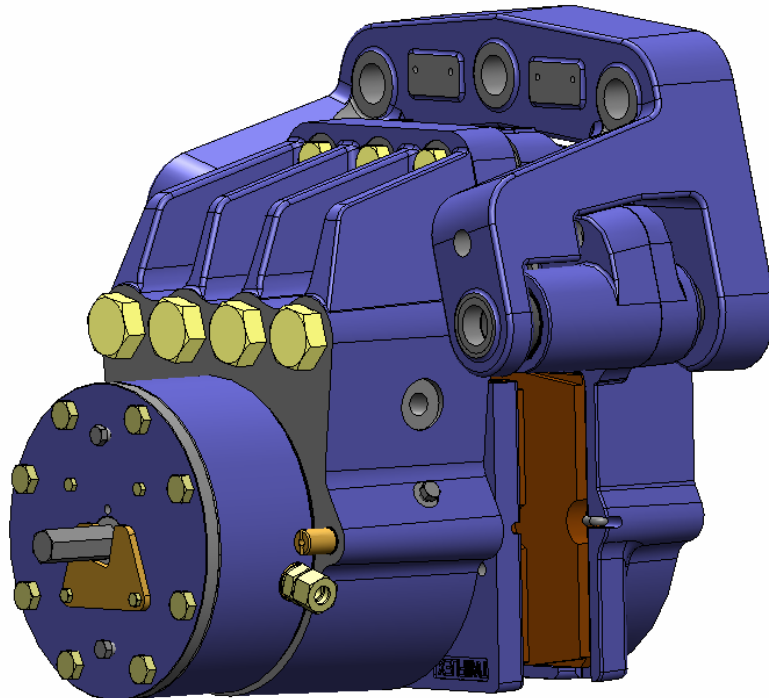




**TWIFLEX
VKSD-FL FLOATING CALIPER
BASE MODEL
INSTALLATION, OPERATION AND
MAINTENANCE INSTRUCTIONS**

MANUAL M1445



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M1445

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1. SPECIFICATION

1.1 General description

- 1.1.1 The FLOATING VKSD CALIPER disc brake is a spring applied, hydraulically retracted unit consisting of two parts, the standard VKSD SPRING MODULE and the VKSD FLOATING MODULE. The caliper can be mounted on either side of a mounting plate or pedestal by means of 5 off M24 bolts, and may be used on any disc having a minimum diameter of 740mm and a thickness of 25mm. There is no upper limit on diameter. Larger disc thickness may be accommodated by inserting a spacer between the spring and floating modules and lengthening the fixing screws.

	Drg. No.	Part No.
VKSD119/62 Floating Caliper	A01535	67A1544
VKSD64/28 Floating Caliper	A01536	67A1545
VKSD Floating Module	A01537	67A1546
VKSD119/62 Spring Module	A01519	67A1537
VKSD64/28 Spring Module	A01520	6701538

The operational sequence is illustrated in Appendix 1. Numbers in brackets refer to item numbers on the above drawings.

- 1.1.2 The VKSD SPRING MODULE (A01519 & A01520) supplies the braking force and is described below. The braking torque may be controlled by varying the effective braking path radius (R_e), or varying the braking force. The brake force may be varied by any combination of air gap setting, shim thickness between piston and end cover, or by the use of hydraulic back pressure during braking.

- 1.1.3 The braking force is applied by the disc spring pack (25), through the spring guide (4) and thrust screw (3) to the pressure plates (2), and hence to the friction pads. The pads are kept in position by pad retraction hooks (13) on to the pressure plates (2).

The housing (1) contains the spring chamber. Spigotted to the housing is the cylinder (6) which when filled with hydraulic pressure compresses the spring packs via the hydraulic retraction piston (5) which is connected to the spring guide by piston collets (8) and retainer (9), thus lifting the friction pads of the disc.

The hydraulic fluid inlet and outlet ports G3/8," are screwed into the cylinder and can be rotated to position by releasing 2 set screws (55).

Brake rating can be varied by removing or adding shims between piston (5) and end cover (7). Gap adjustment is manual and is effected by turning the hexagonal adjusting spindle (10). Nominal gaps are as given on the drawing. Maintaining the correct gap ensures that the braking torque is effectively constant and minimises the stress range for the springs, leading to an extended fatigue life. Reduction in torque due to a 1mm stroke increase by approximately 6% to 8%. Failure of an individual spring would result in a substantial loss of braking torque in the caliper; see 3.7d (Loss of braking).

- 1.1.4 A spring loaded hook arrangement is provided, through the housing each side of the friction pad assembly. This is to keep the pad in contact with the pressure plate and off the disc during brake off or manual retraction.

- 1.1.5 Seals are designed to be as leak free as possible but slight leakage may sometimes occur. This is generally considered acceptable and drain ports are positioned so that

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any leaked fluid may be piped away. Excessive leaking should be investigated and rectified.

Bleeding can be performed by replacing the return line flexible hydraulic hose with G3/8" coupling (20) and bleed screw (19) both supplied loose. Both ports are plugged for transit and the fittings are supplied loose.

1.2 Hydraulics

1.2.1 Only good quality mineral oil based hydraulic fluid should be used, such as BP Energol SHF-LT15 ideal for low temperatures, or Shell 'Tellus 37'. Water based fluids would require the caliper to have a high degree of corrosion protection and, depending on required operating temperature range, a change of seals.

1.2.2 Pressure to release brake and maximum allowable pressure (occasional).

See drawings A01535, A01536

Piston area (on pressure plate) = 15394mm²

Total fluid displacement for 3mm movement = 0.092 litres

Initial fill requirement, caliper only = 26cc nominal

1.2.3 Two G3/8" ports are provided in the cylinder, one for fluid inlet and the other for fluid outlet.

A flexible hose is to be used to interconnect the hydraulic module to a manifold block, which may be secured to the mounting plate. This is then connected to a hydraulic power unit by means of 12mm o/d x 1.5mm thick wall seamless steel tube to DIN2391/C.

1.2.4 There are two G1/8" drain ports in the housing, positioned 180° apart.

In a vertical brake disc installation, the lower of the two drain ports is used for draining. It is recommended that the port used for draining should have transparent flexible tubing connected so that leaked fluid is piped away as convenient, and leakage may be observed.

1.3 Braking force and torque

1.3.1 The braking force ' F_b ' acting tangentially on the disc is given by:

$$F_b = 2\mu F_n$$

where 2 = Two friction pads per calliper
 μ = Coefficient of friction
 F_n = Disc spring thrust (kN)

1.3.2 In calculating braking force, and for comparative purposes, μ is assumed to be 0.4 between the friction pad and disc, but this value is only achieved after correct conditioning and bedding in of the friction pads. See Appendix 3.

The braking force obtained is also dependant on the air gap setting and the amount of shims fitted as shown on performance curves G1457 and G1458 see appendix 2. Also shown on these curves is the fatigue life for (99%) of the spring for a particular gap setting.

1.3.3 Braking torque (T_b) is given by:

T_b = Braking force x effective radius

$T_b = F_b (R - 0.095)$ where R is the outside radius of the brake disc in metres and 0.095m is distance from edge of brake disc to centre of friction pad.

1.4 Friction pads

Twiflex friction pads do not contain asbestos.

- 1.4.1 The standard friction pad material supplied is Twiflex code - 9 (D3904) and the coefficient of friction (μ) between the friction pad and the brake disc is assumed to be 0.4 for the purposes of calculation.

This value for μ will only be reasonably accurate when the pads are properly bedded in and conditioned (see Appendix 3). Other factors which influence μ are:

- a) material and surface finish of brake disc
- b) cleanliness of pad and disc
- c) humidity, temperature and rubbing speed

In a static application with adverse conditions μ can be as low as 0.15.

- 1.4.2 Alternative friction pad materials are available for special applications. Also available are friction pads fitted with electrical wear indicator leads. These will signal remotely when pad replacement is required.

- 1.4.3
- | | | |
|-------------------------|---|---|
| Pad size (nominal) | = | 207mm x 180mm x 19mm thick
(including backing plate) |
| Pad area (2 pads) | = | 726 cm ² |
| Max. allowable pad wear | = | 5mm |

1.5 Materials

- 1.5.1 The housing and pressure plates on the Standard VKSD module, and the bracket on the Floating VKSD are castings of SG iron, to BS2789, grade 420-12. The Floating VKSD Housing is a casting of steel to BS3100, grade A6.

- 1.5.2 The main dynamic hydraulic seal is a proprietary polyurethane lip seal. Other hydraulic seals are nitrile rubber 'O'-rings installed with PTFE spiral anti-extrusion rings. Bearing rings are a proprietary brand of textile reinforced PTFE.

1.6 Quality

- 1.6.1 Each calliper is tested after assembly and a test certificate is issued with the unit. The test is for maximum pressure and leakage observation.
- 1.6.2 As an option, all critical components can be non-destructively tested (NDT) on request, using a magnetic particle inspection technique and are individually certified.

2. INSTALLATION AND ADJUSTMENT

2.1 General

Refer to Drg. No. A01535, A01536 A01537, A01519 and A01520

Ideally, two calipers should be used on each disc, mounted diametrically opposite each other, in order to neutralise the braking torque reaction forces on the shaft bearings. Any other position can also be catered for, as the bleed screw on the cylinder can be indexed to any position, after releasing the two setscrews (A01519, A01520 item 55). The setscrews should be tightened to 6Nm.

2.1.2 The mounting plate should be positioned with respect to the disc as shown on drawings A01535, A01536 and should be of adequate strength and rigidity, flat and parallel to the disc surface. Each caliper is secured by five M24 bolts (can be supplied by Twiflex) which should be tightened to a minimum torque 670Nm.

2.1.3 Sufficient space should be allowed for access to the calipers for routine inspection and maintenance and for pad renewal. Calipers are supplied in the "parked off" position in which the springs are fully relaxed and the pad is retracted. When the caliper has been bolted into position, the hydraulic supply should be connected and all air bled from the system.

2.2 Installation

To install a complete caliper assembly:

- a) Ensure abutment faces of caliper and mounting plate are clean. Ensure the disc is free from grease.
- b) Assemble caliper to the mounting plate with 5 off M24 tie bolts and torque to 670Nm.
- c) If access to installation is difficult, secure single function monitor unit, if fitted to caliper as described in section 2.4.
- d) Connect a flexible hydraulic hose to the calliper.
- e) Support the weight of total caliper assembly (approx 580Kg) and secure into installation taking care not to damage disc, pads and monitor units.

2.3 Initial air gap adjustment

- 2.3.1 With the outlet valve (return line) closed, the cylinders may be pressurised to a maximum of 25bar above the retraction. This will retract the pressure plate (A01519, A01520 item 2).

Make sure that the floating caliper is free to slide.

2.3.2 Spring Module (A01519, A01520)

Remove the M5 screws in the spindle locking plate (12) and disengage its slot from the hexagon spindle (10). Using a 19mm AF spanner turn the hexagonal adjusting spindle (10) clockwise until both the pads are in firm contact with the disc, then anticlockwise to achieve required air gap. 1/3 rd of a turn is equal 1mm total air gap. (The pitch of the thrust screw is 3mm).

The actual retraction dimensions will be slightly greater when the caliper deflects under load. Operate the Caliper and check that the air gap or stroke is correct; adjust if required. The minimum adjustment which can be made is 1/6th of a turn = 0.5mm by leaving the locking plate in the same position or 1/12th of a turn = 0.25mm by removing the M5 screws and inverting the locking plate (12).

NOTE A) Please note that the correct shim stack height will have been fitted, commensurate with the brake performance required. The braking force can however be reduced by adding shims.

B) Maximum shim stack height = 7mm for the VKSD with the step on the end cover (7) inwards. Exceeding these amounts will under stress the disc springs and shorten their life.

C) Always, after refitting end cover (7), tighten set screws (47) evenly in turn to a torque of 50Nm.

WARNING

The position of the step on the end cover (7) of the **VKSD119/62 MUST ALWAYS BE INWARD - NEVER OUTWARD**, as this would severely overstress the disc springs.

2.4 **Monitor unit (Optional)**

There are two monitor units supplied, one attached to the standard VKSD Spring module, the other to the VKSD Floating module.

2.4.1 VKSD Spring module two or three function monitor unit.

This is a standard 'V' Type monitor unit with functions 'A' and 'B' pre-set at Twiflex, and function 'C' set on installation. The monitor incorporates 2 or 3 two-pole micro switches sealed to IP67 NEMA type 6.

