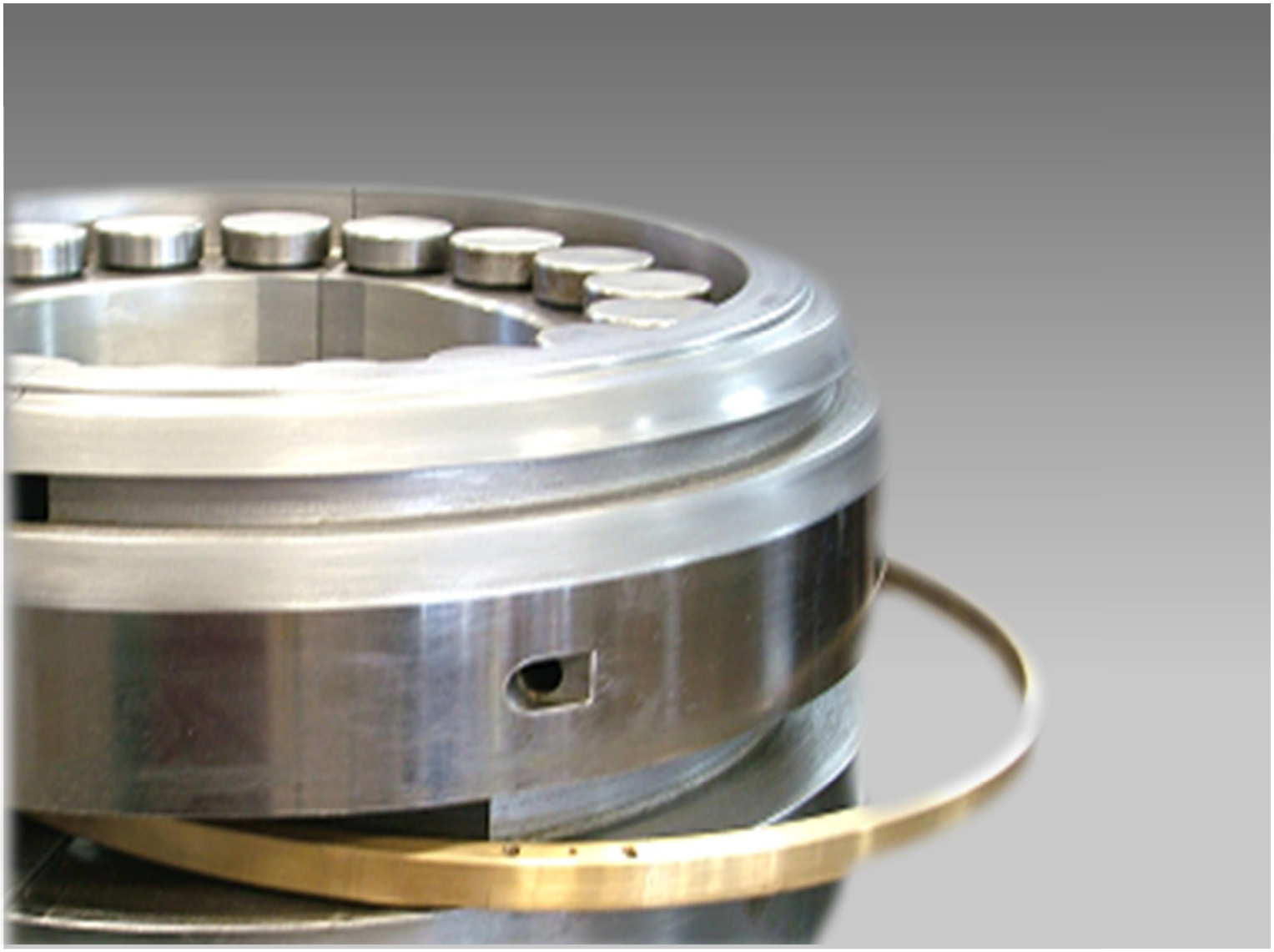

DIN STANDARD FLUID FILM BEARINGS TYPE S SHAFT DIA 80 TO 355 MM.

SUNTECH
ENGINEERING CORPORATION
BEYOND ENGINEERING

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1. BASIC PRINCIPLES

1.1 HYDRODYNAMIC LUBRICATION

SUNTECH slide bearings are usually designed based on the principle of hydrodynamic lubrication which increases its reliability. When the calculation design and manufacturing conditions permit this type of lubrication, the slide bearings will fulfil all the requirements expected of them.

It has been proven that plain cylindrical bearings (fig. 01) built-up its carrying oil wedge by making possible clearance between bearing shell and shaft due to its eccentric position (converging film).
Now a days various special geometry design has been Implanted which also based on hydrodynamic Calculation as per DIN 31657.

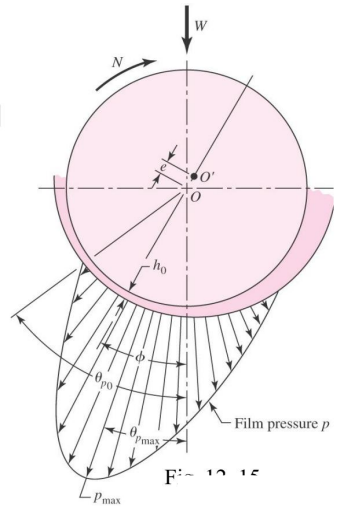


Figure 01 Pressure build-up in a plain cylindrical

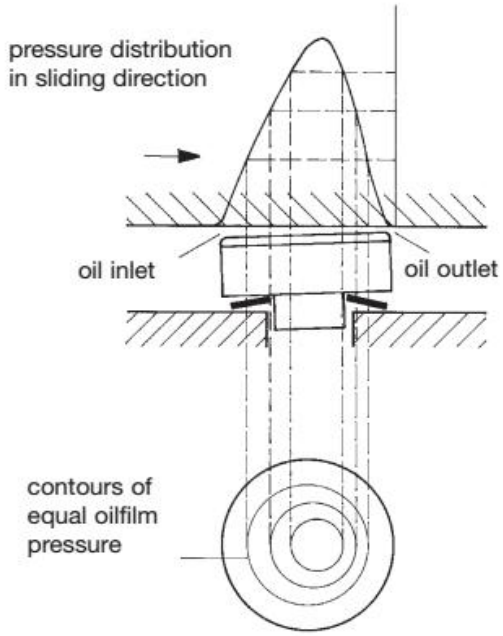


Figure 02 Pressure build-up at a tilting RD pad

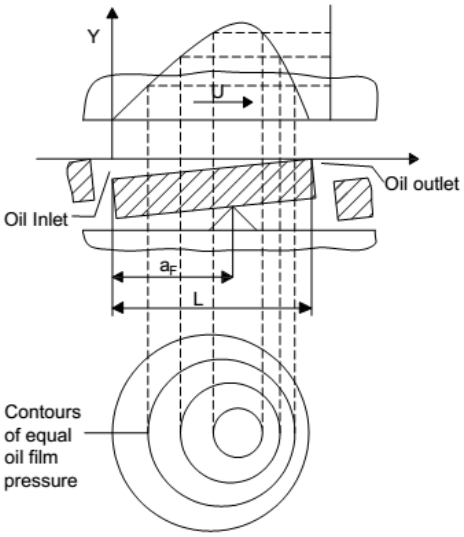


Figure 03 Pressure build-up at a tilting Rectangular pad

Offset Bore bearing, Lemon Bore bearing, two, three, four-lobe bearing are example of above. It also has been proved this geometrical changes on cylindrical bearing enable a wide range of pre-load & continuous radial load due to re-generation/ multi-generation of activated oil wedge.

Now there is some geometrical over view of multi lobs bearing.

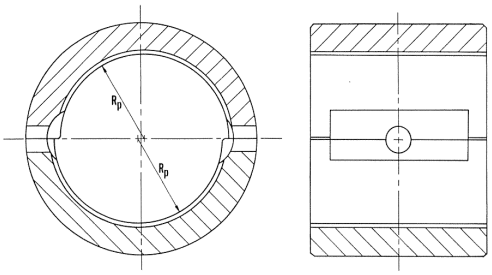


Figure 04 Offset split journal bearing

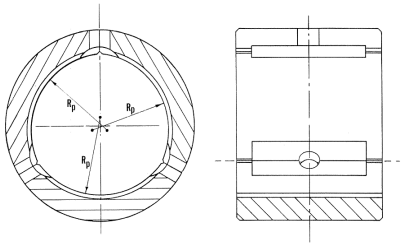


Figure 05 three-lobe journal bearing

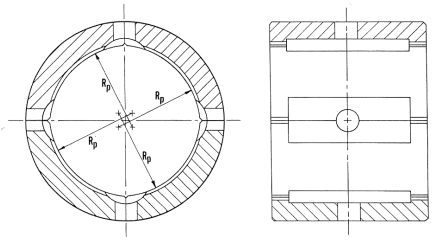


Figure 06 Four-lobe journal bearing

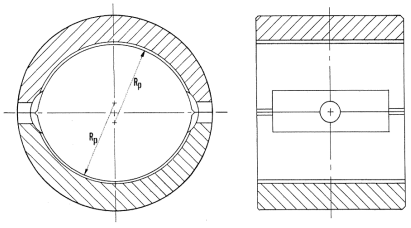


Figure 07 Lemon bore journal bearing

From the design point of view of thrust pads axially loaded bearings or thrust bearings are be implemented with advanced edge design which enable it to take higher axial load capacity. General standard design are taper landed thrust pad, tilting pad, LEG thrust pad (Leading Edge Groove), RD Pad etc.

