

OPERATION & MAINTENANCE MANUAL

FOR

ROTARY TYPE TWIN GEAR

Pump Type: HGSX

MODEL :

CLIENT :

PROJECT :

P.O. NO. :

SR. NO. :

W.O. No. :

MANUFACTURER : DEL Pd PUMPS & GEARS PVT LTD.

HEAD OFFICE & WORKS :

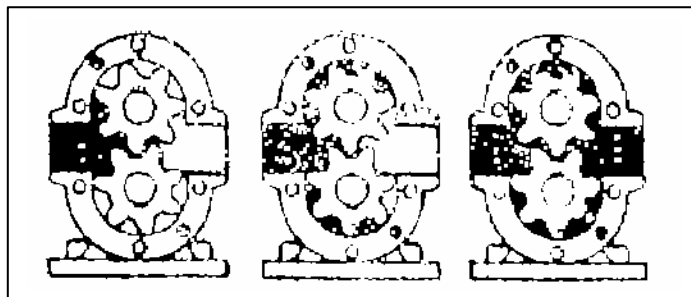
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1. INTRODUCTION :

Introduction & Operation: 'ROTODEL' Rotary Gear Pump type 'HGSX' is a self priming bi-directional, positive displacement rotary pump in all stainless steel (SS-316) construction with dry Teflon coated DU bush bearing requiring no lubrication. These pumps are easy cleanable, is maintainable in 3-pcs. Construction. The back cover can simply be removed by 4 Dom nut. The rt angle mounting brackets facilitates foot mounting of the pump on base plate with electric motor of appropriate ratings. This compact & efficient SS pump find various application for handling viscous food products like butter, fruit pulp, vegetable sows, kanji etc. They are also used in pharmaceuticals industries for handling sugar solution, glycerin, glycol etc. In chemical industries corrosive viscous chemicals can easy be handled with this pump most effectively. The space between the tooth gap & casing forms a cavity, which broadly carries the liquid from the suction bay to discharge port. When the pair of gears opens on the suction side, vacuum is created with assistance of viscous liquid film enabling the liquid to enter the pumping chamber with the assistance of atmospheric pressure, thus this pump are also self-priming. The incoming liquid feels up the tooth cavity, which broadly moves on the periphery to the discharge side & is pushed forward over coming the backpressure thus developing the pressure. In this process some liquid always escapes on the suction side throe the internal clearance causing slip, which depend upon the internal clearance, the workmanship the viscosity of the liquid & the differential pressure. Some amount of slip is always desirable as it helps in lubricating the gear faces, the bush bearing etc.



A positive displacement pump do not develop pressure on it's own but has capability to over come the back pressure in discharge side without substantial drop in the capacity. In other word

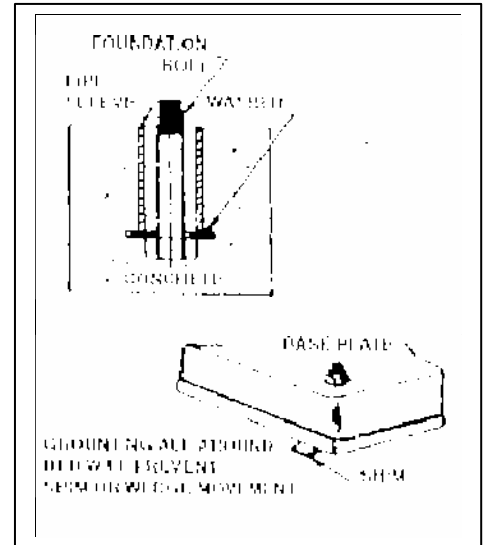
when there is substantial drop in the pumping capacity while overcoming the pressure one say that the pump is not developing enough pressure.

Starting : The pump is self priming & therefore the use of the foot-valve is not necessary. For the initial run the pump should be filled through suction branch (if a negative suction is there). On subsequent start-ups this measure is not necessary & the liquid remaining in the casing is sufficient to provide the lubrication & sealing of the gears to enable pump to prime.

