Support the cylinder weight and remove locking strip A2-216-082 and the pin A2-215-033 from the cylinder 'eye'.

(d) With the cylinder still supported remove 4 off M20 nuts - B1-210-026-IT13 and pull mounting plate A2-216-112 clear of valve with cylinder taking care not to damage bushes and dowels.

For re-assemble - reverse above procedure and grease bushes after assembly.

1.4 SUPPLIED SPARES (ACTUATOR)

2 off - complete hydraulic cylinders with isolating valves fitted to each port and ready for mounting to the valve.

ADDITIONAL RECOMMENDED SPARES

Seal kit for hand pump comprising of:-

2 only F3103-2 - Plunger Packing
2 only L3006-7 - Cap 'O' Ring
1 only C1707-4 - Pin Packing
1 only X73 - 38 - Seal Ring
1 only L3006-40 - Control Valve 'O' Ring
2 only L3006-111- 'O' Ring
2 only L3006-43 - 'O' Ring
1 only E1014 - Gasket

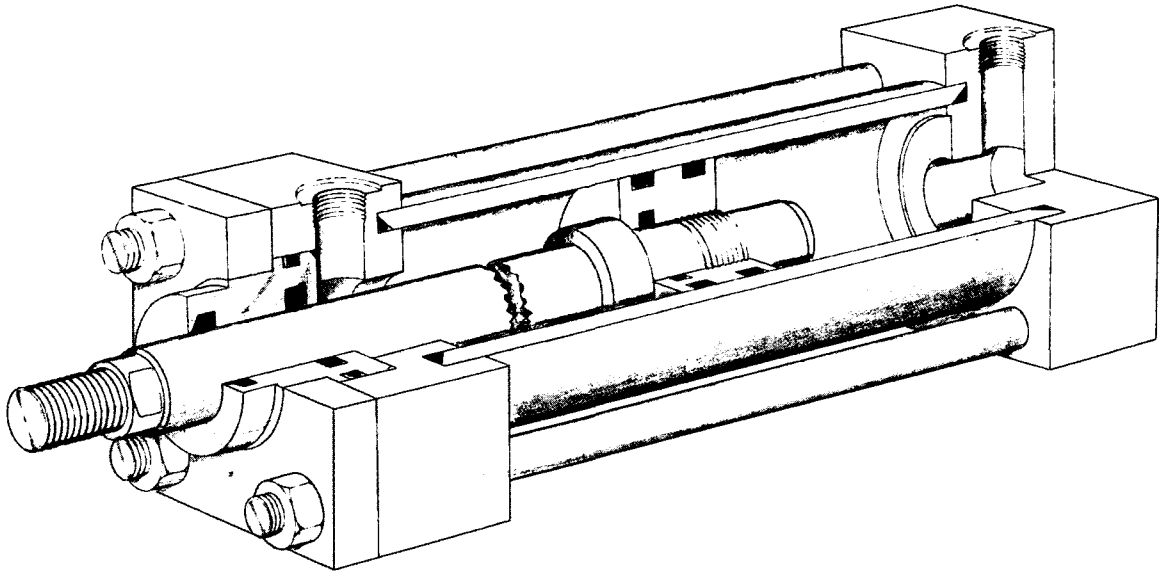
PONGRASS

Hydraulic Cylinders

tie-rod construction
H7 and H8 Series

DESIGN AND CONSTRUCTION INFORMATION

CONFORMS TO N F P A STANDARDS ENDORSED BY AMERICAN NATIONAL STANDARDS
B93 1-1964 B93 8-1968 B93- 15-1971 B93 29-1973



A PRODUCT DESIGNED AND MANUFACTURED BY AN AUSTRALIAN OWNED COMPANY

MADE RIGHT HERE IN AUSTRALIA PONGRASS

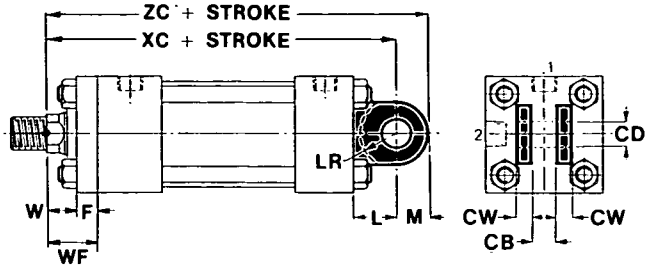
SERIES H7 HEAVY DUTY HYDRAULIC CYLINDER
SERIES H8 INDUSTRIAL DUTY HYDRAULIC CYLINDER

- **CYLINDER BORES** — 1½" to 12" (38 mm to 305 mm)
- **PRESSURE RATED** — H7 to 5000 p.s.i. (35 MPa) static non-shock load
  — H8 2000-3500 p.s.i. (14-24 MPa) depending on size (see page 3)

- **PISTON RODS** for H7 series cylinders are precision ground from high tensile steel of yield strength 100,000 p.s.i (680 MPa). Piston rods for H8 series cylinders are precision ground from medium carbon steel of yield strength 60,000 p.s.i. (410 MPa). All are polished to 6-12 micro-inch (0.15-0.3 micrometres) finish and hard chrome plated to a thickness of 0.001 inches (0.025 mm). The plating prevents scuffing and resists impact, thereby guarding against damage of the gland bush seal.
- **ROD WIPERS** of the double-lip type are moulded of polyurethane. The front lip wipes off dirt from the rod on the instroke and the rear lip dries the rod on the outstroke. This prohibits ingress of contaminants into the gland area and into the cylinder itself.
- **CUSHION PLUNGERS** are provided as required on both sides of the piston. On the side farthest from the head the plunger is an extension of the piston rod. On the side nearest the head the plunger is an annular sleeve around the piston rod. Tapering part of the cushion plungers gives progressively firmer cushioning.
- **GLAND BUSH BEARING** is as long as possible for rigidity to side loading. For most applications, grey cast iron, with its free graphite content, provides excellent bearing. Bronze is recommended for very high side loads.
- **GLAND BUSH SEAL** is not merely located by the gland bush bearing but is seated within it, making anything other than proper alignment and sealing impossible. The lip-type seal is of polyurethane. The flexible lips of the seals, which are forced outward by an O-ring between them, make for highly efficient sealing even at the lowest pressures.
- **CYLINDER ENDS** are of rolled steel plate, giving great strength and stability and eliminating porosity and stress cracking. The ends are precision-machined to ensure accurate parallel relationships between all mountings and moving elements.
- **BARREL** is cold drawn seamless carbon steel tubing of yield strength 60,000 p.s.i. (410 MPa). It is honed to 8 micro-inch (0.2 micrometre) finish. The cylinder ends have machined in their inner faces cylindrical grooves, which positively locate the ends of the barrel, thereby ensuring their concentricity with all internal elements.
- **PISTON** is a one-piece design of grey cast iron. Bevelled leading edges won't dig in despite high side loading.
- **PISTON SEALS** for H7 series cylinders are of the lip type, made of polyurethane to resist abrasion, with a molybdenum disulphide content as a permanent lubricant to reduce running and breakout friction. Piston seals for H8 series cylinders are one-piece double acting seals made of Nitrile, given all-round support by two spiral back-up washers of bronze-filled PTFE.
- **PORTS** are designed to produce minimum pressure drop at full piston speed. They are tapped with BSP parallel thread. NPT tapping is available as an option. A shallow recess is machined around each port to accept a face washer seal.
- **TIE RODS** for H7 series cylinders are of high tensile steel of yield strength 100,000 p.s.i. (680 MPa). Tie rods for H8 series cylinders are of medium carbon steel of yield strength 60,000 p.s.i. (410 MPa). Both are fitted with grade 5 nuts and prestressed at assembly.
- **CUSHION ADJUSTING SCREW** flush fits within the cylinder. It enables simple adjustment of cushioning speeds over a wide range.
- **QUICK START** of the piston is achieved by allowing the oil to bypass the cushion adjusting screw through ball check valves having light spring loading and oversize passages.

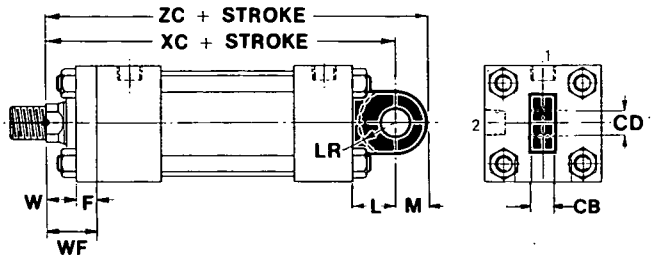
CAP CLEVIS AND EYE MOUNTING ENVELOPE DIMENSIONS

REFER TO PAGE 6 FOR ALL OTHER DIMENSIONS



TYPE 1P
CAP FIXED CLEVIS

NFPA STYLE MP1



TYPE 3P
CAP FIXED EYE

NFPA STYLE MP3

NFPA STD. DOES NOT INCLUDE SIZES FOR THIS MOUNTING

INCH

BORE	ROD	W	WF	XC	ZC	■ □ CB	†CD	CW	F	L	LR	M
1½	A	5/8	1	6 3/8	6 7/8	¾	.500	½	3/8	¾	5/8	½
	B	1	1 3/8	6¾	7¼							
2	A	¾	1 3/8	7¼	8	1¼	.750	5/8	5/8	1¼	1 1/8	¾
	B	1	1 5/8	7½	8¼							
2½	A	¾	1 3/8	7 3/8	8 1/8	1¼	.750	5/8	5/8	1¼	1 1/8	¾
	B	1	1 5/8	7 5/8	8 3/8							
	C	1¼	1 7/8	7 7/8	8 5/8							
3¼	A	7/8	1 5/8	8 5/8	9 5/8	1½	1.000	¾	¾	1½	1 3/8	1
	B	1 1/8	1 7/8	8 7/8	9 7/8							
	C	1¼	2	9	10							
4	A	1	1 7/8	9¾	11 1/8	2	1.375	1	7/8	2 1/8	2	1 3/8
	B	1 1/8	2	9 7/8	11¼							
	C	1 3/8	2¼	10 1/8	11½							
5	A	1 1/8	2	10½	12¼	2½	1.750	1¼	7/8	2¼	2 1/16	1¾
	B-D	1 3/8	2¼	10¾	12½							
6	A-D	1¼	2¼	12 1/8	14 1/8	2½	2.000	1¼	1	2½	2 3/16	2
7	A-E	1¼	2¼	13¾	16¼	3	2.500	1½	1	3	2 9/16	2½
8	A-E	1¼	2¼	15	17¾	3	3.000	1½	1	3¼	2 13/16	2¾
10	A-E	1¼	2 15/16	19 1/16	22 9/16	4	3.500	2	1 11/16	4	3 7/8	3½

† TOLERANCE ON HOLE $^{+.002}_{-.000}$ ■ TOLERANCE ON EYE $^{-.005}_{-.010}$ □ TOLERANCE ON CLEVIS $^{+.005}_{+.020}$

MILLIMETRE

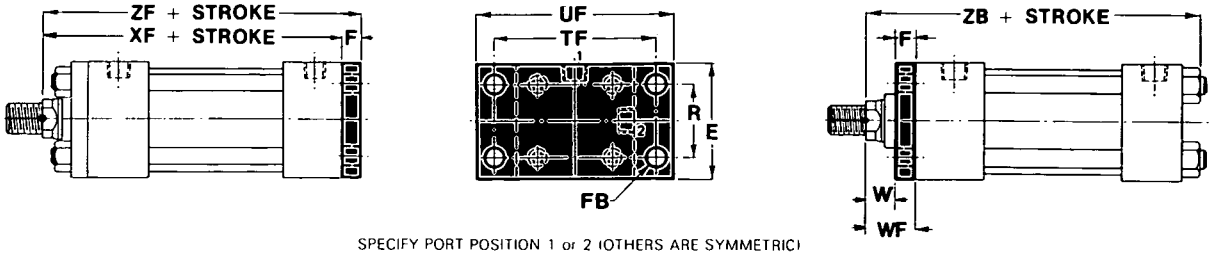
BORE	ROD	W	WF	XC	ZC	■ □ CB	†CD	CW	F	L	LR	M
38	A	16	25	162	175	19	12.70	13	10	19	16	13
	B	25	35	171	184							
51	A	19	35	184	203	32	19.05	16	16	32	29	19
	B	25	41	191	210							
63	A	19	35	187	206	32	19.05	16	16	32	29	19
	B	25	41	194	213							
	C	32	48	200	219							
82	A	22	41	219	244	38	25.40	19	19	38	35	25
	B	29	48	225	251							
	C	32	51	229	254							
102	A	25	48	248	283	51	34.93	25	22	54	51	35
	B	29	51	251	286							
	C	35	57	257	292							
127	A	29	51	267	311	64	44.45	32	22	57	52	44
	B-D	35	57	273	318							
152	A-D	32	57	308	359	64	50.80	32	25	64	56	51
178	A-E	32	57	349	413	76	63.50	38	25	76	65	64
203	A-E	32	57	381	451	76	76.20	38	25	83	71	70
254	A-E	32	75	484	573	102	88.90	51	43	102	98	89

† TOLERANCE ON HOLE $^{+.05}_{-.00}$ ■ TOLERANCE ON EYE $^{-.13}_{-.25}$ □ TOLERANCE ON CLEVIS $^{+.13}_{+.50}$

CYLINDER SUPPLIED WITH PORT POSITION 1 UNLESS SPECIFIED OTHERWISE

PORT POSITIONS 3 AND 4 ARE SYMMETRICALLY THE SAME AS 1 AND 2

RECTANGULAR FLANGE MOUNTING DIMENSIONS



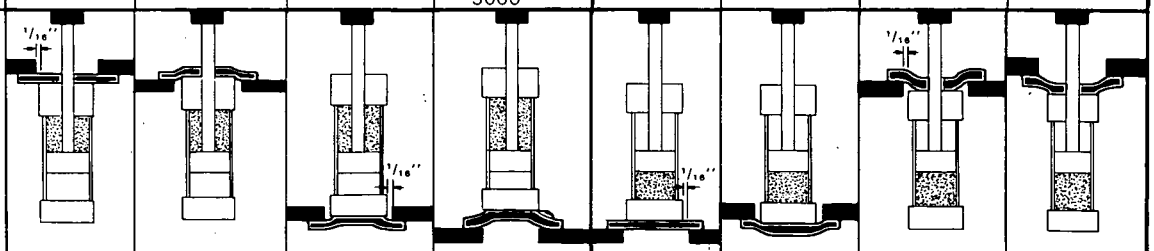
SPECIFY PORT POSITION 1 or 2 (OTHERS ARE SYMMETRIC)

TYPE 2F
CAP RECTANGULAR FLANGE
NFPA STYLE MF2

TYPE 1F
HEAD RECTANGULAR FLANGE
NFPA STYLE MF1
NFPA STD. DOES NOT INCLUDE SIZES FOR THIS MOUNTING

FOR ALL MOUNTING DIMENSIONS SEE AS IN SQUARE FLANGE MOUNTING DIMENSIONS ON PAGE 9

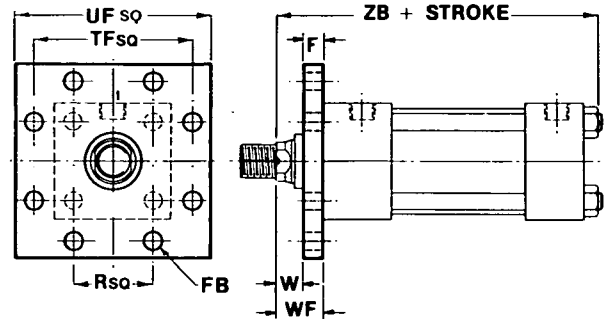
Rectangular flange mounts are subject to stresses of a magnitude depending on the method of mounting (as illustrated below). Many of these mounting arrangements are unable to take 5000 p.s.i. cylinder pressure in a mid piston position. The table below indicates the maximum rated pressures for individual mountings incorporating a saftey factor of 4:1 on ultimate tensile strength. Standard flanges are made of mild steel plate of 60,000 p.s.i. U.T.S. If the safety factor can be down graded, the rated pressures can be increased proportionally. Non standard flanges of increased thickness or of higher strength steel may be used when the recommended mounting or equivalent square flange mounting is not possible.

BORE	ROD	PRESSURE LIMITATIONS (P.S.I.)							
		PULL STROKE				PUSH STROKE			
		TYPE 1F		TYPE 2F		TYPE 2F		TYPE 1F	
1½	A	•	•	•	2800	•	4400	4200	2300
	B	•	•	•	4100				
2	A	•	•	•	•	•	•	•	3700
	B	•	•	•	•				
2½	A	•	•	•	3300	•	•	•	2800
	B	•	•	•	4000				
	C	•	•	•	•				
3¼	A	•	•	•	3000	•	4700	4600	2400
	B	•	•	•	3400				
	C	•	•	•	3900				
4	A	•	•	•	3100	•	4600	4900	2500
	B	•	•	•	3300				
	C	•	•	•	4100				
5	A	•	3700	3700	1900	•	3100	3200	1600
	B	•	4200	4200	2200				
	C	•	4900	4900	2500				
	D	•	•	•	3200				
6	A	•	3500	3500	1800	•	2800	2900	1500
	B	•	3800	3900	2000				
	C	•	4300	4400	2300				
	D	•	•	•	2700				
7	A	•	2600	2700	1400	•	2200	2300	1100
	B	•	2900	3000	1500				
	C	•	3200	3300	1700				
	D	•	3700	3800	1900				
	E	•	4400	4600	2300				
8	A	•	2100	2300	1100	•	1700	1800	900
	B	•	2300	2500	1200				
	C	•	2500	2700	1300				
	D	•	2800	3000	1500				
	E	•	3200	3500	1700				
10	A	•	3800	4000	2000	•	3000	3200	1600
	B	•	4000	4200	2100				
	C	•	4400	4500	2300				
	D	•	4800	/ 4900	2500				
	E	•	•	•	3000				
MOUNTING									
RECOMMENDATION		GOOD	GOOD TO FAIR	GOOD TO FAIR	FAIR TO POOR	GOOD	FAIR	FAIR	POOR

* FULL RATING OF 5000 P.S.I. ALLOWABLE

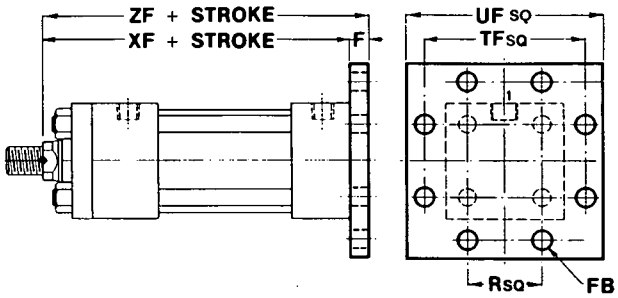
SQUARE FLANGE MOUNTING ENVELOPE DIMENSIONS

