



संवाद
Sanwaad

Online Workshop

for **Development of Local Suppliers**
for sourcing of engineering items & raw materials

12th January 2021, 10.00 AM

#AatmaNirbharBharat



#VocalforLocal

Sixth Workshop – **Components-Mechanical**

Hosted by Heavy Power Equipment Plant (HPEP), BHEL , Hyderabad

Components - Mechanical (HPEP, Hyderabad)

(Steam Turbines & Compressors)



Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Tilting Pad Journal Bearings	Steam Turbine	2.0	84833000	M/s Triveni & M/s Siemens
Thrust Bearings	Steam Turbine	0.60	84833000	M/s Triveni & M/s Siemens
Grounding Brush	Steam Turbine	0.80	84818000	M/s Triveni & M/s Siemens
Solenoid Valves	Steam Turbine	1.5	84798999	M/s Triveni & M/s Siemens
Tilting Pad Journal Bearings	Centrifugal Compressors	0.4	84833000	--
Self Equalizing double acting thrust bearing	Centrifugal Compressors	0.5	84833000	--

Components - Mechanical (HPEP, Hyderabad) (Gas Turbines)



Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Rotor Hardware	Gas Turbine Rotor assembly	1.5	84119900	GE and other GT OEMs
Liner and Thrust Bearings	Bearings for gas turbines	1.00	84833000	GE and other GT OEMs
Brush Seal	Seal used in Gas turbine Hot gas path	2.00	84119900	GE and other GT OEMs
C seal (IN 718)	Gas turbines	0.033	84119900	GE and other GT OEMs
W seal (IN 718)	Gas turbines	0.12	84119900	GE and other GT OEMs
Cloth Seals	Seal used in Gas turbine Hot gas path	0.2	84119900	GE and other GT OEMs
Precision Machined pins	Gas turbine hot gas path	0.33	73182400	GE and other GT OEMs

Components - Mechanical (HPEP, Hyderabad) (Gas Turbines)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
<u>SS FLEXIBLE HOSES, 1" to 2", Sch40/80</u>	Gas turbine piping	0.35	83071000	GE and other GT OEMs
<u>FUEL CONTROL VALVES</u>	Gas turbine fuel control	1.0	84818030	GE and other GT OEMs
<u>FILTERS (HYDRAULIC, LUBE OIL)</u>	Gas Turbine Lube oil / control oil / liquid fuel	0.15	84212190	GE and other GT OEMs
<u>LP CO2 SYSTEM WITH CONTROLS & ACCESSORIES</u>	GAS TURBINE fire protection	1.85	84241000	GE and other GT OEMs
<u>VALVES (CONTROL, NON- RETURN, PNEUMATIC, 6-WAY TRANSFER VALVES ETC.)</u>	Gas Turbine auxiliary systems	2	84818030	GE and other GT OEMs
<u>COOLING AIR BLOWERS</u>	Gas Turbine cooling systems	0.4	84145930	GE and other GT OEMs
<u>PUMPS – LP & HP (OIL, LIQUID FUEL-AC & DC MOTOR DRIVEN)</u>	Gas Turbine auxiliary systems	2	84133020	GE and other GT OEMs

Components - Mechanical (HPEP, Hyderabad) (Gas Turbines)



Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
<u>TUBE CONNECTORS</u> <u>(SWAGELOK / PARKER</u> <u>EQUIVALENT)</u>	Gas turbine piping	1.0	73071190	GE and other GT OEMs
<u>OIL MIST ELIMINATOR</u>	Gas Turbine lube oil system	0.6	84213990	GE and other GT OEMs
<u>HYDRAULIC ACTUATORS -</u> <u>IGV</u>	Gas Turbine Inlet Guide Vane	0.5	84119900	GE and other GT OEMs
<u>GAS TURBINE TURNING GEAR</u> <u>MECHANISM WITH AUTO</u> <u>DISENGAGE CLUTCH</u>	Gas Turbine starting system	0.5	84834000	GE and other GT OEMs
<u>ROTARY AIR COMPRESSOR</u> <u>/BLOWER (WITH / WITHOUT</u> <u>MOTOR DRIVE)</u>	Gas Turbine atomizing air system	0.75	84148090	GE and other GT OEMs

Components - Mechanical (HPEP, Hyderabad) (Gas Turbines)



Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
<u>TORQUE CONVERTER</u>	Gas turbine starting system	1.5	84836090	GE and other GT OEMs
INDUSTRIAL LATCHES & HINGES	Gas Turbine enclosure	0.1	84119900	GE and other GT OEMs
<u>WATER WASH NOZZLES</u>	Gas Turbine water washing	0.1	84119900	GE and other GT OEMs

Components - Mechanical (HPEP, Hyderabad) (Electrical Machines)



Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
<u>ROTOR WEDGES</u> (CuNi2Si)	Generator Rotor	0.7	8503	
<u>ROTORWEDGES</u> (AlZnMgCu1.5F52)	Generator Rotor	0.3	8503	

Components - Mechanical (HPEP, Hyderabad) (Heat Exchangers)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Spray Valves	Spray-cum-Tray Deaerator	0.8	8481	
Tray Assemblies	Spray-cum-Tray Deaerator	1.5	84049000	
Vacuum Pump	Air Evacuation from Surface Condenser	2.0	85012000	M/s L&T, M/s ISGEC, M/s Thermax, M/s GE- Triveni and other Condenser manufacturers.

Components - Mechanical (HPEP, Hyderabad) (Oil Rigs)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Centrifugal Mud pumps	Drilling Rigs	1	8431	
Mechanical seals for Limestone slurry service	Horizontal FGD Agitators	0.5	8484	
Pressure gauges with glycerin liquid range from 0-200 Psi	Drawworks of onshore oil rig			
Brake lining blocks (pads)	Drawworks of onshore oil rig			
Pneumatic control valves	Drawworks of onshore oil rig			

Components - Mechanical (HPBP, Trichy)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
C-Seals	The C-Seal is used for the sealing portion of electromatic relief valve.	0.20	8481	L&T Valves and other safety Valve manufacturers
Piston Ring	The piston rings are precisely manufactured components made to tight tolerances and are used in Electrometric Relief valve of Power Plant Boilers	0.30		
Tungsten Alloy Springs	The spring used in spring loaded safety valve and safety relief valve	2.00	8481	L&T, GE, HAWA
Premium Threaded tubing hanger	Used to hang OCTL (Oil Country Tubular Products) for 4 to 5 km height.	2.50		
ERV	Electromatic Relief Valve for Boilers is used along with safety valve in Reheater and super heater line	2.00		

Components - Mechanical (HEP, Bhopal)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Bearings NH 318 ECMRA/C4 VA3091 & NU 324 ECMRA/C4VA30	Traction Motor IM3302 IM3602	18	8482	(Customer) -Indian Railways (Competitors) -Crompton Grieves.
NU 2236 ECMRD/C4 VA301 & NJ 320E-CM/P64VA3091+ HJ320EC.VA301 for Traction Motor 6 FRA 6068 Bearing	Traction Machines	14	8482	-Saini Electricals
Anti-friction bearings	Electrical machines	4	8482	(Competitors) Siemens, Crompton Greaves, (Customers) – Power Utility, Refinery, Cement Industry
Ball bearing type 6318M/C4	Traction Alternator	0.1		(Customer) -Indian Railways (Competitors) -Crompton Grieves. -Saini Electricals
PTFE Thrust Bearing Pad	Hydrogenerator	13	739800	Voith Siemens Andritz Hydro, ABB, Alstom

Components - Mechanical (HEP, Bhopal)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
AXIAL SHAFT SEAL		20.00		HEP Bhopal

Components - Mechanical (HEEP, Haridwar)



Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Tilted Pad bearing	Steam Turbines	0.50		HEEP Haridwar

Components - Mechanical (PEM Noida & PESD Hyd)



Classification	Application	BHEL Specification	Requirement per annum (Rs. Cr.)	BHEL Unit*	HSN Code	Required by any other Clients
Agitators in FGD	Flue Gas Desulfurization	GEM-FGD-AGI-00	30	PEM, Noida*	8479	Doosan, GE Power India, ISGEC, L&T, MHPS, TATA

*Also required by PESD-Hyderabad and BAP-Ranipet for various other applications/projects.