PREPARATION OF FOUNDATION

A good solid foundation is important securely bold base plate units after leveling with shims for wedges. Recheck with straight edge after tightening bolts. A twisted base plate produces heavy stress on motor & pump.

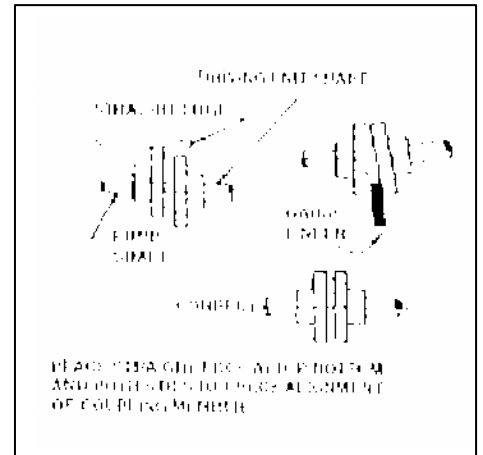
A shim or wedge should be close to each foundation bolt after foundation bolts are tightened and flatness is checked. Then the wedges for shims may be grouted to prevent loosening. Place pump in accessible location to speed inspection and maintenance. When pumping hazardous fluids, be sure pump has good air circulation. Avoid pit installation.



ALIGNING MOTOR AND SHAFT

Driving unit and pump are factory aligned before shipping to you, if you supply driving units check alignment after motor base bolts are tightened, see sketch.

Flexible couplings do not compensate for misalignment. After all connections are made, check whole unit for free operation without binding. Driving units can be more positively secured by installing to down pins at convenient angles, one at each diagonal corner, 1/2 each from edge of base bolt hole



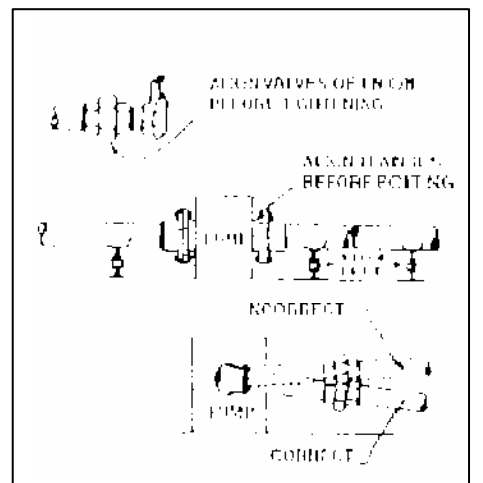
PIPE INSTALLATION

Pipe strain can produce bearing or misalignment. Check carefully and allow for pipe construction and expansion. Use pipe supports and expansion joints to avoid weight and strain on pump.

Run pipe to pump fit flanges and unions so that there is no strain on pipes when joints are tightened.

The size of the pump opening is nor necessarily the correct pipe size. If in doubt, pump should be installed below fluid supply level, with short supply line to assure good priming.

CAUTION : Installing pipes with Teflon tape may damage pump.



Following fault finding chart will be helpful for various problem, which can arise due to faulty installation.