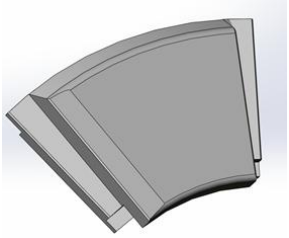


Figure 08 Taper landed thrust pad

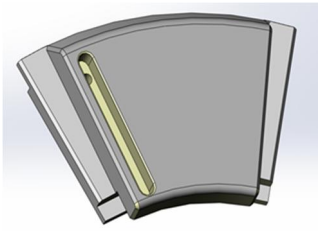


Figure 09 LEG thrust pad

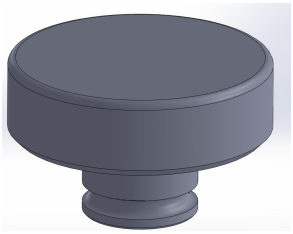


Figure 10 RD thrust pad

We can also enable the bi-directional motion of journal by changing the pivot position of tilting pad as per hydrodynamic calculation specification DIN 31652.

Customized design tilting pad journal bearing also available with us against customer requirements.

2.0 GUIDE TO SELECTION OF HORIZANTAL DIN STANDARD BEARING ACCORDING TO ITS INPUT SPECIFICATION

2.1 SELECTION OF BEARING GEOMETRY (RADIAL)

The bearing size selection it's directly depends on load applicable to its surface area and which may effect on stability temperature and bearing life. The chart (2.3) will helps designer to select proper bearing size and frame efficiently.
Appendix: Approximate permissible unit radial load considered as to point to n/mm2 (Higher can be achieved by special design as early described).

2.2 SELECTION OF BEARING GEOMETRY (AXIAL)

In DIN types bearing variety of axial geometries are there which can enable to take up a wide range of axial load.
Type B design: This is the basic design of thrust bearing surface normal radial oil groove can take essential load.
Type K design: Design on thrust surface enabled continuous and bi-directional load potentially.
Type A design: A combination of RD pads Rectangular Pad along with cup spring washer enabled to take a high continues thrust load, which can design with and without direct lubrication system. Provision of RTD (Radial Temperature Detector) can be provident with RD pad arrangement.

2.3 BEARING RADIAL & AXIAL LOAD V/S SIZE & DIAMETER

Size	Diameter 'D' (mm.)	Radial load (N)	Thrust load		
			' B' surface	' K' surface	' A' surface
9	80	10000	925	3 250	6 500
	90	11000	1 100	3 750	7 800
	100	12000	1 100	3 600	4 500
11	100	15000	1 300	4 000	7 700
	110	17000	1 750	5 600	9 800
	125	21000	1 600	5 150	5 000
14	125	26000	2 200	6 250	17 700
	140	29000	2 850	9 000	19 300
	160	31000	2 250	7 000	12 000
	180	34000	1 900	5900	10 200
18	160	44000	3 450	11 000	33 450
	180	49000	4 300	12 700	37 250
	200	52000	3 750	11 000	23 300
	225	54000	3 150	10 000	21 250
22	200	67000	5 150	15 800	54 200
	225	76000	5 650	18 200	60 100
	250	79000	6 150	19 100	44 650
	280	83000	6 400	20 300	42 200
	300	86000	6 800	21 800	40 200
28	250	106000	7300	23 200	84 800
	280	115000	8100	26 000	94 100
	300	120000	8600	28 100	72 300
	315	124000	9200	30 100	67 600
	335	128000	9500	31 800	65 000
	355	131000	9700	33 800	62 000

2.4 SELECTION OF LUBRICATION OIL

The calculation of hydrodynamic state of bearing its directly depend on viscosity of oil, higher viscosity sustained at higher load but frictional loss also increases with higher viscous oil i.e. selection of proper viscous oil according to load is very important.

2.5 GENERAL GUIDE TO LUBRICANT SELECTION WITH VISCOSITY

Specific load (N/mm2)	Surface Speed (m/s)				
	<3	**<3 to 10**	**<10 to 25**	**<25 to 50**	**<50**
≤ 1.25	68	46	46	32	32
>1.25 to 2.5	100	68	46	46	32
>2.5	150	100	68	46	46

2.6 RECOMMENDED SIZE OF OIL OUTLET FOR VISCOSITY & QUANTITY OF OIL

Size	Oil Outlet	ISO VG 32 & 46 lit/min at 40°C	ISO VG 68 & 100 lit/min at 40°C	Oil Outlet	ISO VG 32 & 46 lit/min at 40°C	ISO VG 68 & 100 lit/min at 40°C
9	G $1^1/_4$	8	7	2 x G $1^1/_4$	16	14
11	G $1^1/_4$	8	7	2 x G $1^1/_4$	16	14
14	G $1^1/_2$	10	9	2 x G $1^1/_2$	20	18
18	G $1^1/_2$	10	9	2 x G $1^1/_2$	20	18
22	G 2	19	17	2 x G 2	38	34
28	G $2^1/_2$	28	25	2 x G $2^1/_2$	56	50

2.7 SELECTION OF BEARING BORE DESIGN

Bearing type	Cylindrical	Two-lobe	Four-lobe	Tilting Pads
Designation	C	Y	V	K
Type of radial bearing for electrical machines, fans, compressors and turbines				
Peripheral speed U [m/s] Specific load p [N/mm2]	30 3.5	76 2.5	120 1.8	140 1.8
Type of radial bearing for gear boxes				
Peripheral speed U [m/s] Specific load p [N/mm2]	30 0,1 to 5	60 3.5	45 to 100 1.8	63 to 160 2.8

3.0 ADMISSIBLE BEARING TEMPERATURES

To improve and maintain the bearing Operation life with respect to Lubrication oil and effect of Cladding Metal / Babbitt Metal there are some Hydro-dynamically proved points which are indicating the admissible temperature of SUNTECH Bearings.

a) Maximum temperature of Oil Bath - to maintain 80°C.
b) Maximum temperature of Bearing Loaded zone – to maintain 90°C.
d) For precise measurements maximum distance should maintain approx. 10 to 3 mm from the Bond and Cladding surface steel/White Metal .

Though Design has it's own speciality to calculate the Hydro-dynamic Calculation with respect to Temperature at loaded zone of Bearing so it is to important to conform The best Designed Operating temperature from Our Team.

4.0 ALARM AND SHUTDOWN TEMPERATURES

Temperatures on the order of 160° C cause plastic flow of the Babbitt. Maximum temperature are conservatively limited to 135° C. Allowing 8° C for alarm and 15°C for tripe setting, maximum operating Babbitt temperature is 120° C. It is important to note that alarm and trip are set relative to normal design temperatures. Specifically, if the design temperature is 85° C, the trip should be set at 100° C, not 120° C.

In addition to the bearing, consideration has to be given to the temperature limitations of the lubricant. Consult the lubricant Supplier for information on the lubricant limitations.

5.0 WATER COOLING

One of a special Cooling arrangements also be incorporated in case of Higher peripheral speeds and where Oil ring Lubrication is sufficient to handle heat due to tribology but not sufficient to handled residual heat which are not able to dissipated due to Housing geometry. To maintain the proper oil bath temperature a special type of N/F Base Finned Cooling Coil (Side Mounted)inserted in to the oil sump (Material of Coil is depend on the thermodynamic heat decapitation calculation).

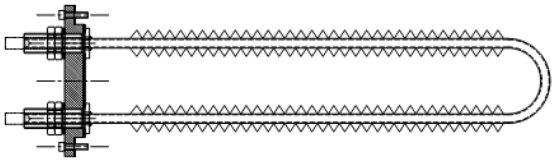


FIG : 11

Maximum speed of the water should maintain less then 1.5 m/s to avoid damage by cavitation particularly in pipe bends. To maintain such speed end user should incorporate the corresponding control valves.

6.0 EXTERNAL OIL SUPPLY

Another special type Lubrication system which is incorporated to release more circumferential heat through external oil supply (lubrication by oil circulation from an external system).when Oil ring lubrication system cannot able to handle heat generated due to the exceeding peripheral speed "External Oil Supply system" will incorporated is to enable and handle such heat properly. In general bearings should always be connected to oil supply systems where a system is already installed and contains oil suitable for the bearing.

7.0 FINNED HOUSING SURFACE

Finned Bearing housing can be applied in order to prevent emergency situations, such as failure of the rotor, which can occur while the bearing is overloaded. The fins provide an increase of heat transfer surface, thus improving the cooling efficiency and enhancing heat dissipation. This also contributes to more uniform temperature distribution in Bearing and Lubricating Oil also, and to better working conditions of the Bearing and rotary Equipment.