The unit monitors 2 or 3 functions:

- a) Brake fully retracted
- b) Adjustment for pad wear
- c) 80% Pad wear / replacement

For a full description see Manual M1105.

2.4.2 VKSD Floating module monitor unit (90% pad wear).

This is a positive action safety switch that monitors 90% total pad wear and needs to be set on installation.

For a full description see Manual M1454.

3. MAINTENANCE

3.1 Running in period

3.1.1 For the first full week of operation make a DAILY CHECK of the following items:

- a) Hydraulic fluid leakage. Record any evidence of excessive fluid leakage.

A very slight seepage of oil past seals is normal, but should not be such as to cause a flow in the drainpipes. If leakage occurs at pipe connections or at the bleed screws, tighten as appropriate, carefully wipe away spilled fluid and check for further leaks with brakes off as well as on.

- b) If friction pads become fouled with fluid, they must be replaced after first investigating and rectifying the cause of the leak and then wiping clean the brake disc(s).

- c) Check the condition of the brake paths. They should remain smooth and free from contaminants, for example chain lubricant. Remove any deposits, and ensure that the brake path is left clean and dry.

- d) Apply the bedding-in procedure as detailed in publication M1060 (included with this document as Appendix 3).

- e) At the end of the running-in period, check the security of all fasteners and pipe connections.

If tie rods and bolts are paint marked, check to see if any movement has occurred. Re-tighten if movement has taken place.

3.2 Maintenance inspection program

After the running-in period the following schedule should be followed in addition to any statutory requirements:

ITEM	WEEKLY	MONTHLY	PERIODIC
a) Check for hydraulic fluid leakage	x (note i)		
b) Observe brake operation	x (note ii)		
c) Clean calipers of accumulated deposits		x	
d) Clean brake paths on disc		x (note iii)	
e) Observe bolt security		x (note iv)	
f) Note and record condition of friction pad		x (note v)	
g) Check availability and condition of spares and tools			x

NOTES

- (i) See 3.1.1(a). Any appreciable flow from the drainpipes indicates that one or more of the hydraulic seals needs replacing. This may be conveniently done by replacing the complete hydraulic module as in Section 3.8. However, if servicing on site is essential, consult Section 3.9.
- (ii) See 3.1.1(c).
- (iii) Under adverse conditions this may be required more frequently. Proprietary cleaners and de-greasants may be used for cleaning the brake disc, but ensure that the surface is left free from residue, clean and dry.
- (iv) Check that no movement has occurred at paint-marked bolts and test security of other fasteners.
- (v) Check friction pad wear by measuring the protrusion of the plungers on the pad retraction hooks from the VKSD Spring housing (A01519, A01520), with brakes on. A dimension of 2.5mm or less between the top of the plunger (14) and the housing (1) indicates that the pad needs to be replaced. Replacement thickness is 14mm minimum, including backing plate. New pad thickness is 19mm nominal, including backing plate.

3.3 **Adjustment for friction pad wear**

Pad wear adjustment will be indicated either by the VKSD spring module monitor unit or by visual inspection of pads.

VKSD spring module (A01519, A01520)

The adjustment is made by turning the adjusting spindle (10) clockwise using a suitable spanner. Adjustment can be made in 0.5mm increments (1/6th of a turn) by leaving the locking plate in the same position or in 0.25mm by inverting the locking plate.

- a) Determine adjustment required to bring piston stroke into line with original gap setting (should be approx 0.5mm).
- b) Remove the M5 screws from spindle locking plate (12) and slide it back to disengage spindle.
- c) Turn spindle clockwise by one 'flat' (60 deg.) for 0.5mm adjustment, two 'flats' (120 deg.) for 1mm etc. Should adjustment required be 0.25mm then the locking plate must be inverted for 1/12 turn.
- d) Replace locking plate and tighten M5 screws to 6Nm so locking the adjusting spindle.

3.4 **Friction pad replacement**

Brake pad replacement is indicated when:-

- a) Pad wear indicator has signalled that a pad is fully worn if fitted.
- b) Top of the plunger (A01519, A01520 item 14) protrudes less than 2.5mm above housing face (1).
- c) If the pad thickness has more than 2mm taper, as measured at the four corners, it should be replaced, even if not fully worn.
- d) Minimum pad thickness including backing plate is 14mm.

Before removing brake pads, secure the disc against rotation. Retract brakes fully, hydraulically, and place the brake in the 'parked-off' position by turning the adjusting spindle fully anti-clockwise. The hydraulic pressure may now be released. Move the brake assembly to one side so the floating module pad is touching the disc.

Unhook the pad retraction hook (13) by inserting a large screwdriver in the pad retraction plunger (14), depressing spring (24) and turning the hook through 180 degrees. The pad can now be removed by pushing it away from the pressure plate through the holes provided.

Repeat procedure for the floating module (A01537), by unhooking the pad retraction hook (6), depressing spring (9) and turning the hook through 180 degrees.

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Remove dirt using a clean dry cloth and note condition of pad friction surface, which should be polished, uniformly marked and free of serious pitting. Replacement of the pad is carried out by reversing the removal procedure, but first clean the pressure plate. Ensure that pad is properly seated before positioning the pad retraction hooks. Air gaps must be reset as described in Section 2.3 (Initial Air Gap Adjustment).

NOTE The new pads require bedding in and conditioning. (See Appendix 3).

3.5 Hydraulic supply failure

The brake may be released by means of a hand pump connected direct to the feed port. After the brake has been released the 'parked-off' position can be obtained by turning the adjusting spindle fully anti-clockwise. The hand pump can then be removed.

3.6 Mechanical retraction

The retraction tool is only used on the VKSD Spring module (A01519, A01520) and should only be required to release the brake when a hand pump is not available or there is a hydraulic failure, such as when the seals leak to such an extent that the brake cannot be released by hand pump. The retraction tool should then be used as follows:

- a) Remove monitor unit, if fitted, and end covers (7). Take care not to lose any shims if supplied.
- b) With nuts (51) already threaded onto the retraction screws (46), attach the retractor flange (15) to the hydraulic piston (5). See scrap view on drawing.
- c) Release brake by tightening the nuts evenly in turn.
- d) Turn the adjusting spindle fully anti-clockwise thus placing the brake in the 'Parked-Off' position.
- e) The retractor flange may now be removed, by loosening the nuts evenly in turn.
- f) Always remove retractor flange before resuming normal operation.

3.7 Loss of braking force

Possible causes are:-

- a) Contaminants on surface of pads or disc, especially lubricants.
- b) Higher than normal hydraulic backpressure when brakes are applied.
- c) Increased stroke (due to pad wear, necessitating adjustment; or incorrect adjustment).
- d) Damaged or broken disc spring or springs

Spring force can be checked by use of a calibrated oil pressure gauge suitable for the maximum back pressure employed. Pressures required for full retraction are given on the drawing or can be taken from the curves. Springs should be changed if the

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reduction in pressure is 12.5% or more. Normally the easiest procedure would be to remove the complete calliper as described in section 3.8 and return it to Twiflex for service or replacement. However, for cases where this is not possible the procedure for seal replacement is described in section 3.9 and replacement springs is described in section 3.10.

3.8 **Removal and replacement of calliper**

- a) Secure the installation from rotation.
- b) Release the brakes hydraulically or mechanically and place the brake in the 'Parked-Off' position by turning the adjusting spindle fully anti-clockwise hydraulic pressure may then be released.
- c) Disconnect the flexible hydraulic hose from the manifold block. Fluid loss should be minimal.
- d) Support the weight of the caliper (approx weight of calipers only 580Kg).
- e) Unscrew and remove complete caliper and mounting plate assembly from installation, taking care not to damage the friction pads, discs or the monitor units.
- f) Unscrew and remove five off M24 bolts per caliper assembly.
- g) It may be necessary at this stage to separate the floating module from the spring module by unscrewing 4 off M24 (7) and 3 off M16 (8) bolts (A01535, A01536).
- h) Replacement of the complete caliper assembly is the reverse of removal. The M24 bolts should be torqued to 670Nm and M16 bolts should be torqued to 200Nm.

3.9 **Replacement of seals**

Drawing numbers A01519, A01520

Leakage of large cylinder seal (29) is indicated by oil seeping from the cylinder cover drain. Leakage of rod seal (30) is indicated by oil seeping from the G1/8" holes at the sides of the housing fitted with plugs (58) on delivery.

- a) Follow instructions as under 3.8.
- b) Remove end cover (7) complete with bolts (47) and shim (27,28), if fitted.
- c) Slacken off set screws (55).
- d) Remove retaining ring (40) from piston.
- e) Retract and remove collet retainer (9) by inserting M4 x 40 screws in the tapped holes in this retainer.
- f) Remove split piston collet (9). It may be necessary to free the segments by tapping them towards the pad end of the calliper. Note that collet segments are marked with a batch number, e.g. B/20.

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- g) Remove cylinder (6) and piston (5) together, by means of bar bolted to M12 retraction holes in piston. 'O' ring (36) may be reused unless severely damaged.
- h) Take assembly to work bench and carefully remove piston (5).
- j) Inspect wear surfaces, seals, wear rings and 'O'-rings for damage and refurbish or replace as necessary.
- k) Re-assembly is generally as dismantling procedure but in reverse order; note the following: -
 - i) Exercise great care not to damage seals and wearing surfaces.
 - ii) Clean wearing surfaces on spring guide (4) and cylinder (6).
 - iii) First assemble piston into cylinder.
 - iv) Note that cylinder seal (29) has to be 'sized' by means of the cylinder, and rod seal (30) by means of a tool, with a diameter of 69.970/69.940 (70f7) with a chamfer of 8mm (0.3 in) long @ 15° blended into this diameter; surface finish to be 0.4 microns (16 micro-ins).
 - v) Slide cylinder-piston assembly onto spring guide, ensuring that cylinder spigot is fully home into housing. Move piston into cylinder so that split collet segments (8) can be entered into groove in spring sleeve. Refit 'O'-ring (35) to hold segments in place. Insert collet retainer (9) and apply some air pressure to cylinder port to 'blow' piston into place. Collet segments should be replaced in their original positions, referring to batch number and identifying marks.
 - vi) Refit retaining ring (40).
 - vii) Turn cylinder so that bleed screw (19) is uppermost. Note that threads at hydraulic feed port and at bleed screw port are the same size; hence adaptor (20) and bonded seal (61) can be removed to port which is nearest top and thus save turning cylinder an unnecessary amount.
 - viii) Tighten two setscrews (55) to 6Nm.
 - ix) Refit end cover (7), (note correct position - see note a), taking care to enter the 3 tension pins (42) into the holes in the spring guide. Tighten setscrews (47) evenly in turn to a torque of 50Nm. Refit external 'O' Ring (36). Finally reconnect hydraulic pipes, bleed and, readjust brakes as under section 2.

- Note**
- a) Note position of end cover (7) and refit as shown on drawing, i.e. flat side is always on outside.
 - b) Tension pins (42) have to be tapped into inside of lid.

3.10 Replacement of springs

Drawing Numbers A01519, A01520

3.10.1 Dismantling

- a) Proceed as under 3.8 and transfer caliper half to workshop.
- b) Proceed as under 3.9 steps (b) to (d).
- c) The pressure plate (2), thrust screw (3) and spring guide (4) with springs (25) can now be removed from the housing.
- d) Alternatively the pressure plate (2) and thrust screw (3) can be removed first by rotating the latter clockwise by means of the adjusting spindle (10).

The spring guide (4) with springs (25) can then be removed for inspection.

Note: Take great care not to damage the rubbing surface for the rod seals (30). Keep springs in their order as assembled if possible.

3.10.2 Non-destructive Testing

If the springs are visually sound an N.D.T. method may be employed. It is essential that the surface finish of the disc springs is not damaged by electrical contacts, sparking or otherwise, so an N.D.T. should be adopted, which does not give rise to any such danger.

Inspect other parts as may be required.

3.10.3 Re-assembly

Follow generally the reverse of the dismantling procedure, but note:

- i) Exercise great care not to damage seals and bearing surfaces.
- ii) Re-assemble spring in the reverse order to that in, which they were originally assembled (to extend their fatigue life).
- iii) Observe assembly notes under 3.9.
- iv) Clean wearing surfaces of cylinder (6), thrust screw (3) and spring guide (4) before re-assembly.

Tighten setscrews (55) to 6Nm.

- v) It is essential when re-installing the caliper to torque bolts as described in section 3.8.h.
- vi) Re-fit brake pads.

NOTE The disc spring bearing on the spring guide abutment must do so with its smallest diameter, as shown on the drawing.