Fault Finding Chart

Fault	Cause	Action
I) Pump does not make suction	1) Rotation wrong.	Check rotation. If necessary change connections of motor.
	2) Pump is dry.	Fill pump initially with oil.
	3) Suction line is not tight.	Tighten all bolts & nuts on suction side. If necessary pressure test suction line, attach vacuums gauge, which should show approximately 0.6 Kg/Cm2 vacuums at close suction valve.
	4) Relief valve not tight. Damaged valve joint. Foreign body between valve seat & valve.	Remove valve & check seat. If necessary grind it. Check joint between suction & discharge opening in the pump, if necessary replace joint. Remove foreign body. In case of damage to valve seat, grind it. Tighten bolts of cover.
I.a) In the case of working against closed discharge line.	5) Evacuated air cannot pass through the pressurized oil column & streams back into the suction line.	Arrange desertion cock on discharge side of pump. When pump is started open this cock until all air is exhausted & then close. In the case of such arrangement a non-return valve is necessary on the discharge line & also a foot valve is suggested so that the suction line, when switching off, remain full.
II) Lose of output.	1) Speed too slow.	Check speed by means of a tachometer. Check frequency & voltage on motor nameplate. Check as in the case of overload, speeds can be dropped. Check star delta & compare with voltage.
	2) Relief valve opens too soon.	Remove valve cap & adjusting screw If spring is fatigued, replace. Take care when adjusting that the pressure rise with closed discharge valve dose not over load. For detail see Fault-I) paragraph 4)
	3) Loss in output due to air in stuffing box.	See fault I), paragraph 3)
	4) Suction line friction too great.	Fit vacuums gauge & check suction lift, which should not be greater than 16-20 feet.
	a) Suction pipe too small.	In case of items a), b) & c) only a larger suction line or a reduction in length can help.
	b) Suction lint too long.	
	c) Suction filter blocked.	
	d) Viscosity too high	
III) Pump is noisy.	1) Badly aligned coupling.	Disconnect pump from motor & align coupling.
a) Mechanical noise.	2) Spindle not running.	Strip motor rotor & remove main spindle (an operation that should only be carried out by an expert) Test with dial gauge between centers.
	3) Gear blanks are damaged by foreign bodies.	Remove gear & correct damaged blanks with oilstone. Finally grind by hand.
	4) Delivery against low pressure in the case of thin liquid.	Load gears blanks by closing discharge valve giving approximately 15-20 psi. noise will be eliminated.
	b) Hydraulic or Pneumatic noise.	5) The pumped medium contains air.

	6) Cavitations due to	
	a) Too high suction lift.	a) Reduce the suction lift.
	b) Excessive speed in the case of very viscous liquids.	b) Reduce speed only a low vacuum is permissible.
	c) Pumping of liquids which are highly volatile like petrol, solvents etc.	
IV)	1) Wrong connection of motors or only two phases.	Connect motor according to nameplate & check voltage in all three phases.
	2) Motor overloaded	Check Amps by means of an ammeter.
	3) Pump seizing.	Disconnect motor & check that the pump can be turned by hand.(Please refer page Important-A)
	4) Delivery pressure too high.	Connect pressure gauge on the discharge branch & check whether delivery pressure is in accordance with the nameplate of the pump.
	5) Viscosity too high	Check viscosity at pumping temperature & compare with name plate of the pump
	6) Misalignment.	Re-align coupling.
V) Fluctuating delivery.	1) Frothing medium.	Avoid air enter in the oil (see that in the case of circulating pumps, the return line end well below the oil level.
VI) Pump seized.	1) Excessive pressure due to wrongly adjusted relief valve.	Check relief valve pressure at closed discharge valve, re-adjust relief valve so that it opens at 100% above working pressure.
	2) Foreign body in pumped medium.	Dismantle pump. Remove foreign body. Smooth seized area with oilstone. If necessary, fit new bearing & provide suction filter.
	3) Dry running.	Remove seized area as above fill with oil & wet rotors before starting up. Under certain circumstance check desertion, see section 1) paragraph 2).
	4) Insufficient lubricating quality of pumped medium	Check whether pumped medium has lost its lubricating properties due too elevated temperature. If a pump has seized, gears & bearings should be dismantled. All seized areas to be smoothed with oilstone. The bearing should be scraped & casting bores ground if necessary. If it is possible after re-assembly to turn the spindles easily by hand, the pump can be started up at low pressure observing at the same time the ammeter.
VII) Relief valve chattering.	1) Valve is jammed.	Fit new spring, check valve for easy movement in the valve sheet.

MAINTENANCE

Periodical :

- a) Alignment of the pump & motor should be checked.
- b) Suction line should be checked for no air leakage & jamming of the dust in filter.
- c) If there is a pressure dropped, the relief valve should be further screwed in till desired pressure is achieved. If this does not give result then there should be a considerable wear in the wear plates, which should be replaced.
- d) Leakage, if any, on end covers eliminated by tightening bolts.
- e) Mechanical Seal, if found leaking, check following.
 - 1. If there are scratches on lapped faces of stationary seat or face housing due to foreign bodies, scratched part should be replaced. While replacing the lapped faces must be thoroughly cleaned.
 - 2. If 'O' rings are busted, they should be replaced, working smoothly, removed obstruction & make it smooth.