REFER TO PAGE 6 FOR ALL OTHER DIMENSIONS



TYPE 5F
HEAD SQUARE FLANGE

NFPA STYLE MF5
NFPA STD. DOES NOT INCLUDE SIZES FOR THIS MOUNTING



TYPE 6F
CAP SQUARE FLANGE

NFPA STYLE MF6

INCH

BORE	ROD	W	WF	XF	ZB	ZF	E	F	R	*FB	TF	UF
1½	A	5/8	1	5 5/8	6	6	2½	3/8	1.63	7/16	3 7/16	4¼
	B	1	1 3/8	6	6 3/8	6 3/8						
2	A	¾	1 3/8	6	6 7/16	6 5/8	3	5/8	2.05	9/16	4 1/8	5 1/8
	B	1	1 5/8	6¼	6 11/16	6 7/8						
2½	A	¾	1 3/8	6 1/8	6 9/16	6¾	3½	5/8	2.55	9/16	4 5/8	5 5/8
	B	1	1 5/8	6 3/8	6 13/16	7						
	C	1¼	1 7/8	6 5/8	7 1/16	7¼						
3¼	A	7/8	1 5/8	7 1/8	7 11/16	7 7/8	4½	¾	3.25	11/16	5 7/8	7 1/8
	B	1 1/8	1 7/8	7 3/8	7 15/16	8 1/8						
	C	1¼	2	7½	8 1/16	8¼						
4	A	1	1 7/8	7 5/8	8 3/16	8½	5	7/8	3.82	11/16	6 3/8	7 5/8
	B	1 1/8	2	7¾	8 5/16	8 5/8						
	C	1 3/8	2¼	8	8 9/16	8 7/8						
5	A	1 1/8	2	8¼	9 1/16	9 1/8	6½	7/8	4.95	15/16	8 3/16	9¾
	B-D	1 3/8	2¼	8½	9 5/16	9 3/8						
6	A-D	1¼	2¼	9 5/8	10½	10 5/8	7½	1	5.73	1 1/16	9 7/16	11¼
7	A-E	1¼	2¼	10¾	11¾	11¾	8½	1	6.58	1 3/16	10 5/8	12 5/8
8	A-E	1¼	2¼	11¾	12 13/16	12¾	9½	1	7.50	1 5/16	11 13/16	14
10	A-E	1¼	2 15/16	15 1/16	16 5/8	16¾	12 5/8	1 11/16	9.62	1 13/16	15 7/8	19

MILLIMETRE

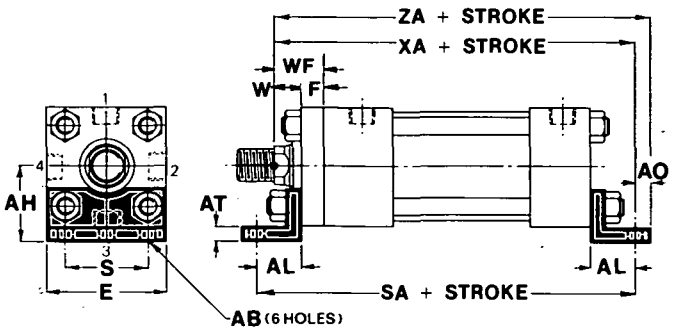
BORE	ROD	W	WF	XF	ZB	ZF	E	F	R	*FB	TF	UF
38	A	16	25	143	152	152	64	10	41.4	11	87	108
	B	25	35	152	162	162						
51	A	19	35	152	164	168	76	16	52.1	14	105	130
	B	25	41	156	170	175						
63	A	19	35	156	167	171	89	16	64.8	14	117	143
	B	25	41	162	173	178						
	C	32	48	168	179	184						
82	A	22	41	181	195	200	114	19	82.6	17	149	181
	B	29	48	187	202	206						
	C	32	51	191	205	210						
102	A	25	48	194	208	216	127	22	97.0	17	162	194
	B	29	51	197	211	219						
	C	35	57	203	217	225						
127	A	29	51	210	230	232	165	22	125.7	24	208	248
	B-D	35	57	216	237	238						
152	A-D	32	57	244	267	270	191	25	145.5	27	240	286
178	A-E	32	57	273	298	298	216	25	167.1	30	270	321
203	A-E	32	57	298	325	324	241	25	190.5	33	300	356
254	A-E	32	75	383	422	425	321	43	244.3	46	403	483

* FB IS 1/16" LARGER IN DIA. THAN NOMINAL BOLT SIZE

NO NEED TO SPECIFY PORT POSITION ON SYMMETRIC MOUNTINGS

SIDE MOUNTING ENVELOPE DIMENSIONS

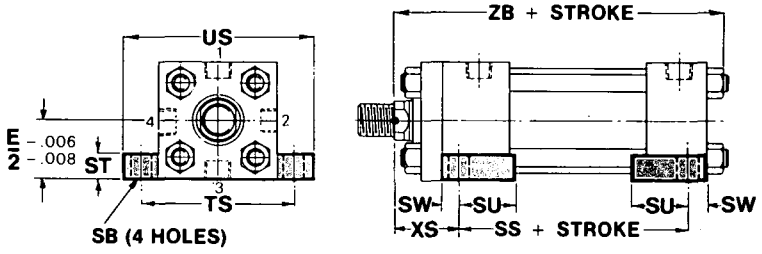
REFER TO PAGE 6 FOR ALL OTHER DIMENSIONS



PRESSURE LIMITATIONS
500 psi.

TYPE 1S
SIDE END ANGLES

NFPA STYLE MS1



TYPE 2S
SIDE LUGS

NFPA STYLE MS2

INCH

BORE	ROD	W	WF	XA	XS	ZA	ZB	AB	AH	AL	AO	AT	E	F	S	SA	SB	SS	ST	SU	SW	TS	US
1½	A	5/8	1	6 5/8	1 3/8	7	6	7/16	1 3/8	1	3/8	3/16	2½	3/8	1¾	7	7/16	3 7/8	½	15/16	3/8	3¼	4
	B	1	1 3/8	7	1¾	7 3/8	6 3/8																
2	A	¾	1 3/8	7¼	1 7/8	7¾	6 7/16	9/16	1 11/16	1¼	½	3/16	3	5/8	2	7¾	9/16	3 5/8	¾	1¼	½	4	5
	B	1	1 5/8	7½	2 1/8	8	6 11/16																
2½	A	¾	1 3/8	7 5/16	2 1/16	7 7/8	6 9/16	11/16	1 15/16	1 3/16	9/16	3/16	3½	5/8	2 3/8	7¾	13/16	3 3/8	1	1 9/16	11/16	4 7/8	6¼
	B	1	1 5/8	7 9/16	2 5/16	8 1/8	6 13/16																
	C	1¼	1 7/8	7 13/16	2 9/16	8 3/8	7 1/16																
3¼	A	7/8	1 5/8	8 15/16	2 5/16	9 5/8	7 11/16	13/16	2 9/16	1 13/16	11/16	¼	4½	¾	3 1/8	9 7/8	13/16	4 1/8	1	1 9/16	11/16	5 7/8	7¼
	B	1 1/8	1 7/8	9 3/16	2 9/16	9 7/8	7 15/16																
	C	1¼	2	9 5/16	2 11/16	10	8 1/16																
4	A	1	1 7/8	9¾	2¾	10 5/8	8 3/16	1 1/16	2 13/16	2 1/8	7/8	¼	5	7/8	3¼	10 7/8	1 1/16	4	1¼	2	7/8	6¾	8½
	B	1 1/8	2	9 7/8	2 7/8	10¾	8 5/16																
	C	1 3/8	2¼	10 1/8	3 1/8	11	8 9/16																
5	A	1 1/8	2	10 3/8	2 7/8	11¼	9 1/16	1 1/16	3 11/16	2 1/8	7/8	5/16	6½	7/8	4¾	11 3/8	1 1/16	4½	1¼	2	7/8	8¼	10
	B-D	1 3/8	2¼	10 5/8	3 1/8	11½	9 5/16																
6	A-D	1¼	2¼	12 1/16	3 3/8	13 1/8	10½	1 5/16	4¼	2 7/16	1 1/16	3/8	7½	1	5 3/8	13¼	1 5/16	5 1/8	1½	2½	1 1/8	9 3/4	12
7	A-E	1¼	2¼	13 15/16	3 5/8	15¼	11¾	1 9/16	4 15/16	3 3/16	1 5/16	½	8½	1	5 7/8	15 7/8	1 9/16	5¾	1¾	2 7/8	1 3/8	11¼	14
8	A-E	1¼	2¼	14 15/16	3 5/8	16¼	12 13/16	1 9/16	5½	3 3/16	1 5/16	½	9½	1	6 1/8	16 7/8	1 9/16	6¾	1¾	2 7/8	1 3/8	12¼	15
10	A-E	1¼	2 15/16	NA	4 9/16	NA	16 5/8	NA	NA	NA	NA	NA	12 5/8	1 11/16	NA	NA	1 9/16	8 7/8	2¼	3½	1 5/8	15 7/8	19 1/8

MILLIMETRE

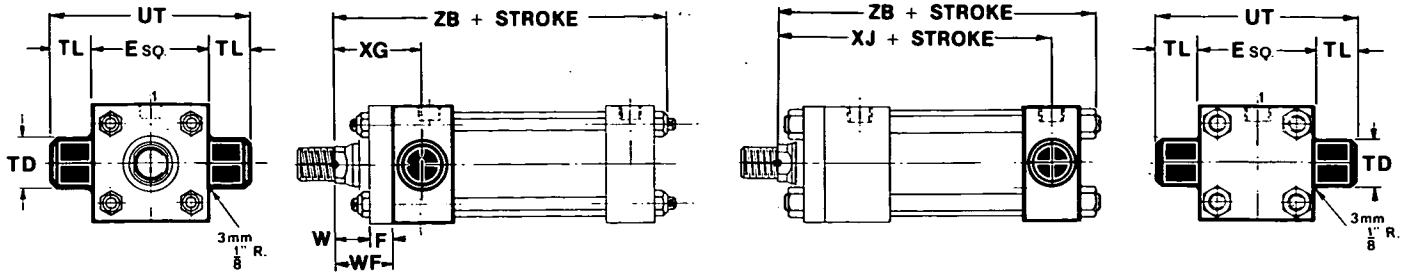
BORE	ROD	W	WF	XA	XS	ZA	ZB	AB	AH	AL	AO	AT	E	F	S	SA	SB	SS	ST	SU	SW	TS	US
38	A	16	25	168	35	178	152	11	35	25	10	5	64	10	44	178	11	98	13	24	10	83	102
	B	25	35	178	44	187	162																
51	A	19	35	184	48	197	164	14	43	32	13	5	76	16	51	197	14	92	19	32	13	102	127
	B	25	41	191	54	203	170																
63	A	19	35	186	52	200	167	17	49	30	14	5	89	16	60	197	21	86	25	40	17	124	159
	B	25	41	192	59	206	173																
	C	32	48	198	65	213	179																
82	A	22	41	227	59	244	195	21	65	46	17	6	114	19	79	251	21	105	25	40	17	149	184
	B	29	48	233	65	251	202																
	C	32	51	237	68	254	205																
102	A	25	48	248	70	270	208	27	71	54	22	6	127	22	83	276	27	102	32	51	22	171	216
	B	29	51	251	73	273	211																
	C	35	57	257	79	279	217																
127	A	29	51	264	73	286	230	27	94	54	22	8	165	22	121	289	27	114	32	51	22	210	254
	B-D	35	57	270	79	292	237																
152	A-D	32	57	306	86	333	267	33	108	62	27	10	191	25	137	337	33	130	38	64	29	248	305
178	A-E	32	57	354	92	387	298	40	125	81	33	13	216	25	149	403	40	146	44	73	35	286	356
203	A-E	32	57	379	92	413	325	40	140	81	33	13	241	25	175	429	40	171	44	73	35	311	381
254	A-E	32	75	NA	116	NA	422	NA	NA	NA	NA	NA	321	43	NA	NA	40	225	57	89	41	403	486

NA: NOT AVAILABLE BECAUSE OF PRESSURE LIMITATION.

CYLINDER SUPPLIED WITH PORT POSITION 1 UNLESS SPECIFIED OTHERWISE

TRUNNION MOUNTING ENVELOPE DIMENSIONS

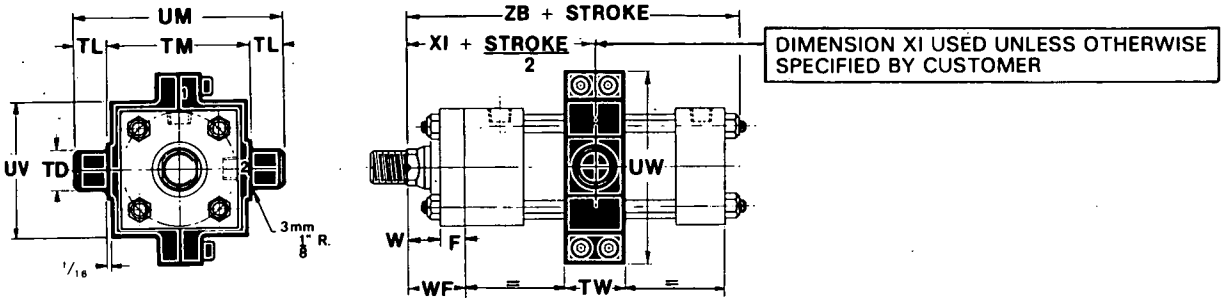
REFER TO PAGE 6 FOR ALL OTHER DIMENSIONS



TYPE 1T
HEAD TRUNNION NFPA STYLE MT1

NFPA STD. DOES NOT INCLUDE SIZES FOR THIS MOUNTING

TYPE 2T
CAP TRUNNION NFPA STYLE MT2



DIMENSION XI USED UNLESS OTHERWISE SPECIFIED BY CUSTOMER

TYPE 4T
INTERMEDIATE TRUNNION NFPA STYLE MT4

NFPA STD. DOES NOT INCLUDE SIZES FOR THIS MOUNTING

INCH

BORE	ROD	W	WF	XG	XI	XJ	ZB	E	F	•TD	TL	TM	TW	UM	UT	UV	UW
1½	A	5/8	1	1 7/8	3 5/16	4 7/8	6	2½	3/8	1.000	1	3	1¼	5	4½	2¾	4
	B	1	1 3/8	2¼	3 11/16	5¼	6 3/8										
2	A	¾	1 3/8	2¼	3 11/16	5¼	6 7/16	3	5/8	1.375	1 3/8	3½	1½	6¼	5¾	3¼	4¾
	B	1	1 5/8	2½	3 15/16	5½	6 11/16										
2½	A	¾	1 3/8	2¼	3¾	5 3/8	6 9/16	3½	5/8	1.375	1 3/8	4	1½	6¾	6¼	3¾	5¼
	B	1	1 5/8	2½	4	5 5/8	6 13/16										
	C	1¼	1 7/8	2¾	4¼	5 7/8	7 1/16										
3¼	A	7/8	1 5/8	2 5/8	4 3/8	6¼	7 11/16	4½	¾	1.750	1¾	5	2	8½	8	4¾	6¾
	B	1 1/8	1 7/8	2 7/8	4 5/8	6½	7 15/16										
	C	1¼	2	3	4¾	6 5/8	8 1/16										
4	A	1	1 7/8	2 7/8	4¾	6¾	8 3/16	5	7/8	1.750	1¾	5½	2	9	8½	5¼	7¼
	B	1 1/8	2	3	4 7/8	6 7/8	8 5/16										
	C	1 3/8	2¼	3¼	5 1/8	7 1/8	8 9/16										
5	A	1 1/8	2	3	5 1/8	7 3/8	9 1/16	6½	7/8	1.750	1¾	7	2	10½	10	6¾	9
	B-D	1 3/8	2¼	3¼	5 3/8	7 5/8	9 5/16										
6	A-D	1¼	2¼	3 3/8	5 15/16	8 3/8	10½	7½	1	2.000	2	8½	3	12½	11½	7¾	10¼
7	A-E	1¼	2¼	3 5/8	6½	9 3/8	11¾	8½	1	2.500	2½	9¾	3	14¾	13½	8¾	11½
8	A-E	1¼	2¼	3¾	7	10¼	12 13/16	9½	1	3.000	3	11	3½	17	15½	9¾	13¼
10	A-E	1¼	2 15/16	4¾	9	13¼	16 5/8	12 5/8	1 11/16	3.500	3½	14	4½	21	19 5/8	13	17½

● TOLERANCE +.000 −.002

MILLIMETRE

BORE	ROD	W	WF	XG	XI	XJ	ZB	E	F	•TD	TL	TM	TW	UM	UT	UV	UW
38	A	16	25	48	84	124	152	64	10	25.40	25	76	32	127	114	70	102
	B	25	35	57	94	133	162										
51	A	19	35	57	94	133	164	76	16	34.90	35	89	38	159	146	83	121
	B	25	41	64	100	140	170										
63	A	19	35	57	95	137	167	89	16	34.90	35	102	38	171	159	95	133
	B	25	41	64	102	143	173										
	C	32	48	70	108	149	179										
82	A	22	41	67	111	159	195	114	19	44.45	44	127	51	216	203	121	171
	B	29	48	73	117	165	202										
	C	32	51	76	121	168	205										
102	A	25	48	73	121	171	208	127	22	44.45	44	140	51	229	216	133	184
	B	29	51	76	124	175	211										
	C	35	57	83	130	181	217										
127	A	29	51	76	130	187	230	165	22	44.45	44	178	51	267	254	171	229
	B-D	35	57	83	137	194	237										
152	A-D	32	57	86	151	213	267	191	25	50.80	51	216	76	318	292	197	260
178	A-E	32	57	92	165	238	298	216	25	63.50	64	248	76	375	343	222	292
203	A-E	32	57	95	178	260	325	241	25	76.20	76	279	89	432	394	248	337
254	A-E	32	75	121	229	337	422	321	43	88.90	89	356	114	533	498	330	445

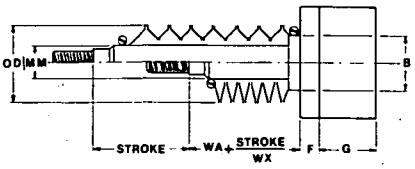
● TOLERANCE +.00 −.05

TYPE 1T AND 2T CYLINDER SUPPLIED WITH PORT POSITION 1 ONLY
TYPE 4T CYLINDER SUPPLIED WITH PORT POSITION 1 UNLESS SPECIFIED OTHERWISE
PORT POSITIONS 3 AND 4 ARE SYMMETRICALLY THE SAME AS 1 AND 2

SPECIAL APPLICATIONS

DUST BOOTS

- When dust boots are required with "3X" mounting (extended front tie rods) Most of the "OD" sizes as shown foul the tie rod extensions. In these instances special boots of smaller "OD" and smaller "WX" are required. Sizes available on application.
- When dust boots are required with "1S" mounting (side end angles) most of the "OD" sizes as shown foul the heads of the mounting bolts. In these instances special boots with a longer cuff (Bigger "WA") are required. Sizes available on application.