3.10.4 **Testing**

Carry out functional testing and operational testing as may be required. Check settings of monitoring units (if used) after refitting the calliper. Adjust if necessary.

4 PARTS LIST

4.1 Parts list for one Floating VKSD Caliper assembly

Type: FLOATING VKSD119/62-FL

Drg. No. A01535 Part No. 67A1544

ITEM No.	COMPONENT	PART No.	QTY
1	VKSD119/62 Spring Module	6701537	1
2	VKSD Floating module	6701546	1
3	Brake Pad Assembly	X1898	2
4			
5			
6			
7	Bolt, Hex/Head, M24 x 270	5001067	4
8	Bolt, Hex/Head, M16 x 90	5000656	3
9			
10	Nut, M16	5100239	3
11			

4.2 Type: FLOATING VKSD64/28

Drg. No. A01536 Part No. 67A1545

ITEM No.	COMPONENT	PART No.	QTY
1	VKSD64/28 Spring Module	6701538	1
2	VKSD Floating module	6701546	1
3	Brake Pad Assembly	X1898	2
4			
5			
6			
7	Bolt, Hex/Head, M24 x 270	5001067	4
8	Bolt, Hex/Head, M16 x 90	5000656	3
9			
10	Nut, M16	5100239	3
11			

4.2

Parts list for one Spring Brake Module assembly

Type: VKSD119/62 Drg. No. A01519 Part No. 6701539

Type: VKSD64/28 Drg. No. A01520 Part No. 6701538

ITEM No.	COMPONENT	PART No.	QTY.
1	Housing	7931996	1
2	Pressure Plate	7931997	1
3	Thrust Screw	7951998	1
4	Spring Guide	7951999	1
5	Piston	7952000	1
6	Cylinder	7931995	1
7	End Cover	7952001	1
8	Piston Collet	7952002	1
9	Collet Retainer	7952003	1
10	Adjusting Spindle	7902004	1
11	Spindle Bearing	7902224	1
12	Spindle Locking Plate	7902225	1
13	Pad Retraction Hook	7902005	2
14	Pad Retraction Plunger	7902006	2
15	Retractor Flange	7952007	1
16	Thrust Washer	4700267	1
17	Washer	4700274	2
18	Washer Cone	4700275	2
*19	Bleed screw, G1/8"	6700381	1
*20	Adaptor, G3/8"(M) x G1/8"(F)	7300662	1
21	Label	7901483	1
22			
23			
24	Pad Retraction Spring	2500248	2
25	Disc Spring, VKSD119/62	2500154	10
25	Disc Spring, VKSD64/28	2500154	7
26	Spacer, VKSD64/28 only	7952008	1
27	Shim 1mm	1650492	1
28	Shim 2mm	1650493	3
29	Cylinder Seal, External dia 150	6000428	1
30	Rod Seal, Internal dia 70	6000427	1
31	Bearing Ring, External dia 150	6000402	1
32	Bearing Ring, Internal dia 70	6000403	1
33	Bearing Ring, Internal dia 172	6000404	1
34	O ring, 150 x 145 x 3	6000399	1
35	O ring, 74 x 70 x 2.4	6000398	1
36	O ring, 190 x 185 x 3	6000167	1
37	O ring, 67 x 75 x 3	6000445	1
38	Back up ring, Internal dia 75	6000490	1
39	Quad ring seal	6000450	1
40	Retaining ring, Internal dia 100	4300195	1
41	Grip Ring, dia 6	4300193	3
42	Tension Pin, dia 6 x 50	3800183	3
43	Tension Pin, dia 5 x 40	3800197	1
44			

M1445

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45	Screw, Socket. Csk. Head, M5 x 16	5500070	1
46	Screw, M12 x 60 Hex. Hd.	5300219	6
47	Screw, Hex/Head, M10 x 30	5300192	8
48	Screw, M5 x 12 Hex. Hd.	5300286	4
49	Screw, Hammer Drive No.2	5600019	4
50			
51	Nut, M12	5100189	6
52	Spring Washer, M10	5800070	8
53	Setscrew, M6 x 8 socket	5400469	2
54	Setscrew, M8 x 10 socket	5400472	1
55	Setscrew, M6 x 12 Skt. Hd.	5400470	2
56			
57	Plug, G3/8"	7300663	2
58	Plug, G1/8"	7300657	4
59	Male stud coupling, 3/8"BSP - 12	7300664	1
60			
*61	Bonded Seal, G3/8"	7301025	2
62	Bonded Seal, G3/8"	7300148	2
63	Eyebolt, M16 collar type	1402353	2

* supplied as loose items

4.3 **Parts list for one Floating Module assembly**
Type: FLOATING VKSD

Drg. No. A01537 Part No. 6701546

ITEM No.	COMPONENT	PART No.	QTY
1	Reactive housing	7922692	1
2	Support bracket	7932691	1
3	Bearing shaft	7952695	2
4			
5	Bearing lock nut	7952698	2
6	Pad retraction hook	7902705	2
7	Pad retraction plunger	7902704	2
8	Washer	4700306	2
9	Pad retraction spring	2500288	2
10			
11			
12			
13			
14	Wiper seal	6000548	4
15	Bearing ring	1800395	4
16			
17			
18			
19			
20			

4.4 Recommended spares for Floating VKSD Caliper

For each brake in use at remote sites or in marine installation, the following spares should be carried:-

4.4.1 Brake Pads

These are to be stored in a dry place away from contact with oil or grease. Please order correct grade of friction material.

Component	Part No	QTY.
Pad - Ferodo 3904F	X1898	2

4.4.2 Seals

NOTE: In addition to the following spares, where machinery down time is critical, it is recommended that at least one complete VKSD SPRING MODULE is kept as a spare.

COMPONENT	PART No.	QTY
2 Part cylinder seal 150 I/D	6000428	2
2 Part rod seal 70 I/D	6000427	2
Bearing ring (piston) 150 I/D	6000402	2
Bearing ring (rod) 70 I/D	6000403	2
Bearing ring 172 I/D	6000404	2
'O' Ring 150 x 145 x 3	6000399	2
'O' Ring 74 x 70 x 2.4	6000398	2
'O' Ring 190 x 185 x 3	6000167	2
'O' Ring 67 x 75 x 3	6000445	2
Back up ring 75 I/D	6000490	2
Quad ring seal 171 I/D	6000450	2

APPENDIX 1

OPERATIONAL SEQUENCE

1 Brake 'Parked Off'

The brake is supplied in the 'Parked-Off' position, so that it can be mounted with disc springs fully relaxed. Brake cannot come on accidentally and can be dismantled safely

2 To install brake:

- a) Install all hydraulic hard pipe work to installation.
- b) Install caliper assembly as described in section 2 (Installation).

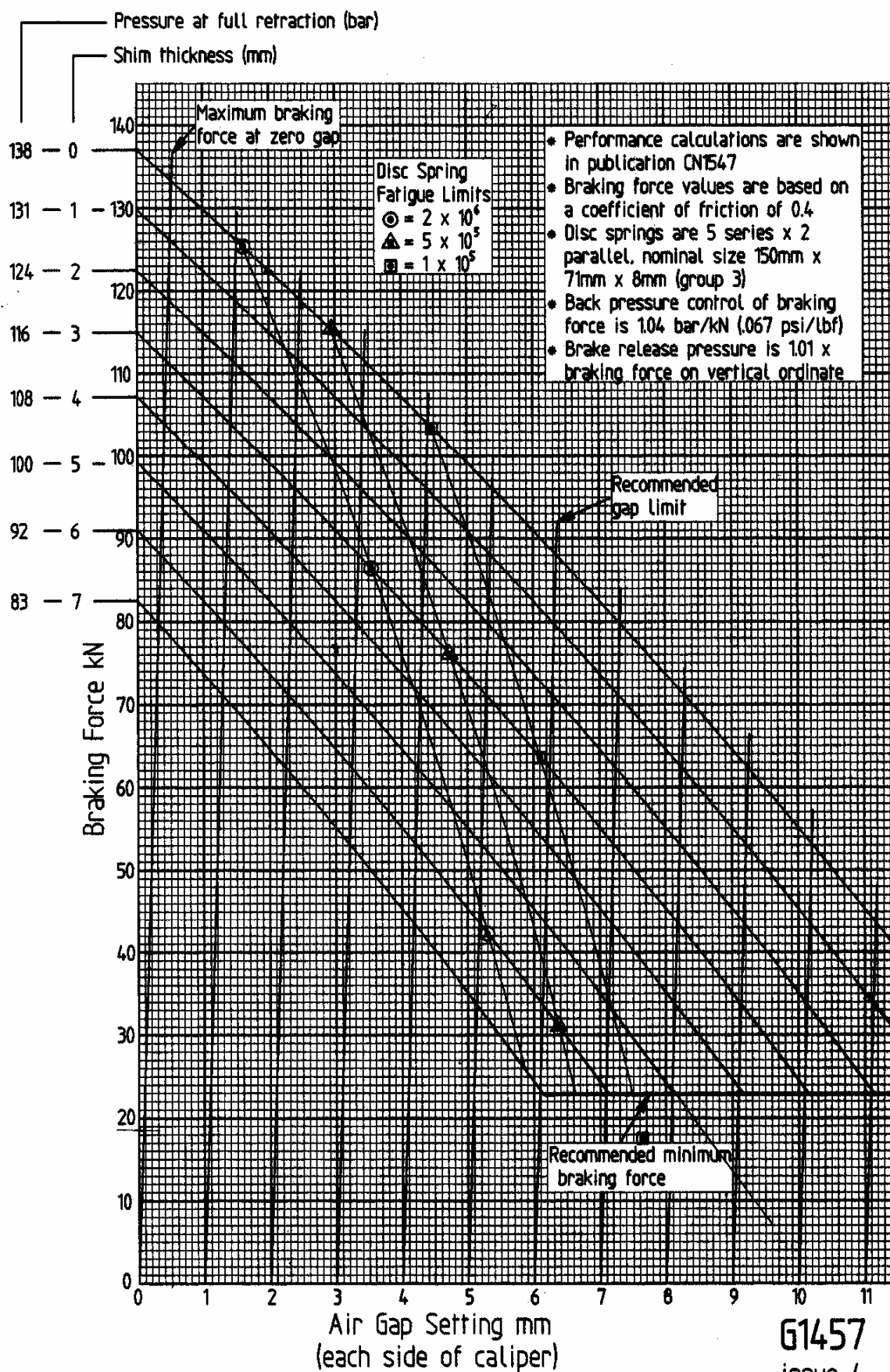
3 Initial set up of brake:

- a) Follow section 2.2 (Initial air gap adjustment).
- b) Follow section 2.4, (monitor unit if fitted).