Salient Points:

- **Agitators are required for GYPSUM and LIMESTONE SLURRY applications in FGD projects, mounted on either Circular or Rectangular shaped tanks or sumps**
- **Type of Agitators required are both SIDE ENTRY and TOP ENTRY for either Continuous / Intermittent operations**
- **Power Generators like NTPC ask for provenness of the Agitators in FGD application.**
- **Indian manufacturers having experience in Non-FGD applications e.g. mineral, metal, fertilizer, chemical industries etc. would also be able to quote with proven credentials having technical tie-up with OEMs.**
- **Agitator Schedules of various projects (tenders floated by PEM) are enclosed for reference.**
- **Typical PQC for non-NTPC projects (floated by PESD-Hyd) is enclosed for reference**

Side Entry (Horizontal) Agitator for Absorber/Aux. Absorbent Tank



Top Entry (Vertical) Agitator for Tanks



Note- Images are sourced from web and only for representational purpose.

Components - Mechanical (BAP, Ranipet)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Gas to Gas Re-heater	Flue Gas Desulfurization	50.00	8404	-
Agitators	Flue Gas Desulfurization	30.00	8479 8970	Doosan, GE Power India, ISGEC, L&T, MHPS, TATA
Cold end Basketed enamelled heating element for APH	Air Preheater	1.23	8219	
Self vulcanizing Bromo Butyl Rubber lining for absorber tanks of FGD	Flue Gas Desulfurization	70.00	9988	
Hydraulic Actuating devices	FD,ID,PA & Booster fans	11.00	8402	
High Pressure Soot Blower for Air Preheater	Air Preheater	3.80	8404	
Spring supported shaft seal	ID & Booster fan	0.50	3926	
Shaft Bush	ID & Booster fan	0.75	8483	

Components - Mechanical (BAP, Ranipet)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
Radial Shaft Seals	FD,ID,PA fan & Booster fan	0.15	4016	
IMPELLER BLADE	FD,ID,PA & Booster fans	5.00	7616	
Cooling/sealing air fan with accessories	ID fan & Booster fan	0.50	8414	

Components - Mechanical (HERP, Varanasi)

Classification	Application	Requirement p.a. (Rs Cr)	HSN Code	Whether required by other clients
High density Balancing weight (ASTM B777)	Balancing of Turbine rotors	0.12		Doosan,L&T,BHEL Bhopal
Ring burner	Heating and Tightening of Breech Nut	0.2		Doosan,L&T
Stud heating and measuring device	Heating and tightening of parting plane Stud and cap nut of Turbine	0.08		Doosan,L&T
Clamping piece	Assembly of moving blades with Turbine rotor	0.16		Doosan,L&T
Sliding plate/ Lubrite plate	Arrangement of Bearing pedestals	0.10		Doosan,L&T
Wrench for Balancing weight	Fixing and removal of Balancing weight with Turbine rotors	0.16		Doosan,L&T
Load Shackle	Lifting of HP,IP and LP Turbine (Casing and rotors)	0.10		Doosan,L&T

BHEL support for Development of Suppliers



24x7 Online portal for registration

- Simple registration form
- Timebound evaluation



Product development support

- Drawings, specifications
- Tooling



Hand holding with R&D and type testing



No LD/ penalty for developmental orders

BHEL support for MSMEs



MSMEs



PURCHASE PREFERENCE

As per Public Procurement Policy and MSMED ACT

ITEM PREFERENCE

358 items currently reserved for MSEs. When developed, items being imported can also be added to this list.

BILL DISCOUNTING

Payments through **TReDS** platform extended to all MSMEs

- RXIL Limited
- Invoice Mart
- M1Xchange

INTERACTIONS

Regular supplier meets.

BENEFITS

- EMD waived
- No elimination in RA
- Relaxation in prior experience and prior turnover to MSEs
- Time bound payments

BHEL support for Start-ups



BENEFITS

**Relaxation in prior
experience and turnover**



STARTUP RUNWAY

**BHEL is tendering its
requirements on GeM
wherein Startups can
supply goods as per the
Startup Runway on GeM**

Calendar for BHEL SAMVAAD

[Detailed list](#)

SNO	Category of Material	Date	Day	TIME
1	Raw Materials-Special/ Alloy/ Electrical Steel	29.12.2020	Tuesday	10:00 AM - 12:00 PM
2	Consumables for Foundry Applications	01.01.2021	Friday	10:00 AM - 12:00 PM
3	Welding Consumables of Special Grade	05.01.2021	Tuesday	10:00 AM - 12:00 PM
4	Castings & Forgings	08.01.2021	Friday	10:00 AM - 12:00 PM
5	Components-Mechanical	12.01.2021	Tuesday	10:00 AM - 12:00 PM
6	Insulating Materials	15.01.2021	Friday	10:00 AM - 12:00 PM
7	Components - Electrical & Electronics	19.01.2021	Tuesday	10:00 AM - 12:00 PM
8	Components – Solar	22.01.2021	Friday	10:00 AM - 12:00 PM
9	Systems & Packages	27.01.2021	Wednesday	10:00 AM - 12:00 PM

[Click here for filling up your details regarding your participation](#)

For any queries, please contact us on samvaad@bhel.in

Enrollment for BHEL SAMVAAD – Online Form submission

BHEL SAMVAAD

"An Interaction forum with local industry for strengthening the cause of Atma Nirbhar Bharat"

Required

Supplier Name and address *

Your answer

Contact person Name *

Your answer

Contact person's email address *

Your answer

Contact person's Mobile No. *

Your answer

Category of Material (Kindly select from below category and select one with you necessity for the concerned period time) *

- ☐ Engineering Spare Parts (Engineering Spare Parts) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Consumables (Consumables) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Raw Material (Raw Material) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Spares & Tooling (Spares & Tooling) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Consumables (Consumables) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Spares & Tooling (Spares & Tooling) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Consumables (Consumables) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Spares & Tooling (Spares & Tooling) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM
- ☐ Consumables (Consumables) (01/01/2021 - 31/03/2021) 09:00 AM - 05:00 PM