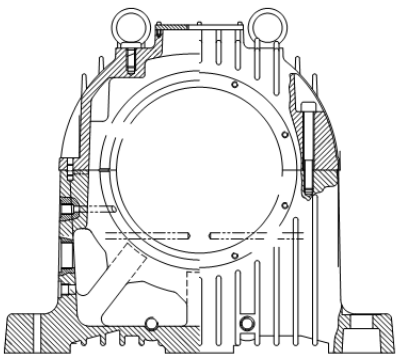


FIG : 12

8.0 SHAFT SEALS

8.1 GENERAL

Shaft seals are used to prevent the leakage of oil or oil mist, to prevent the penetration of harmful quantities of impurities (sand, dust) and water.

Selection of shaft seals is depend on site conditions and to perform different requirements with regard to the penetration of impurities and water.

8.2 LABYRINTH SEALS

In Rotary elements which run with Hydrodynamic Lubrication system a non-Rubber Sealing systems are used- Labyrinth seals which are able to handle so high speed like over 100 m/s circumferential speed. Bakelite or a Special thermo Plastic (Sunplust) is use as material of labyrinth.

THE FOLLOWING TYPES OF SEALS ARE AVAILABLE STANDARD ITEMS:

8.2.1 FLOATING INSULATED OIL SEAL – IP 44 TYPE 10.

A product that has a rating of IP44 means that it is protected against solid objects that are bigger than 1mm and water splashing from all directions. This type of sealing systems are used where freely movable arrangement is required to insensitive radial shaft displacement. After the bearing housing has been installed and aligned on the base frame or foundation, the seal carrier can be fitted using non hardening sealing compound . (FIG: 14)

8.2.2 RIGID ALUMINIUM OIL SEAL – IP 44 TYPE 20.

Aluminium is used to give rigidity to IP 44 and it's type is denoted as Type 20. (FIG: 13)

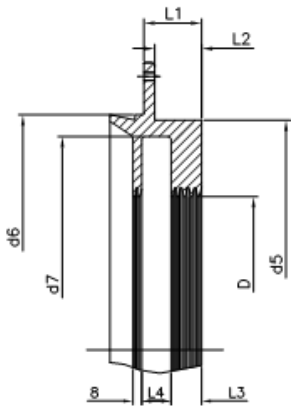


FIG : 13

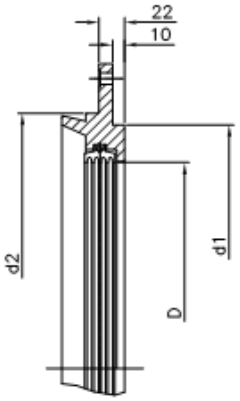


FIG : 14

8.2.3 FLOATING OIL SEAL WITH ROTATING DUST SEAL RINGS IP 54.

A product with an IP54 rating is protected against dust ingress sufficient to prevent the product from operating normally but it's not dust tight. The product is fully protected against solid objects and splashing of water from any angle.
A flinger is clamped on the shaft which engages in a groove in the Carrier. (FIG: 16)

8.2.4 FLOATING INSULATED OIL RING WITH RIGID RING BAFFLE IP 55.

An IP 55 rated product Is protected against dust ingress that could be harmful for the normal operation of the product but is not fully dust tight. It is protected against solid objects and water jets projected by a nozzle from any directions. (FIG: 15)

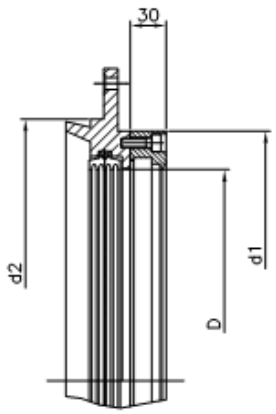


FIG : 15

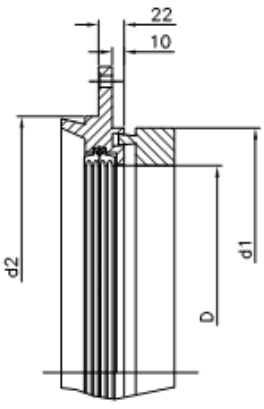
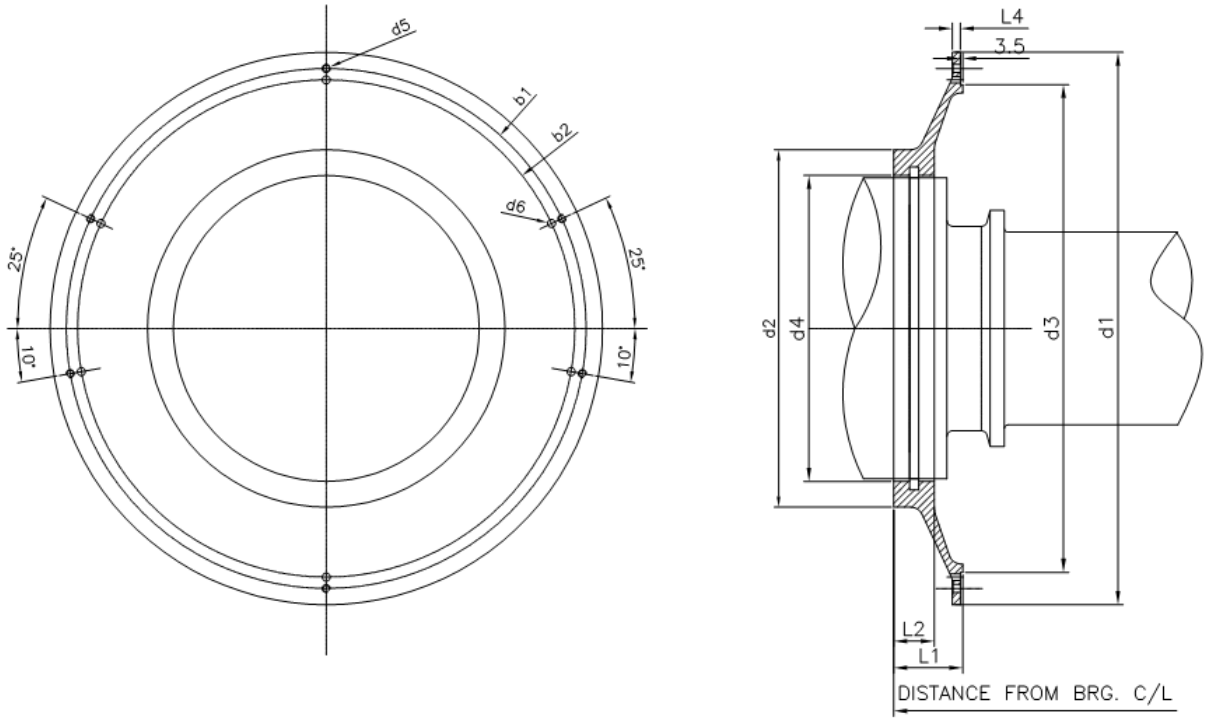


FIG : 16

8.3 FOR SF TYPE BEARING SPECIAL SEALING ARRANGEMENT (INSIDE MACHINE SEALS)

An additional machine seal can be mounted on the inside of the machine plate. The resulting additional space between the housing and Machine seals are vented by holes in upper and lower parts of the housing, to protect the bearing from low pressure high temperature and other potentially damaging effect from machine.



8.4 MECHANICAL SEAL FOR SF HOUSING DESIGN

SIZE	D	d1	d2	d3	d4	d5	d6	b1	b2	L1	L2	L3	L4
9	80 90 100	380	160	280	111.5 121.5 131.5	7	14	360	310	60	35	148	10
11	100 110 125	420	180	315	136.5 151.5 161.5	7	14	400	350	65	35	163	10
14	125 140 160	395	230	355	171.5 191.5 201.5	7	-	375	-	70	35	188	10
18	160 180 200	460	290	400	216.5 241.5 251.5	10	-	430	-	75	40	214	10
22	200 225 250	570	360	500	266.5 291.5 316.5	10	-	535	-	80	40	255	10
28	250 280 300	680	440	600	326.5 356.5 376.5	10	10	640	-	85	50	288	10

9.0 GENERAL ARRANGEMENT AND ACCESSORIES:

9.1 BEARING HOUSINGS

Depending on the operating conditions, the bearing housings are supplied either with fins or as a smooth design. (Flange bearings are finned design only.)
Bearing housings are available in high- rigidity with Grey cast iron (IS 210), also with customer requirements. Housings positioned with Inlet, Outlet, Shell & Sump thermometer entry. Others are also be, as per customer requirements.

9.2 BEARING SHELLS

The bearing shells are spherically seated in the housing .This means simple assembly as well as suitability for high static and also dynamic axial and radial loads. Forged bearing shells with white metal lining (min 3mm.) have sufficient hold for different applications. Modular assembly system includes axial design B, K and A (with R.D pad) type. Usually bearing shells with cylindrical or two- lobe be fitted with loose oil rings. The perfect metallic bond between steel and bearing metal is guaranteed by the specified ultrasonic tests which are carried out in the course of manufacture.