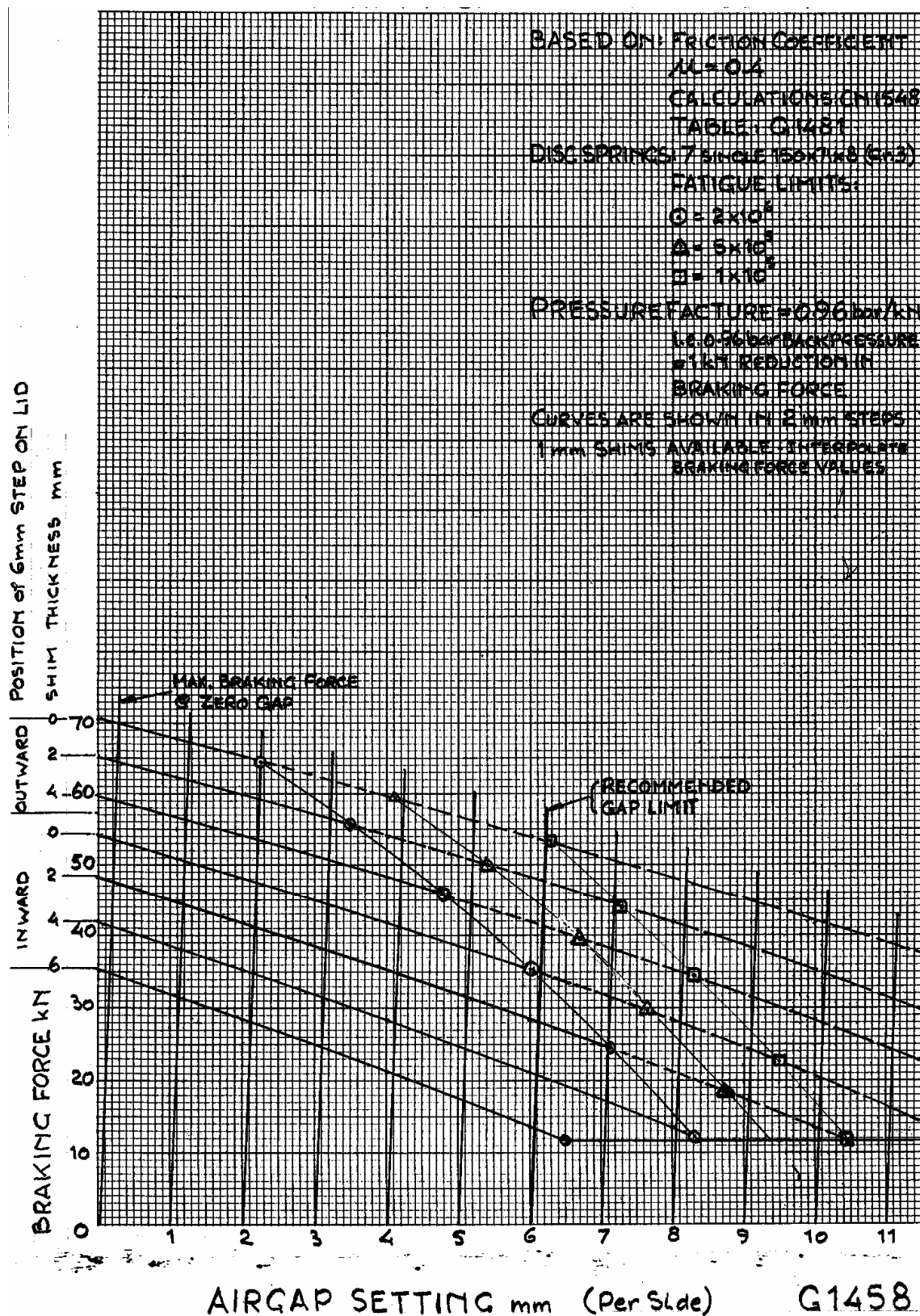
The brake is now ready for operation. Releasing hydraulic pressure will now apply the brake. Follow maintenance program as described in section 3.2 (Maintenance / inspection program).

APPENDIX 2

PERFORMANCE CURVES G1457 FOR VKSD119/62



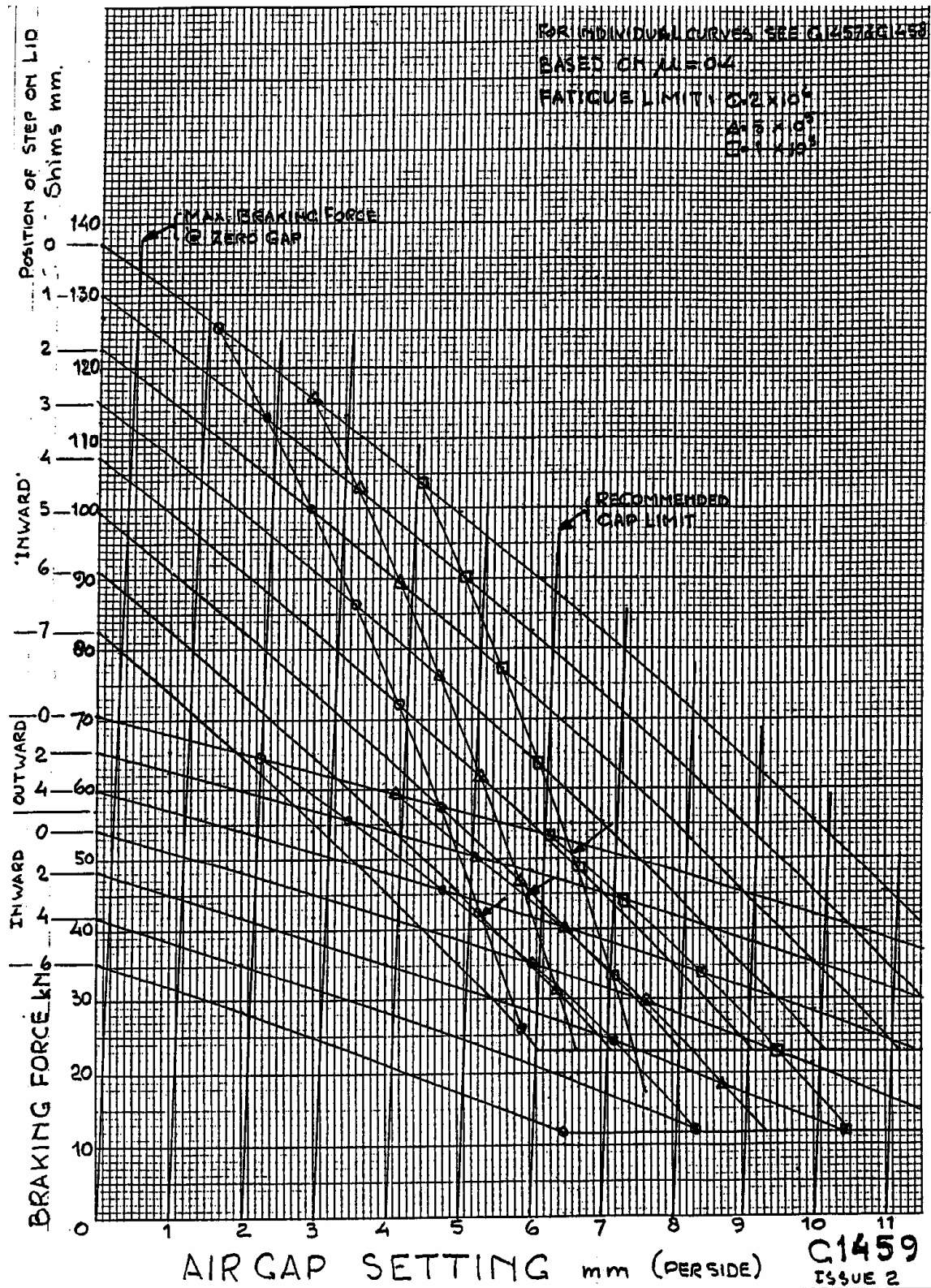
PERFORMANCE CURVES G1458 FOR VKSD64/28

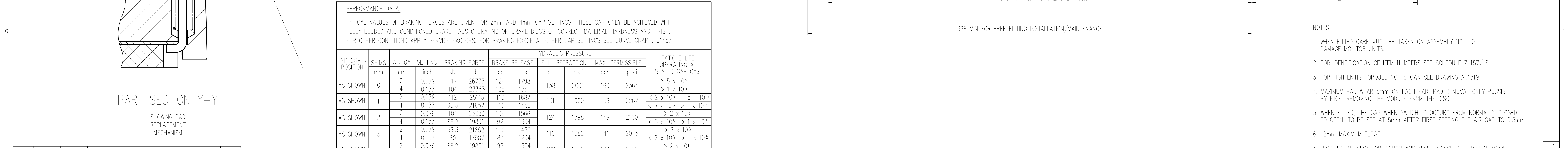


G1458


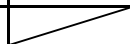
Issue 3

PERFORMANCE CURVES G1459 FOR VKSD119/62 AND 64/28 COMBINED

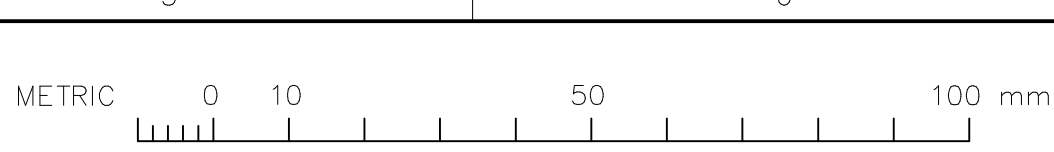
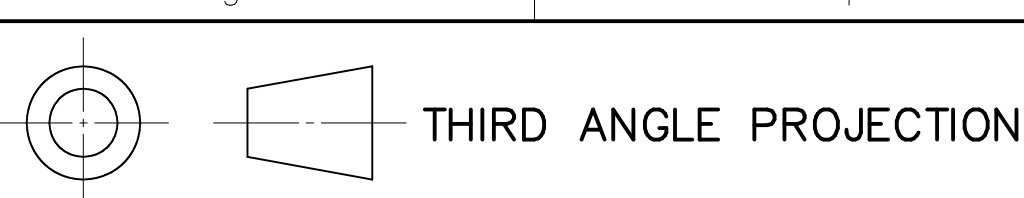




THIS
ISSUE
04 H

Used on	Item Number	Component	Drawing Number	Part Number	Quantity	Remarks
	1	SPRING MODULE, VKSD119/62	A01519	6701537	1	Z157/13
	2	FLOATING MODULE, VKSD	A01537	6701546	1	Z157/20
	3	BRAKE PAD ASSEMBLY	X1898	X1898	2	MAKE FROM 70A0153-9
	4					
	5					
	6					
	7	BOLT, HEX. HD. M24 x 270		5001067	4	GRADE 8.8, ZINC PLATED
	8	BOLT, HEX. HD. M16 x 90		5000656	3	GRADE 8.8, ZINC PLATED
	9					
	10	NUT, HEX. HD. M16		5100239	3	GRADE 8.8, ZINC PLATED
		THE FOLLOWING ARE OPTIONAL AND ARE				
		SUPPLIED SEPARATELY:				
		FASTENER LENGTH TO SUIT MOUNTING PLATE				
		THICKNESS				
		BOLT, HEX. HD. M24 x			2	GRADE 8.8, ZINC PLATED
		SCREW, SOCKET HD. M24 x			3	GRADE 12.9, ZINC PLATED
		NUT, HEX. HD. M24		5100255	5	GRADE 8.8, ZINC PLATED
		Title VKSD119/62-FL FLOATING BRAKE ASSEMBLY - BASE MODEL				Assembly Drawing No. A01535
						Assembly Part No. 67A1544
Drawn	Date	22/07/2004				Installation Drawing No.
R.E.G.	Alt No.					Schedule No.
Checked	Issue	01				Z157/18
---	Any loose fittings to be placed in a plastic bag and tied to unit					
						Form No. DO/52-3