Is it of items proposed to be developed for BHEL *

Your answer

Submit

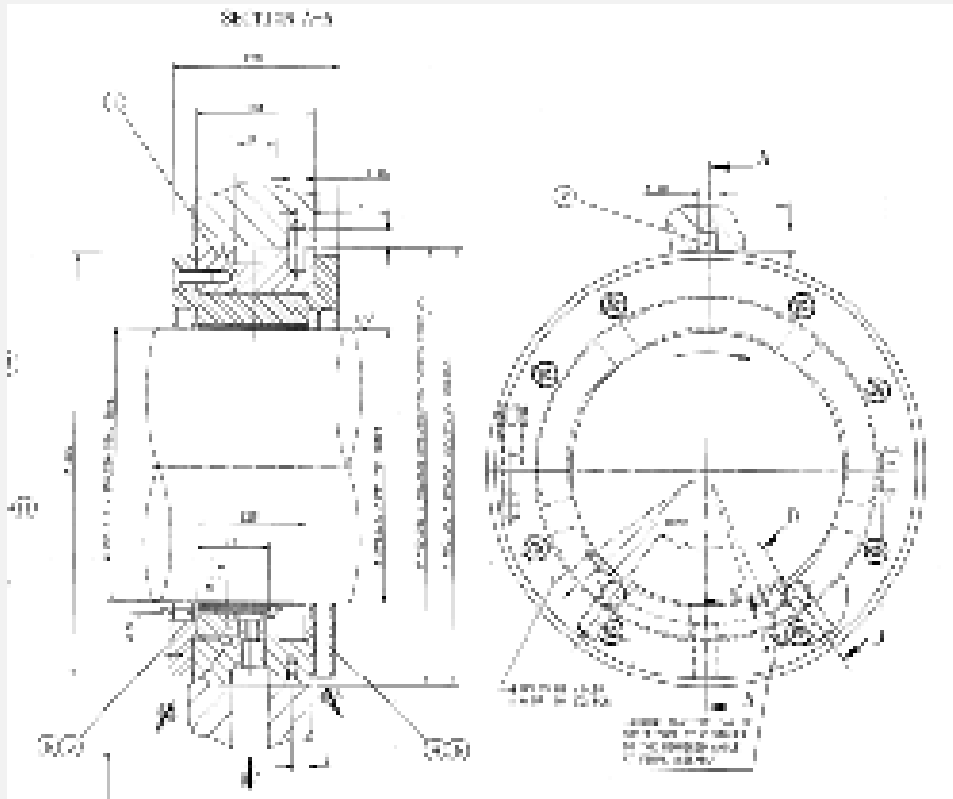



Thank You

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Write to samvaad@bhel.in to convey your interest

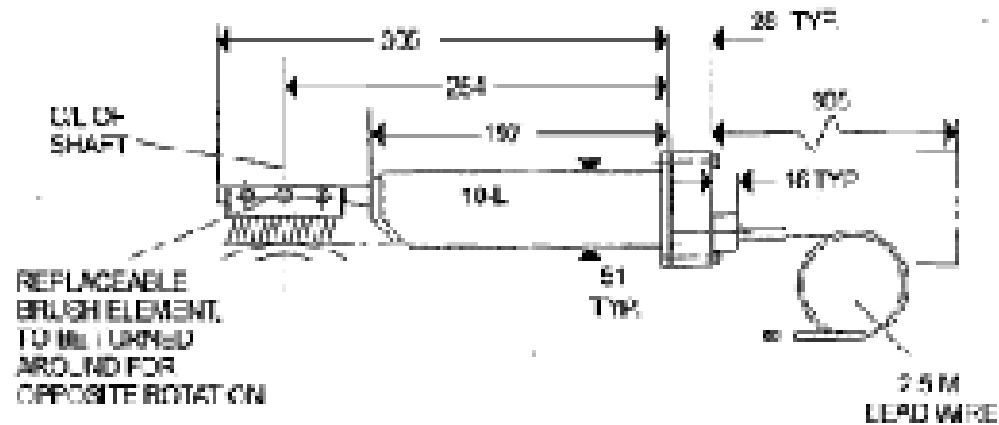
JOURNAL BEARINGS, THRUST BEARINGS (STEAM TURBINES)



BHEL HYDRA-RAJ	PROJECT STANDARD TURBINES & COMPRESSORS	TCM 698
		REV 01
		PAGE 1 OF 1
TECHNICAL SPECIFICATIONS OF FITTING PAD JOURNAL BEARINGS WITH CRUISE POWERED PAIRS		
1.0 <u>PURPOSE</u> This standard specifies the requirements of fitting pad journal bearings for hydroelectric power turbines.		
2.0 <u>TECHNICAL REQUIREMENTS</u>		
2.1 The bearings shall be fitting pad type with 5 pads fixed between a pair and conforming to the dimensions and other details given in the drawings mentioned in the variant table.		
2.2 The bearings shall be oil fed lubricated.		
2.3 The oil to be used is open to air 300-350 cSt @ 40°C.		
2.4 The oil supply system for which these bearings are to be used shall be:		
The bearing is lubricated by oil sprayed by pads		
Despatched by: 		

Variant table of bearings											
The bearings are to be fitted to the turbines as given in the table below for oil fed lubrication. The oil to be used is open to air 300-350 cSt @ 40°C.											
Variant	1	2	3	4	5	6	7	8	9	10	11
Dimensions	100	125	150	175	200	225	250	275	300	325	350
Material	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Notes	1. The bearings shall be fitted to the turbines as given in the table below for oil fed lubrication. The oil to be used is open to air 300-350 cSt @ 40°C. 2. The bearings shall be fitted to the turbines as given in the table below for oil fed lubrication. The oil to be used is open to air 300-350 cSt @ 40°C. 3. The bearings shall be fitted to the turbines as given in the table below for oil fed lubrication. The oil to be used is open to air 300-350 cSt @ 40°C.										

GROUNDING BRUSH SPECS / PRE-QUALIFYING CRITERIA (STEAM TURBINES)



PRE-QUALIFYING CRITERIA FOR PROCUREMENT OF GROUNDING BRUSH

- 1) **SCOPE:** Supply of GROUNDING BRUSH for steam turbines to be mounted on bearing pedestal. These brushes are used for grounding stray currents generated in Steam Turbine rotors.
- 2) **CONDITION OF DELIVERY:**
The grounding brush shall be supplied in single kit comprising of grounding brush and other accessories as per the vendor (casing, arm, or thing cable with terminating shoe, flanges and fasteners).
- 3) **TECHNICAL REQUIREMENTS:**
 - (a) The brush to be manufactured as per spec. TC 51216 & Dwg no. 3007500014 Rev 00.
 - (b) The brush assembly should be available for service at temperatures up to 200°C.
 - (c) The brush should be suitable for shaft speed of approximately 400 RPM.
 - (d) The grounding brush should have at least 10 metallic bristles which are removable and adjustable. Bristles used shall have the composition as given below:


CHEMICAL COMPOSITION OF BRISTLES MATERIAL:

Analysis of chemical composition of bristles shall conform to the following in weight %:

Ag (Silver)	Copper (Cu)	Traces of Ni, Zn, Al, Fe
70-85%	Cu = 30-14.5	0.4-0.8

Gold Plating: 99% Pure

Gold Coating: 0.5-2 microns (impregnated in shaft wire)

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SOLENOID VALVES (TRIP AND OTHER PURPOSES) (STEAM TURBINES)



PRODUCT STANDARD TURBINES & COMPRESSORS

Spec.No: TC 65537
Page 1 of 4
Rev.No : 00

N2 Way Solenoid Valve (SIL -3 certified) in Explosion Proof (Flame proof) Enclosure for Turbine Tripping application

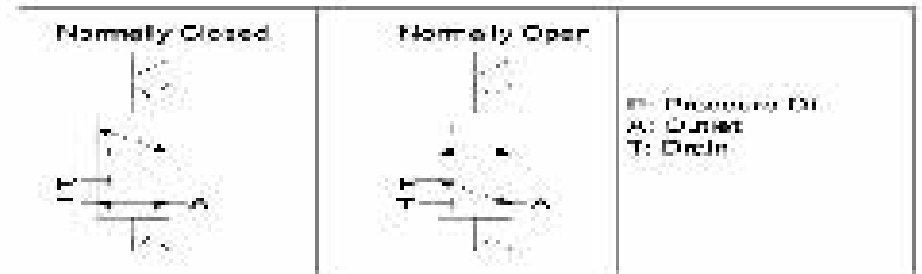
1.0 SCOPE :

This standard specifies the requirement of N2-Way solenoid valve in explosion proof (Flameproof) Enclosure as per IEC 90/07) enclosure and SIL certified (SIL-3) minimum as per IEC 60508) for turbine tripping application to be utilized petrochemical refinery industrial power plant applications.

2.0 TECHNICAL REQUIREMENTS:

2.1 GENERAL: The Solenoid valve shall be suitable for ambient of minimum and ambient temperature -10-50 deg.C. Copper and copper alloys shall be avoided for all the parts exposed to atmosphere. The solenoid valves shall be suitable for typical service.

2.2 PURPOSE: The solenoid valve is intended for installation in the pressure oil circuit to the turbine anti-surge trip gun. When operated it will interrupt the oil flow to the turbine. At the same time, the trip oil circuit will be connected to the oil drain thereby emergency tripping is released.