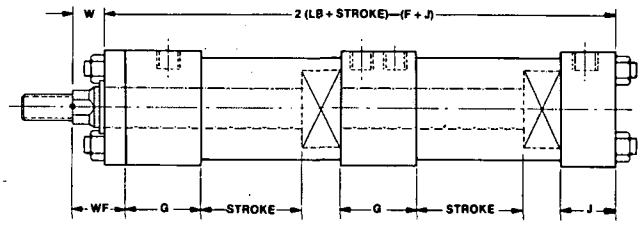


INCH

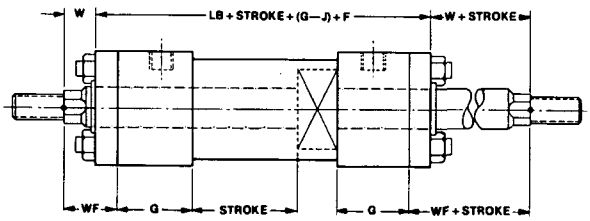
BOOT SIZES	CHOOSE BY CYLINDER BORE AND PISTON COMBINATIONS													
								8-A	8-B	10-A 8-C	10-B 8-D	10-C 8-E	10-D	10-E
							7-A	7-B	7-C	7-D	7-E			
						6-A	6-B	6-C	6-D					
					5-A	5-B	5-C	5-D						
				4-A	4-B	4-C								
			3¼-A	3¼-B	3¼-C									
		2½-A	2½-B	2½-C										
		2-A	2-B											
	1½-A	1½-B												
MM	.625	1.000	1.375	1.750	2.000	2.500	3.000	3.500	4.000	4.500	5.000	5.500	6.000	7.000
B	1⅛	1½	2	2⅜	2⅝	3⅛	3¾	4¼	4¾	5¼	5¾	6¼	6¾	7¾
OD	2½	3¼	4	6¼	6¼	7	7	8	9	9	10	10	11	12
WA	1 9/16	1 11/16	1 13/16	1 15/16	2 1/16	2 7/16	2 7/16	2 7/16	2 11/16	2 11/16	2 11/16	2 11/16	2 11/16	2 11/16
WX	5	6	10	14	14	14	14	16	16	16	18	18	18	20

COMBINATION CYLINDERS

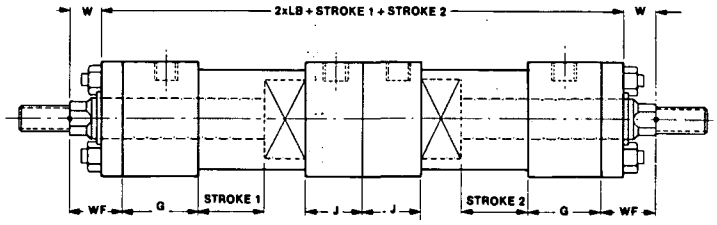
- DACETC Tandem cylinders exert approximately twice the force of a normal cylinder the same size. Piston rod diameters must be strong enough to withstand this force, hence "A" rods are generally not recommended. Tandem cylinders are used mainly in places where space is restricted.
- DACEBB Back to Back cylinders are normally used to provide a three or four position actuation; viz, zero, stroke 1, stroke 2 and stroke 1 + stroke 2.
- DANCDE Double ended rod cylinders are used for simultaneous double actions or for affecting an adjustable stroke viz; Adjustable stops one end, actuation the other.



FUNCTION: DACETC: DOUBLE ACTING CUSHION ENDED TANDEM CYLINDER.



FUNCTION: DANCDE: DOUBLE ACTING NON CUSHION DOUBLE ENDED ROD CYL.



FUNCTION: DACEBB: DOUBLE ACTING CUSHION ENDED BACK TO BACK CYLINDERS.

SPRING RETURN CYLINDERS

Spring return cylinders are used in situations where a mechanical return system is required in preference to hydraulic power. For example; Automatic shut down on power failure.

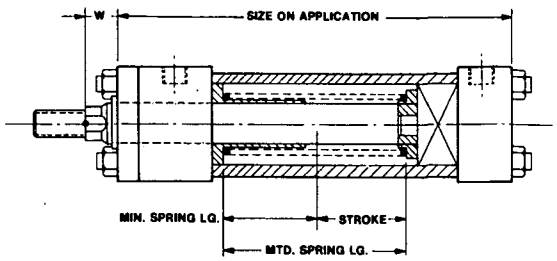
Spring return cylinders are considerably more expensive than standard Double Acting cylinders and much longer in length for the same stroke.

When ordering, please state the two forces the return spring is to work between (from zero to full stroke).

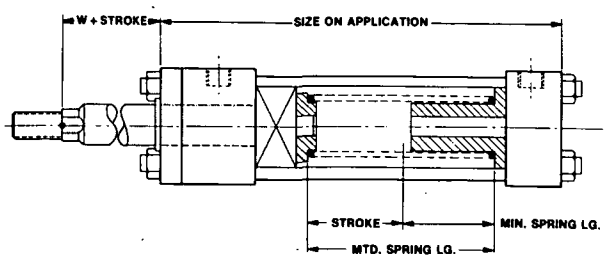
Spring return cylinders increases in length:

1. As the spring forces become higher
2. As the difference between the two limits of spring force decrease.
3. As the stroke becomes longer.

Strokes over 6 " are generally impracticle.

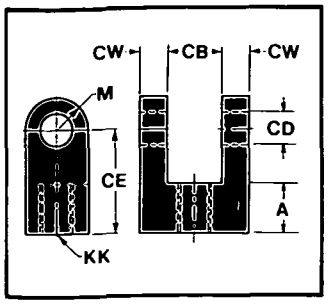


FUNCTION: SPSH: SINGLE ACTING NON CUSHIONED POWER PUSH SPRING RETURN

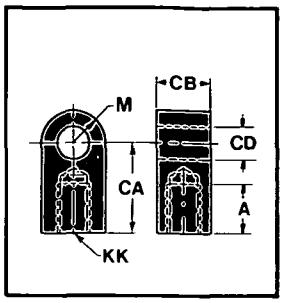


FUNCTION: SPLL: SINGLE ACTING NON CUSHIONED POWER PULL SPRING RETURN

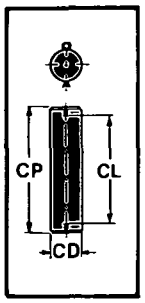
CYLINDER ACCESSORIES



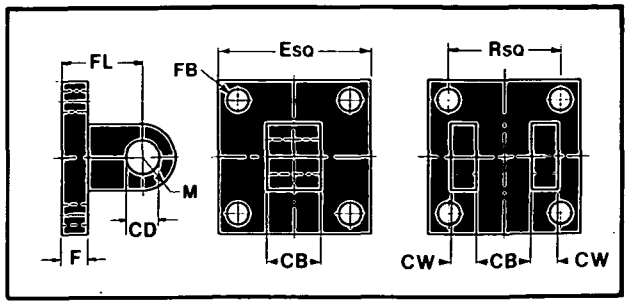
FEMALE CLEVIS



FEMALE EYE



CLEVIS PIN



EYE AND CLEVIS BRACKET

INCH

FRONT END ACCESSORIES	FRONT END ACCESSORIES CHOOSE BY CYLINDER BORE AND PISTON COMBINATIONS												
								8-A	8-B	10-A 8-C	10-B 8-D	10-C 8-E	10-D 10-E
							7-A	7-B	7-C	7-D	7-E		
						6-A	6-B	6-C	6-D				
					5-A	5-B	5-C	5-D					
				4-A	4-B	4-C							
			3¼-A	3¼-B	3¼-C								
		2½-A	2½-B	2½-C									
		2-A	2-B										
	1½-A	1½-B											
*KK	7/16-20	¾-16	§1-12	1¼-12	1½-12	1 7/8-12	2¼-12	2½-12	3-12	3¼-12	3½-12	4-12	

FEMALE CLEVIS

A	¾	1 1/8	1 5/8	2	2¼	3	3½	3½	4	4½	5	5½
□CB	.750	1.250	1.500	2.000	2.500	2.500	3.000	3.000	3.750	4.000	4.250	4.500
†CD	.500	.750	1.000	1.375	1.750	2.000	2.500	3.000	3.000	3.500	3.500	4.000
CE	1½	2 3/8	3 1/8	4 1/8	4½	5½	6½	6¾	7½	8½	9	10
CW	½	5/8	¾	1	1¼	1¼	1½	1½	1 7/8	2	2 1/8	2¼
*KK	7/16-20	¾-16	§1-12	1¼-12	1½-12	1 7/8-12	2¼-12	2½-12	3-12	3¼-12	3½-12	4-12
M	½	¾	1	1 3/8	1¾	2	2½	3	3	3½	3½	4
PART No.	1B2682	1B2683	1B2684	1H0862	1H0863	1H0864	1H1114	1H0865	1H0866	1H1253	1H1254	1H1256

FEMALE EYE

A	¾	1 1/8	1 5/8	2	2¼	3	3½	3½	4	4½	5	5½
CA	1½	2 1/16	2 13/16	3 7/16	4	5	5 13/16	6 1/8	7	7 5/8	7 1/8	9 1/8
■CB	.750	1.250	1.500	2.000	2.500	2.500	3.000	3.000	3.750	4.000	4.250	4.500
†CD	.500	.750	1.000	1.375	1.750	2.000	2.500	3.000	3.000	3.500	3.500	4.000
*KK	7/16-20	¾-16	§1-12	1¼-12	1½-12	1 7/8-12	2¼-12	2½-12	3-12	3¼-12	3½-12	4-12
PART No.	1H0867	1H0868	1H0869	1H0870	1H0871	1H0872	1H1115	1H0873	1H0874	1H1242	1H1243	1H1245

CLEVIS PIN

•CD	.500	.750	1.000	1.375	1.750	2.000	2.500	3.000	3.000	3.500	3.500	4.000
CL	1 13/16	2 9/16	3 1/16	4 1/16	5 1/16	5 1/16	6 1/16	6 1/16	7 9/16	8 1/16	8 9/16	9 1/16
CP	2 3/8	3 1/8	3 5/8	4¾	5 13/16	5 13/16	6 7/8	6 7/8	8 3/8	9	9½	10
PART No.	1H0875	1H0876	1H0877	1H0878	1H0879	1H0880	1H1116	1H0881	1H0882	1H0646	1H0647	1H0649

EYE BRACKET

E	2½	3½	4½	5	6½	7½	8½	9½	9½	12 5/8	12 5/8	14 7/8
F	3/8	5/8	¾	7/8	7/8	1	1	1	1	1 11/16	1 11/16	1 15/16
M	½	¾	1	1 3/8	1¾	2	2½	3	3	3½	3½	4
R	1.63	2.55	3.25	3.82	4.95	5.73	6.58	7.50	7.50	9.62	9.62	11.45
■CB	.750	1.250	1.500	2.000	2.500	2.500	3.000	3.000	3.750	4.000	4.250	4.500
†CD	.500	.750	1.000	1.375	1.750	2.000	2.500	3.000	3.000	3.500	3.500	4.000
FB	25/64	33/64	21/32	21/32	29/32	1 1/32	1 5/32	1 5/16	1 5/16	1 13/16	1 13/16	2 1/16
FL	1 1/8	1 7/8	2¼	3	3 1/8	3½	4	4¼	4½	5 11/16	5 11/16	6 7/16
PART No.	1H1126	1H1128	1H1129	1H1130	1H1131	1H1132	1H1133	1H1134	1H2904	1H2905	1H2906	1H2907

CLEVIS BRACKET NFPA STD. DOES NOT INCLUDE CLEVIS BRACKETS

E	3	4½	5	6½	7½	8½	9½	10½	11½	14½	14½	16
F	3/8	5/8	¾	7/8	7/8	1	1	1	1	1 11/16	1 11/16	1 15/16
M	½	¾	1	1 3/8	1¾	2	2½	3	3	3½	3½	4
R	2.05	3.25	3.82	4.95	5.73	6.58	7.50	8.25	9	11	11	12
□CB	.750	1.250	1.500	2.000	2.500	2.500	3.000	3.000	3.750	4.000	4.250	4.500
†CD	.500	.750	1.000	1.375	1.750	2.000	2.500	3.000	3.000	3.500	3.500	4.000
CW	½	5/8	¾	1	1¼	1¼	1½	1½	1 7/8	2	2 1/8	2¼
FB	25/64	33/64	21/32	21/32	29/32	1 1/32	1 5/32	1 5/16	1 5/16	1 13/16	1 13/16	2 1/16
FL	1 1/8	1 7/8	2¼	3	3 1/8	3½	4	4¼	4½	5 11/16	5 11/16	6 7/16
PART No.	1H1117	1H1119	1H1120	1H1121	1H1122	1H1123	1H1124	1H1125	1H2900	1H2901	1H2902	1H2903

BACK END ACCESSORIES	FOR BACK END ACCESSORIES CHOOSE BY CYLINDER BORE SIZE:											
	1½	2:2½	3¼	4	5	6	7	8		10		

■TOLERANCE ON EYE −.005 −.010

□ TOLERANCE ON CLEVIS +.005 +.020

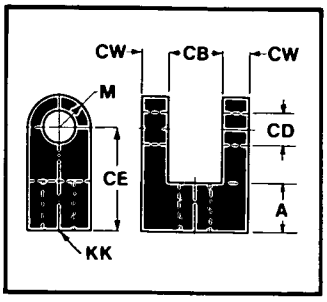
●TOLERANCE ON HOLE +.002 −.000

†TOLERANCE ON PIN + 000 −.002

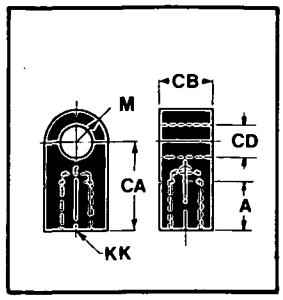
*UNF THREAD

§ NFPA STD. IS 1" — 14 UNS AVAILABLE ON APPLICATION.

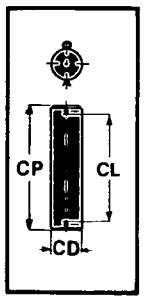
CYLINDER ACCESSORIES



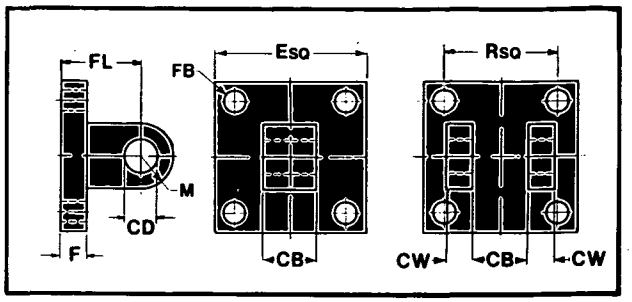
FEMALE CLEVIS



FEMALE EYE



CLEVIS PIN



EYE AND CLEVIS BRACKET

MILLIMETRE

FRONT END ACCESSORIES	FRONT END ACCESSORIES CHOOSE BY CYLINDER BORE AND PISTON COMBINATIONS													
								203-A	203-B	254-A 203-C	254-B 203-D	254-C 203-E	254-D	254-E
							178-A	178-B	178-C	178-D	178-E			
						152-A	152-B	152-C	152-D					
					127-A	127-B	127-C	127-D						
				102-A	102-B	102-C								
			82-A	82-B	82-C									
		63-A	63-B	63-C										
		51-A	51-B											
	38-A	38-B												
*KK	7/16-20	¾-16	§1-12	1¼-12	1½-12	1⅞-12	2¼-12	2½-12	3-12	3¼-12	3½-12	4-12		

FEMALE CLEVIS

A	19	29	41	51	57	76	89	89	102	114	127	140
□CB	19.05	31.75	38.10	50.80	63.50	63.50	76.20	76.20	95.25	101.60	107.95	114.30
†CD	12.70	19.05	25.40	34.93	44.45	50.80	63.50	76.20	76.20	88.90	88.90	101.60
CE	38	60	79	105	114	140	165	171	191	216	229	254
CW	13	16	19	25	32	32	38	38	48	51	54	57
*KK	7/16-20	¾-16	§1-12	1¼-12	1½-12	1⅞-12	2¼-12	2½-12	3-12	3¼-12	3½-12	4-12
M	13	19	25	35	44	51	64	76	76	89	89	102
PART No.	1B2682	1B2683	1B2684	1H0862	1H0863	1H0864	1H1114	1H0865	1H0866	1H1253	1H1254	1H1256

FEMALE EYE

A	19	29	41	51	57	76	89	89	102	114	127	140
CA	38	52	71	87	102	127	148	156	178	194	200	232
■CB	19.05	31.75	38.10	50.80	63.50	63.50	76.20	76.20	95.25	101.60	107.95	114.30
†CD	12.70	19.05	25.40	34.93	44.45	50.80	63.50	76.20	76.20	88.90	88.90	101.60
*KK	7/16-20	¾-16	§1-12	1¼-12	1½-12	1⅞-12	2¼-12	2½-12	3-12	3¼-12	3½-12	4-12
PART No.	1H0867	1H0868	1H0869	1H0870	1H0871	1H0872	1H1115	1H0873	1H0874	1H1242	1H1243	1H1245

CLEVIS PIN

•CD	12.70	19.05	25.40	34.93	44.45	50.80	63.50	76.20	76.20	88.90	88.90	101.60
CL	46	65	78	103	129	129	154	154	192	205	218	230
CP	60	79	92	121	148	148	175	175	213	229	241	254
PART No.	1H0875	1H0876	1H0877	1H0878	1H0879	1H0880	1H1116	1H0881	1H0882	1H0646	1H0647	1H0649

EYE BRACKET

E	64	89	114	127	165	191	216	241	241	321	321	378
F	10	16	19	22	22	25	25	25	25	43	43	49
M	13	19	25	35	44	51	64	76	76	89	89	102
R	41.40	64.77	82.55	97.03	125.73	145.54	167.13	190.50	190.50	244.35	244.35	290.83
■CB	19.05	31.75	50.80	50.80	63.50	63.50	76.20	76.20	95.25	101.60	107.95	114.30
†CD	12.70	19.05	25.40	34.93	44.45	50.80	63.50	76.20	76.20	88.90	88.90	101.60
FB	10	13	17	17	23	26	29	33	33	46	46	52
FL	29	48	57	76	79	89	102	108	114	144	144	175
PART No.	1H1126	1H1128	1H1129	1H1130	1H1131	1H1132	1H1133	1H1134	1H2904	1H2905	1H2906	1H2907

CLEVIS BRACKET NFPA STD. DOES NOT INCLUDE CLEVIS BRACKETS

E	76	114	127	165	191	216	241	267	292	368	368	406
F	10	16	19	22	22	25	25	25	25	43	43	49
M	13	19	25	35	44	51	64	76	76	89	89	102
R	52.07	82.55	97.03	125.73	145.54	167.13	190.50	209.55	228.60	279.40	279.40	304.80
□CB	19.05	31.75	38.10	50.80	63.50	63.50	76.20	76.20	95.25	101.60	107.95	114.30
†CD	12.70	19.05	25.40	34.93	44.45	50.80	63.50	76.20	76.20	88.90	88.90	101.60
CW	13	16	19	25	32	32	38	38	48	51	54	57
FB	10	13	17	17	23	26	29	33	33	46	46	52
FL	29	48	57	76	79	89	102	108	114	144	144	175
PART No.	1H1117	1H1119	1H1120	1H1121	1H1122	1H1123	1H1124	1H31125	1H2900	1H2901	1H2902	1H2903

BACK END ACCESSORIES	FOR BACK END ACCESSORIES CHOOSE BY CYLINDER BORE SIZE:											
	38	51:63	82	102	127	152	178	203		254		

■ TOLERANCE ON EYE −0.13 −0.25

□ TOLERANCE ON CLEVIS +0.13 +0.50

TOLERANCE ON HOLE +0.05 −0

TOLERANCE ON PIN +0 −0.05

* UNF THREAD IN INCHES

ORDERING YOUR POWER CYLINDERS

H 7 — 60 B 1 — DACE — 4T — 5" — FC — CP

FLUID	SERIES	BORE	ROD SIZE	ROD END STYLE
H HYDRAULIC	**7** SERIES 7	15 = 1½" 38 mm		
SH SPECIAL HYDRAULIC OR SPECIAL OPTION	**8** SERIES 8	20 = 2" 51 mm		
		25 = 2½" 63 mm		
		32 = 3¼" 82 mm		
		40 = 4" 102 mm		
		50 = 5" 127 mm		
		60 = 6" 152 mm		
		70 = 7" 178 mm		
		80 = 8" 203 mm		
		100 = 10" 254 mm		
		120 = 12" 305 mm available on application		