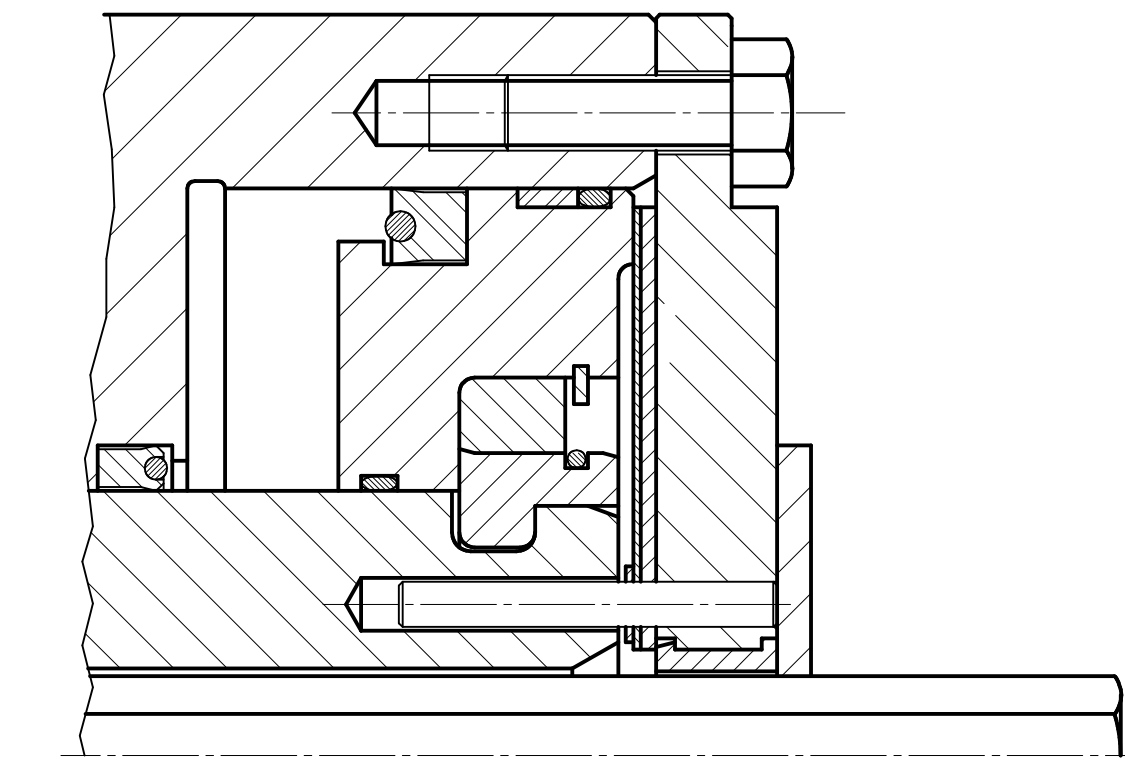
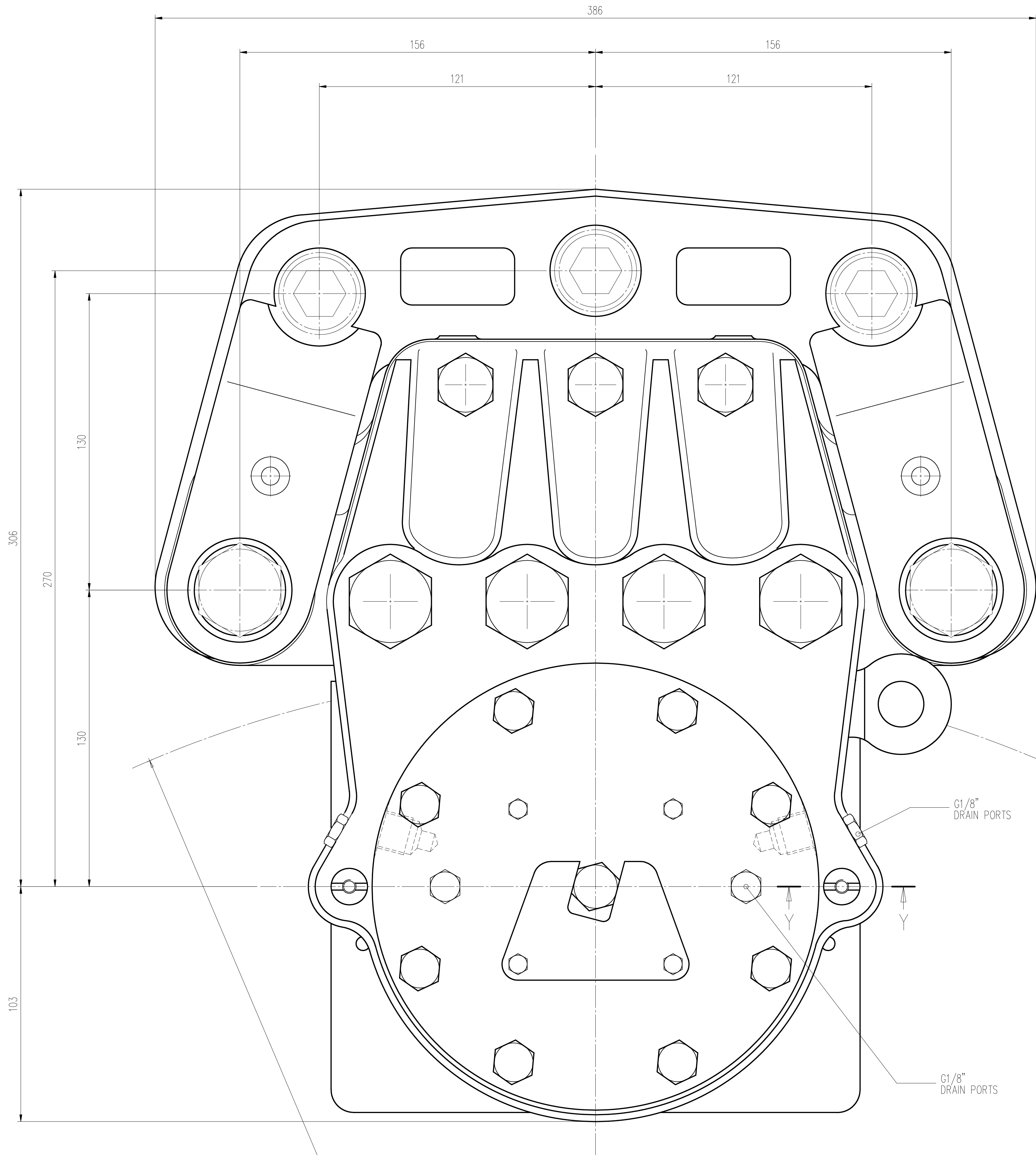
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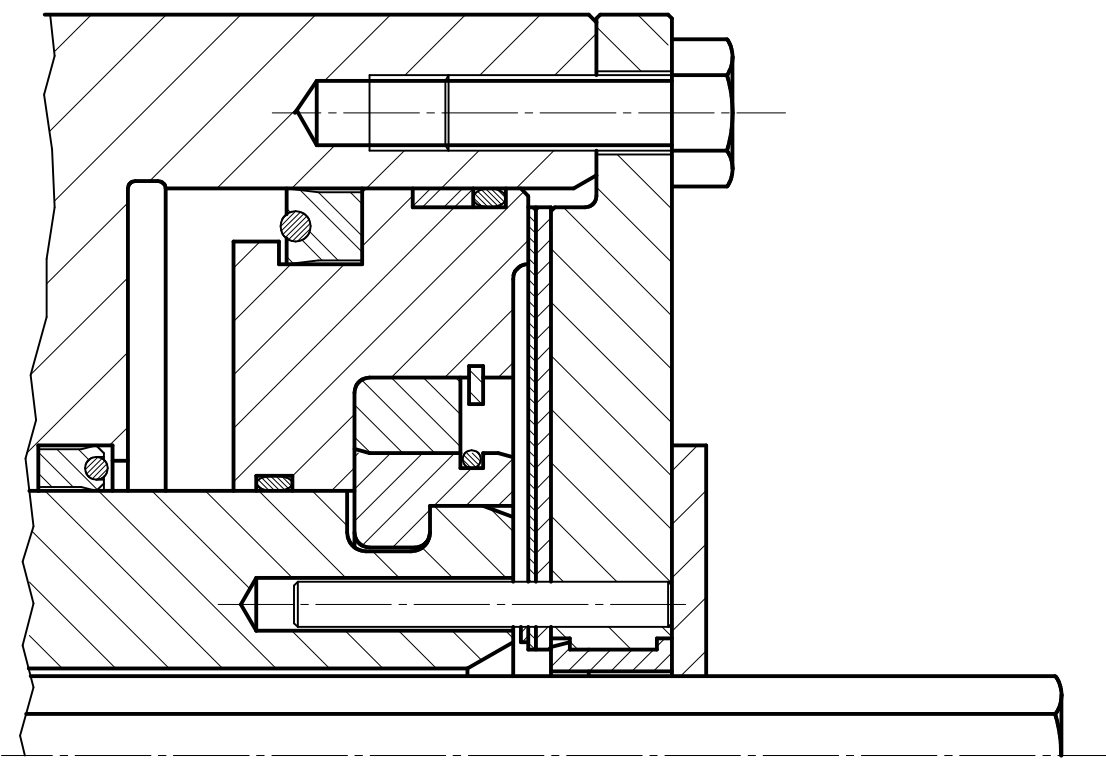
DO NOT SCALE