9.3 SEALS

Floating labyrinth seals are sufficient to achieve by using additional labyrinth for most applications, but rigid seals are also available for Special application.
seals are also available on based of requirement high oil throughput. Both types of seals meet the condition. The assembly is sealed with an end of Protection Class IP 44, IP 55 or 56 (see page no. 6 for details).

9.4 LUBRICATION

The loose oil ring normally provides a sufficient oil supply subjected to verification of operating temperature being within limit. However, the bearings are always set up to an oil supply system. The oil ring ensures
Emergency lubrication in the event of a malfunction of the supply system.

9.5 INSULATION

The bearings also can be insulated to prevent shaft currents. In an insulated bearing all contacts of housing with shaft or bearing bush is made through insulated component such as guide pin bush, seal carrier bolts and Nylon bush

9.6 HEAT DISSIPATION

Heat generated in the bearing is usually dissipated through radiation and convection. Greater dissipation can be achieved by fitting an oil cooler in sump or connecting the system with an oil supply.

9.7 TEMPERATURE MONITORING

Both lateral surfaces of the bearing can be equipped with connections measuring the temperature. Identical and interchangeable provisions have been made to accommodate Temperature detector, one each from each side for oil sump and bearing bush.

9.8 OIL GRADE SELECTION

Unblended, branded oils are normally used. The optimal viscosity for a particular application is determined by computerized calculation. Recommendation is also available subject to application data being made available to us (see page no. 4 for details).

9.9 SHAFT DETAILS

Recommendatory shaft details are given with the GA Drawing after PO. The journal bearing dia and required shaft tolerance are farther calculated by the output data given in the computer calculation. Any deviation from the recommended shaft dia or tolerance to be informed to us for a computer calculation check.

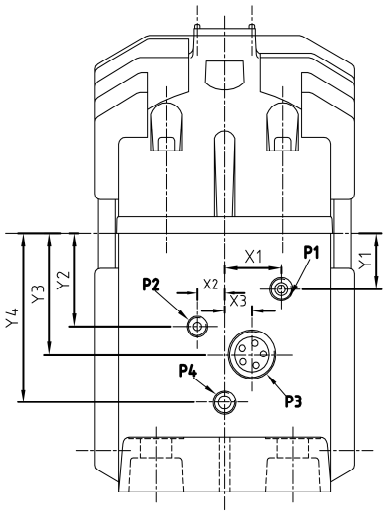
10.0 BEARING SELECTION EXAMPLE: SGZYK11225

		1	2	3	4	5	6	7
Model Selection - "S" model Series		**S**	**G**	**Z**	**Y**	**K**	**11**	**225**
Housing Type								
R	Finned, foot mounted.							
G	Smooth, foot mounted.							
F	Finned, End flange mounted.							
M	Finned, centrally flange mounted.							
Heat Dissipation								
N	Natural cooling							
Z	Lubrication by oil circulation with external oil cooling.							
X	Lubrication by oil circulation with external oil cooling for high oil throughput.							
W	Water cooler arrangement in oil sump.							
U	Circulating pump and natural cooling.							
T	Circulating pump and water cooled oil sump.							
Shape of Bore								
C	Plain cylindrical bore, without oil ring.							
L	Plain cylindrical bore, with loose oil ring							
Y	Two lobe Bore.							
V	Four lobe Bore.							
Thrust Faces:								
Q	Without thrust parts (non locating bearing).							
B	Plain sliding surfaces & lubricating grooves. (locating bearing).							
K	Taper land sliding surface (locating bearing).							
A	Circular tilting pads (RD thrust pads) supported.							
Housing Size								
Journal Diameter								

11.0 PEDESTAL MOUNTED SLIDE BEARING ACCORDANCE WITH DIN 31690
FOR SHAFT DIA RANGE: 80-355

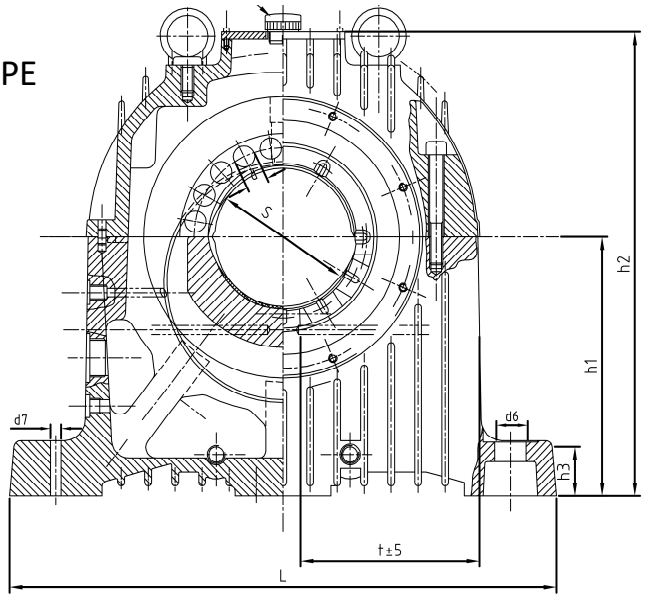
11.1 APPLICATIONS

Pedestal bearings type SR (cooling fins) SG (no cooling fins) are successfully used in a wide range of applications. For example:
1) Turbo generators. 2) Blowers. 3) Hydro generators. 4) Compressors. 5) Motors for rolling mills. 6) Water turbines. 7) Induction motors.



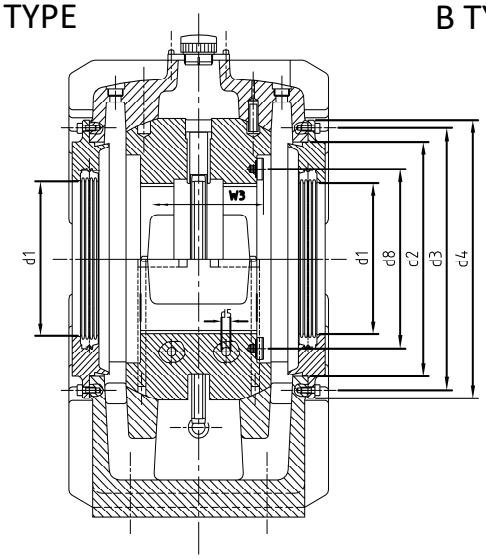
P1 & P3 – OIL INLET AND OUTLET.
P2 – THERMOMETER.
P4 – PLUG.

SR TYPE



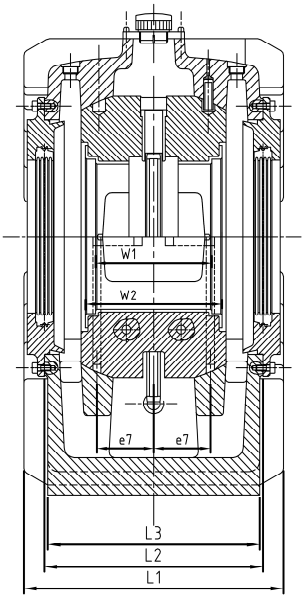
SG TYPE

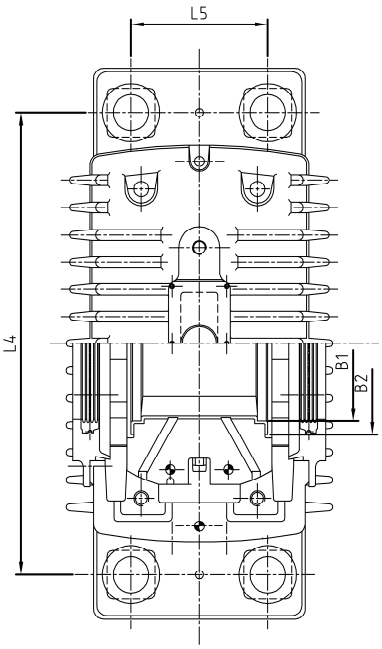
Q TYPE



A TYPE

B TYPE





K TYPE

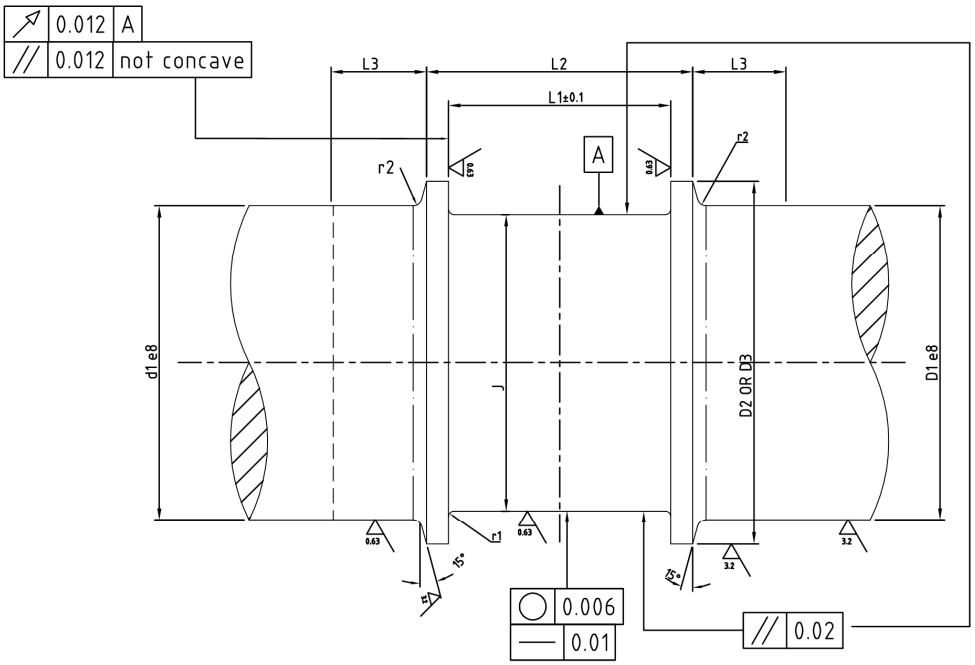
11.2 GEOGRAPHY & POSITION CHART, FOR DIN 31690 BEARING.