FUNCTION

DACE	= DOUBLE ACTING CUSHIONED
DANC	= DOUBLE ACTING NON CUSHIONED
DACER	= DOUBLE ACTING CUSHIONED REAR
DACEF	= DOUBLE ACTING CUSHIONED FRONT
SALL	= SINGLE ACTING PULL
SASH	= SINGLE ACTING PUSH
DACEDE	= DOUBLE ACTING CUSHIONED DOUBLE ENDED ROD
DANCDE	= DOUBLE ACTING NON CUSHIONED DOUBLE ENDED ROD
DACETC	= DOUBLE ACTING CUSHIONED TANDEM
DACEBB	= DOUBLE ACTING CUSHIONED BACK TO BACK
SPSH	= SINGLE ACTING NON CUSHIONED POWER PUSH SPRING RETURN
SPLL	= SINGLE ACTING NON CUSHIONED POWER PULL SPRING RETURN

MOUNTING TYPE

TIE ROD MOUNTINGS
- 0X = NO TIE ROD EXTENSION
- 1X = BOTH ENDS TIE ROD
- 2X = CAP END TIE ROD
- 3X = HEAD END TIE ROD

CLEVIS MOUNTINGS
- 1P = CAP FIXED CLEVIS
- 3P = CAP FIXED EYE

FLANGE MOUNTINGS
- 1F = HEAD RECTANGULAR FLANGE
- 2F = CAP RECTANGULAR FLANGE
- 5F = HEAD SOUARE FLANGE
- 6F = CAP SOUARE FLANGE

TRUNNION MOUNTINGS
- 1T = HEAD TRUNNION
- 2T = CAP TRUNNION
- 4T = INTERMEDIATE TRUNNION

FOOT MOUNTINGS
- 1S = SIDE END ANGLES
- 2S = SIDE LUGS

STROKE

E.G.
INCH: 5"
MILLIMETRE: 127 mm

CUSHIONED LENGTH OF STROKE:
REAR END: 1½" — 6" = 1"
7" — 10" = 1½"
FRONT END: ALL = ¾"— 1"

ACCESSORIES

ROD END:
- FC = FEMALE CLEVIS
- FE = FEMALE EYE
- CB = CLEVIS BRACKET
- CP = CLEVIS PIN WITH SPLIT PINS
- EB = EYE BRACKET
- B = BOOT

REAR END:
- CBR = CLEVIS BRACKET
- EBR = EYE BRACKET
- CPR = CLEVIS PIN WITH SPLIT PINS

1 = MALE (STANDARD SUPPLY)
2 = FEMALE
3 = PLAIN
4 = "A" SHAFT MALE
5 = OTHER (special)
FOR FURTHER EXPLANATION REFER TO PAGE 5

B = STANDARD ROD SIZE
A
C
D
E
REFER DIMENSIONAL TABLES ON PAGE 5

FOR MINIMUM COST AND LEAD TIME SELECT "B1"; "B3" or "B4" RODS

PRESSURE RATINGS: P.S.I.

BORE DIA	H7 SERIES 4:1 SAFETY ON YIELD	4:1 SAFETY ON U.T.S.	HEAVY DUTY SERVICE	NON-SHOCK OPERATING SERVICE
1½*	3250	4000	4000	5000
2	3320	4080	4000	5000
2½	2000	2500	3000	5000
3¼	2100	2600	3000	5000
4	1930	2370	3000	5000
5	2140	2650	3000	5000
6	2230	2750	3000	5000
7	2310	2850	3000	5000
8	2050	2530	3000	5000
10	2710	3340	3000	5000

BORE DIA	H8 SERIES* 4:1 SAFETY ON YIELD	4:1 SAFETY ON U.T.S.	HEAVY DUTY SERVICE	NON-SHOCK OPERATING SERVICE
1½*	1750	2660	2660	3500
2	1660	2650	2650	3320
2½	1000	1600	1600	2000
3¼	1050	1690	1690	2100
4	1120	1580	1580	2240
5	1070	1720	1720	2140
6	1200	1820	1820	2400
7	1230	1880	1880	2460
8	1070	1660	1660	2140
10	1400	2180	2180	2800

SHOCK LOADS ARE CREATED BY DECELERATION FORCES. (FORCE = MASS x ACCELERATION). TO OPERATE AT "NON SHOCK" CONDITIONS USE ONLY LOW SPEEDS AND SMALL ATTACHED MASSES.
* NOT APPLICABLE FOR "A" SHAFT — AVAILABLE ON APPLICATION.

SPECIAL OPTIONS:

- **PISTON ROD**
  - SPECIAL ROD END STYLES
  - EXTENDED "WF" DIMENSION
  - 316 STAINLESS STEEL
  - 431 STAINLESS STEEL (WHEN HIGHLY STRESSED)
  - INDUCTIONED HARDENED
  - HEAVY HARD CHROME PLATING
- **SEALS**
  - NITRILE : FOR — 10°C TO 100°C
  - POLYURETHANE: FOR — 40°C TO 100°C STD. SUPPLY MOST SUITABLE FOR MINERAL BASED, HYDRAULIC FLUIDS AND WATER.
  - VITON FOR ELEVATED TEMPERATURES (—10°C TO 230°C) SUITABLE FOR PHOSPHATE ESTER FIRE RESISTANT OILS
  - ETHYLENE PROPYLENE FOR —40°C TO 125°C. SUITABLE FOR PHOSPHATE ESTER FIRE RESISTENT OILS, AUTOMOTIVE BRAKE FLUID, AND HOT WATER **MUST NOT BE USED WITH MINERAL BASED OILS**
- **BARREL**
- **PISTON**
- **BEARING**
- **EXTERNAL FINISH**
- **MOUNTINGS**
- **WIPER**
- **ACCESSORIES**
- **OTHERS**
  - HARD CHROME PLATED I.D.
  - BRONZE OVERLAYED
  - BRONZE
  - SOUARE RETAINER TAPPED
  - ROUND RETAINER
  - METALIC BLUE PAINT (STD.)
  - EPOXY PAINT FINISHES
  - ALL STAINLESS STEEL CYLS.
  - SPECIAL SIZES
  - JET AIR WIPER
  - SCRAPPERS
  - SPECIAL SIZES
  - ASBESTOS DUST BOOTS
  - PLEASE ASK

STOP TUBE AND PISTON ROD STROKE SELECTION

THE STOP TUBE acts as a spacer to increase the distance between the piston and the rod bearing when cylinder has fully out stroked. It minimises the "dog leg" or Jack-knife effect and reduces bearing pressures. Stop tubes are normally used for "L" lengths, as shown in diagrams opposite, in excess of 1 metre, 40 inch. Basic length of cylinder, LB, is increased by stop tube length.

$$\text{STOP TUBE LENGTH (mm)} = \frac{\text{"L" (mm)} - 1000\ \text{(mm)}}{10}$$

OR

$$\text{STOP TUBE LENGTH (inch)} = \frac{\text{"L" (inch)} - 40\ \text{(inch)}}{10}$$

Round off Stop Tube length to next centimetre or inch for convenience. The minimum Stop Tube length shall be 2 centimetres or 1 inch.

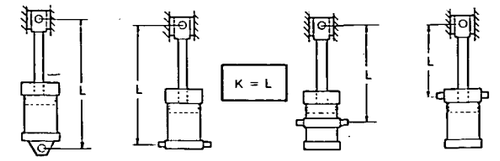
If stop tube length exceeds three times bore diameter, it is recommended that the next larger size cylinder is used at reduced operating pressure.

THE PISTON ROD in a cylinder acts as a column under thrust **(PUSH)** conditions. It is, therefore, subjected to both compressive stresses and buckling stresses. Consequently, it may be necessary to increase the rod diameter to achieve the necessary column "strength".

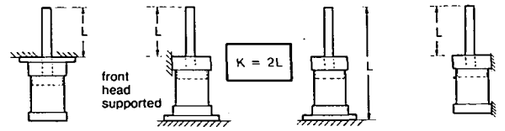
The values of **'K'** shown in the tables are our recommended maximum equivalent **'K'** length for normal horizontal and vertical applications under light to medium shock loads. For heavy duty shock loading and high cycling, choose the next rod size larger than shown by the table.

THE PROCEDURE

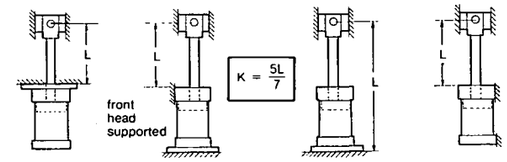
1. Determine actual length **'L'** from the applicable diagram remembering to **ADD** in stop tube length and any additional rod extension.
2. Calculate **'K'** from formula adjacent to each diagram group.
3. Determine cylinder thrust from applicable formula.
4. Find rod size from table by reading across line from the push (load) figure until the first figure exceeding calculated **'K'** is reached. Recommended rod diameter is then read from the top of the table.
5. If piston rod exceeds maximum rod size available in cylinder bore, then use larger bore cylinder at reduced operating pressure.



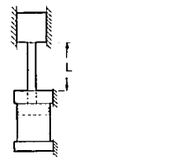
Case 1 — Both ends pivoted (round).



Case 2 — One end fixed — one end free.



Case 3 — One end fixed — one end free, but guided.



Case 4 — Both ends fixed. (Both ends rigidly coupled and guided.)

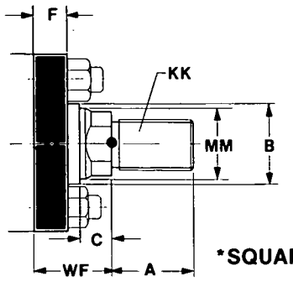
MILLIMETRE TABLE OF 'K'

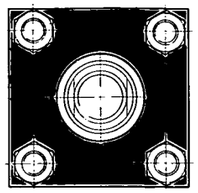
PUSH kN	ROD DIAMETER 16	25	35	44	51	64	76	89	102	114	127	140	152	178
1	1300													
2	920	2300												
2.5	820	2050	3920											
3	750	1870	3540											
4	650	1620	3070	5000	6450									
5	580	1450	2740	4500	5800									
6	530	1320	2500	4100	5300									
8	460	1140	2160	3500	4600	7100								
10	410	1020	1930	3150	4100	6400								
12	380	940	1760	2900	3750	5850								
14	350	870	1630	2670	3450	5400								
18	310	770	1440	2350	3050	4750	6870							
22	280	690	1300	2130	2750	4300	6200	8500						
26		640	1190	1950	2550	3950	5700	7850						
30		590	1120	1820	2350	3700	5300	7300						
35		550	1020	1680	2200	3400	4900	6700	8800					
40		510	960	1570	2050	3200	4600	6300	8200					
45		480	910	1480	1930	3000	4350	5900	7700	9700	12100			
50		460	860	1400	1830	2850	4100	5600	7320	9250	11200			
60			790	1280	1670	2600	3750	5100	6650	8400	10200			
80			680	1120	1450	2250	3250	4420	5790	7300	9100	11000		
100			610	990	1300	2000	2900	4000	5150	6550	8100	10000	11800	15800
150				810	1060	1630	2360	3230	4200	5300	6610	8100	9650	12800
200					910	1420	2050	2800	3660	4600	5750	7000	8350	11200
250						1260	1820	2500	3250	4120	5150	6250	7450	10000
300							1660	2280	2950	3760	4700	5700	6800	9100
350							1540	2100	2760	3500	4350	5300	6300	8400
400							1440	1970	2600	3260	4080	4930	5650	7800
500								1750	2310	2920	3620	4400	5250	7000
750				THIS AREA OVER MAX. THRUST ABILITY OF SHAFT					1880	2370	2970	3600	4250	5650
1000										2050	2570	3110	3700	4880
1250											2310	2790	3300	4370
1500											2200	2550	3020	4000
1750												2350	2800	3700
2000													2600	3450

INCH TABLE OF 'K'

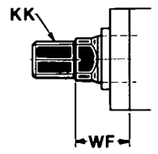
PUSH lb.f.	ROD DIAMETER 5/8	1	1 3/8	1 3/4	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	7
200	54													
500	34	86	165											
600	31	78	150											
800	27	67	129	207	270									
1 000	24	60	115	185	241									
1 200	22	55	105	170	221									
1 400	20	51	97	156	205									
1 600	19	48	90	146	192									
1 800	18	45	85	138	181	280								
2 000	17	43	80	131	171	267								
2 500	15	38	72	117	153	238								
3 000	14	35	65	107	140	218								
4 000	12	30	57	93	121	189	272							
5 000	11	27	50	83	108	172	243	330						
6 000		25	46	76	99	154	221	301						
7 000		23	42	70	91	143	205	280						
8 000		21	39	66	85	134	192	262	342					
9 000		20	37	62	80	126	181	246	323					
10 000		19	35	59	76	119	171	234	307	386				
12 000		17	32	54	70	109	156	212	279	351	435			
16 000			27	47	60	94	135	184	241	305	375			
20 000			24	42	54	84	122	165	216	272	336	405		
30 000				34	44	69	99	134	176	222	274	330	390	
40 000				29	38	60	86	116	152	193	238	286	337	
50 000					34	54	77	103	136	172	212	256	300	405
60 000						49	70	94	124	157	193	233	250	370
80 000							61	82	107	136	167	202	278	320
100 000							55	73	96	122	150	181	228	285
125 000								66	86	109	134	162	192	255
150 000				THIS AREA OVER MAX. THRUST ABILITY OF SHAFT				60	78	99	123	148	175	234
200 000									68	86	106	127	152	202
250 000										77	94	114	146	180
300 000											86	104	124	165
350 000												96	115	152
400 000												88	107	142

ROD END AND BEARING DIMENSIONS

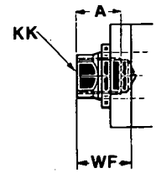




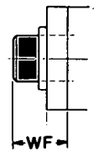
***SQUARE RETAINER WITH NUTS (STD.)**



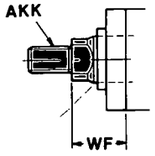
MALE
Code 1



FEMALE
Code 2



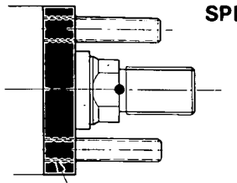
PLAIN
Code 3



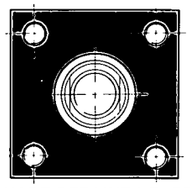
"A" SHAFT MALE
Code 4
WITH "A" SHAFT THREAD DIA. AND THREAD LENGTH IRRESPECTIVE OF SHAFT DIA.

OTHER
Code 5
(Details to be supplied)

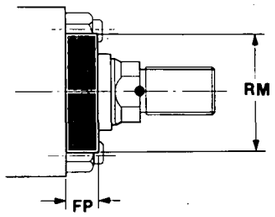
SPECIAL OPTIONS

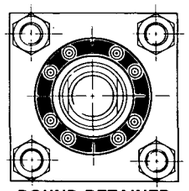


TIE RODS TAPPED INTO SQUARE RETAINER



*SQUARE RETAINER TAPPED AND EXTENDED TIE RODS





ROUND RETAINER

***AVAILABLE AS SQUARE OR RECTANGULAR FLANGE RETAINERS**

INCH

BORE	ROD CODE	ROD SIZE MM	A	B	C	F	FP	*KK	RM	WF
1½	A	.625	¾	1.124	⅜	⅜	NA	7/16-20	NA	1
	B	1.000	1 1/8	1.499	½	⅜	NA	¾-16	NA	1 3/8
2	A	1.000	1 1/8	1.499	½	⅝	NA	¾-16	NA	1 3/8
	B	1.375	1 5/8	1.999	⅝	⅝	NA	†1-12	NA	1 5/8
2½	A	1.000	1 1/8	1.499	½	⅝	½	¾-16	2 23/32	1 3/8
	B	1.375	1 5/8	1.999	⅝	⅝	NA	†1-12	NA	1 5/8
	C	1.750	2	2.374	¾	⅝	NA	1¼-12	NA	1 7/8
3¼	A	1.375	1 5/8	1.999	⅝	¾	⅝	†1-12	3½	1 5/8
	B	1.750	2	2.374	¾	¾	NA	1¼-12	NA	1 7/8
	C	2.000	2¼	2.624	⅞	¾	NA	1½-12	NA	2
4	A	1.750	2	2.374	¾	⅞	⅝	1¼-12	3 7/8	1 7/8
	B	2.000	2¼	2.624	⅞	⅞	⅝	1½-12	4 5/8	2
	C	2.500	3	3.124	1	⅞	⅝	1 7/8-12	4 5/8	2¼
5	A	2.000	2¼	2.624	⅞	⅞	⅝	1½-12	4 5/8	2
	B	2.500	3	3.124	1	⅞	⅝	1 7/8-12	4 5/8	2¼
	C	3.000	3½	3.749	1	⅞	¾	2¼-12	6 1/8	2¼
	D	3.500	3½	4.249	1	⅞	¾	2½-12	6 1/8	2¼
6	A	2.500	3	3.124	1	1	¾	1 7/8-12	5¾	2¼
	B	3.000	3½	3.749	1	1	¾	2¼-12	5¾	2¼
	C	3.500	3½	4.249	1	1	⅞	2½-12	7	2¼
	D	4.000	4	4.749	1	1	⅞	3-12	7	2¼
7	A	3.000	3½	3.749	1	1	¾	2¼-12	5¾	2¼
	B	3.500	3½	4.249	1	1	¾	2½-12	6¼	2¼
	C	4.000	4	4.749	1	1	⅞	3-12	7	2¼
	D	4.500	4½	5.249	1	1	⅞	3¼-12	7 3/8	2¼
	E	5.000	5	5.749	1	1	⅞	3½-12	8	2¼
8	A	3.500	3½	4.249	1	1	¾	2½-12	6¼	2¼
	B	4.000	4	4.749	1	1	⅞	3-12	7	2¼
	C	4.500	4½	5.249	1	1	⅞	3¼-12	7 3/8	2¼
	D	5.000	5	5.749	1	1	⅞	3½-12	8	2¼
	E	5.500	5½	6.249	1	1	⅞	4-12	8½	2¼
10	A	4.500	4½	5.249	1	1 11/16	1½	3¼-12	8	2 15/16
	B	5.000	5	5.749	1	1 11/16	1½	3½-12	8	2 15/16
	C	5.500	5½	6.249	1	1 11/16	1½	4-12	9	2 15/16
	D	6.000	5½	6.749	1	1 11/16	1½	4-12	9	2 15/16
	E	7.000	5½	7.749	1	1 11/16	1½	4-12	10	2 15/16
12	AVAILABLE ON APPLICATION									