REMOVE SHARP EDGES

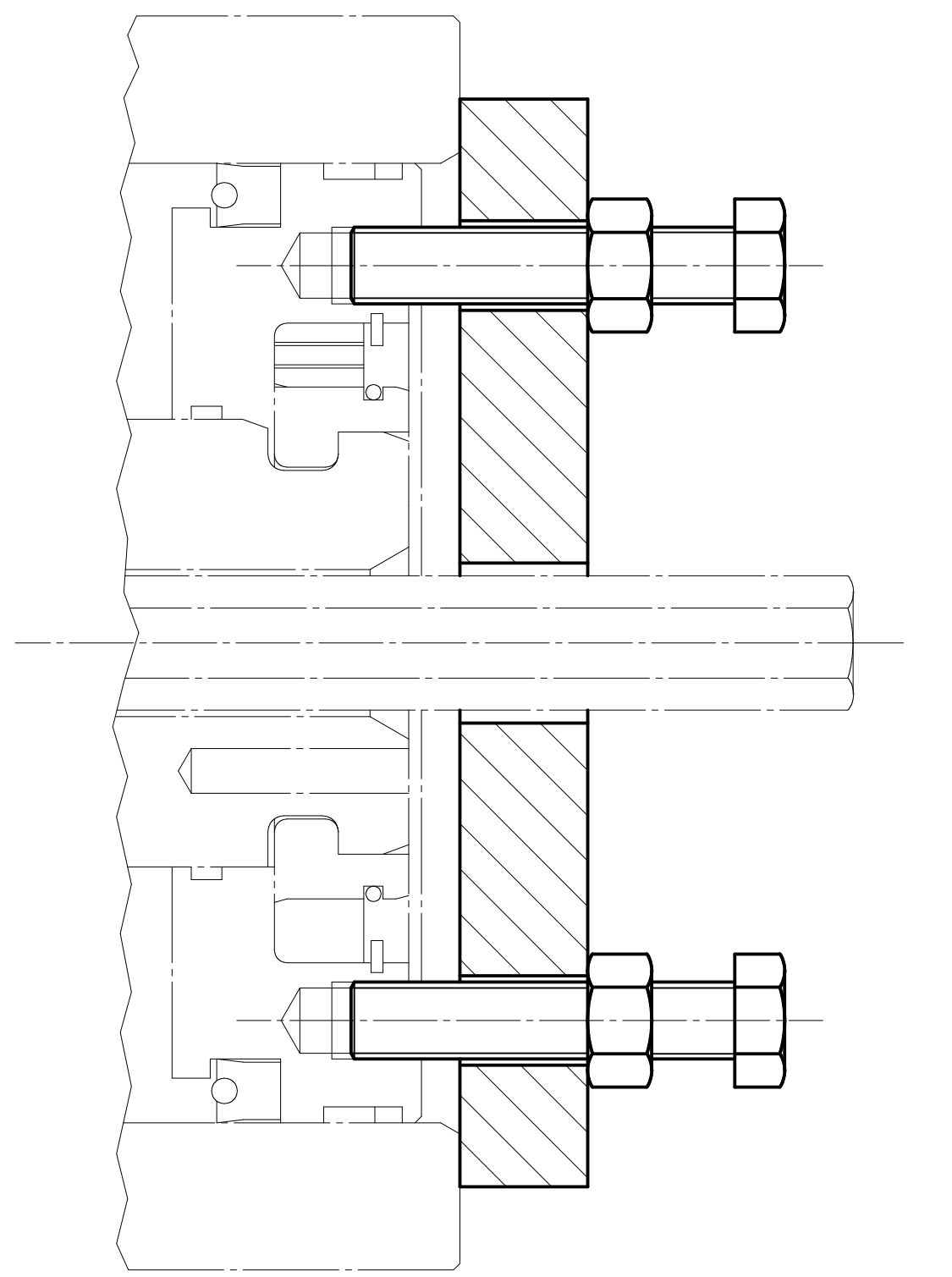
DIMENSIONS AND TOLERANCES TO BS 308



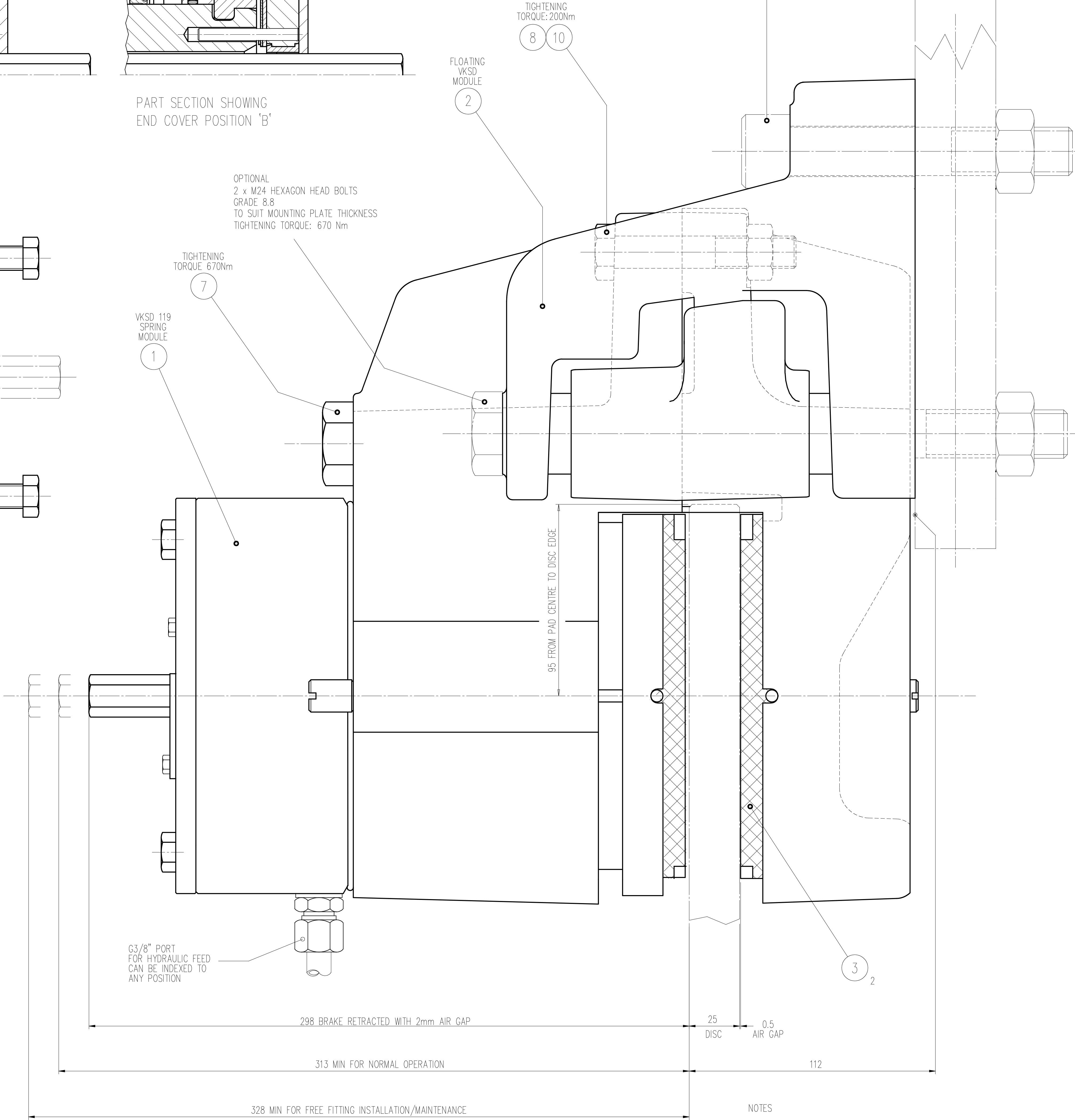
PART SECTION SHOWING
END COVER POSITION 'A'



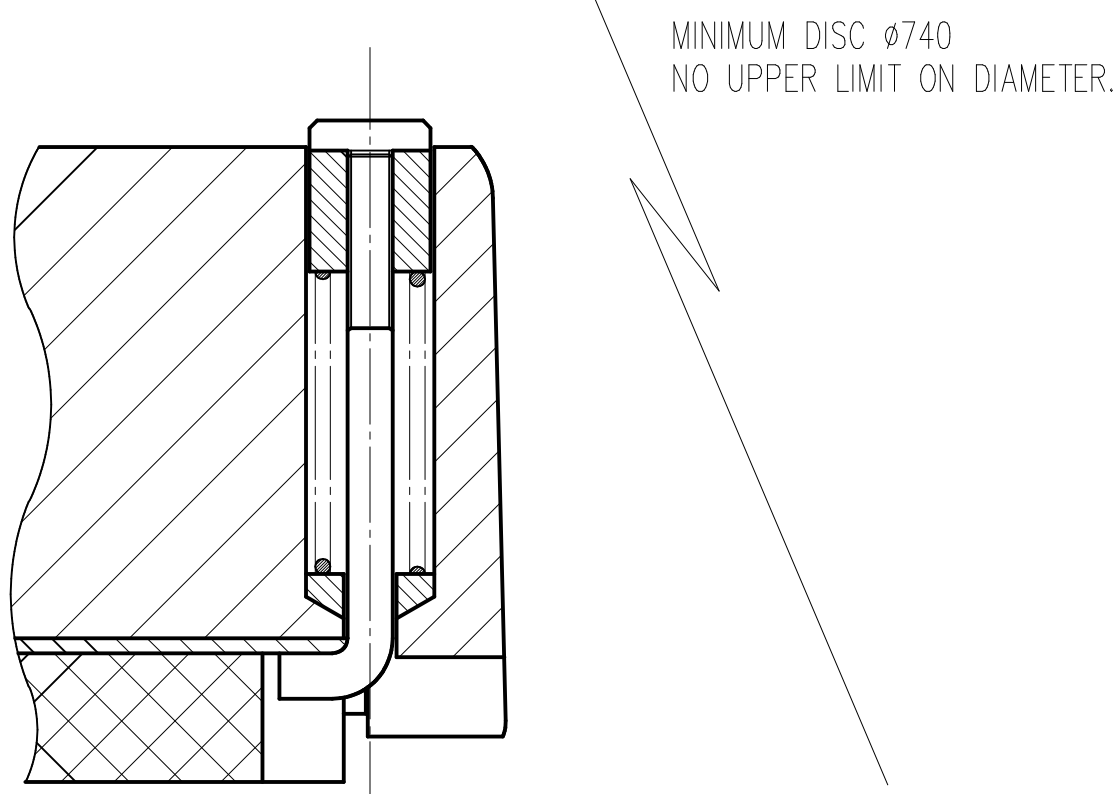
PART SECTION SHOWING
END COVER POSITION 'B'



MECHANICAL RETRACTION DETAIL
TOOL KIT PART No. 7903437
TO BE PURCHASED SEPARATELY
SCHEDULE No. Z157/22



- NOTES
- WHEN FITTED CARE MUST BE TAKEN ON ASSEMBLY NOT TO DAMAGE MONITOR UNITS.
 - FOR IDENTIFICATION OF ITEM NUMBERS SEE SCHEDULE Z 157/19
 - FOR TIGHTENING TORQUES NOT SHOWN SEE DRAWING A01520
 - MAXIMUM PAD WEAR 5mm ON EACH PAD. PAD REMOVAL ONLY POSSIBLE BY FIRST REMOVING THE MODULE FROM THE DISC.
 - WHEN FITTED, THE GAP WHEN SWITCHING OCCURS FROM NORMALLY CLOSED TO OPEN, TO BE SET AT 5mm AFTER FIRST SETTING THE AIR GAP TO 0.5mm
 - 12mm MAXIMUM FLOAT.
 - FOR INSTALLATION, OPERATION AND MAINTENANCE SEE MANUAL M1445



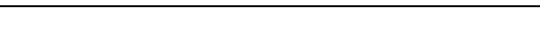

PART SECTION Y-Y



SHOWING PAD
REPLACEMENT
MECHANISM

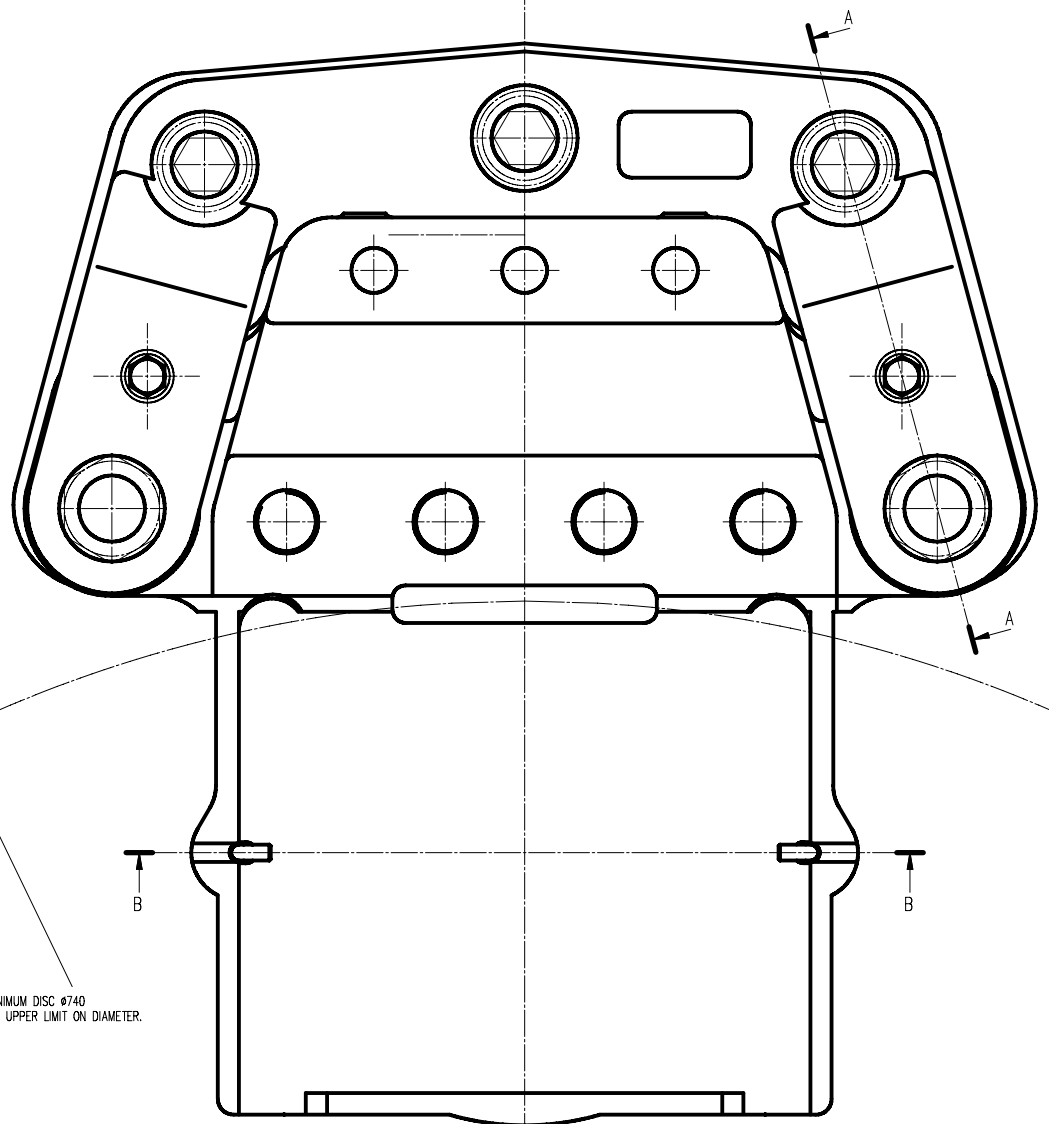
TOTAL OIL DISPLACEMENT = 28ml FOR 1mm RETRACTION (FOR BOTH PADS)

PERFORMANCE DATA													
TYPICAL VALUES OF BRAKING FORCES ARE GIVEN FOR 2mm AND 4mm GAP SETTINGS. THESE CAN ONLY BE ACHIEVED WITH FULLY BEDDED AND CONTIONED BRAKE PADS OPERATING ON BRAKE DISCS OF CORRECT MATERIAL HARDNESS AND FINISH. FOR OTHER CONDITIONS APPLY SERVICE FACTORS, FOR BRAKING FORCE AT OTHER GAP SETTINGS, SEE GRAPH G1458.													
END COVER POSITION	SHIMS	AIR GAP SETTING EACH SIDE		BRAKING FORCE		BRAKE RELEASE		FULL RETRACTION		MAX. PERMISSIBLE		FATIGUE LIFE* OPERATING AT STATED GAP CYS.	
		mm	inch	kN	lbf	bar	p.s.i	bar	p.s.i	bar	p.s.i		
A	0	2	0.079	64.1	14411	63	914	69	1000	94	1363	< 2 x 10 ⁶	> 5 x 10 ⁵
		4	0.157	58.7	13197	58	841					< 5 x 10 ⁵	> 1 x 10 ⁵
A	2	2	0.079	58.7	13197	58	841	63	914	88	1276	> 2 x 10 ⁶	
		4	0.157	53.0	11915	53	768					< 2 x 10 ⁶	> 5 x 10 ⁵
A	4	2	0.079	53.0	11915	53	768	58	841	83	1204	> 2 x 10 ⁶	
		4	0.157	47.1	10589	47	682					> 2 x 10 ⁶	
B	0	2	0.079	47.1	10589	47	682	53	768	78	1131	> 2 x 10 ⁶	
		4	0.157	41.0	9218	41	595					> 2 x 10 ⁶	
B	2	2	0.079	41.0	9218	41	595	47	681	72	1044	> 2 x 10 ⁶	
		4	0.157	34.4	7734	34	493					> 2 x 10 ⁶	
B	4	2	0.079	34.4	7734	34	493	41	594	66	957	> 2 x 10 ⁶	
		4	0.157	27.8	6250	28	406					> 2 x 10 ⁶	
B	6	2	0.079	27.8	6250	28	406	34	493	59	856	> 2 x 10 ⁶	
		4	0.157	20.7	4654	21	304					> 2 x 10 ⁶	