SIZE	S	W1	W2	W3	B1	B2	d1	d2	d3	d4	d5	d6	d7	d8	L	L1	L2	L3	L4	L5
9	80 90 100	60	80	80	86 96 106	110 120 130	80/90/100/110	150	170	190	11	22	10	110 120 125	355	190	150	145	300	90
11	100 110 125	80	100	100	108 118 133	135 150 160	100/110/125/140	180	195	215	11	26	10	135 140 150	450	205	170	165	375	100
14	125 140 160 180	105	125	125	135 150 170 190	170 190 200 220	125/140/160/180 OIL INLET	230	270	290	11	30	10	165 180 195 -	540	255	215	205	450	125
18	160 180 200 225	135	160	160	172 192 212 237	215 240 250 275	160/180/200/225 OIL OUTLET	275	320	340	13	40	15	210 230 245 -	660	300	255	245	560	150
22	200 225 250 280 300	170	200	200	214 239 264 294 310	265 290 315 345 325	200/225/250/280/300	340	380	400	13	46	15	265 285 305 - -	880	380	320	310	670	200
28	250 280 300 315 335 355	215	250	250	266 296 316 331 351 371	325 355 375 390 410 430	250/280/300/315/355	440	500	525	13	55	20	325 355 365 380 - -	950	450	380	370	800	250

SIZE	S	P1	P2	P3	P4	X1	Y1	X2	Y2	X3	Y3	Y4	h1	h2	h3	f+-5	WEIGHT (Kg.)	OIL CAPACITY (Litre)
9	80 90 100	3/8" BSP	1/2" FP	11/4" BSP	1/2" FP	37	30	22.5	60	22.5	85	135	190	321	35	105 105 100	53	1.8
11	100 110 125	3/8" BSP	1/2" FP	11/4" BSP	1/2" FP	42	40	22.5	70	22.5	90	150	225	375	50	140 140 132	82	3.8
14	125 140 160 180	3/8" BSP	1/2" FP	11/2" BSP	1/2" FP	55	60	27.5	85	27.5	125	180	265	455	60	165 165 145 132	158	5.4
18	160 180 200 225	3/8" BSP	1/2" FP	11/2" BSP	1/2" FP	68	70	30	105	30	155	215	315	560	70	207 207 185 170	283	9.2
22	200 225 250 280 300	1/2" FP	1/2" FP	2" BSP	1/2" FP	83	8	40	135	40	175	245	375	675	80	262 262 248 206 187	525	17.5
28	280 300 315 335 355	1/2" FP	1/2" FP	2" BSP	1/2" FP	106	35	50	155	50	220	310	450	824	90	317 317 267 260 230	325	28.6

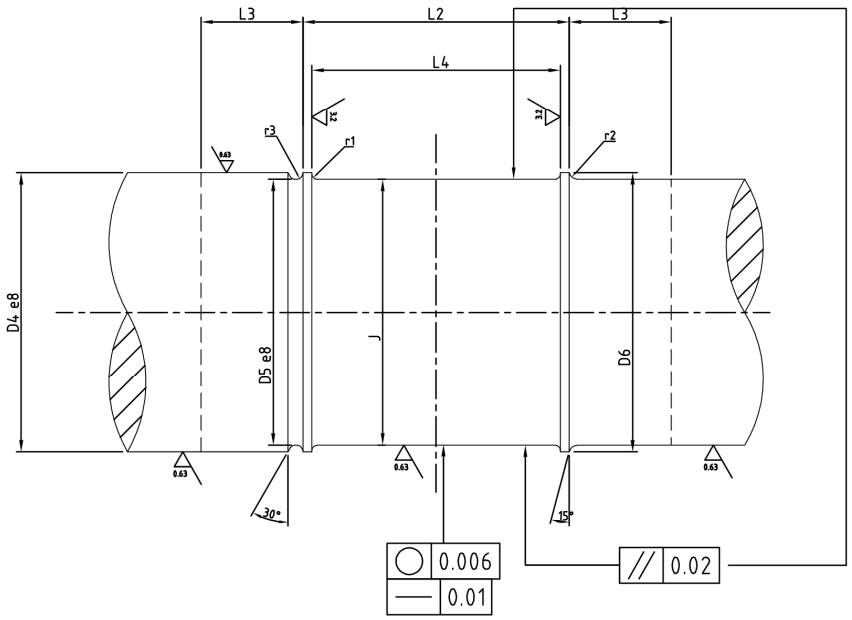
Larger sizes are also available & manufactured, on customer requirement basis.
The dimensions & design are not strictly binding as they are subject to continuous R & D. We reserve the right to introduce modification & farther improvement.

12.0 SHAFT RECOMMENDATION - APPROPRIATE FOR DIN 31690.



- D2 FOR B & K TYPE
- D3 FPR A TYPE BEARING

SHAFT FOR A , B , K TYPE AXIAL BEARING



SHAFT FOR Q TYPE AXIAL BEARING

12.1 SHAFT DIMENSION, APPROPRIATE FOR DIN 31690.

SIZE	S	D1	D2	D3	d4/d5	D6	L1	L2	L3 SEAL/TYPE 10	L3 SEAL/TYPE 20	L4	r1	r2	r3
9	80 90 100	80/90/100/110	110 120 130	132 142 143	80/ - 90/80 100/90 110/100	90 100 110	80.4	100	50	75	90	2.5	4	1.6
11	100 110 125	100/110/125/140	135 150 160	157 162 168	100/ - 110/100 125/110 140/125	110 125 140	100	120	50	75	110	2.5	4	1.6
14	125 140 160 180	125/140/160/180	170 190 200 220	192 207 217 -	125/ -140/125 160/140 180/160	1410 160 180 200	125	150	60	85	140	4	6	2.5
18	160 180 200 225	160/180/200/225	215 240 250 275	244 264 273 -	160/ - 180/160 200/180 225/200	180 200 225 250	160	190	60	85	180	4	6	2.5
22	200 225 250 280 300	200/225/250/280	265 290 315 345	308 328 339 - -	200/ - 225/200 250/225 280/250	225 250 280 315 330	200	240	70	105	220	6	10	4
28	250 280 300 315 335 355	250/280/315/355	325 355 375 390 430 430	378 408 408 423 - -	250/ - 280/250 315/280 355/315	280 315 315 345 365 385	250	300	70	105	280	6	10	6

1. Recommendation of Shaft dia and tolerance as per computerised calculation, under SEC scope.
2. Dimension of L1 & L2 subjected to the axial expansion i.e. depend on coefficient of heat transfer.
3. It is to recommended to maintain 0.5 mm normal axial clearance which is enable to change of direction of Thrust
4. Design of recess can be changed and sometime can be omit depend upon scope of application.

12.2 SELECTION OF RD PAD NUMBER & SIZE CORRESPONDENCE TO PERMISSIBLE UNIT LOAD CHART.

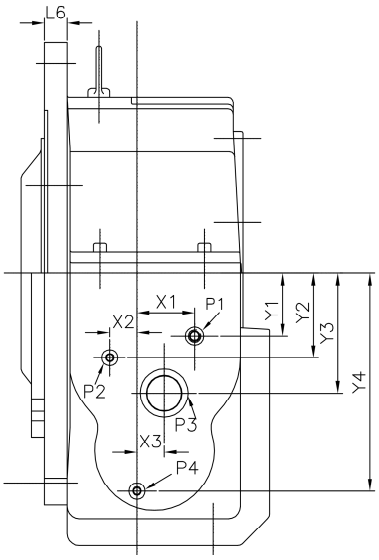
SIZE	D	d	RD THRUST PADS (NOS.)	SIZE	D	d	RD THRUST PADS (NOS.)
9	80	20	14	18	160	31.5	18
	90	20	16		180	31.5	20
	100	16	20		200	25	24
					225	-	-
11	100	20	20	22	200	40	18
	110	20	20		225	40	20
	125	16	16		250	31.5	24
					280	-	-
					300	-	-
14	125	25	18	28	250	50	18
	140	25	20		280	50	20
	160	20	24		300	40	24
	180	-	-		315	40	24
					335	-	-
					355	-	-