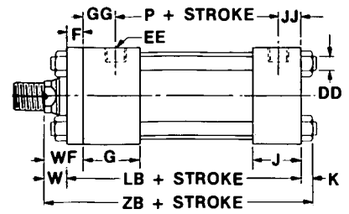
MILLIMETRE

BORE	ROD CODE	ROD SIZE MM	A	B	C	F	FP	*KK	RM	WF
38	A	15.88	19	28.55	9.5	9.5	NA	7/16-20	NA	25
	B	25.40	29	38.07	13	9.5	NA	¾-16	NA	35
51	A	25.40	29	38.07	13	16	NA	¾-16	NA	35
	B	34.92	41	50.77	16	16	NA	†1-12	NA	41
63	A	25.40	29	38.07	13	16	13	¾-16	69	35
	B	34.92	41	50.77	16	16	NA	†1-12	NA	41
	C	44.45	51	60.30	19	16	NA	1¼-12	NA	48
82	A	34.92	41	50.77	16	19	16	†1-12	89	41
	B	44.45	51	60.30	19	19	NA	1¼-12	NA	48
	C	50.80	57	66.65	22	19	NA	1½-12	NA	51
102	A	44.55	51	60.30	19	22	16	1¼-12	98	48
	B	50.80	57	66.65	22	22	16	1½-12	117	51
	C	63.50	76	79.35	25	22	16	1 7/8-12	117	57
127	A	50.80	57	66.65	22	22	16	1½-12	117	51
	B	63.50	76	79.35	25	22	16	1 7/8-12	117	57
	C	76.20	89	95.22	25	22	19	2¼-12	156	57
	D	88.90	89	107.92	25	22	19	2½-12	156	57
152	A	63.50	76	79.35	25	25	19	1 7/8-12	146	57
	B	76.20	89	95.22	25	25	19	2¼-12	146	57
	C	88.90	89	107.92	25	25	22	2½-12	178	57
	D	101.60	102	120.62	25	25	22	3-12	178	57
178	A	76.20	89	95.22	25	25	19	2¼-12	146	57
	B	88.90	89	107.92	25	25	19	2½-12	159	57
	C	101.60	102	120.62	25	25	22	3-12	178	57
	D	114.30	114	133.32	25	25	22	3¼-12	187	57
	E	127.00	127	146.02	25	25	22	3½-12	203	57
203	A	88.90	89	107.92	25	25	19	2½-12	159	57
	B	101.60	102	120.62	25	25	22	3-12	178	57
	C	114.30	114	133.32	25	25	22	3¼-12	187	57
	D	127.00	127	146.02	25	25	22	3½-12	203	57
	E	139.70	140	158.72	25	25	22	4-12	216	57
254	A	114.30	114	133.32	25	43	38	3¼-12	203	75
	B	127.00	127	146.02	25	43	38	3½-12	203	75
	C	139.70	140	158.72	25	43	38	4-12	229	75
	D	152.40	140	171.42	25	43	38	4-12	229	75
	E	177.80	140	196.82	25	43	38	4-12	254	75
305	AVAILABLE ON APPLICATION									

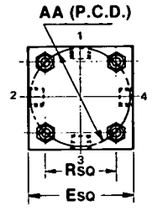
* = UNF THREAD
NA = NOT AVAILABLE
† = NFPA STD. IS 1"-14 UNS. THIS IS NON STD. THREAD. NUTS AND TAPS ARE GENERALLY UNAVAILABLE. WE THEREFORE SUPPLY 1"-12 UNF BUT 1"-14 UNS IS AVAILABLE ON APPLICATION.

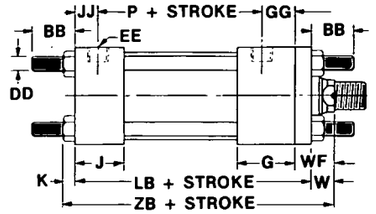
Q-Pulse Id IMS781

TIE RODS MOUNTING ENVELOPE DIMENSIONS

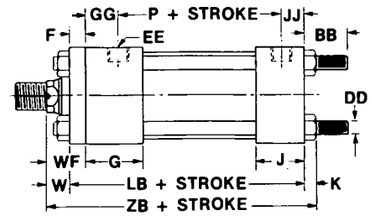


0X NO TIE RODS
NFPA STYLE MX0

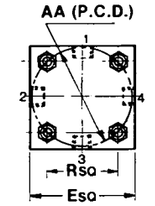




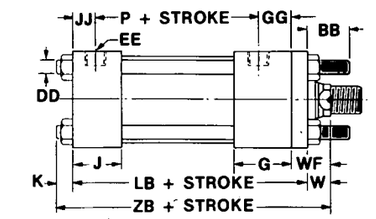
1X BOTH ENDS TIE RODS
NFPA STYLE MX1



2X CAP TIE RODS
NFPA STYLE MX2



PORTS ARE NUMBERED CLOCKWISE 1 TO 4 WHEN VIEWED FROM FRONT END.



3X HEAD TIE RODS
NFPA STYLE MX3

BOTH 1X AND 3X STYLE AVAILABLE WITH TIE RODS TAPPED INTO SQUARE RETAINER FOR FLUSH HEAD MOUNTING AS SHOWN ON PAGE 5.

INCH

BORE	ROD	W	WF	ZB	E	F	G	J	K	P	R	AA	BB	●DD	▲EE	GG	JJ	LB
1½	A	5/8	1	6	2½	⅜	1¾	1½	⅜	2 15/16	1.63	2.3	1⅜	⅜-24	½	1 31/32	23/32	5
	B	1	1⅜	6⅜														
2	A	¾	1¾	6 7/16	3	⅝	1¾	1½	7/16	2 15/16	2.05	2.9	1 13/16	½-20	½	1 31/32	23/32	5¼
	B	1	1⅝	6 11/16														
2½	A	¾	1⅜	6 9/16	3½	⅝	1¾	1½	7/16	3 1/16	2.55	3.6	1 13/16	½-20	½	1 31/32	23/32	5⅜
	B	1	1⅝	6 13/16														
	C	1¼	1⅞	7 1/16														
3¼	A	⅞	1⅝	7 11/16	4½	¾	2	1¾	9/16	3 9/16	3.25	4.6	2 5/16	⅝-18	¾	1 13/32	27/32	6¼
	B	1 1/8	1⅞	7 15/16														
	C	1¼	2	8 1/16														
4	A	1	1⅞	8 3/16	5	⅞	2	1¾	9/16	3 13/16	3.82	5.4	2 5/16	⅝-18	¾	1 13/32	27/32	6 5/8
	B	1 1/8	2	8 5/16														
	C	1 3/8	2¼	8 9/16														
5	A	1 1/8	2	9 1/16	6½	⅞	2	1¾	¾	4 5/16	4.95	7.0	3 3/16	⅞-14	¾	1 13/32	27/32	7⅛
	B-D	1 3/8	2¼	9 5/16														
6	A-D	1¼	2¼	10½	7½	1	2¼	2¼	⅞	5	5.73	8.1	3 5/8	1-12	1	1 3/16	1 3/16	8 3/8
7	A-E	1¼	2¼	11¾	8½	1	2¾	2¾	1	5 3/8	6.58	9.3	4 1/8	1 1/8-12	1¼	1 9/16	1 9/16	9½
8	A-E	1¼	2¼	12 13/16	9½	1	3	3	1 1/16	6 1/8	7.50	10.6	4½	1¼-12	1¼	1 11/16	1 11/16	10½
10	A-E	1¼	2 15/16	16 5/8	12 5/8	1 11/16	3 11/16	3 11/16	1 9/16	8½	9.62	13.6	5½	1¾-12	2	1 13/16	1 13/16	13 13/16

● = U.N.F. THREAD
▲ = PORT B.S.P. PL THREAD

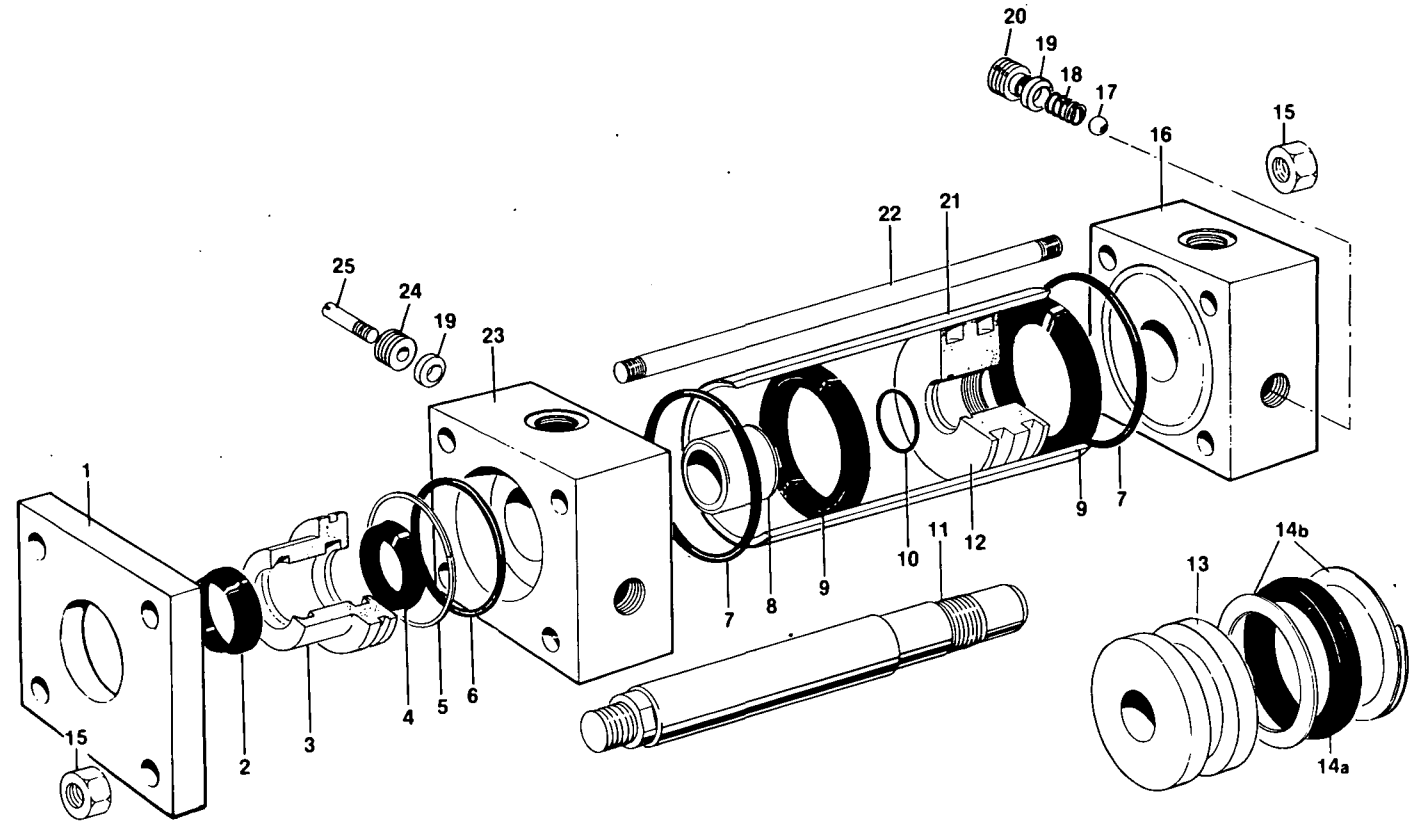
MILLIMETRE

BORE	ROD	W	WF	ZB	E	F	G	J	K	P	R	AA	BB	●DD	▲EE	GG	JJ	LB
38	A	16	25	152	64	10	44	38	10	75	41.40	58 42	35	⅜-24	½	25	18	127
	B	25	35	162														
51	A	19	35	164	76	16	44	38	11	75	52.07	73.66	46	½-20	½	25	18	133
	B	25	41	170														
63	A	19	35	167	89	16	44	38	11	78	64.77	91.44	46	½-20	½	25	18	137
	B	25	41	173														
	C	32	48	179														
82	A	22	41	195	114	19	51	44	14	90	82.55	116.84	59	⅝-18	¾	28	21	159
	B	29	48	202														
	C	32	51	205														
102	A	25	48	208	127	22	51	44	14	97	97.03	137.16	59	⅝-18	¾	28	21	168
	B	29	51	211														
	C	35	57	217														
127	A	29	51	230	165	22	51	44	19	110	125.73	177.80	81	⅞-14	¾	28	21	181
	B-D	35	57	237														
152	A-D	32	57	267	191	25	57	57	22	127	145.54	205.74	92	1-12	1	30	30	213
178	A-E	32	57	298	216	25	70	70	25	137	167.13	236.22	105	1⅛-12	1¼	40	40	241
203	A-E	32	57	325	241	25	76	76	27	156	190.50	269.24	114	1¼-12	1¼	43	43	267
254	A-E	32	75	422	321	43	94	94	40	216	244.35	345.44	140	1¾-12	2	46	46	351

● = U.N.F. THREAD
▲ = PORT B.S.P. PL THREAD

Active 29/01/2014

CYLINDER PARTS LIST



WHEN ORDERING SPARE PARTS PLEASE GIVE FULL CYLINDER CODE

SPARE PARTS LIST

. FOR DOUBLE ACTING CYLINDER CUSHIONED BOTH ENDS (H7 AND H8 DACE)

ITEM NO.	DESCRIPTION	QTY.	SEAL KIT ITEMS
1	SQUARE RETAINER	1	
2	ROD WIPER	1	1
3	GLAND BUSH BEARING	1	
4	GLAND SEAL	1	1
5	BACK UP WASHER (GLAND BUSH)	1	1
6	O-RING (GLAND BUSH)	1	1
7	O-RING (BARREL)	2	2
8	CUSHION PLUNGER	1	
9	H7 PISTON SEAL: SINGLE ACTING	2	2
10	O-RING (PISTON)	1	1
11	PISTON ROD	1	
12	H7 PISTON	1	
13	H8 PISTON	1	
14a	H8 PISTON SEAL: DOUBLE ACTING	1	1
14b	H8 PISTON SEAL BACK UP WASHER	2	2
15	TIE ROD NUT	8	
16	CAP END	1	
17	BALL (CHECK VALVE)	2	
18	SPRING (CHECK VALVE)	2	
19	TEFLON SEAL	4	4
20	RETAINER (CHECK VALVE)	2	
21	BARREL	1	
22	TIE ROD	4	
23	HEAD END	1	
24	RETAINER (CUSHION)	2	
25	CUSHION ADJUSTING SCREW	2	

• INDIVIDUAL MOUNTING STYLES NOT INCLUDED IN ABOVE LIST, NOMINATE BY STYLE CODING AS REQUIRED.

SEAL KITS: STD.

FOR VITON SEAL KITS QUOTE SAME PART NUMBER BUT IN 4A . . . . SERIES

BORE	ROD SIZE CODE	ROD SIZE DIA.	H7	H8
1½	A	.625	3A0054	3A0116
	B	1.000	3A0055	3A0117
2	A	1.000	3A0056	3A0118
	B	1.375	3A0057	3A0119
2½	A	1.000	3A0058	3A0120
	B	1.375	3A0059	3A0121
	C	1.750	3A0060	3A0122
3¼	A	1.375	3A0061	3A0123
	B	1.750	3A0062	3A0124
	C	2.000	3A0063	3A0125
4	A	1.750	3A0064	3A0126
	B	2.000	3A0065	3A0127
	C	2.500	3A0066	3A0128
5	A	2.000	3A0067	3A0129
	B	2.500	3A0068	3A0130
	C	3.000	3A0069	3A0131
	D	3.500	3A0070	3A0132
6	A	2.500	3A0071	3A0133
	B	3.000	3A0072	3A0134
	C	3.500	3A0073	3A0135
	D	4.000	3A0074	3A0136
7	A	3.000	3A0075	3A0137
	B	3.500	3A0076	3A0138
	C	4.000	3A0077	3A0139
	D	4.500	3A0078	3A0140
	E	5.000	3A0079	3A0141
8	A	3.500	3A0080	3A0142
	B	4.000	3A0081	3A0143
	C	4.500	3A0082	3A0144
	D	5.000	3A0083	3A0145
	E	5.500	3A0084	3A0146
10	A	4.500	3A0085	3A0147
	B	5.000	3A0086	3A0148
	C	5.500	3A0087	3A0149
	D	6.000	3A0088	3A0150
	E	7.000	3A0089	3A0151

ALL SEAL KITS INCLUDE SEALS FOR DOUBLE ACTING CYLINDERS CUSHIONED BOTH ENDS.

TIE ROD NUT TORQUE H7 SPECIFICATIONS (H8: HALF VALUE)

BORE DIA.	TORQUE ft. lbsf.	ELONG. IN 36"
1½	25	.025"
2	40	.025"
2½	55	.040"
3¼	100	.040"
4	150	.060"
5	320	.050"
6	470	.055"
7	700	.060"
8	850	.060"
10	700	.050"

TORQUE FIGURES APPLY FOR OIL LUBRICATED NUTS

WARNING

WHEN REASSEMBLING CYLINDERS, TIE ROD NUTS MUST BE TORQUED UP TO THE FIGURES GIVEN ABOVE OTHERWISE BARREL O-RINGS (ITEM No. 7) ARE LIKELY TO DAMAGE IN SERVICE AND SUBSEQUENTLY LEAK.

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PONGRASS INDUSTRIES LIMITED
Cnr. Progress & Industrial Rds.
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Phone (07) 271 2711
Telex AA 41991

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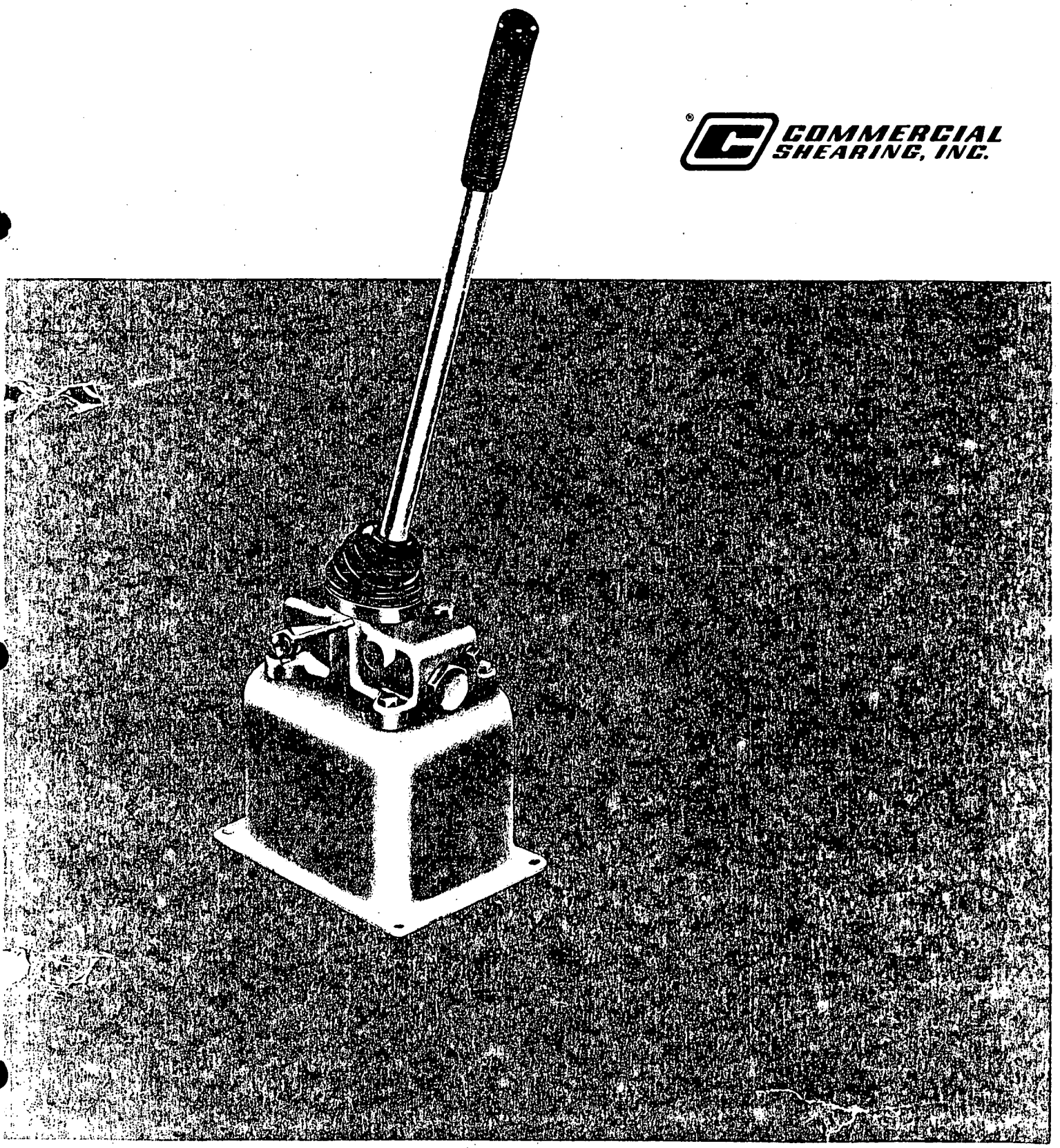
YOUR LOCAL DISTRIBUTOR:

Right to change design reserved.