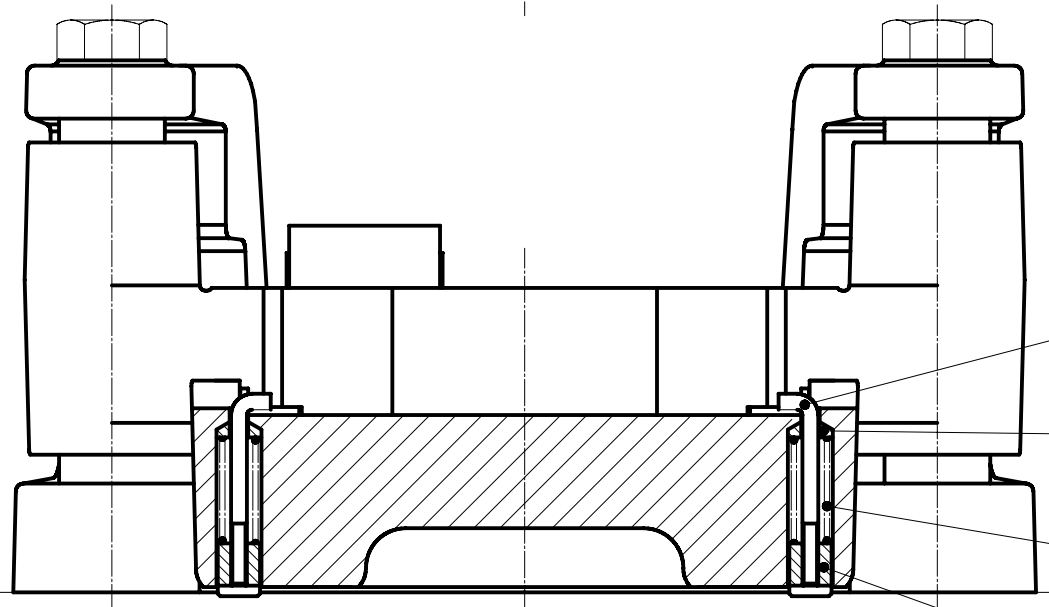
ISSUE No.	ALT. No.	DATE	DESCRIPTION	GRID REF.
03	13818	27/02/09	DRAWING CHANGED PICTORIALLY	
02	13325	13/04/05	MECHANICAL RETRACTION DETAIL VIEW AND NOTE ADDED	
01		25/08/04		
ALTERATION				

 TWIFLEX LIMITED THE GREEN TWICKENHAM MIDDLESEX ENGLAND TW2 5AQ	DIMENSIONS IN mm. OPEN TOLERANCES ± 0.25 ANGLES ± 0.5° M/C AT SURFACE FINISH IN MICRONS e.g.  = 2 MICRONS (0.002mm) CLA (= 80 MICRO-INCHES CLA)	CERT'D	DESCRIPTION		INERTIA	WEIGHT	
		CHECKED	VKSD64/28 FLOATING BRAKE ASSY		- kg m ²	- kg	
		DRAWN	R.E.G.	MATERIAL	FINISH	PART No.	67A1545
		SCALE 1 : 1	DATE 25/08/04	-	-	DRG. No.	A01536
						A O	

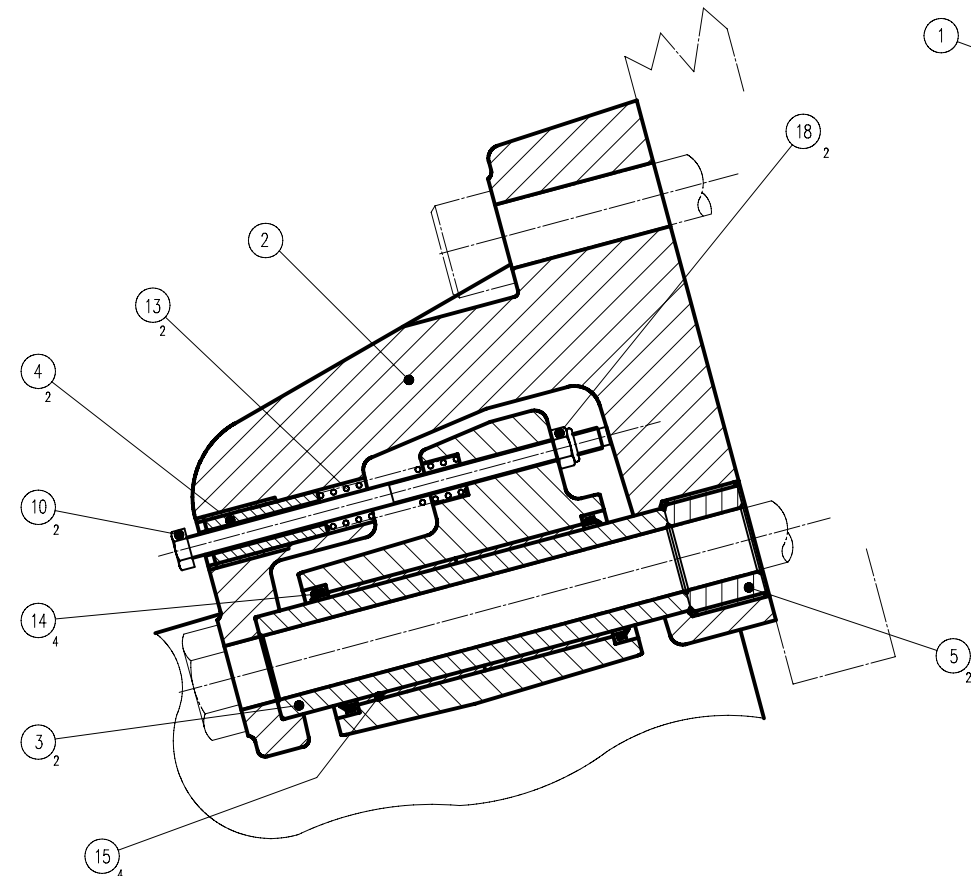
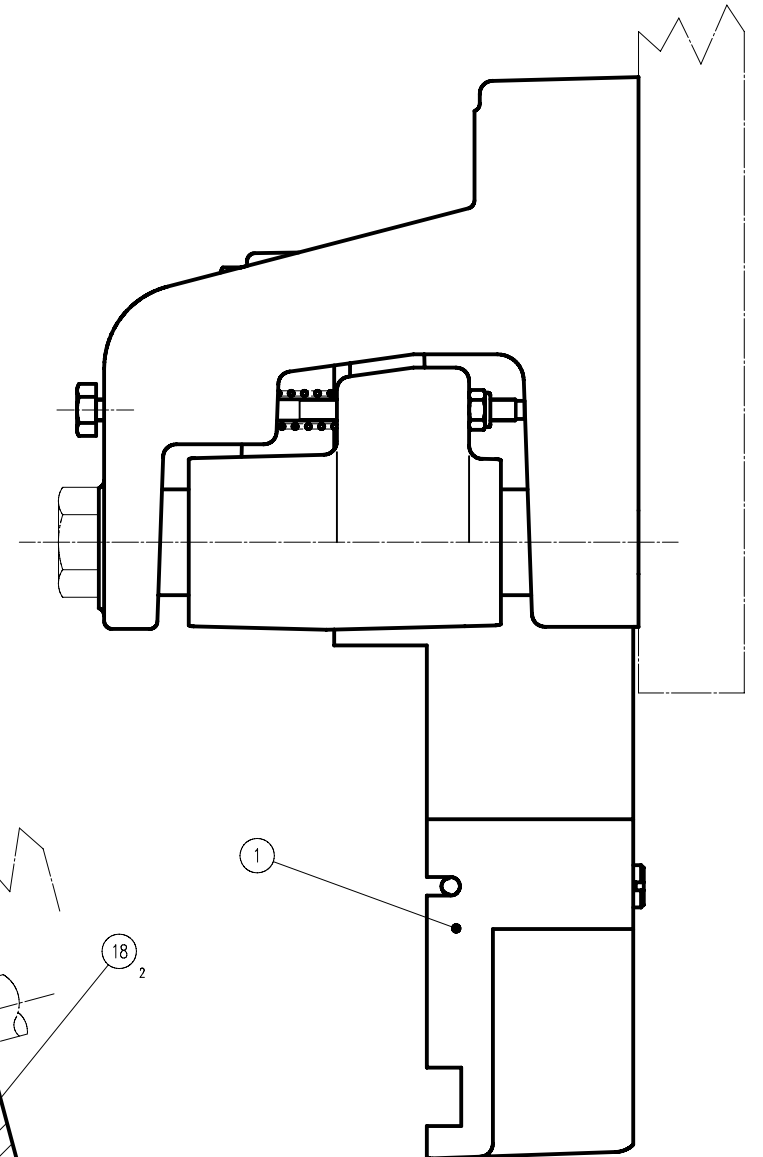
Used on	Item Number	Component	Drawing Number	Part Number	Quantity	Remarks
	1	SPRING MODULE, VKSD64/28	A01520	6701538	1	Z157/14
	2	FLOATING MODULE, VKSD	A01537	6701546	1	Z157/20
	3	BRAKE PAD ASSEMBLY	X1898	X1898	2	MAKE FROM 70A0153-9
	4					
	5					
	6					
	7	BOLT, HEX. HD. M24 x 270		5001067	4	GRADE 8.8, ZINC PLATED, MAKE FROM 5001067
	8	BOLT, HEX. HD. M16 x 90		5000656	3	GRADE 8.8, ZINC PLATED
	9					
	10	NUT, HEX. HD. M16		5100239	3	GRADE 8.8, ZINC PLATED
		THE FOLLOWING ARE OPTIONAL AND ARE				
		SUPPLIED SEPARATELY:				
		FASTENER LENGTH TO SUIT MOUNTING PLATE				
		THICKNESS				
		BOLT, HEX. HD. M24 x			2	GRADE 8.8, ZINC PLATED
		SCREW, SOCKET HD. M24 x			3	GRADE 12.9, ZINC PLATED
		NUT, HEX. HD. M24		5100255	5	GRADE 8.8, ZINC PLATED
		Title VKSD64/28-FL FLOATING BRAKE ASSEMBLY - BASE MODEL				Assembly Drawing No. A01536
						Assembly Part No. 67A1545
Drawn	Date	22/07/2004				Installation Drawing No.
R.E.G.	Alt No.					Schedule No.
Checked	Issue	01				Z157/19
---	Any loose fittings to be placed in a plastic bag and tied to unit					
						Form No. DO/52-3



MINIMUM DISC Ø740
NO UPPER LIMIT ON DIAMETER.