3.0 TECHNICAL SPECIFICATIONS OF VALVE:

S.No	Parameter	Requirement
a	Material of valve body	Cast iron
b	Type of mounting	Electromagnetic direct coupling
c	Valve material	Stainless steel
d	Electrical rating	Turbine oil 180 V/32 A, 250 V/6 A
e	Flow rate of the valve	100 l/min
f	Medium temperature	0-50 deg.C
g	Mounting position	Any position
h	Valve connection	1/2"
i	Switching time	100 milli second maximum
j	Switching time	100 milli second minimum

COMPRESSOR JOURNAL BEARINGS

Technical Requirement:

Tilting Pad Journal Bearings for high speed equipment.

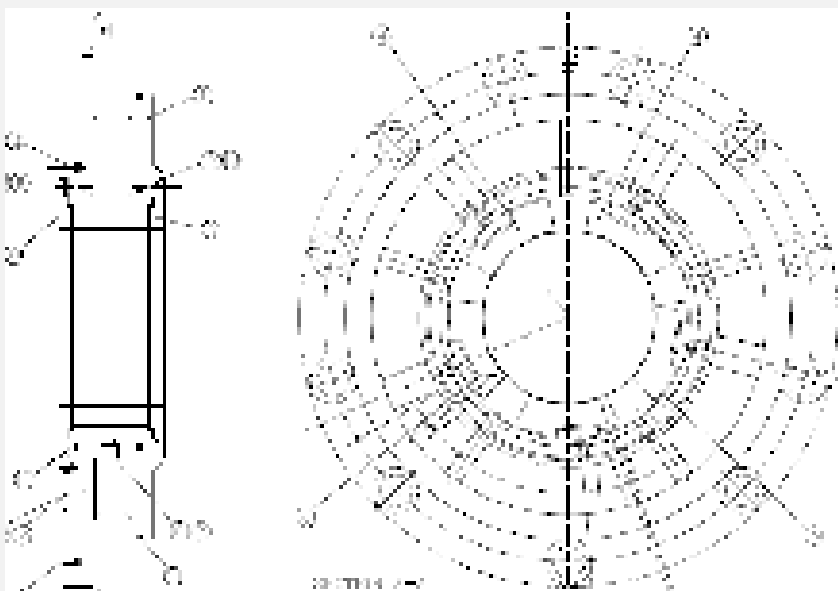
- Bearing Variants:**
- (i) Flooded Lubricated in Single Piece;
 - (ii) Flooded Lubricated in two halves;
 - (iii) Direct Lubricated in Single Piece;
 - (iv) Direct Lubricated in two halves;

Size: journal bearing shaft diameter varies from 70mm to 250mm

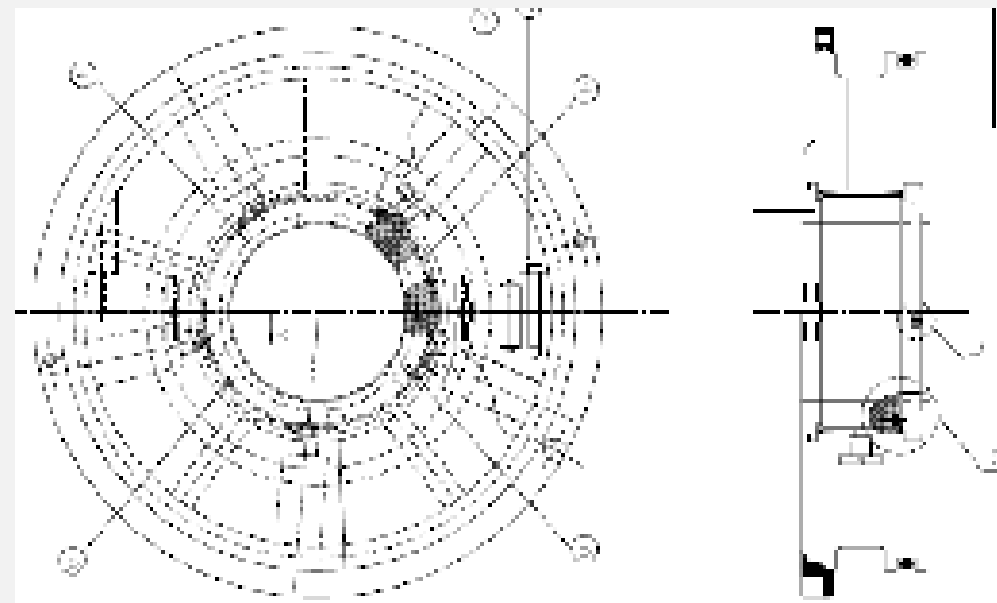
Application: Hazardous and corrosive environment. Oil & Gas, Fertilizer and Power Industry

GENERAL REQUIREMENTS	
1.	The design and construction of the bearing shall be such that the bearing is conformable with the shaft and the bearing is capable of supporting the design load and the bearing shall be free from distortion in operation.
2.	The bearing shall be capable of supporting the design load and the bearing shall be free from distortion in operation.
3.	The bearing shall be capable of supporting the design load and the bearing shall be free from distortion in operation.
TECHNICAL SPECIFICATIONS	
Material	Cast Iron
Shaft Diameter	70mm to 250mm
Journal Diameter	70mm to 250mm
Journal Length	70mm to 250mm
Journal Tolerance	±0.02mm
Journal Surface Finish	0.8µm
Journal Hardness	200HB

PAD Babbitt



Journal Brg in Single Piece



Journal Brg in 2/2

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THRUST BEARINGS For Compressors


Technical Requirement:

Double acting Self-Levelling Thrust bearings for high speed equipment.

- Bearing Variants:**
- (i) Flooded Lubricated;
 - (ii) Flooded Lubricated with Retaining Ring (for axial assembly);
 - (iii) LEG Lubricated;
 - (iv) LEG Lubricated with Retaining Ring (for axial assembly);

Size: Nominal size bearings varies from 5 inch to 17inch

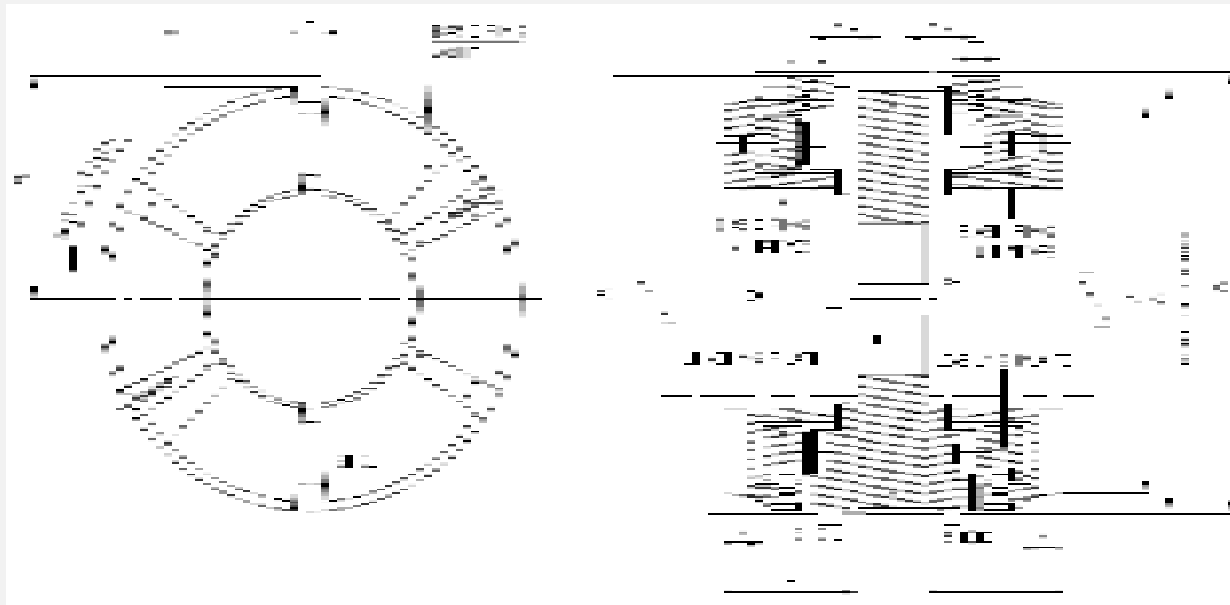
Application: Hazardous and corrosive environment. Oil & Gas, Fertilizer and Power Industry




Technical drawing showing a cross-section of a thrust bearing assembly. The drawing includes labels for various components and dimensions. The title is 'THRUST BEARING FOR COMPRESSOR'.