YEARLY:

- a) If the pressure drop is too much the gears or the wear plate as the case may be, should be changed due to excess wear on them.
- b) On dismantling, if the body shows wear, then it should be sent back to us for replacement. This will be in a very long run only.

IMPORTANT :

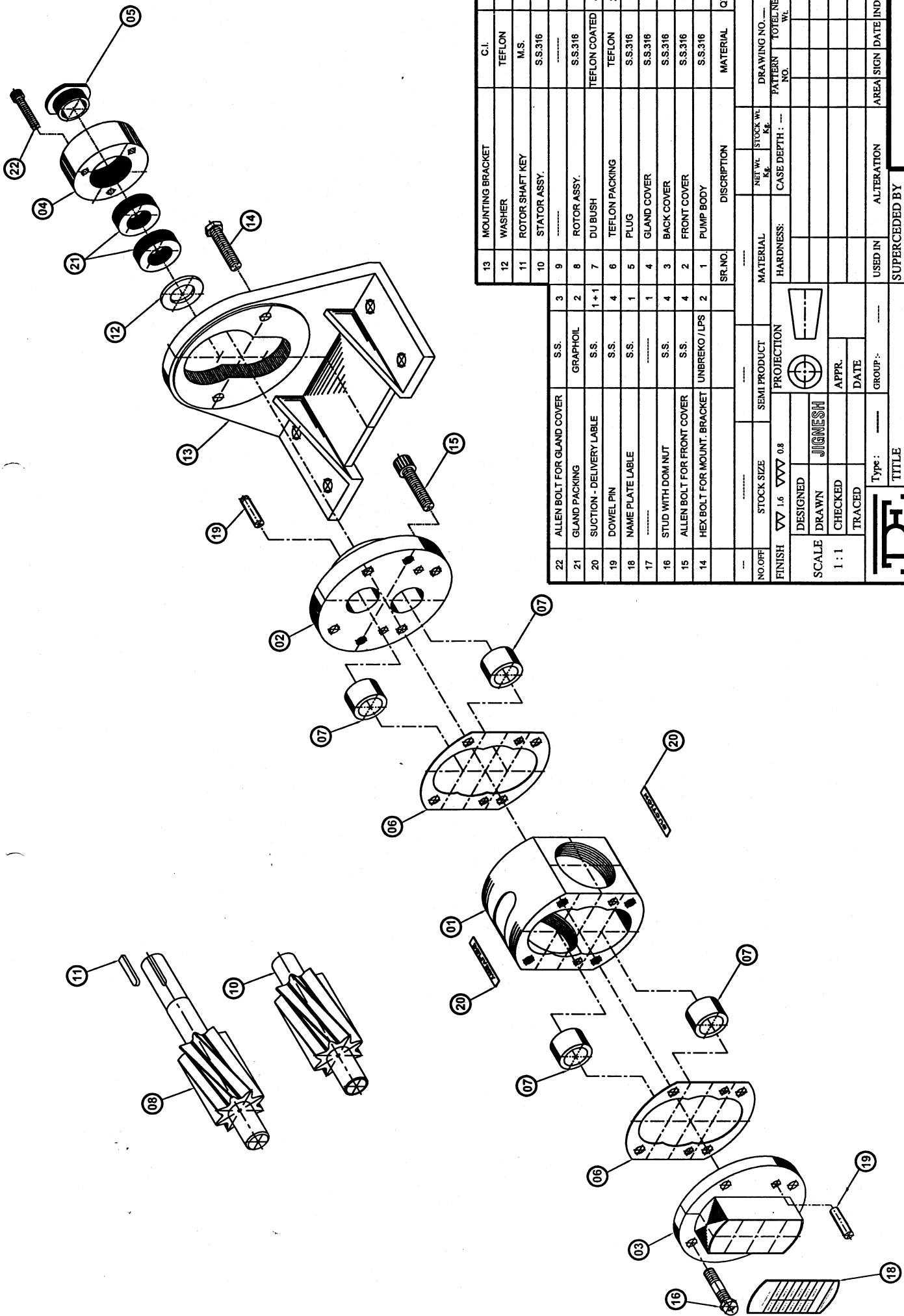
- a) If the pump gets jammed in running position, in that case loosen all the bolts on cover by half a turn (this will be only in the case of pumps with bush bearings) & try to rotate then start the pump & allow it to run smoothly & tighten the bolts slowly till there is no jamming.
- b) If the rotor does not rotate, then dismantling is necessary.
- c) Where the pump is excessively heated in the initial running & the jamming is caused, allow it to cool down to the temperature till jamming is eliminated.