RD PAD SIZE = DIA	16	18	20	25	31	40	50	63	71	80
PERMISSIBLE UNIT LOAD AT STARTUP (N/mm2)	2			2.5		2.5				
PERMISSIBLE UNIT LOAD WHEN OPERATING (N/mm2)	2			2.5	2.5	4				

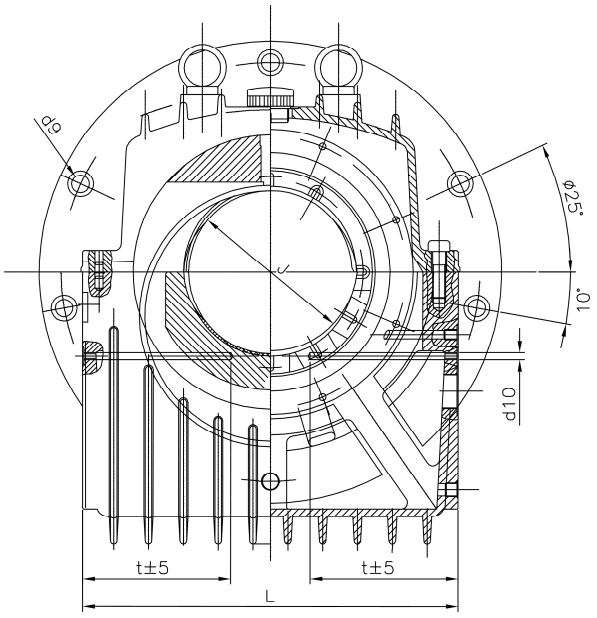
13.0 ENDSHIELD MOUNTED SLIDE BEARING ACCORDANCE WITH DIN 31693 FOR SHAFT DIA RANGE: 80-355

13.1 APPLICATIONS

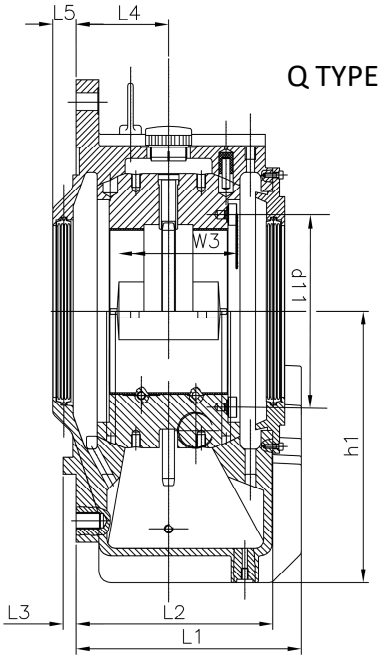
This type of bearings are flange mounted slide Bearings specially designed for electrical and turbo machine engineering, easy mounting, inspection and maintenance. End shield Bearing series SF are support by a mounting to the main machine for proper hold



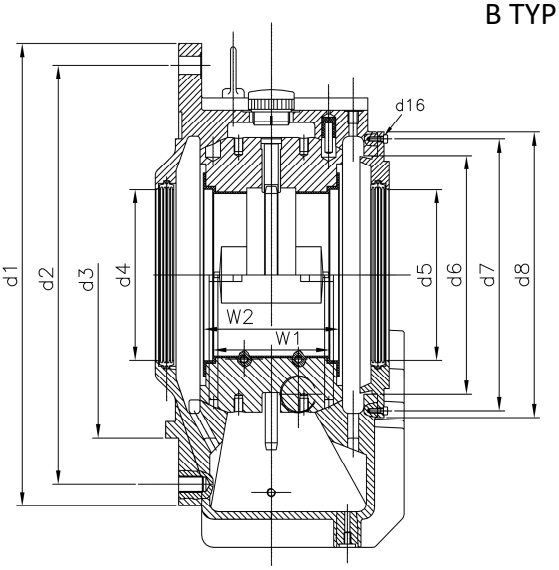
P1 & P3 – OIL INLET AND OUTLET.
P2 – THERMOMETER.
P4 – PLUG.



SF TYPE

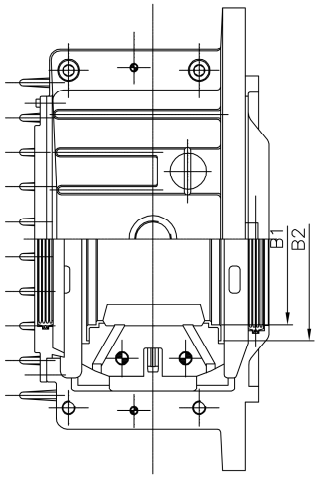


Q TYPE



K TYPE

B TYPE



A TYPE

13.2 GEOGRAPHY & POSITION CHART, FOR DIN 31693 BEARING.

SIZE	S	W1	W2	W3	B1	B2	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	L	L1	L2
9	80 90 100	60	80	80	86 96 106	110 120 130	340	310	280	100	80/90/100/110	150	170	190	14	11	110 120 125	270	162	140
11	100 110 125	80	100	100	108 118 133	135 150 160	380	350	315	125	100/110/125/140	180	195	215	14	11	135 140 150	310	192	165
14	125 140 160 180	105	125	125	135 150 170 190	165 180 195 -	460	415	355	160 160 160 180	125/140/160/180	230	270	290	18	11	165 180 195 -	370	232	205
18	160 180 200 225	135	160	160	172 192 212 237	210 230 245 -	540	490	400	200 200 200 225	160/180/200/225	275	320	340	22	13	210 230 245 -	440	273	241
22	200 225 250 280 300	170	200	200	214 239 264 294 310	265 285 305 - -	680	620	500	250 250 250 280 300	200/225/250/280/300	340	380	400	26	13	265 285 305 - -	550	354	314
28	250 280 300 315 335 355	215	250	250	266 296 316 331 351 371	325 355 375 390 410 430	850	770	600	315 315 315 315 355 355	250/280/300/315/355	440	500	525	33	13	325 355 365 380 - -	690	414	365

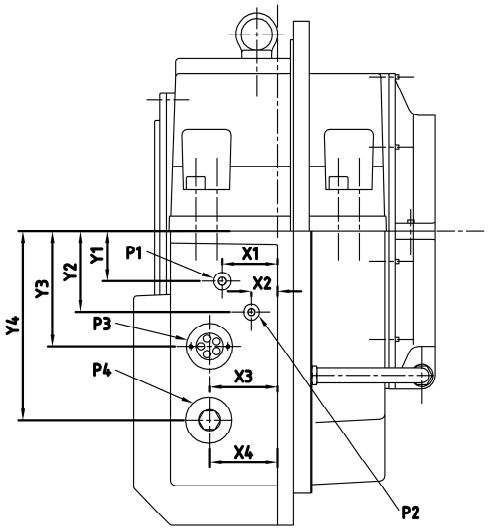
SIZE	S	L3	L4	L5	L6	P1	P2	P3	P4	X1	Y1	X2	Y2	X3	Y3	Y4	h1	f+-5	WEIGHT(Kg.)	OIL CAPACITY (Litre)
9	80 90 100	15	70	23	12	3/8" BSP	1/2" BSP	11/4" BSP	1/2" BSP	37	35	22.5	60	20	85	175	250	115 115 115	59	2.6
11	100 110 125	15	80	29	17	3/8" BSP	1/2" BSP	11/2" BSP	1/2" BSP	42	40	22.5	70	22.5	90	195	280	165 165 127	94	4.5
14	125 140 160 180	15	100	26	23	3/8" BSP	1/2" BSP	11/2" BSP	1/2" BSP	55	60	22.5	85	27.5	125	240	340	165 165 145 125	458	8.1
18	160 180 200 225	20	116	31	25	3/8" BSP	1/2" BSP	11/2" BSP	1/2" BSP	68	70	30	105	30	155	270	400	197 197 175 150	251	12.8
22	200 225 250 280 300	20	150	32	37	1/2" BSP	1/2" BSP	2" BSP	1/2" BSP	83	80	40	135	40	175	350	450	252 252 238 192 177	541	22.8
28	280 300 315 335 355	20	170	43	42	1/2" BSP	1/2" BSP	21/2" BSP	1/2" BSP	106	115	50	155	50	220	400	500	322 322 272 267 242 229	964	33.8

Larger sizes are also available & manufactured, on customer requirement basis. The dimensions & design are not strictly binding as they are subject to continuous R & D process. We reserve the right to introduce modification & farther improvement.

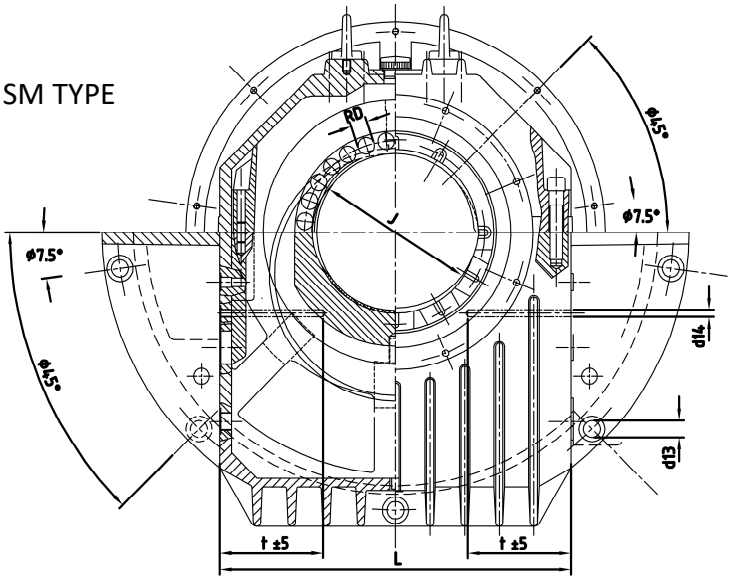
14.0 MIDDLE FLANGE MOUNTED SLIDE BEARING ACCORDANCE WITH DIN 31694.