ITEM NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	THRUST BEARING	1	PC	
2	THRUST BEARING	1	PC	
3	THRUST BEARING	1	PC	
4	THRUST BEARING	1	PC	
5	THRUST BEARING	1	PC	
6	THRUST BEARING	1	PC	
7	THRUST BEARING	1	PC	
8	THRUST BEARING	1	PC	
9	THRUST BEARING	1	PC	
10	THRUST BEARING	1	PC	

Thrust Brg Spec



Thrust Brg Dwg

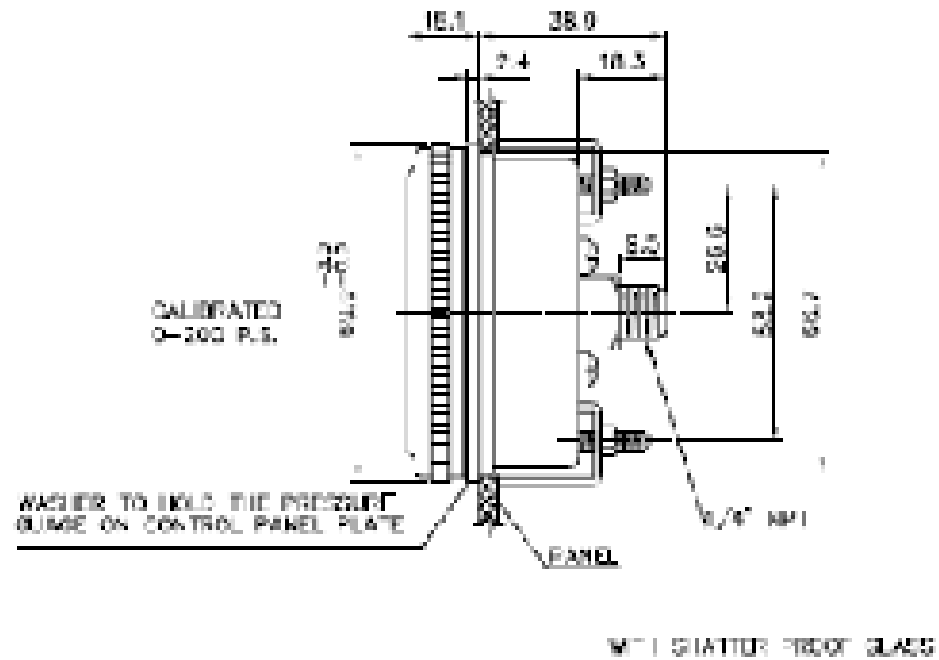
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Centrifugal mud pump



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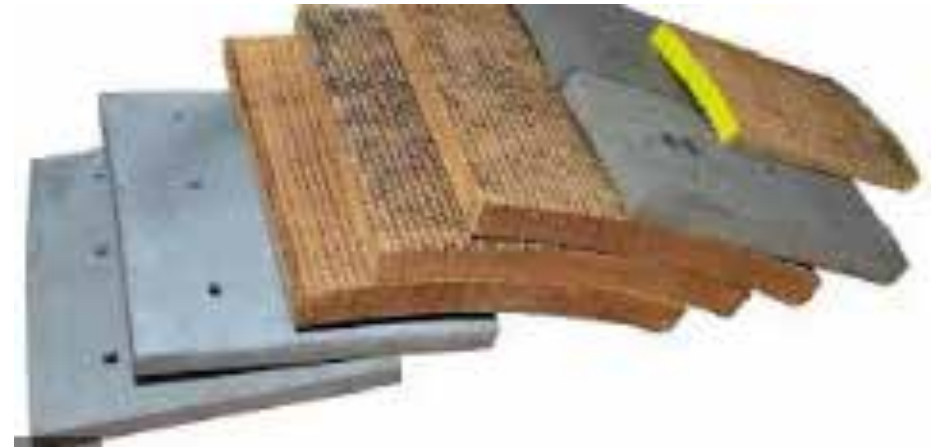
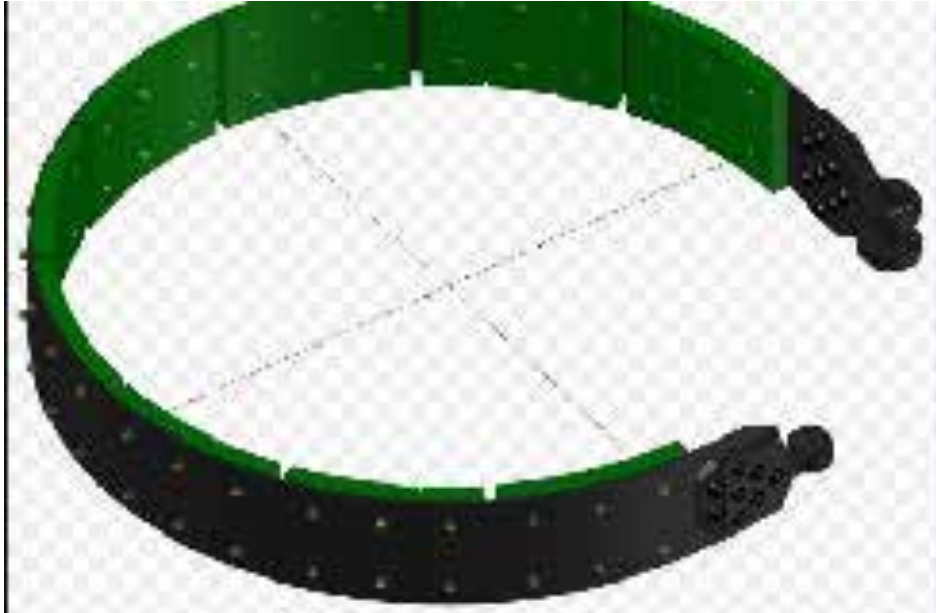
Pressure gauge



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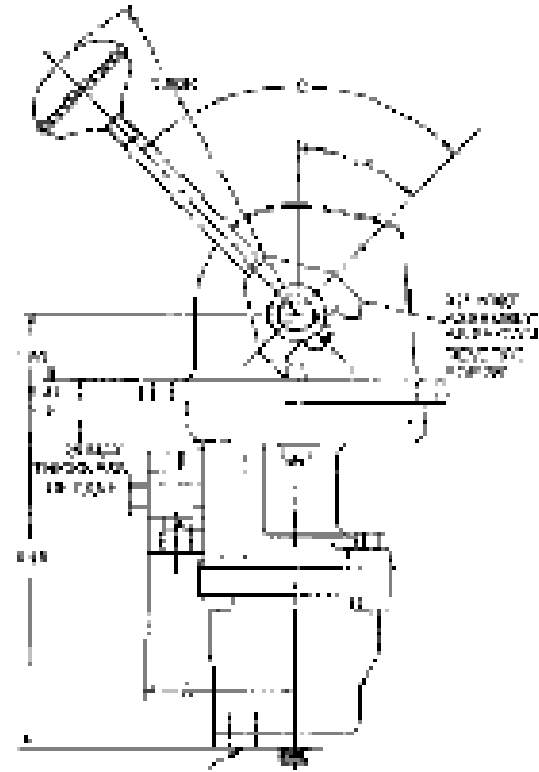
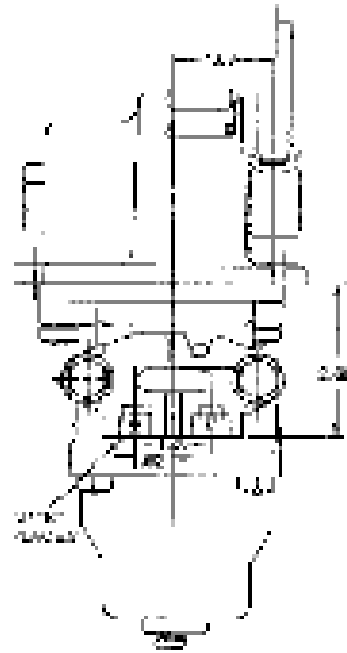