• How to dismantle HGSX series pumps

- I. Disconnect pump from electric motor & bracket.
- II. Remove Circlip (25), Ball Bearing (24) & Collar (23).
- III. Remove Washer (05), Gland Ring (22) & Oil Seal(12).
- IV. Remove back cover (03) & Front Cover (2) by unscrew of stud with dom nut (16) & then pull out gear assembly.
- V. Thoroughly clean all the parts in Kerosene & inspect
- VI. Replace warmed out parts.

• How to re-assembly HGSX series pumps

- I. Insert the gear shaft assembly into body (1)
- II. Align the back cover by inserting 4 nos. of Dom Nut (16) & then front cover with 4 nos. of Allen Bolt (15).
- III. To insert washer, gland ring, oil seal & ball bearing into front cover as shown in Exploded View
- IV. Check pump rotor should move freely, insert Cir Clip at Bearing end.
- V. While coupling the pump with electric motor, insure the correct alignment.



NO. OFF	STOCK SIZE	SEMI PRODUCT	MATERIAL	NET WL Kg.	STOCK WL Kg.	DRAWING NO.
22	Allen Bolt for Gland Cover	S.S.		3		
21	Gland Packing	Graphoil		2		
20	Suction - Delivery Label	S.S.	1*1	7		
19	Dowel Pin	S.S.		4		
18	Name Plate Label	S.S.		1		
17	Stud with Dom Nut	S.S.		1		
16	Allen Bolt for Front Cover	S.S.		4		
15	Hex Bolt for Mount. Bracket	Unbrako/LPS		2		
14	Mounting Bracket	C.I.		1		
13	Washer	Teflon		1		
12	Rotor Shaft Key	M.S.		1		
11	Stator Assy.	S.S.316		1		
10	Rotor Assy.	S.S.316		1		
9	Du Bush	Teflon Coated		4		
8	Teflon Packing	Teflon		2		
7	Plug	S.S.316		1		
6	Gland Cover	S.S.316		1		
5	Back Cover	S.S.316		1		
4	Front Cover	S.S.316		1		
3	Pump Body	S.S.316		1		
2	Discription					
1	SR.No.					

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18	Name Plate Label	S.S.		1		
17	Stud with Dom Nut	S.S.		1		
16	Allen Bolt for Front Cover	S.S.		4		
15	Hex Bolt for Mount. Bracket	Unbrako/LPS		2		
14	Mounting Bracket	C.I.		1		
13	Washer	Teflon		1		
12	Rotor Shaft Key	M.S.		1		
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7	Plug	S.S.316		1		
6	Gland Cover	S.S.316		1		
5	Back Cover	S.S.316		1		
4	Front Cover	S.S.316		1		
3	Pump Body	S.S.316		1		
2	Discription					
1	SR.No.					

FINISH	STOCK SIZE	SEMI PRODUCT	MATERIAL	NET WL Kg.	STOCK WL Kg.	DRAWING NO.
VV 1.6 VVV 0.8						
DESIGNED	JIGNESH					
DRAWN						
CHECKED						
TRACED						
APPR.						
DATE						
GROUP						
TITLE						
EXPLODED VIEW OF PUMP - HGSK-200						
SUPERCEDED BY						
REPLACES						
AREA SIGN DATE INDEX						

Del Pd Pumps & Gears (P.) Ltd.