14.1 APPLICATIONS

Designed primarily for use in electrical motors and generators, mid flange bearing assemblies are supported centrally by a mounting flange with a centring device on the lower bearing housing.

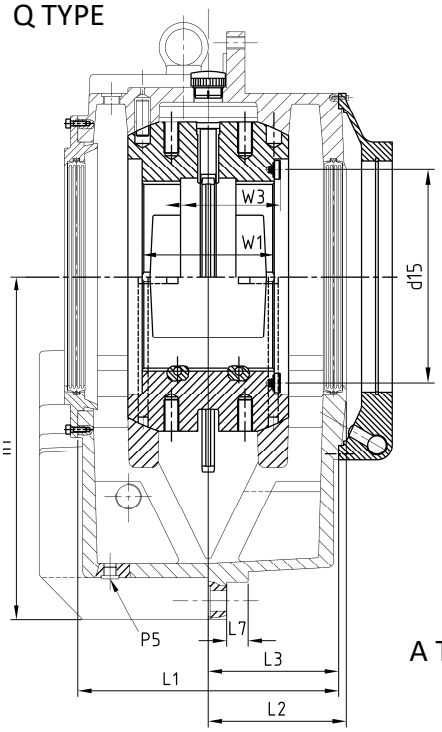


SM TYPE



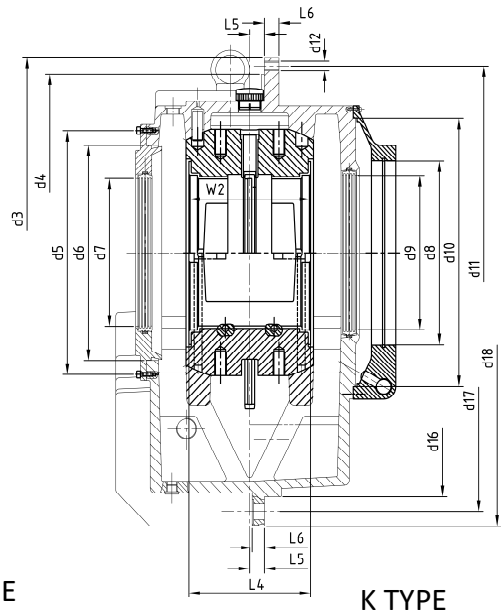
P1 & P3 – OIL INLET AND OUTLET.
P2 – THERMOMETER.
P4 – PLUG.

Q TYPE

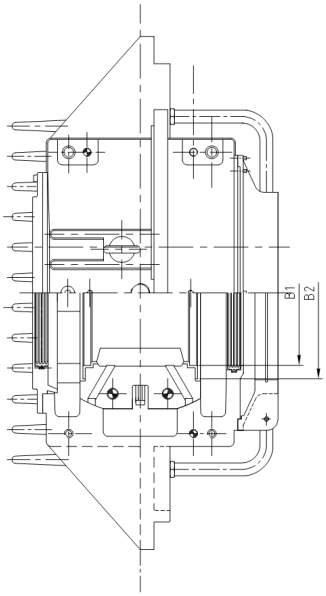


A TYPE

B TYPE



K TYPE



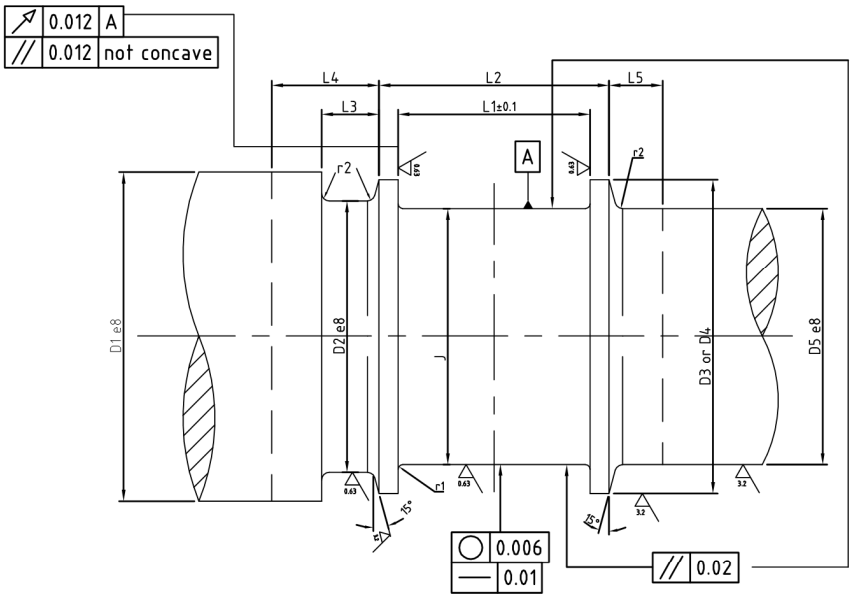
14.2 GEOGRAPHY & POSITION CHART, FOR DIN 31694 BEARING.

SIZE	S	W3	W2	W3	B1	B2	d1	d2	d3	d4	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16	L	L1
9	80	60	80	80	86	110	300	270	170	150	80/90/100/110	111.5	100	180	285	M-6	11	11	110	375	400	425	250	160
	90				96	120						121.5							120					
	100				106	130						131.5							125					
11	100	80	100	100	108	135	355	320	195	180	100/110/125/140	136.5	125	220	340	M-6	14	11	135	450	475	500	300	190
	110				118	150						151.5							140					
	125				133	160						161.5							150					
14	125	105	125	125	135	170	425	380	270	230	125/140/160/180	171.5	160	280	400	M-6	18	11	165	530	560	600	355	225
	140				150	190						191.5							180					
	160				170	200						201.5							195					
	180				190	220						221.5							-					
18	160	135	160	160	172	215	540	450	320	275	160/180/200/225	216.5	200	330	475	M-8	22	13	210	630	670	710	425	265
	180				192	240						241.5							230					
	200				212	250						251.5							245					
	225				237	275						276.5							-					
22	200	170	200	200	214	265	630	570	380	340	200/225/250/280/300	266.5	250	420	600	M-10	26	13	265	800	850	900	530	335
	225				239	290						291.5							285					
	250				264	315						316.5							305					
	280				294	345						346.5							-					
	300				310	325						346.5							-					
28	250	215	250	250	266	325	800	730	500	440	250/280/300/315/355	326.5	315	550	765	M-12	33	13	325	1000	1060	1120	670	425
	280				296	355						356.5							355					
	300				316	375						376.5							365					
	315				331	390						391.5							380					
	335				351	410						431.5							-					
	355				371	430						431.5							-					

SIZE	S	L2	L3	L4	L5	L6	L7	P1	P2	P3	P4	P5	X1	Y1	X2	Y2	X3	Y3	X4	Y4	h1	f+-5	WEIGHT (KG.)	OIL CAPACITY (Litre)
9	80	100	80	80	20	16	30	3/8" BSP	1/2" BSP	1" BSP	11/4" BSP	3/8" BSP	35.5	27.5	20	60	67.5	85	45	142	212	105	60	2.4
	90																					105		
	100																					105		
11	100	115	95	100	20	18	30	3/8" BSP	1/2" BSP	11/4" BSP	11/4" BSP	3/8" BSP	40	30	22.5	70	70	90	60	160	250	130	97	4.2
	110																					130		
	125																					122		
14	125	135	113	125	25	20	30	1/2" BSP	1/2" BSP	11/2"	11/4" BSP	3/8" BSP	55	45	27.5	85	85	125	7	200	300	158	264	6.8
	140																					158		
	160																					138		
	180																					117		
18	160	150	133	160	25	25	30	1/2" BSP	1/2" BSP	11/2" BSP	11/4" BSP	3/8" BSP	68	60	30	105	80	155	80	240	355	190	242	10
	180																					190		
	200																					170		
	225																					145		
22	200	185	168	200	30	30	30	3/4" BSP	1/2" BSP	2" BSP	11/4" BSP	1/2" BSP	83	70	40	135	100	175	100	310	450	242	460	24.4
	225																					242		
	250																					220		
	280																					182		
	300																					166		
28	280	225	213	250	30	30	35	3/4" BSP	1/2" BSP	21/2"	11/4" BSP	1/2" BSP	106	95	50	155	130	220	130	360	560	312	850	44.5
	300																					312		
	315																					262		
	335																					257		
	355																					232		
																						219		