OIL HYDRAULIC FLUID POWER HAND PUMPS

pressures
up to
5000 psi

COMMERCIAL SHEARING, INC.

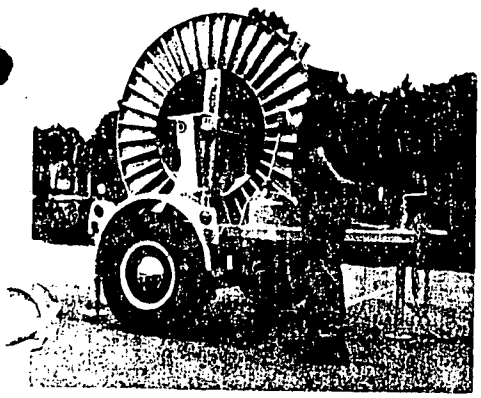


COMMERCIAL SHEARING, INC.

typical applications

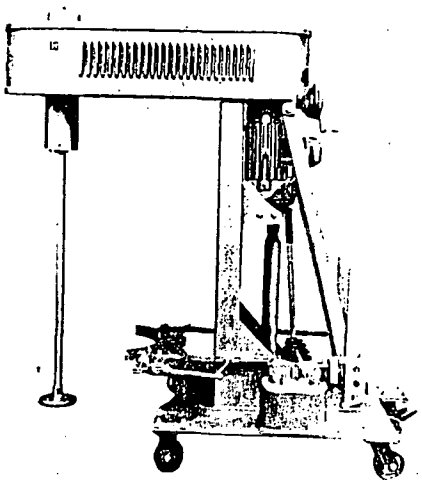
one-man cable reel trailers

One man can pick up and deliver cable to job site. Commercial's hand-operated, double-acting hydraulic pump activates two cylinders that lift cradle and spindle bar to full travel position.



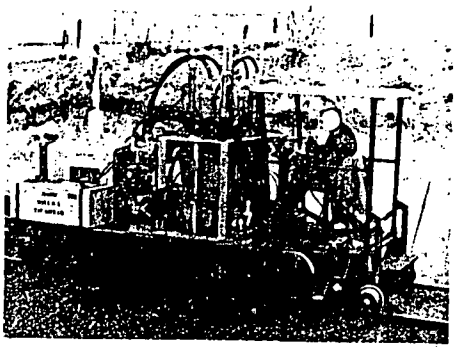
chemical disperser

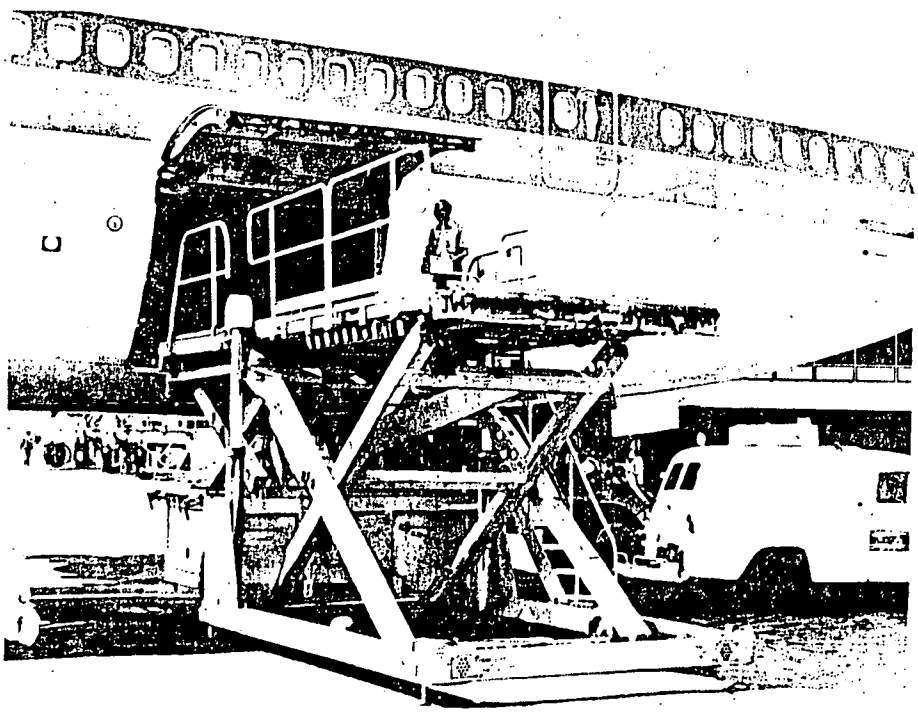
Efficiently disperses, deagglomerates, dissolves or emulsifies a wide range of chemical products. For raising and lowering, the entire assembly tilts up and out of container.



railroad tie shear

Commercial's hand pump provides many emergency functions in this railway maintenance application. The hand pump can be used to retract the tie shear blades and the tie butt kicker arms, also to raise the shear blade towers to the travel position. The hand pump also operates a turntable when it's necessary to move in the opposite direction.





aircraft container/pallet loader

Scissor-lift platform is raised hydraulically to working height to load aircraft. Commercial's hand pump is used as a standby unit to provide hydraulic power should the main hydraulic system malfunction.

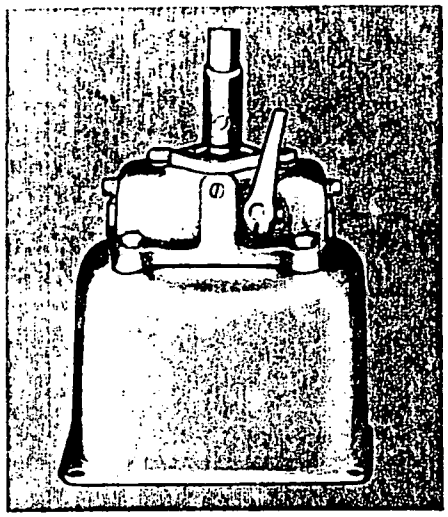
NOTE: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

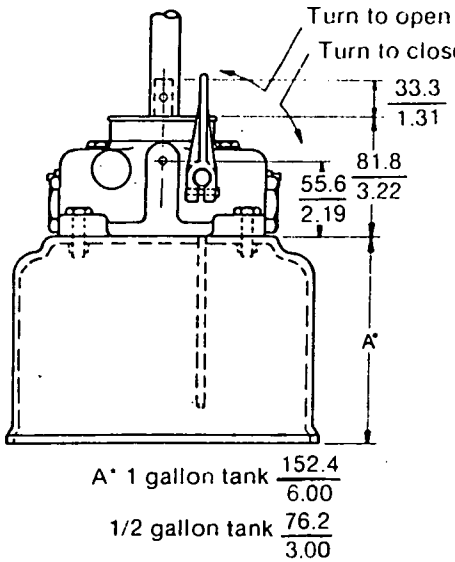
dimensional data

with tank

Commercial's hand pumps are available as a unit with tanks of either 1 or ½ gallon capacity. Dimensional data below applies to both models.

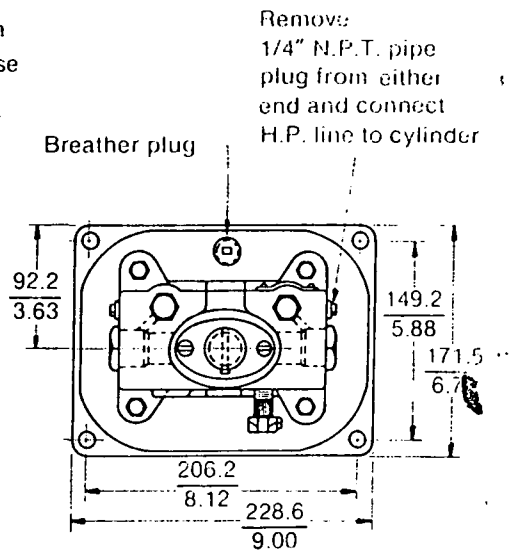
Dimensional data shown in mm / inches





A* 1 gallon tank 152.4 / 6.00

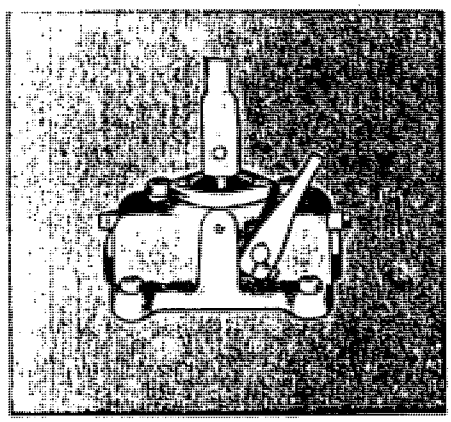
1/2 gallon tank 76.2 / 3.00

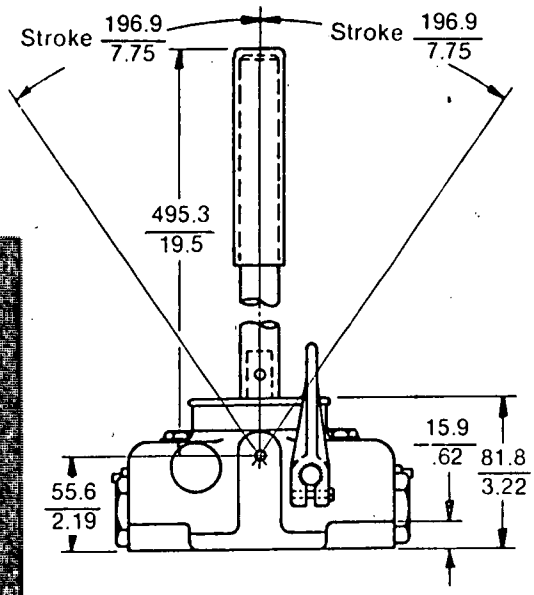


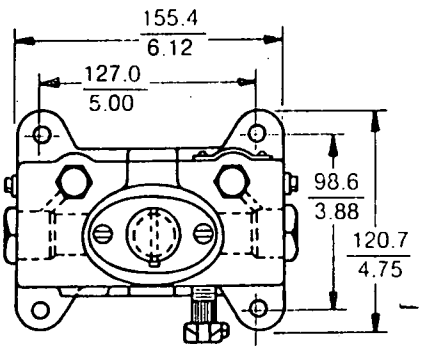
without tank

Dimensional data shown in mm / inches

To avoid mismatching components, mounting bolts and suction pipe will not be furnished if another manufacturer's reservoir is to be used.







4

service instructions

The complete hand pump unit consists of a pump mounted on a tank. Both are illustrated in the exploded view on page 6.

Simplicity is the keynote of construction. Should trouble occur, however, these service instructions will enable you to locate and correct it.

detailed description

The pump is double-acting. A full or partial stroke is effective in either direction. Outlets, tapped for ¼" NPT male fittings, are provided at both ends of the pump. If only a single outlet is used, the other remains plugged.

The tank serves as the hydraulic oil reservoir. For shipment, the filler opening is closed with a solid plug which should be replaced with a vented plug prior to operation.

Normally, hand pumps are mounted in a vertical position. The tank should be filled with an adequate amount of oil to operate all rams connected to the tank at one time plus a reserve. The end of the suction pipe must be submerged at all times. The suction pipe must be tight to prevent air from entering the pump.

If the hand pump is installed in any position other than vertical, be certain that the suction pipe is always submerged.

oil specifications

The hydraulic oil we supply in these units is of the best quality, suitable for all-year operation, including winter temperatures as low as 20 to 30 degrees below zero. Whenever you replace oil, use equal quality. An SAE 10W oil with a minus 30 degree cold-pour test is satisfactory for climates where temperatures do not fall below this mark. **Never use hydraulic brake fluid.**

Care should be taken when filling the tank to exclude all foreign particles and water. Dirt will eventually damage check valves; water causes foaming, and can cause castings to burst if freezing occurs.

lines and hoses

High-pressure flexible hose or tubing with a minimum bursting pressure between 8,000 and 10,000 psi is recommended. Lines should be the same size as the ports (¼").

A union or swivel connection should be used at one end of the line. To assemble, attach the non-swiveling end of the line to the pump unit. With the ram in its operating position and retracted, run the connecting line from the pump to the ram and work the pump handle until oil flows from the end of the line venting as much air as possible from the line. Then make the connection. Be sure to avoid twists in the hose when tightening the union or swivel. Twists cause early hose failures. Air in the lines creates uncertain and jerky action, so keep all lines tight.

operation

To extend a ram connected to the pump, first close the control valve. Then, operate the pump handle back and forth until the ram has been extended to the desired length, or to the end of its stroke. The ram will stay in this position until lowered by the operator. Do not pump after the end of the stroke has been reached, which is signaled by sharply increased resistance on the pump handle. Never use a longer handle than provided as original equipment; to do so may damage vital parts.

To lower or retract the ram, open the control valve and the load on the ram will force it down, at the same time returning the oil to the supply tank. Lowering speed can be controlled by varying the valve opening.

care and service

Failure to operate at one or both ends of the stroke is usually due to improper check ball seating. Dirt and other foreign particles are the chief troublemakers. Remove plug No. 28 and check balls and springs. Examine the seats to see that they are smooth and clean. Clean all parts thoroughly and re-assemble.

If both ends fail to pump, dirt may be in both check valves or low oil level may have caused the suction line to be exposed. Make sure the suction pipe is clean, free of obstructions and airtight. Replenish the oil supply. Also, check to see that the seat and needle valve seal perfectly.

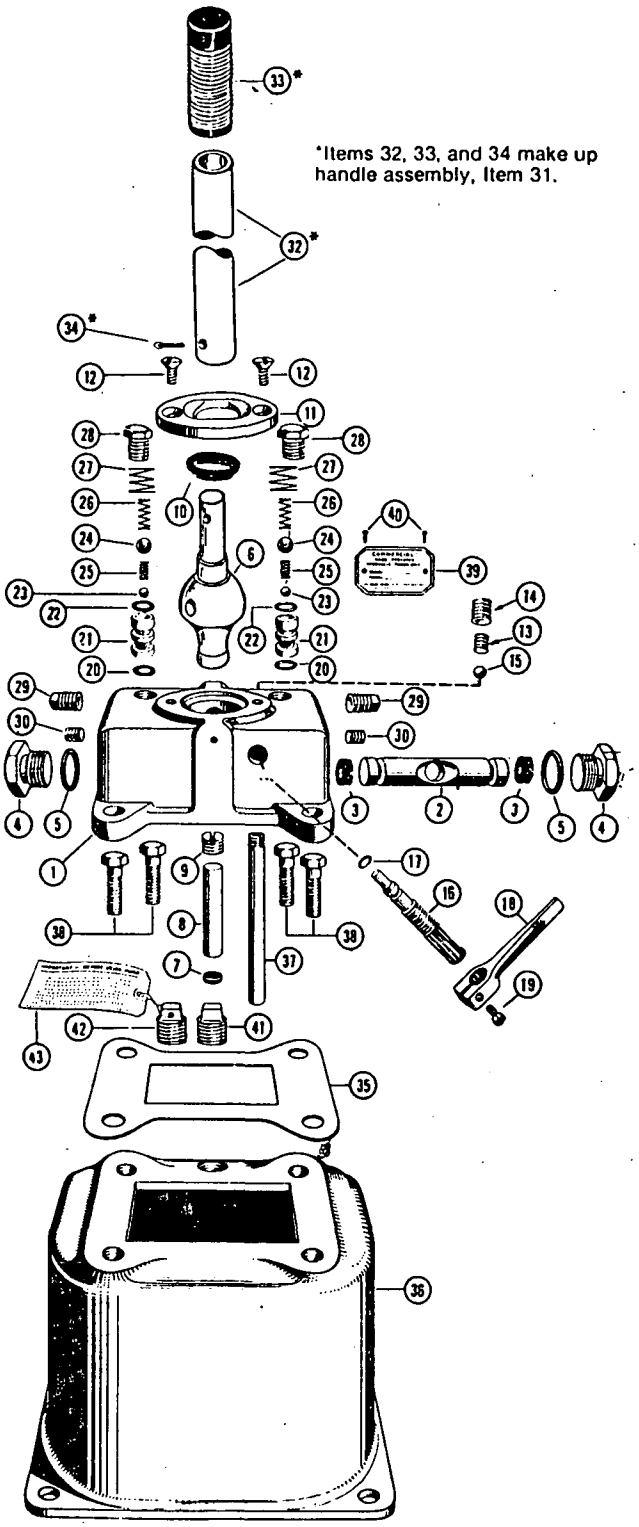
If caps No. 4 have been removed to inspect the piston or bore of the pump, use sealing compound on the threads when re-assembling. These caps must be tight to prevent any oil leak and to keep air out of the pump.

If the plunger is removed, be sure to refill the operating lever chamber with oil.

original service parts

In order to avoid delays in receiving service parts, please include the model and serial numbers of the pump in your order.

exploded view



service parts list

NOTE: To replace handle assembly, order part number 355 9100 007, Item 31. This assembly consists of one piece each of Items 32, 33, and 34 which are not sold separately.