SECTION BB





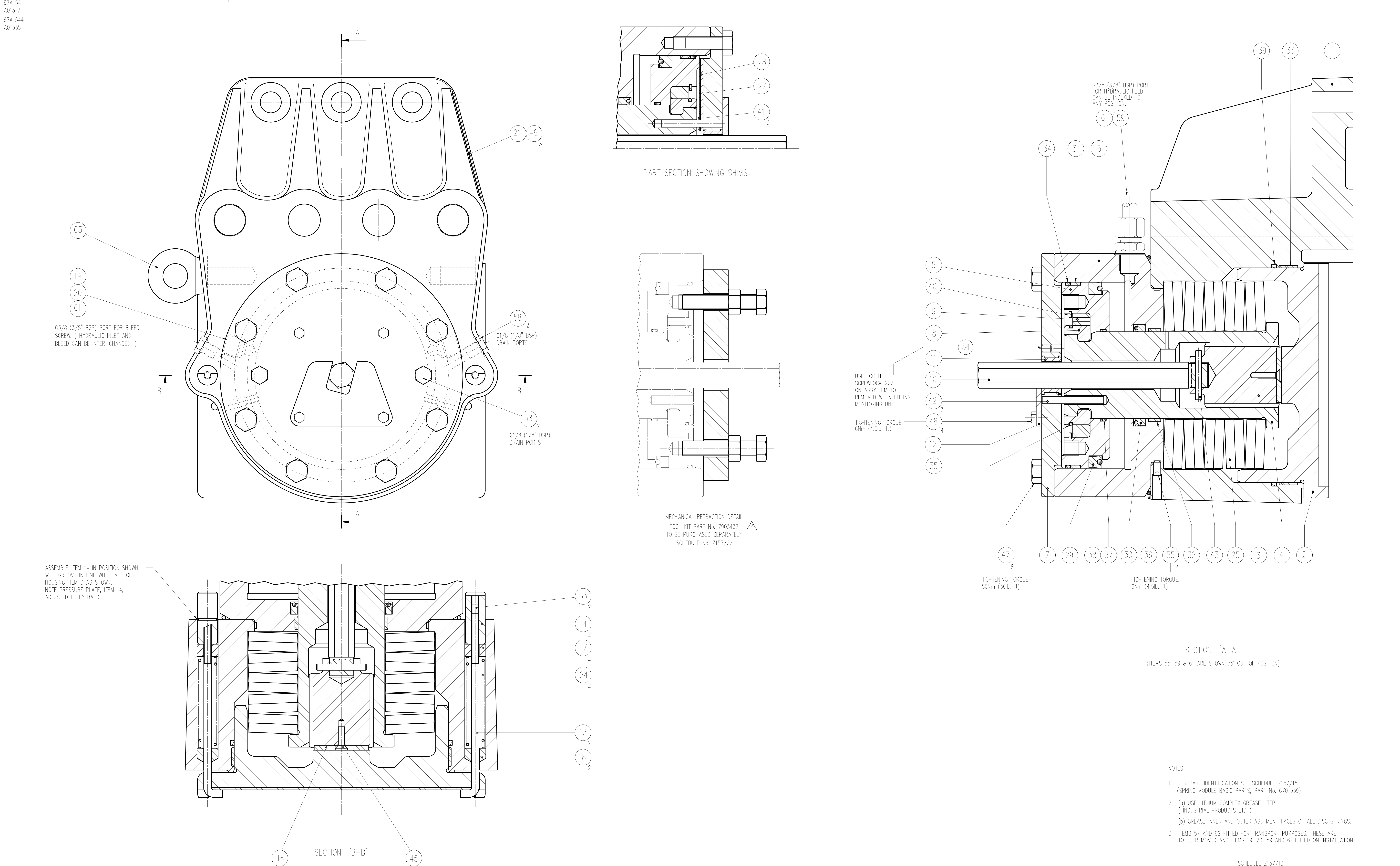
SECTION AA


- NOTES
- 1. FOR COMPONENT IDENTIFICATION SEE SCHEDULE Z157/20
 - 2. FOR INSTALLATION, OPERATION AND MAINTENANCE SEE MANUAL M1445


ISSUE No.	ALT. No.	DATE	DESCRIPTION	GRID REF.
04	13882	21/09/09	ITEMS 4, 10, 13, 18 RESTORED	
03	13818	26/02/09	ITEMS 4,10,13,18 REMOVED	
02	13228	23/09/08	LOCTITE 270 REMOVED FROM ITEMS 2, 4 AND 5.	-
01		28/07/04		


<div></div> <div>TWIFLEX LIMITED THE GREEN TWICKENHAM MIDDLESEX ENGLAND TW2 5AQ</div>	DIMENSIONS IN mm. OPEN TOLERANCES ± 0.25 ANGLES ± 0.5° M/C AT ✓ SURFACE FINISH IN MICRONS e.g. ✓ = 2 MICRONS (0.002mm) CLA (= 80 MICRO-INCHES CLA)	CERT'D		DESCRIPTION WSD FLOATING MODULE BASE MODEL	INERTIA kg m ²	WEIGHT kg		
		CHECKED						
		DRAWN	R.E.G.				MATERIAL	FINISH
		DATE	28/07/04					
		SCALE	1 : 1		PART No. 6701546			
					DRG. No. A01537			

Used on	Item Number	Component	Drawing Number	Part Number	Quantity	Remarks			
67A0928/ AU65	1	HOUSING, REACTIVE	A01281/2	7922692	1	MAKE FROM A012812			
	2	BRACKET, SUPPORT	A12592/2	7932691	1	MAKE FROM A125923			
	3	SHAFT, BEARING	A34040	7952695	2	CHROME PLATED			
	4	SPRING ADJUSTING SCREW	A34041	7952696	2				
	5	NUT, BEARING LOCK	A34042	7952698	2	ZINC PLATED			
	6	HOOK, PAD RETRACTION	A34051	7902705	2	MAKE FROM 7902005			
	7	PLUNGER, PAD RETRACTION	A34050	7902704	2	MAKE FROM 7902006			
	8	WASHER	A34049	4700306	2	MAKE FROM 4700275			
	9	SPRING, PAD RETRACTION	A34048	2500288	2	MAKE FROM 2500248			
	10	BOLT. M8x170	X1806	X1806	2	BOLT, M8 x 170, Mod. 5001028			
	11								
	12								
	13	SPRING, COMPRESSION	ND	2500290	2				
	14	SEAL, WIPER		6000548	4	BUSAK SHAMBAN ASA40505			
	15	RING, BEARING		1800395	4	GLACIER MB4050DU			
	16								
	17								
	18	NUT, NYLOC, M8 TYPE T	ND	5100220	2				
	19								
	20								
	21								
	22								
	23								
	24								
	25								
	26								
		Title VKSD-FL FLOATING MODULE BASE MODEL				Assembly Drawing No.	A01537		
						Assembly Part No.	6701546		
Drawn	Date	22/07/2004	26/02/2009	21/09/2009				Installation Drawing No.	
R.E.G.	Alt No.		13818	13882				Schedule No.	
Checked	Issue	01	02	03				Z157/20	Sheet 1 of 1
---	Any loose fittings to be placed in a plastic bag and tied to unit								Form No. DO/52-3



Used on	Item Number	Component	Drawing Number	Part Number	Quantity	Remarks			
6701537	1	HOUSING	A01161	7931996	1	MAKE FROM CASTING PART No. A011613			
6701538	2	PRESSURE PLATE	A11705/2	7931997	1	MAKE FROM CASTING PART No. A117053			
	3	ADJUSTING SCREW	A35332	7953810	1				
	4	SPRING GUIDE	A22365/2	7951999	1	MAKE FROM PART No. 7951999/1			
	5	PISTON	A22364	7952000	1				
	6	CYLINDER	A12375	7951995	1				
	7	END COVER	A22358	7952001	1				
	8	PISTON COLLET	A32656/2	7952002	1	MAKE FROM PART No. 7952002/1			
	9	COLLET RETAINER	A32657	7952003	1				
	10								
	11	SPINDLE BEARING	A33053	7902224	1				
	12	SPINDLE LOCKING PLATE	A33069	7902225	1				
	13	PAD RETRACTION HOOK	A32659	7902005	2				
	14	PAD RETRACTION PLUNGER	A32660	7902006	2				
	15								
	16	THRUST WASHER	A32670	4700267	1				
	17	WASHER	A33052	4700274	2				
	18	WASHER	A33056	4700275	2				
	19	BLEEDSCREW, 1/8" BSP	31033	6700381	1	S/ST			
	20	ADAPTOR, 3/8" BSP(M) x 1/8" BSP(F)	A31609	7300662	1				
	21	LABEL	A31872	7901483	1	BRASS			
	22								
	23								
	24	PAD RETRACTION SPRING		2500248	2	TERRY D22690. S/ST			
	25	DISC SPRING	SEE Z157/3		-				
	26	SPACER	SEE Z157/3B		-	VKSD64/28 ONLY (DRG. No. A01520)			
		SPRING MODULE, BASIC PARTS, VKSD, BASE MODEL				Assembly Drawing No.	(A01519 & A01520)		
						Assembly Part No.	6701539		
Drawn	Date	01/06/04	13-4-05	26-03-10		Installation Drawing No.	-		
REG	Alt No.		13325	13932		Schedule No.			
Checked	Issue	01	02	03		Z157/15	Sheet 1 of 3		
---	Any loose fittings to be placed in a plastic bag and tied to unit						Form No. DO/52-3		

Used on	Item Number	Component	Drawing Number	Part Number	Quantity	Remarks			
6701537	1	HOUSING	A01161	7931996	1	MAKE FROM CASTING PART No. A011613			
6701538	2	PRESSURE PLATE	A11705/2	7931997	1	MAKE FROM CASTING PART No. A117053			
	3	ADJUSTING SCREW	A35332	7953810	1				
	4	SPRING GUIDE	A22365/2	7951999	1	MAKE FROM PART No. 7951999/1			
	5	PISTON	A22364	7952000	1				
	6	CYLINDER	A12375	7951995	1				
	7	END COVER	A22358	7952001	1				
	8	PISTON COLLET	A32656/2	7952002	1	MAKE FROM PART No. 7952002/1			
	9	COLLET RETAINER	A32657	7952003	1				
	10								
	11	SPINDLE BEARING	A33053	7902224	1				
	12	SPINDLE LOCKING PLATE	A33069	7902225	1				
	13	PAD RETRACTION HOOK	A32659	7902005	2				
	14	PAD RETRACTION PLUNGER	A32660	7902006	2				
	15								
	16	THRUST WASHER	A32670	4700267	1				
	17	WASHER	A33052	4700274	2				
	18	WASHER	A33056	4700275	2				
	19	BLEEDSCREW, 1/8" BSP	31033	6700381	1	S/ST			
	20	ADAPTOR, 3/8" BSP(M) x 1/8" BSP(F)	A31609	7300662	1				
	21	LABEL	A31872	7901483	1	BRASS			
	22								
	23								
	24	PAD RETRACTION SPRING		2500248	2	TERRY D22690. S/ST			
	25	DISC SPRING	SEE Z157/3		-				
	26	SPACER	SEE Z157/3B		-	VKSD64/28 ONLY (DRG. No. A01520)			
		SPRING MODULE, BASIC PARTS, VKSD, BASE MODEL				Assembly Drawing No.	(A01519 & A01520)		
						Assembly Part No.	6701539		
Drawn	Date	01/06/04	13-4-05	26-03-10				Installation Drawing No.	-
REG	Alt No.		13325	13932				Schedule No.	
Checked	Issue	01	02	03				Z157/15	Sheet 1 of 3
---	Any loose fittings to be placed in a plastic bag and tied to unit								Form No. DO/52-3

Used on	Item Number	Component	Drawing Number	Part Number	Quantity	Remarks		
6701537 6701538	27	SHIM 1mm	SEE Z157/3		-			
	28	SHIM 2mm	SEE Z157/3		-			
	29	CYLINDER SEAL, 150 O.D.		6000428	1	PARKER SA D028 00030		
	30	ROD SEAL, 70 I.D.		6000427	1	PARKER BA 7013 00030		
	31	BEARING RING, 150 O.D.		6000402	1	SHAMBAN S55908-1500-255A		
	32	BEARING RING, 70 I.D.		6000403	1	SHAMBAN S55809-0700-255A		
	33	BEARING RING, 172 I.D.		6000404	1	SHAMBAN S55815-1720-255C		
	34	O-RING, 150 x 145 x 3		6000399	1	BS4518-1445-30, DOWTY 202-754-4470		
	35	O-RING, 74 x 70 x 2.4		6000398	1	BS4518-0696-24, DOWTY 202-666-4470		
	36	O-RING, 190 X 185 x 3		6000167	1	BS4518-1845-30, DOWTY 202-762-4470		
	37	O-RING, 67 x 75 x 3		6000445	1	BS4518-0695-30, DOWTY 202-739-4470		
	38	BACK UP RING, 75 I.D.		6000490	1	BS0695-30/E, CLARON SEAL		
	39	QUAD RING SEAL, 171.05 I.D. x 3.53 SECTI		6000450	1	WILLS POLYMERS, PART No. 4261		
	40	RETAINING RING, 100 I.D.		4300195	1	SPIROLOX MR393		
	41	GRIP RING, 6 DIA.		4300193	3	ANDERTON M1440-0060		
	42	PIN, TENSION, 6 DIA. X 50		3800183	3	HEAVY DUTY, DIN1481		
	43							
	44							
	45	SCREW, SOCKET CSK, M5 x 16		5500070	1	GRADE 12.9		
	46							
	47	SCREW, HEX. HEAD, M10 x 30		5300192	8	GRADE 8.8, ZINC PLATE AND PASSIVATE		
	48	SCREW, HEX. HEAD, M5 x 12		5300286	4	S/ST		
	49	SCREW, HAMMER DRIVE No. 2		5600019	4			
	50							
	51							
	52							
		Title SPRING MODULE, BASIC PARTS, VKSD, BASE MODEL				Assembly Drawing No.	(A01519 & A01520)	
						Assembly Part No.	6701539	
Drawn REG	Date	01/06/04	13-4-05	26-03-10			Installation Drawing No.	-
	Alt No.		13325	13932			Schedule No.	
Checked ---	Issue	01	02	03			Z157/15	Sheet 2 of 3
	Any loose fittings to be placed in a plastic bag and tied to unit							Form No. DO/52-3