Brake lining blocks



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Control valves



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Mechanical Component – C seal



BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
C Seal	C-Seal is a component used in electromatic relief valve. The C-Seal is used for the sealing of electromatic relief valve. The functionality of C seal ERV, a type of safety valve.	4-V-7501-portion of 10146 Rev 03	HPBP Trichy	0.20	8481	L&T and other valve manufacturers

Material Specification:



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Mechanical Component – Piston Ring



BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
Piston Ring	piston rings are precisely manufactured components made to tight tolerances and are used in Electromatic Relief valve of Power Plant Boilers	4-V-7522-10612	HPBP Trichy	0.30	8481	L&T and other valve manufacturers

Material Grade: ASTM B 637 UNS N07718 OR EQUIVALENT

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Mechanical Component – Tungsten Alloy Spring



BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
Tungsten Alloy Spring	The spring used in spring loaded safety valve and safety relief valve	4-V-J790-23814	HPBP Trichy	2	8481	L&T and other valve manufacturers

Material Grade: ASTM A681-H12/H21 or BS 4659 –BH12/BH21

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Tilt pad Bearing (Bearing Complete)

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- This bearing comprises Bearing Pedestal, Bearing shell with 5 no. pads, Oil Catchers, thermocouples type-K, High Pressure Hoses, lube oil supply ports etc.
- The internal design and detailed engineering in supplier's scope. Outer dimensions for mounting/interface are given.

Technical Data:

1. Bearing Nominal diameter : 250mm H6 for journal dia. 249.66(-0.03)mm
2. Oil Catcher diameter : dia275.1 (+0.05) mm for shaft dia275
3. Radial load : 44 kN
4. Rated rotational speed : 3000 rpm
5. Overspeed for 2 minutes : 3600 rpm
6. Oil Type : ISO VG46
7. Oil temperature : 50 degree C
8. Inlet Oil Pressure : 1.3 - 1.5 bar
9. Speed for Jacking Oil supply (ON/OFF) : 90 rpm (cold) / 230 rpm (warm)
10. Max. Bearing Temperature : 70 degree C
11. Oil Flow Rate : 30 LPM
12. Jacking Oil (Pressure & quantity) : 2x0.8 LPM, Starting Pressure : 90bar; Operating Pressure : 50 bar

Design Features:

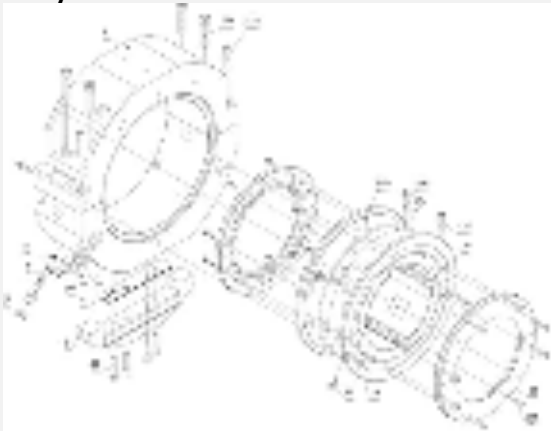
1. No. of Pads : 5 (load between pad, LBP) tin alloy babbitted pads.
2. Provision for jacking oil supply in bottom two pads.
3. Bearing Shell and both side Oil Catchers insulated from bearing pedestal/housing.
4. Triplex thermocouples type-K for temperature monitoring in bottom two pads.
5. Provisions for mounting of shaft and pedestal vibration probes.
6. Detachable flanged lube oil inlet /outlet connections.
7. Provision for potential measurement, terminated on pedestal.
8. Provision for lifting of complete bearing using Eye bolts.

Tilted Pad Journal Bearing for Steam Turbine

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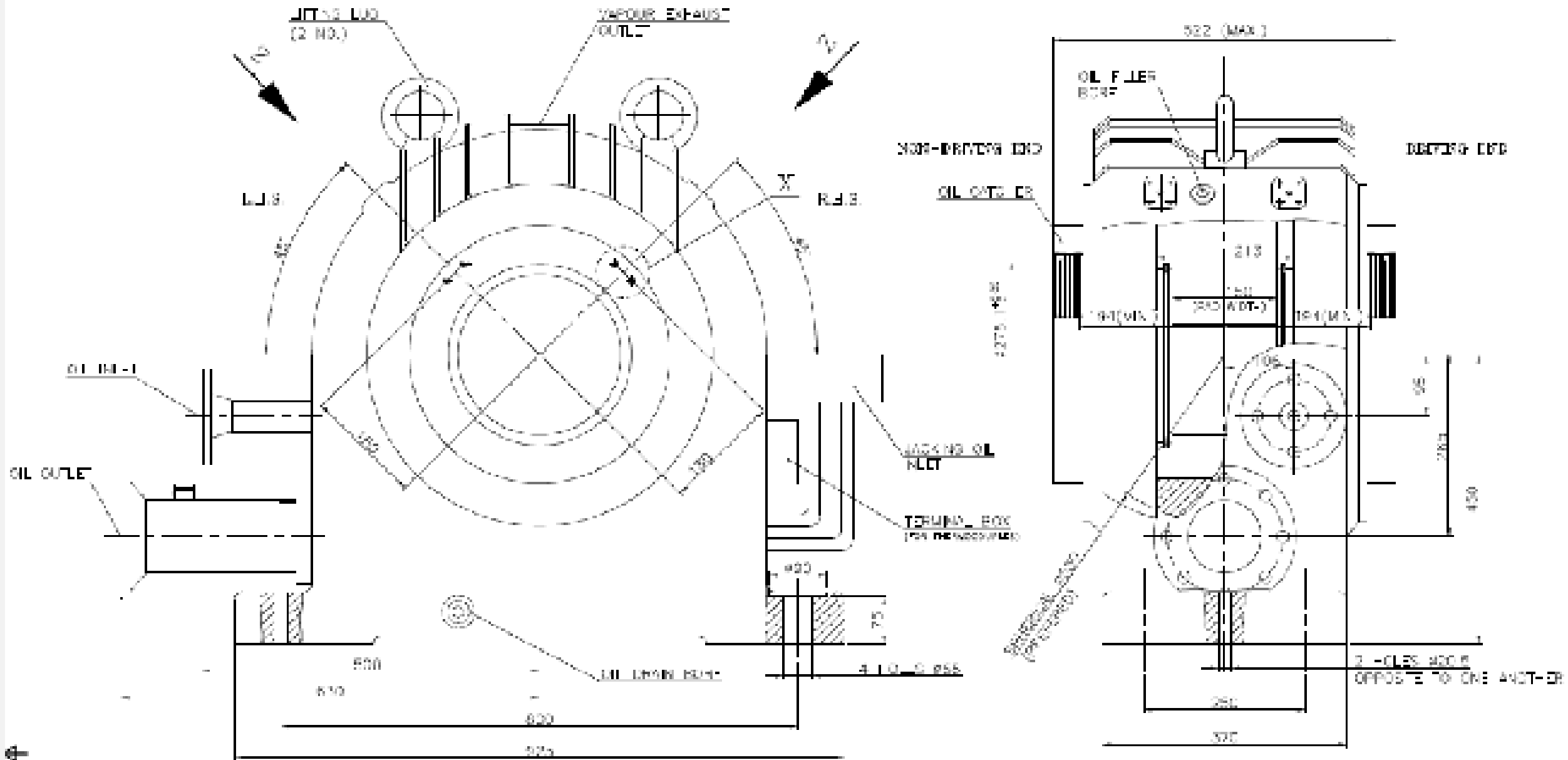