Item	Description	Engineering Number
1.	Housing	B1120-1
1.	Housing	B1120-1-1
1.	Housing	B1120-4
1.	Housing	B1120-1-4
1.	Housing	B1120-7
1.	Housing	B1120-1-7
2.	Plunger	M1326-1
2.	Plunger	M1326-2
2.	Plunger	M1326-3
3.	Plunger Packing	F3103-1
3.	Plunger Packing	F3103-2
3.	Plunger Packing	F3103-3
4.	Cap	A1704-1
5.	Cap "O" Ring	L3006-7
6.	Plunger Operating Lever	—
7.	Pin Packing (Rubber)	C1707-4
8.	Operating Lever Pin	A1509-7
10.	Seal Ring	X73-38
11.	Packing Retainer	N1016
12.	¼" x ⅜" Oval Head Machine Screw	X45-16
13.	Control Valve Seat	D2211-4
14.	Pipe Plug	X1-49-3
15.	5/16" Steel Ball	X53-9
16.	Control Valve	J1033
17.	Control Valve "O" Ring	L3006-40
18.	Control Valve Lever	G1541
19.	¼" x ⅛" Cap Screw Hex Head	X2-93
20.	"O" Ring Seal	L3006-111
21.	Insert Seat	E1391
22.	"O" Ring	L3006-43
23.	¼" Stainless Steel Ball (Intake)	X53-10
24.	⅜" Stainless Steel Ball (Discharge)	X53-11
25.	Intake Ball Spring	A1327-18
26.	Discharge Ball Spring	A1327-17
27.	Ball Retainer Spring	A1327-96
28.	⅜" Special Pipe Plug	B2211-3
29.	¼" Pipe Plug	X1-49-2
30.	⅛" Pipe Plug	X1-26
30.	⅛" Pipe Plug	X1-26
31.	Handle Assembly (Items 32, 33, 34)	—
32.	Operating Lever Handle	—
33.	Handle Grip	—
34.	Cotter Pin	X9-2
35.	Gasket	E1014
36.	Tank	C2210
36.	Tank	D2210
37.	Suction Pipe	—
37.	Suction Pipe	—
38.	⅜" x 1¼" Hex Cap Screw	X2-9
39.	Name Plate	A2078-23-1
40.	Drive Screw	X41-4
41.	½" Pipe Plug (For Shipping)	X1-5
42.	Breather Plug	A2211-2
43.	Hand Pump Tag	A2079-3

COMMERCIAL SHEARING, INC.

• Dots in table below indicate which parts make up each model.

Computer Number	Req'd. Per Unit	Model Number											
		C301	C304	C307	C301-2	C304-2	C307-2	C301A	C304A	C307A	C301B	C304B	C307B
355 1501 701	1	•			•			•					
355 1501 704	1										•		
355 1501 702	1		•			•			•				
355 1501 705	1											•	
355 1501 703	1			•			•			•			
355 1501 706	1												•
391 2383 021	1	•			•			•			•		
391 2383 023	1		•			•			•			•	
391 2383 024	1			•			•			•			•
391 1983 101	2	•			•			•			•		
391 1983 102	2		•			•			•			•	
391 1983 103	2			•			•			•			•
391 0583 003	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2881 101	2	•	•	•	•	•	•	•	•	•	•	•	•
391 1842 004	1	•	•	•	•	•	•	•	•	•	•	•	•
391 1988 014	1	•	•	•	•	•	•	•	•	•	•	•	•
391 2089 027	1	•	•	•	•	•	•	•	•	•	•	•	•
391 2883 059	1	•	•	•	•	•	•	•	•	•	•	•	•
355 1508 004	1	•	•	•	•	•	•	•	•	•	•	•	•
391 1433 016	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2285 005	1	•	•	•	•	•	•	•	•	•	•	•	•
391 2282 057	1	•	•	•	•	•	•	•	•	•	•	•	•
391 0282 009	1	•	•	•	•	•	•	•	•	•	•	•	•
391 3682 010	1	•	•	•	•	•	•	•	•	•	•	•	•
391 2881 134	1	•	•	•	•	•	•	•	•	•	•	•	•
391 1841 001	1	•	•	•	•	•	•	•	•	•	•	•	•
391 1401 093	1	•	•	•	•	•	•	•	•	•	•	•	•
391 2881 205	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2982 002	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2881 137	2	•	•	•	•	•	•	•	•	•	•	•	•
391 0282 010	2	•	•	•	•	•	•	•	•	•	•	•	•
391 0282 011	2	•	•	•	•	•	•	•	•	•	•	•	•
391 3581 018	2	•	•	•	•	•	•	•	•	•	•	•	•
391 3581 017	2	•	•	•	•	•	•	•	•	•	•	•	•
391 3581 091	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2282 063	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2282 056	3	•	•	•	•	•	•	•	•	•	•	•	•
391 2282 026	2	•	•	•	•	•	•	•	•	•			
391 2282 026	4										•	•	•
355 9100 007	1	•	•	•	•	•	•	•	•	•	•	•	•
355 1507 004	0												
391 0283 016	0												
391 2081 002	0												
391 1584 012	1	•	•	•	•	•	•	•	•	•	•	•	•
355 1506 002	1	•	•	•									
355 1506 004	1				•	•	•						
391 2102 027	1	•	•	•									
391 2102 028	1				•	•	•						
391 1401 009	4	•	•	•	•	•	•						
391 2181 009	1	•	•	•	•	•	•	•	•	•	•	•	•
391 1432 004	2	•	•	•	•	•	•	•	•	•	•	•	•
391 2282 005	1	•	•	•	•	•	•						
391 2285 012	1	•	•	•	•	•	•						
391 4061 003	1	•	•	•	•	•	•	•	•	•	•	•	•

SC20/80

Duffield

D99 & D900 HYDRAULIC HOSE and REUSABLE FITTINGS

Frederick Duffield

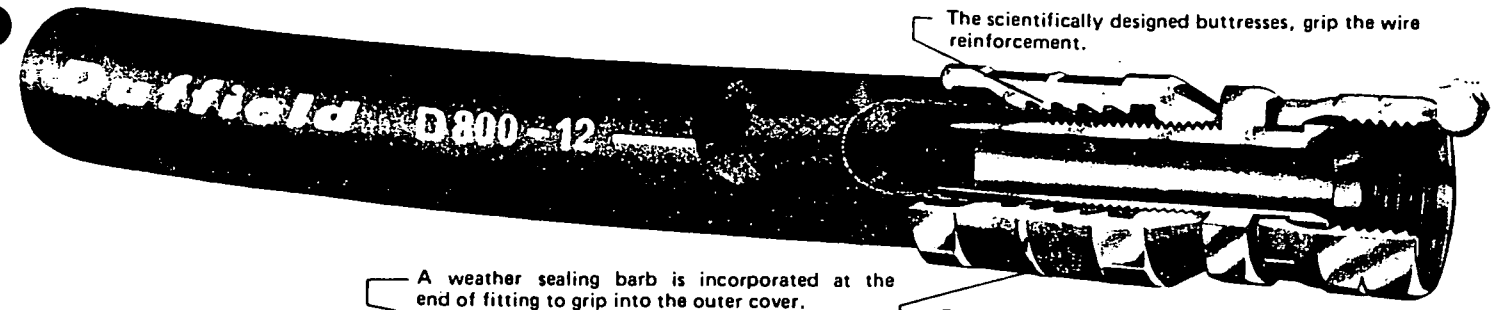
Pty. Limited

HEAD OFFICE: Beaumont Road, Mt. Kuring-gai, N.S.W. 2080, AUSTRALIA

BRANCHES: ● SYDNEY ● NEWCASTLE ● MELBOURNE
● BRISBANE ● [illegible] ● PERTH

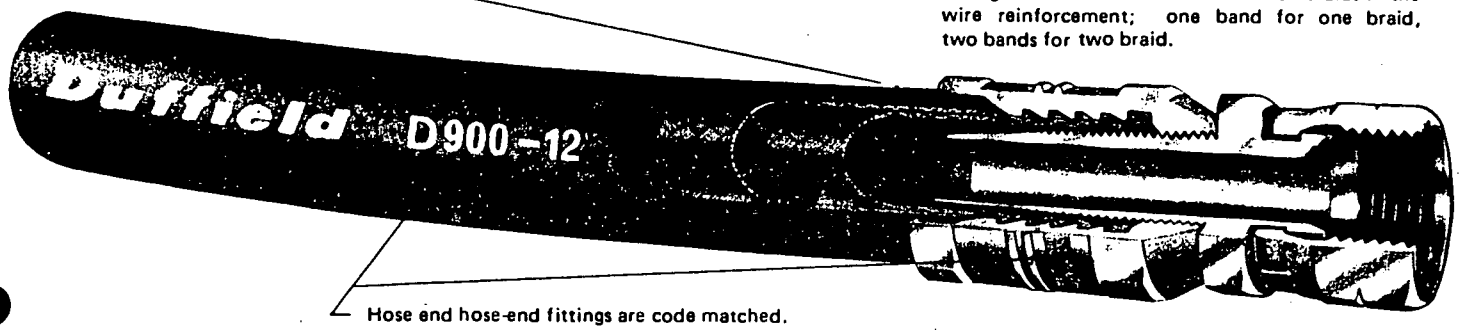
Q-P[illegible]

Duffield D800 & D900 HYDRAULIC HOSE



A weather sealing barb is incorporated at the end of fitting to grip into the outer cover.

Recognition band denotes number of braids in the wire reinforcement; one band for one braid, two bands for two braid.



Hose end hose-end fittings are code matched.

Duffield SPECIFICATION D800/- HOSE
ONE WIRE BRAID – MEDIUM PRESSURE
S.A.E. 100R1 TYPE A

HOSE PART No.		D800/4	D800/5	D800/6	D800/8	D800/10	D800/12	D800/16	D800/20	D800/24	D800/32
Hose Inside Diameter Nominal	Ins	1/4	5/16	3/8	1/2	5/8	3/4	1	1.1/4	1.1/2	2
	mm	6,3	8	10	12,5	16	19	25	31,5	38	51
Working Pressure Recommended Maximum	PSI	2,750	2,500	2,250	2,000	1,500	1,250	1,000	625	500	375
SAE & ISO	MPa	20,0	17,5	16	14,0	10,5	9,0	7,0	4,4	3,5	2,6
Burst Pressure Minimum SAE & ISO	PSI	11,000	10,000	9,000	8,000	6,000	5,000	4,000	2,500	2,000	1,500
	MPa	80	70	64	56	42	36	28	17,6	14	10,4
Bend Radius Minimum	Ins	4	4.5	5	7	8	9.5	12	16.5	20	26
	mm	100	115	130	180	205	240	300	420	500	630
Hose Outside Diameter Nominal	Ins	0.625	0.688	0.781	0.907	1.031	1.188	1.500	1.812	2.063	2.625
	mm	15,88	17,48	19,84	23,04	26,19	30,18	38,10	46,02	52,40	66,68
Wire Braid O.D. Nominal	Ins	0.438	0.500	0.594	0.719	0.844	1.000	1.313	1.594	1.844	2.375
	mm	11,13	12,70	15,09	18,26	21,44	25,40	33,35	40,49	46,84	60,33
Approx. Wt/Ft. Approx. Wt/m	lbs	0.19	0.22	0.29	0.37	0.43	0.52	0.77	1.00	1.99	1.63
	kg	0,28	0,33	0,43	0,55	0,64	0,78	1,15	1,49	1,78	2,43

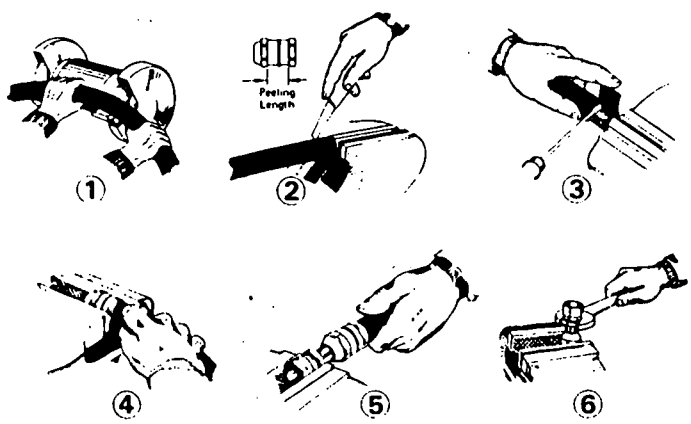
Duffield SPECIFICATION D900/- HOSE
TWO WIRE BRAID – HIGH PRESSURE
S.A.E. 100R2 TYPE A

D900/4	D900/6	D900/8	D900/10	D900/12	D900/16	D900/20	D900/24	D900/32
1/4	3/8	1/2	5/8	3/4	1	1.1/4	1.1/2	2
6,3	10	12,5	16	19	25	31,5	38	51
5,000	4,000	3,500	2,750	2,250	2,000	1,625	1,250	1,000
35	28	25	20	16	14	11	9	8
20,000	16,000	14,000	11,000	9,000	8,000	6,500	5,000	4,000
140	112	100	80	64	56	44	36	32
4	5	7	8	9.5	12	16.5	20	25
100	130	180	205	240	300	420	500	630
.687	.843	.969	1.093	1.250	1.562	2.000	2.250	2.750
17,45	21,41	24,61	27,76	31,75	39,67	50,80	57,15	69,85
.500	.657	.781	.906	1.063	1.375	1.750	2.000	2.500
12,70	16,69	19,84	23,01	27,00	34,93	44,45	50,80	63,50
0.30	0.45	0.54	0.82	0.73	1.06	1.77	2.00	2.80
0,45	0,67	0,80	0,92	1,09	1,58	2,64	2,98	3,73

Temperature Range -40°C to +130°C. Hot Air Max. 70°C
-40°F to +266°F. Hot Air Max. 158°F

Prolonged operation at extreme temperatures may reduce hose life.

D800 & D900 HOSE ASSEMBLY INSTRUCTIONS



Step 1. Cut the hose to length with a Duffield cutting disc taking care that the end is cut squarely. The hose length can be calculated by subtracting the "D" dimension from the desired overall length of the assembly "L". See detailed sketch on page 5.

Step 2. Make one circular knife cut at a distance from the end of the hose equal to the peeling length. (Distance between hexagon collars on the hose-end body.) Make one length-wise cut down to the wires. Do not damage the wires.

Step 3. Using a screwdriver remove the rubber cover from the hose. When the rubber is removed an excess of rubber may adhere to the wires. Remove this excess rubber with a knife.

Step 4. Grip the body in the vice so that the vice jaws make contact with both hexagon collars. Push the prepared hose into the body using a semi-rotational movement, first clockwise then anti-clockwise, until the hose is home. The extreme end of the hose should then be standing 1/32" to 1/16" away from the inside shoulder of the 'fine thread' in the body. This is correct.

Step 5. Grip the "stem" in the vice for the purpose of starting it into the body. Moisten the mating surfaces and threads with light oil. Engage two or three threads by hand.

Step 6. Finally, grip the body in the vice, then screw the stem home with a spanner until the hexagon collar in the stem is from 1/16" to zero from the body. This distance is determined by slight differences in hose thickness.

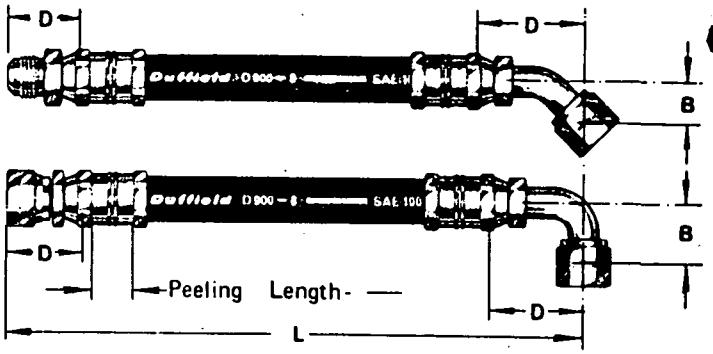
WE RESERVE THE RIGHT TO ALTER THE DESIGN, SPECIFICATIONS, OR TO DISCONTINUE ANY ITEMS LISTED IN OUR CATALOGUES.

HOW TO ORDER

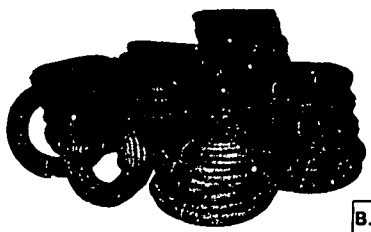
COMPLETE HOSE ASSEMBLIES:
Complete hose assemblies may be ordered using any combination of hose ends for the appropriate code matched hose shown in this catalogue. Should the fittings required not be illustrated your enquiries would be welcomed.

When ordering hose assemblies please state your requirements as follows:– part number of first hose end – hose part number – part number of second hose end – overall assembly length (L) in inches, e.g. D901/1212 – D900/12 – D902/1212 – 43".

N.B.: The length "L" of a hose assembly is the complete overall length of the assembly including fittings. When angled fittings are used on one or both ends the point of measuring is to the centre of the sealing face of the angled fittings.



HOSE:
To order bulk hose for site assembly, express the required quantity in feet or metres followed by the relevant part number, e.g. 230 ft (70 metres) D900/12. When hose is ordered in bulk we reserve the right to supply the hose in random lengths to the following proportions: 65% in lengths to 40 feet (12 metres) minimum and 35% in lengths between 20 feet (6 metres) and 40 feet (12 metres).



HOSE ENDS:
Hose ends may only be ordered for assembly to matching Duffield hose (your attention is drawn to the conditions of sale). When ordering fittings, please give the quantity required and the part number, e.g. 20 only D901/1212.

PART NUMBER:
To find the part number for the hose-end:

1. Establish which hose code and size is required from the hose specification tables on page 1 and determine the prefix (i.e. D8 for D800/- - hose and D9 for D900/ - - hose).
2. The hose-end types and sizes can then be found on pages 2, 3 and 4.
   Over each illustration is a number which incorporates the prefix of the hose required and the hose-end type. The balance of the part number is shown in the table below the illustration, in line with the thread and hose size required.
3. Example: 3/4 BSPP FEMALE STRAIGHT HOSE-END to suit D900/12 hose (¾" I.D.).

B.S.P.P. FEMALE STRAIGHT HOSE END

D801/----

prefix

Hose-end Type — D901/---

Thread Size	Hose Size	
1/8	1/4	/24
1/4	1/4	/44
3/8	1/4	
1/4	5/16	/45
3/8	5/16	/65
1/4	3/8	/46
3/8	3/8	/66
1/2	3/8	/86
1/2	1/2	/88
5/8	5/8	/1010
3/4	5/8	
3/4	3/4	/1212
1	3/4	/1612
	1	

Thread Size / Hose Size

Part No. = D901/1212

CONDITIONS OF SALE

1. The Company will replace any articles sold by it which, within 30 days after delivery, are shown to the Company's satisfaction to have been, at the time of delivery, defective in material or in manufacture. Goods will not be accepted for return without prior approval.
2. All conditions and warranties as to the quality of the goods supplied or fitness for any particular purpose, whether express or implied, whether statutory or otherwise and whether oral or in writing are hereby expressly excluded and negatived but every care will be taken to ensure that goods supplied will conform to the Company's standards or to Specification (within the limits of reasonable commercial accuracy) and will be of good material and workmanship. In no circumstances does the Company accept any liability whatsoever for any consequential loss or damage which may in any way arise out of the goods supplied or any defect in the same.
3. ***Duffield*** fittings (which are covered by design registration) are specially manufactured for attachment only to the make and type of the hose specified in our catalogue. Use of other than the specified hose or assembly of the hose fittings contrary to the instructions contained in the catalogue might result in an unsatisfactory or even dangerous product, and any warranties express or implied as to the fitness or otherwise are expressly excluded and negatived and all liability is disclaimed.
4. The Company sets out suggestions as to the use, installation and care of our products on the understanding that these suggestions are made only from the Company's wish that the purchaser should get the best results from his purchase, and they do not in any way nullify the conditions of sale.
5. Unless stated to the contrary by the customer on his order the company will supply its goods on the understanding that they will be used in hydraulic applications with mineral oil within the limits shown in the company's current catalogues.