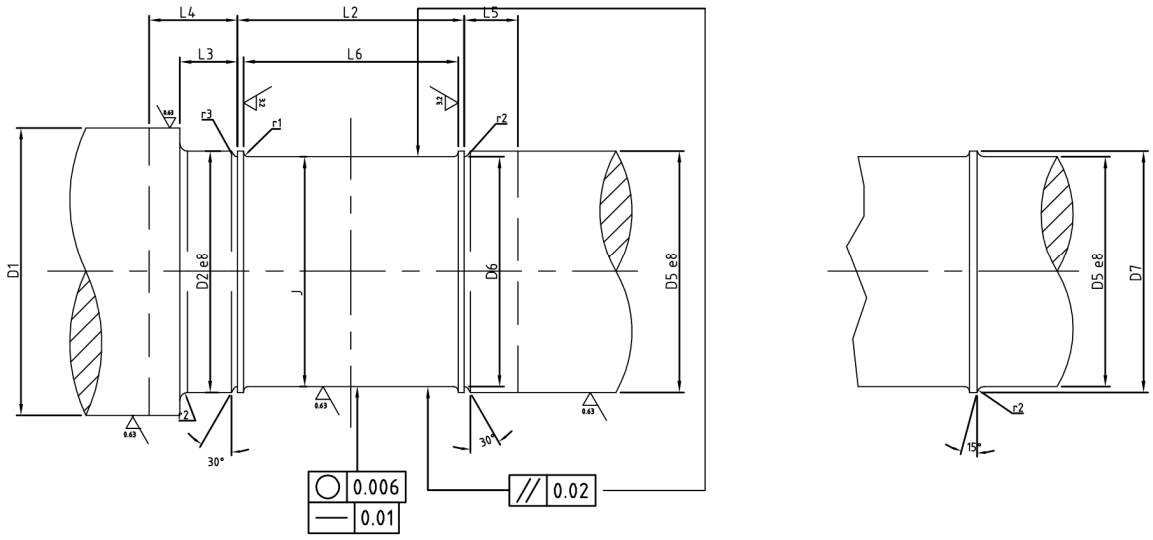
Larger sizes are also available & manufactured, on customer requirement basis.
The dimensions & design are not strictly binding as they are subject to continuous R & D. We reserve the right to introduce modification & farther improvement.

15.0 SHAFT RECOMMENDATION, APPROPRIATE FOR DIN 31693 AND 31694.



- D3 FOR B & K TYPE
- D4 FOR A TYPE BEARING

SHAFT FOR A , B , K TYPE AXIAL BEARING



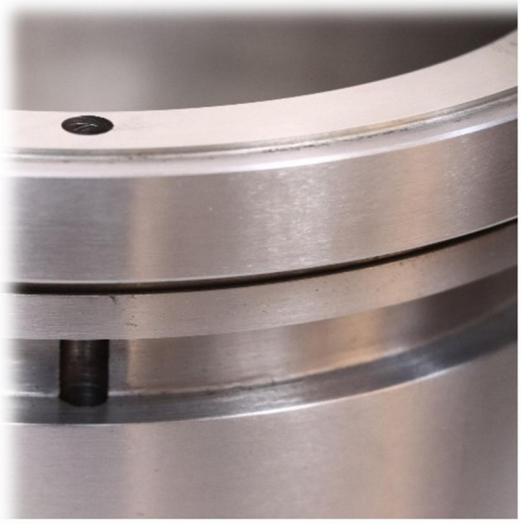
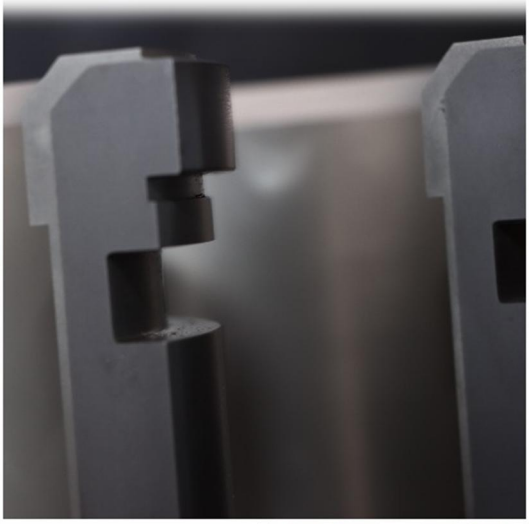
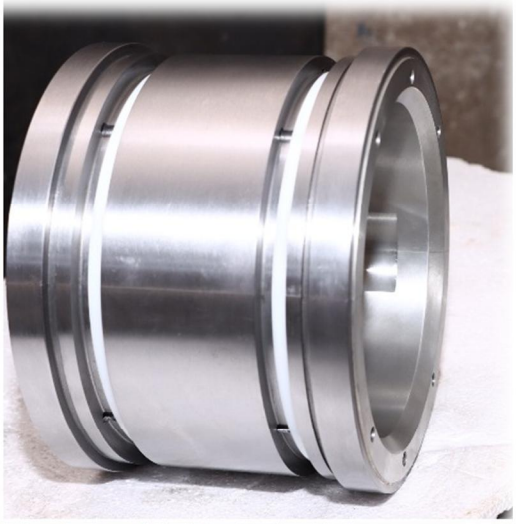
SHAFT FOR Q TYPE AXIAL BEARING

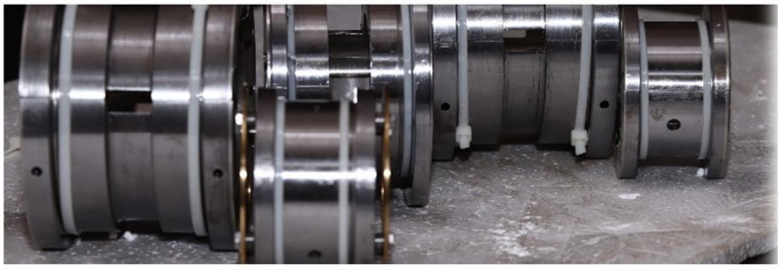
15.1 SHAFT DIMENSION, APPROPRIATE FOR DIN 31693 AND 31694.

SIZE	J	D1	D2	D3	D4	D5/D6	D7	L1	L2	L3	L4	L5	L6	r1	r2	r3	BW
9	80	110	100	110	132	80/ - 90/80 100/90 110/100	90	80.4	100	50	100	50	90	2.5	4	1.6	250
	90	120		120	142		100										
	100	130		130	143		110										
11	100	135	125	135	157	100/ - 110/100 125/110 140/125	110	100.4	120	55	105	50	110	2.5	4	1.6	275
	110	150		150	162		125										
	125	160		160	168		140										
14	125	170	160	170	192	125/ -140/125 160/140 180/160	140	125.4	150	60	115	60	140	4	6	2.5	325
	140	190	160	190	207		160										
	160	200	160	200	217		180										
	180	220	180	220	-		200										
18	160	215	200	215	244	160/ - 180/160 200/180 225/200	180	160.4	188	65	120	60	180	4	6	2.5	368
	180	240	200	240	264		200										
	200	250	200	250	273		225										
	225	275	225	275	-		250										
22	200	265	250	265	308	200/ - 225/200 250/225 280/250	225	200.4	240	70	135	70	220	6	10	4	445
	225	290	250	290	328		250										
	250	315	250	315	339		280										
	280	345	280	345	-		315										
	300	345	300	345	-		330										
28	250	325	315	325	378	250/ - 280/250 300/280 315/280 335/315 355/335	280	250.4	296	75	140	70	280	6	10	6	506
	280	355	315	355	408		315										
	300	375	315	375	408		315										
	315	390	315	390	423		345										
	335	430	355	410	-		365										
	355	430	355	430	-		385										

16.0 ENCLOSURE DIMENSION. (FOR FIG : 13 , 14 , 15 & 16)

SIZE	D	d1	d2	d3	d4	d5	d6	d7	L1	L2	L3	L4
9	80	150	150	155	150	155	148	140	39	29	27	14
	90			155								
	100			155								
	110			155								
11	100	180	180	155	180	180	178	170	41	31	27	16
	110			155								
	125			180								
	140			180								
14	125	230	230	180	228	240	228	212	43	33	27	18
	140			186								
	160			240								
	180			240								
18	160	275	275	240	274	280	273	260	46	36	27	21
	180			240								
	200			280								
	225			280								
22	200	340	340	280	338	340	338	316	49	39	27	24
	225			280								
	250			340								
	280			340								
28	250	410	440	340	410	410	438	390	53	43	28	27
	280			340								
	315			410								
	355			410								




SUNTECH Engineering Corporation.
STAR Enterprises.

OFFICE:
157C, LENIN SARANI (4TH FLOOR)
KOLKATA -700013
Tel Con: 9831207030 / 7278849399
suntech.ecorp@gmail.com

FACTORY :
119/A Kamardanga , Ichapur HIT Road, Howrah,INDIA
Tel Con: 9831207030 / 7278849399
suntech.ecorp@gmail.com

SUNTECH
ENGINEERING CORPORATION

www.suntechecorp.webs.com