- Bearing is one of the most critical item in the whole Steam Turbine system. The subject Tilted Pad Bearing is being used in HP Front Bearing Pedestal which is lightly loaded.
- Tilted pad bearing used in place of conventional journal bearing to improve the expected vibration level where bearing is lightly loaded and is therefore more sensitive with regards to relative shaft vibration compared to the other bearings.
- Tilting pad journal bearings offer the very good rotor stability due to their exceptional stiffness and damping characteristics which help against different vibration issues and mis-alignment and reduce the system sensitivity against low load and thus reduce relative shaft vibration during operation.
- Tilted pad bearing is an assembly consist of different critical parts viz. Bearing pad, Housing, adjusting pad, cover plate, special oil chamber, locking screw etc. BHEL has no design details and any manufacturing drawings and BOMs of all these parts of bearings, as it is a bought-out item for our collaborator also. Whereas Siemens is manufacturing other turbine bearings in-house (for which manufacturing design documents are available with BHEL).
- The performance of this Tilted Pad Bearing is critical to reliability of turbine.



Salient Design Parameters	
Type Of Application	Steam Turbine Bearings
Design Frequency	50Hz
Direction of Rotation of Rotor Clockwise when seen in direction of Generator	Clockwise when seen from HPT in direction of Generator
Orientation of shaft	Horizontal
Diameter of Bearing	250 mm
Length of Bearing	180 mm
Actual Radial Load on Bearing:	61kN
Jacking Oil Provision	Yes
Lift Pressure	150bar header pressure
Jacking oil holding Pressure at 70 μm lift	Break-away press.: 107.9bar; hold press.: 71.7 bar @ Maximum allowable Radial Load on Bearing
Jacking oil flow rate (Maximum)	for VG 46 @ 90kN Maximum allowable Radial Load on Bearing
Lube oil flow pressure	1.5 bar
Oil Supply Temperature	50° C
Maximum allowable rise in Oil Temperature	20° C
Oil splashing control Provision	Yes
Bearing oil.	Compatible with ISO VG 46
Outer Shell Dimension	Same as 01160456000

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Components - Mechanical

BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
Single Row Cylindrical Roller Bearings NH 318 ECMRA/C4 VA3091 & NU 324 ECMRA/C4 VA301	Three phase Traction Motor IM3302 & IM3601 for AC EMU/ MEMU	IS:6457	HEP Bhopal	18	8482	(Customer) -Indian Railways (Competitors) -Siemens -Bombardier -Medha Servo Drives -Alstom



NH 318 ECMRA/C4 VA3091 rivet-less & insulated (SKF nomenclature) or equivalent of other bearing manufacturer for use in Traction motor type IM3302 & IM3601



NU 324 ECMRA/C4 VA301 rivet-less (SKF nomenclature) or equivalent of other bearing manufacturer for use in Traction motor type IM3302 & IM3601

Components - Mechanical

BHEL					HSN Code	Whether required by other clientsSingl
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
Single Row Cylindrical Roller Bearings NU 2236 ECMRD/C4 VA301 & NJ 320ECM/P64 VA3091 + HJ320EC/VA301	Three phase Traction Motor 6FRA6069 for WAG9 & WAP7 Locomotive	IS:6457	HEP Bhopal	14	8482	(Customer) -Indian Railways (Competitors) -Crompton Grieves -Saini Electricals -Medha Servo Drives



NU 2236 ECMRD/C4
VA301 (SKF nomenclature)
or equivalent of other
bearing manufacturer for
use in Traction motor type
6FRA6068



NJ 320E-CM/P64VA3091+
HJ320EC.VA301 (SKF
nomenclature) or
equivalent of other
bearing manufacturer for
use in Traction motor type
6FRA6068

Components - Mechanical



BHEL					HSN Code	Whether required by other clients
Classification	Application	Specification	Unit	Requirement p.a. (Rs Cr)		
Ball bearing type 6318 M/C4	Traction Alternator TA4502AZ for Diesel Electric Tower Car	IS:6455	HEP Bhopal	0.1	8482	(Customer) -Indian Railways (Competitors) -Crompton Greaves

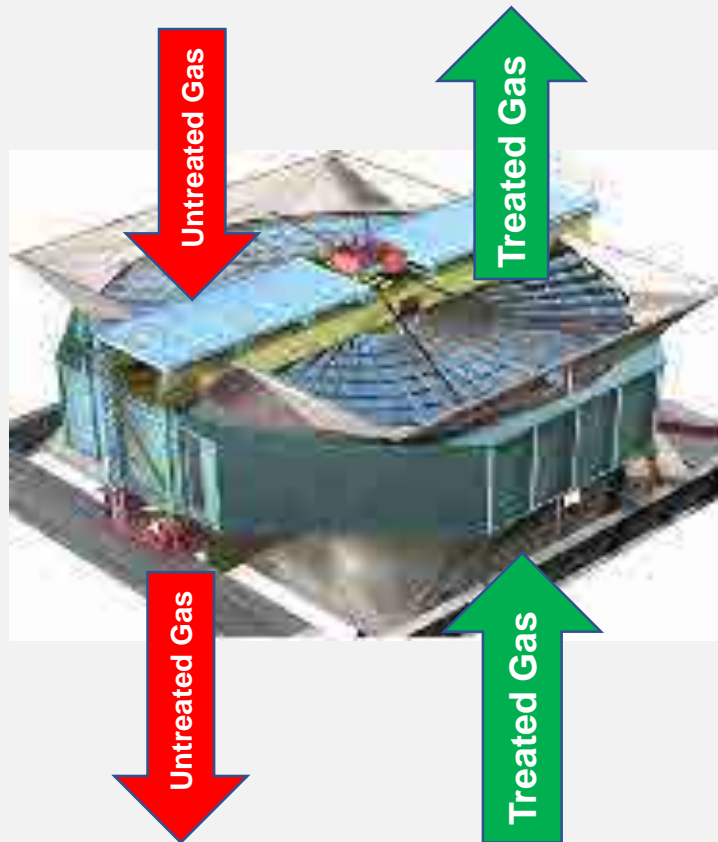


BALL BEARING TYPE 6318M/C4 (SKF NOMENCLATURE) OR EQUIVALENT OF OTHER BEARING MANUFACTURER FOR USE IN TRACTION ALTERNATOR TYPE TA4502

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GGH - Gas to Gas Heater

Gas to Gas Heater:



- ❑ GGH is a heat exchanger used in Flue Gas Desulphurization (FGD) system
- ❑ It is used to reheat the treated flue gas by recovering the heat from the untreated flue gas
- ❑ Low temperature zone which necessitates the entire heating element to be of enameled element to avoid the corrosion and choking of heating element due to moisture and sulphuric acid condensation