PATENTS APPLY TO VARIOUS ***Duffield*** PRODUCTS

1978 FREDERICK DUFFIELD PTY. LTD.

WE RESERVE THE RIGHT TO ALTER THE DESIGN, SPECIFICATIONS, OR TO DISCONTINUE ANY ITEMS LISTED IN OUR CATALOGUES.

DIMET

Coatings

CI/SfB u v

Dimet Ref. 328000

Date July 1977

ARMOURDOR 910

High Build Epoxy MIO Coating

Description A 2-pack epoxy coating utilizing micaceous iron-oxide pigmentation.

Finish Satin, metallic lustre.

Colour Natural steel grey, light metallic grey, medium grey, silver grey.

Uses As a build-coat or finish coat to provide a high level of protection to steel structures operating in wet, corrosive and abrasive conditions.

Application Areas Chemical plants, condenser water boxes, pontoons, marine structures, food processing factories, etc.

Features

- Combines an epoxy's hardness and abrasion resistance with micaceous iron oxide pigments for superior water impermeability.
- Unlike conventional epoxies, weathers to an attractive metallic lustre.
- Highly resistant to chemical attack — ideal for extreme industrial exposures.
- May be applied directly to inorganic zinc silicate coatings as a finish coat.

Performance Data

Weather: Excellent. After 2000 hours exposure in a NATA approved Atlas Weather-ometer, the coating exhibits a considerable increase in lustre. No degrading effects were observed. Coating weathers to a lustrous metallic finish.

Abrasion: The cured film is hard and extremely abrasion resistant, especially to abrasive silts and high velocity water flow.

Adhesion: Excellent. Detachment of the system from steel will not occur under normal conditions of use.

Chemical: Recommended for use with a wide range of acids and alkalies, salts, organic chemicals, solvents, etc. For specific suitability, contact the DIMET technical division.

Immersion: Recommended for salt and fresh water immersion.

Temperature: Dry service temperature range up to 120°C.

Weldability: Not recommended. Leave weld margins.

Specification

Round off all welds and sharp edges. Remove weld spatter.
Abrasive blast clean in accordance with AS1627:4 Class 2½ minimum.
Apply *Zincilate 120* to 75 µm in accordance with the manufacturer's written instructions.
Apply *Armourdor 910* to 200 µm in two coats.

Technical Data

Shelf Life: Indefinite, provided coating is stored in sealed containers below 35°C.

Drying Time: Touch dry in 1 hour at 20°C. Recoatable after overnight drying.

Curing Time: Cures progressively over several days. May be cured at temperatures down to 0°C. Increased temperatures reduce the curing time.

Pot Life: Coating remains usable at 20°C for 2 hours after mixing. Increased temperatures will reduce the pot life.

Armourdor 910

APPLICATION DATA

Surface Preparation
Round off all welds and sharp edges. Remove weld spatter.
Abrasive blast clean steel surfaces in accordance with AS1627:4 Class 2½ minimum.
Alternative methods of surface preparation may be acceptable under certain conditions. These should be established in consultation with the DIMET technical division.

Priming
Apply *Zincilate 120* to all cleaned steel surfaces to 75 µm dry film thickness. Allow to cure before topcoating. Other primers may be required under various service conditions. For a specific recommendation contact DIMET.

Mixing
Stir the contents of each container separately. Add the total contents of the cure container to the total contents of the resin container. Mix thoroughly and allow to stand at least 10 minutes before application.

Thinning
Thin with up to 10% *Armourdor 910* Thinners to assist workability.

Spraying
Conventional air atomising spray equipment is recommended. Typical equipment set-ups are:—

	Gun	Air Cap	Fluid Tip/Needle
Binks-Bullows	230	63PB	2070/59SS
De Vilbiss	JGA	78 or 765	E

Continuous agitation is recommended whilst spraying.

Application
Apply a mist coat over freshly applied zinc primers. When touch dry, apply the coating in even, wet parallel passes overlapping 50%. Give special attention to corners, welds and edges. Avoid excessive thickness over zinc primers to prevent disbondment of the coating.

Brushing and Rolling
Brush and roll without thinning. Do not overwork the paint film, and lay off in one direction only, to ensure that subsequent surface lustre is uniformly developed.

Film Build
A minimum of 125 µm per coat when applied as a build coat or directly over blast cleaned steel. A minimum of 100 µm per coat when applied over *Zincilate 120*. Avoid excessive film thickness over zinc primers as this may lead to disbondment of the coating. Measurement should be made with a magnetic film thickness gauge such as the *Elcometer* Inspector gauge.

Second Coat
A second coat at 125 µm should be applied over blast cleaned steel and a second coat at 100 µm over *Zincilate 120*. Allow overnight drying at 20°C between coats.
Where a second coat has not been applied within 72 hours of the initial coat, the surface should be roughened by light abrasive blast cleaning to ensure a mechanical bond. For specific recommendations contact DIMET.

Reinstatement
Where the coating has been damaged, feather back to sound material and reapply *Armourdor 910*. When the initial coating is fully cured the whole area to be reinstated must be roughened to ensure a mechanical bond.

Safety Precautions
Armourdor 910 contains flammable, volatile solvents. Flash point is above 5°C. Naked flames or smoking should not be permitted during application. In confined spaces ventilation should be assisted to keep solvent vapours below 20% of the explosive limit or ¼% by volume of solvent vapour in the air.

Recommended Dry Film Thickness per Coat	100–125µm
No. of Coats Required	1–2
Total Thickness	125µm as build coat 200µm over *Zincilate 120*
Theoretical Coverage* at 25µm	28.1 sq.m/litre
Theoretical Coverage* at 100µm	7.0 sq.m/litre
Theoretical Coverage* at 125µm	5.6 sq.m/litre

* When computing, working coverages, allow for application losses, surface irregularities, etc.

No. of Components	2
Mixing Ratio	1 part cure to 4 parts resin by volume
Pot Life	2 hours at 20°C
Apply Over	Cleaned steel, *Zincilate* primed steel
Apply By	Brush, roller, spray
Drying Time	Touch dry; 1 hour at 20°C Recoat after overnight drying
Curing Time	Hardens progressively over several days
Thinning & Cleaning	*Armourdor 910* Thinner
Packaging	4 and 20 litres
Shipping Weight	4 litre 7.1 kg 20 litre 35.2 kg

ORDERING

Specify through project contractor or contact our head office or branches.

PACKAGING

Available in 4 litre and 20 litre units

PRODUCT INFORMATION

Although the basic formulation of our products generally remains unchanged, production refinements arising from continuing research and evaluation programmes may occasionally result in marginal changes in coating properties. Specifiers and applicators are therefore requested to ensure that the reference literature in their possession is the most current version for the product under consideration.

TECHNICAL SERVICE

DIMET maintains a technical division to investigate and advise on all problems related to corrosion control. The division will advise on the correct selection of and specification for the required protective coating system. Contact the division through DIMET head office or its branches.

The information contained in this publication is intended to give a fair description of the products and their capabilities under specific test conditions. It does not constitute an offer by the manufacturer, nor does the manufacturer warrant or guarantee its accuracy or completeness in describing the performance or suitability of the various products.

DIMET
A member of the Acmil Group

Sydney	(02) 622 1000	Adelaide	(08) 268 1144
Melbourne	(03) 44 0681	Newcastle	(049) 61 5376
Brisbane	(07) 275 2777	Canberra	(062) 95 6915
Perth	(092) 51 1041	Wollongong	(042) 29 7241

Auckland, Christchurch, Wellington,
Singapore, Bangkok, Bombay, Kuala Lumpur, Jakarta, Hong Kong

THE GENERAL ELECTRIC COMPANY OF AUSTRALIA LTD.
ROCKLEA WORKS

GENERAL ENG. D.O. SCHEDULE

TITLE: BRISBANE CITY COUNCIL
Ø 1370 BUTTERFLY VALVE

REF. Nº	NAME	DRAWING Nº	ITM	COM.	Nº OFF	REMARKS
1	GEN ARRANGEMENT	B1-210-026			3	
2	BODY	B1-212-028	-	10	3	2-SHEETS
3	DOOR	A1-213-028	2	-	3	
4	OP. LEVER ARM	A1-216-111	1	10	3	
5	TRUNNION OP.	A2-215-075	1	-	3	
6	TRUNNION NON OP.	A2-215-076	1	-	3	
7	END PLATE	A2-215-078	2	-	3	
8	CLAMP RING	A1-214-053	1	-	3	
9	SEAL RING	A2-214-058	1	-	3	
11	SPRING RING	A2-214-059	1	-	3	
12	TRUNNION BUSH	A2-215-066	4	-	6	
13	LOCKING PIN ASSY	A2-215-077	-	10	3	
14	MOUNTING PLATE	A2-216-112	1	-	3	
15	BUSH	A3-215-032	5	-	6	CYL. TRUNNION
16	GLAND RING	A2-662-6201	12	-	3	
17	SHAFT SEAL	A2-662-6300	12	-	3	
18	CENTRING RING	A2-215-005	9	-	3	
19	INDICATOR DETS	A2-216-113	-	10	3	
21	SEAT RING	A2-214-060	1	-	3	
22	TAPER DOWEL	A2-273-012	21	-	18	'DOOR'
23	TAPER DOWEL	A2-273-012	22	-	9	'LEVER ARM
24	ACTUATOR PIN	A2-215-033	7	-	3	
25	PARALLEL DOWEL	A2-273-013	17	-	6	
26	NAMEPLATE	A2-216-114	1	-	3	
27	STUD M20	A2-273-014	126	-	12	MTG. PLATE
28	STUD M16	A2-273-014	69	-	24	END PLATE
29	STUD M10	A2-273-014	78	-	24	GLAND RING
31	LOCKING STRIP	A2-216-082	18	-	3	

CUSTR: B.C.C. | ORDER Nº: 21N2345

A	B	REF: 16 GLAND RING NAS A2-662-6201	
11.5.82	30.6.82		

DRAWN
CHECKED
PASSED
APP'D

END PLATE A2-215-078-2.
NON-DRIVE TRUNNION A2-215-076.
TRUNNION BUSH A2-215-066-4.
STUD - END PLATE A2-273-014-69.
CENTRING RING A2-215-005-9.

CENTRING DEVICE. (NON DRIVE END) SECTIONAL DETAIL 'A'.

NOTE
DRILL AND REAM Ø60·03 THROUGH LEVER ARM AND BODY. THEN MOVE CYLINDER TO FULLY OPEN POSITION AND DRILL AND REAM 2ND. HOLE IN LEVER ARM. AFTER COMPLETION OF REAMING FIT BUSHES ITEMS 16,17,18 WITH LOCTITE STUDLOCK.

LOCKING PIN ASSY. A2-215-077.
BUSH A2-215-077-9.
OP. LEVER ARM A1-216-111.
TAPERED DOWEL A2-273-012-22.
STUD - GLAND RING A2-273-014-78.
GLAND RING A2-662-6201-12.
TAPERED DOWEL A2-273-012-21.
DRIVE SIDE TRUNNION A2-215-075.
TRUNNION BUSH A2-215-066-4.
SHAFT SEAL A2-662-6300-12.

DRIVE END TRUNNION AND LOCKING PIN DETAIL. SECTIONAL DETAIL 'B'.

BUSH - CYL. TRUNNION A3-215-032-5.
NOTE 1-1·5mm CLEARANCE BOTH SIDES BETWEEN BUSH HEAD AND CYL. BLOCK.

FRONT TRUNNION MOUNTED CYLINDER DETAIL. SECTIONAL DETAIL 'C'.

COMB. No. 20	COMB. No. 10	NAME OF PART	ITEM No.	MATERIAL	REMARKS	SPEC.
	1	GENERAL ARRGT.	1		ASSY. OF ITEMS 2 - 24.	
	1	HYD. CYLINDER	2	'PONGRASS'	FOR DETAILS SEE NOTE 6.	
6	1	SOC. SET SCREW	3	BS.970/316S16	M8 x 16LG. FLAT POINT.	
	1	'O' RING CORD	4	'BUNA N'	0·139"±·004 x 450LG.	
	1	FORCING RING	5	NATURAL RUBBER	13 Sp.x 43·0LG. SHORE 70°-80°	
6	0	SOC. SET SCREW	6	BS.970/316S16	M8 x 16LG. HALF DOG POINT.	
6	0	SOC. HD. CAP SCREW	7	BS.970/316S16	M12 x 30LG.	
6		CHEESE HD. SCREW	8	BS.970/302S25	M4 x 12LG.	
2		HEX. HD. BOLT	9	BS.970/304S15	M10 x 20LG. WSHR. FACE.	
2		HEX. HD. BOLT	11	" "	M12 x 20LG. WSHR. FACE.	
2		GREASE NIPPLE	12	TAT HEX. HD.	1/8" B.S.P.	
4		HEX. NUT	13	BS.970/302S25	M20 WSHR. FACE.	
8		HEX. NUT	14	" "	M16 WSHR. FACE.	
1		'O' RING	15	BS.1806-1962	BS. 260	
2		BRONZE BEARING	17	SINTALITE	SMC 506035.	
2		BRONZE BEARING	18	SINTALITE	SMC 506050.	
8		HEX. NUT	19	BS.970/302S25	M10 WSHR. FACE.	
1		PARALLEL FEM. COUP.	21	ERMETO S2934	1/4"O.D. PIPE x 3/8" B.S.P.	
1		PARALLEL MALE ELBOW	22	" S2576	1/4"O.D. PIPE x 1/4" B.S.P.	
1		TUBE	23	CU. HARD DRAWN	1/4"O.D. x 16G x 300LG.	
1		GREASE NIPPLE	24	RD. HEAD	3/8" B.S.P.	

52 - HOLES EQUALLY SPACED DRILL AND TAP M8 HALF AND HALF TO SUIT.
BODY B1-212-028.
SEAT RING A2-214-060.
NOTE 3mm CLAMP RING FACE TO BE MACHINED ON ASSY. TO ACHIEVE 0·15mm CLEARANCE WITH DOOR SEAL.
ADJUSTABLE SEAL A2-214-058.
SPRING RING A2-214-059.
CLAMP RING A1-214-053.
NOTE 1/D AND O/D TO BE FITTED TO SUIT ON ASSY.
DOOR A1-213-028-2.

TYPICAL SEAL AND SEAT DETAIL. PART SECTION 'D-D'.

DRILL AND REAM 6 HOLES AS SHOWN. USE TAPER REAMER ST2/103. DRILL AND TAP 1 HOLE IN EACH DOWEL HALF AND HALF AS SHOWN TO SUIT SOCKET SET SCREW IT. 3.

1140, 370 CRS., 370 CRS., 220, 'D', 'D', 510 CRS., 470 CRS., 80 CRS., 850, 580 CRS., 580 CRS., 920, 1080.
SEE DETAIL 'A'.
SEE DETAIL 'B'.
INDICATOR DETAILS A2-216-113 COMB. 10.
LOCKING STRIP A2-216-082-18.
SEE DETAIL 'C'.
13 STUD A2-273-014-126.
DOOR CLOSED.
DOOR OPEN. (DOOR SECTIONED THROUGH ℄.)
MOUNTING PLATE A2-216-112.
36 - HOLES IN EACH FLANGE EQUALLY SPACED OFF-CENTRE ON 1575 P.C.D. —
24 - HOLES DRILL Ø36 AND BACKFACE Ø74.
12 - HOLES DRILL AND TAP M33 x 3·5 DEEP.

POSITION NAMEPLATE A2-216-114 AS SHOWN AND SECURE WITH 4 OFF ITEM 8.
280, 140, 54, 54, 320.
INSPECTION STAMP BOSS.
Ø 1651 FLANGE.
Ø 1370 N.B.
DIRECTION OF FLOW.
TO OPEN.
1000, 1160.
ACTUATOR PIN A2-215-033-7.
DOWEL - PARALLEL A2-273-013-17 DRILL AND REAM Ø20 TO SUIT ON ASSY.
1 - HOLE Ø39 (EACH FOOT) FOR M36 GRADE 8·8 FOUNDATION BOLTS — SUPPLY BY OTHERS.
500, 400, 600.

DRILL AND REAM 3 HOLES EQUALLY SPACED AS SHOWN. USE TAPER REAMER ST2/103. DRILL AND TAP 1 HOLE IN EACH DOWEL HALF AND HALF AS SHOWN TO SUIT SOCKET SET SCREW IT. 3.

(1) ASSEMBLY.

TOTAL ESTIMATED WEIGHT = 3·0 TONNES.

SPECIFICATION

1. DESIGN CONDITIONS

WORKING PRESSURE	—	600 kPa.
TEST PRESSURE	—	1200 kPa.
SEAL TEST PRESSURE	—	600 kPa.
MAX. LEAKAGE RATE	—	14 ml/min.
MAXIMUM FLOW	—	4·8 m/sec.

2. SURFACE TREATMENT
TO BE IN ACCORDANCE WITH B.C.C. CONTRACT No. W.S. 47/81/82 CLAUSE 7·00. PASSIVATE ALL EXPOSED S.S. SURFACES PRIOR TO FINAL ASSEMBLY.
3. HYDRAULIC AND OPERATIONAL TEST TO BE IN ACCORDANCE WITH B.C.C. CONTRACT No. W.S. 47/81/82 CLAUSE 10·00.
4. GREASE ALL POINTS WITH SHELL ALVANIA "EP2".
5. LOCK ALL FASTENERS EXCEPT ITEMS 6,19 WITH LOCTITE AND COAT EXTERIOR WITH DOW CORNING SILICONE COMPOUND 111.
6. HYDRAULIC CYLINDER DETAILS.
BORE - Ø82·5; ROD - Ø34·92; FRONT TRUNNION MTG. TD - Ø44·45; CYLINDER STROKE - 553.
ROD END AS PONGRASS DRG. G293A BUT WITH Ø25·4 BEARING BORE; 'E' - 114; ROD BOOT - 102 O/D.
CLOSED CENTRES OF CYLINDER TO BE SET AT 253·00 PRIOR TO FINAL ASSEMBLY.

A	B		
ORIGINAL ISSUE			
DATE	15. 11. 82	GLAND RING A2-662-6201-12 WAS A2-662-6200-12 (REF. C7) C.D.N.- 2/1444.	

FOR IMPERIAL TOLERANCES REFER A4-001-001 sh. 2 TABLE 2
UNLESS OTHERWISE STATED METRIC UNTOLERANCED DIMENSIONS TO BE WITHIN LIMITS SHOWN

NOMINAL SIZE	UP TO 30	ABOVE 30 UP TO 120	ABOVE 120 UP TO 315	ABOVE 315 UP TO 1000	ABOVE 1000 UP TO 2000
MACHINING	±0.2	±0.3	±0.5	±0.8	±1.2
FABRICATION	±0.5	±0.8	±1.2	±2'	±3
ASSEMBLIES					

TITLE BRISBANE CITY COUNCIL. CONTRACT NO. WS.47/81/82. GENERAL ARRANGEMENT OF Ø1370 BUTTERFLY VALVE.

GEC AUSTRALIA LIMITED
HEAVY ENGINEERING DIVISION
ROCKLEA WORKS QUEENSLAND

DEPT. GEN. ENGG. | DRAWN | SCALE 1:10 | TRACED | O/No. 2/N2345 | CHECKED | CUSTR. B.C.C. | APPROVED
DRG. No. B1-210-026 B
WHEN QUOTING THIS DRAWING NUMBER PLEASE STATE THE LATEST LETTER OF ISSUE.
UNLESS OTHERWISE STATED DIMENSIONS IN MILLIMETRES DO NOT SCALE
679 x 960

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