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Flue Gas Desulfurization

- **Agitator**

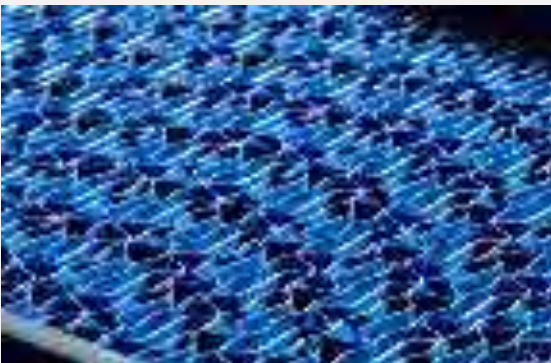
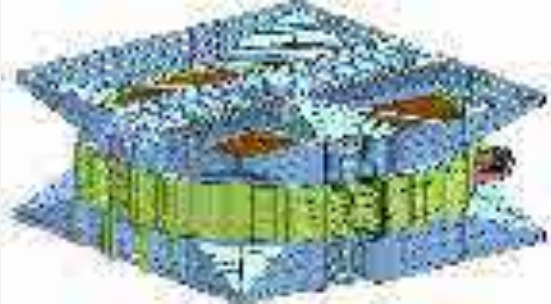
- **PQR CRITERIA REQUIRES EXPERIENCE IN WET LIMESTONE FGD APPLICATION. HOWEVER, INDIAN VENDORS ARE HAVING EXPERIENCE IN SIMILAR PROCESS APPLICATION ONLY.**

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APH - Enameled Heating Element



Enameled Heating Element for Cold End :



- ❑ Regenerative Air Preheater is a heat exchanger used in Thermal Power Plant to transfer heat from hot flue gas to the incoming cold air.
- ❑ Bundle of heating elements (≈ 1.0 mm thick Steel Sheets) serve as heat transfer surfaces in the Air Preheater
- ❑ In coal fired boiler with SCR or in oil fired boiler, SO_x formation is inevitable and heating element is prone to corrosion due to concentrated sulphuric acid fumes and moisture. Fouling is also a potential problem in this environment.
- ❑ Necessitates use of enamel element to avoid corrosion and increases easy cleaning of heating element surfaces.
- ❑ Base metal of Element : Enameling iron as per EN10209 DCO4ED or ASTM A424
- ❑ Enameling thickness : 150 microns on each side of the heating element

Flue Gas Desulfurization

• RUBBER LINING OF ABSORBER TANK

- ❑ PQR CRITERIA REQUIRES THAT RUBBER MANUFACTURER SHOULD HAVE EXPERIENCE IN LINING WET LIMESTONE FGD ABSORBER AND COMPLETED 40,000 HRS OF OPERATION.
- ❑ RUBBER LINING MANUFACTURERS IN INDIA DON'T HAVE EXPERIENCE IN LINING FGD ABSORBER.
- ❑ RUBBER MANUFACTURERS IN INDIA DON'T HAVE TECHNOLOGY TO MANUFACTURE SELF-CURING RUBBER REQUIRED FOR FGD ABSORBER.
- ❑ INDIAN VENDORS ARE BUYING SELF-CURING RUBBER MATERIAL FROM FOREIGN MANUFACTURERS AND RUBBER LINING UNDER FOREIGN SUPERVISION.

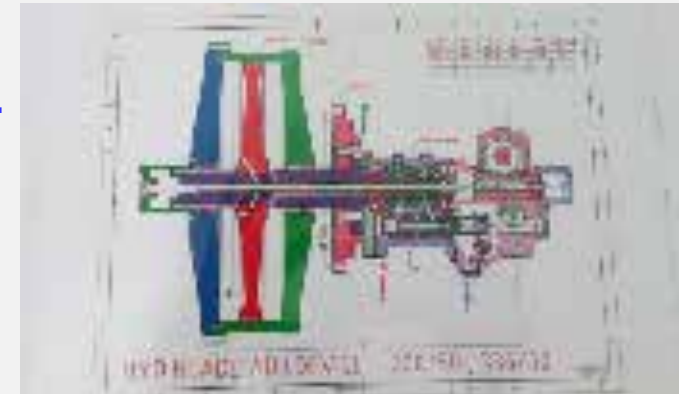
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FANS-ENGINEERING

- **HYDRAULIC BLADE ACTUATING DEVICE**

- **Medium:** Atmospheric Air & Hot Flue Gas
- **Application:** FD,ID,PA & Booster fans
- **Size:** 200/50,336/50, 336/100,415/100 & 400/125
- **Material:** Cast Iron, steel and other materials as per BHEL drawing.



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APH - Multimedia Cleaning Device

Multimedia Cleaning Device



- ❑ Multimedia cleaning device is used for cleaning the Air Preheater Heating Elements 'On Load' with steam and 'Off Load' with high pressure water
- ❑ Mediums used for cleaning
 - High-pressure water at pressure of 100 - 200 bar
 - Steam with 310°C (110°C superheat at 14 kg/cm²)
- ❑ PLC based control system with the ability to operate in both manual and automatic mode

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FANS-ENGINEERING

- **SPRING SUPPORTED SHAFT SEALS**

- **Medium:** HOT FLUE GAS
- **Application:** ID & Booster fan
- **Material:** SPECIAL PTFE COMPOUND
- **SIZE:** 228x242x7.5 and above



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FANS-ENGINEERING

- **SINTERED BUSH**

- **Medium:** HOT FLU GAS

- **Application:** ID & Booster fan

- **Material:** COPPER-TIN BASED SINTERED BUSH. SELF LUBRICATING TYPE.

- **SIZE:** 194x218x23 and above



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FANS-ENGINEERING

- **RADIAL SHAFT SEALS**

- **Medium:** Lube oil-ISO VG68
- **Application:** FD,ID,PA fan & Booster fan
- **Material:** 83 FKM
- **SIZE:** 165x190x13 and above



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FANS-ENGINEERING

- **IMPELLER BLADE**

- **Medium:** Atmospheric Air & Hot Flue
- **Application:** FD,ID,PA & Booster fans
- **Material:** Aluminum Alloy and Cast Iron(GGG40)
-



FANS-ENGINEERING

- **Cooling/sealing air fan with accessories**
- **Medium:** Atmospheric Air
- **Application:** Cooling / Sealing Air Fan for ID fan & Booster fan
- **Fan type :** Radial, Backward curve
- **Parameter:** Flow-1 m³/s & Head-400 mmwc and above



MECHANICAL COMPONENTS-HPEP (EM)

Rotor wedges - CuproNickel (CuNi2Si)

BHEL Spec-TG65811

International Standard: DIN 17666

Method of manufacturing: Extrusion, skin pass & Heat Treatment



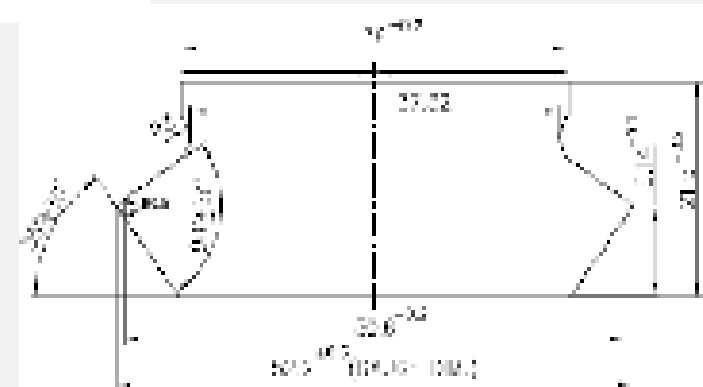
Chemical composition in %:

Cu	Ni	Si	Cr	Zr	others(total)
Remainder	1.6-2.6	0.5-0.8	0.04-0.10	> 0.01	0.5 max

Mechanical properties:-

- a) 0.2% proof stress : 520 N/mm² minimum
- b) Tensile strength : 590-750 N/mm²
- c) Elongation (l=5d) : 10% minimum

Electrical conductivity : 15 MS/m minimum



Tolerance on Straightness and twist : 0.8mm/Metre

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MECHANICAL COMPONENTS-HPEP (EM)

Rotor wedges - AlZnMgCu1.5F52

BHEL Spec-TG65854

International Standard: DIN 1747

Method of manufacturing: Cold drawn, Heat treatment & Stress Reliving

CHEMICAL COMPOSITION IN % :

	Zn	Si	Mg	Fe	Cu	Cr	Mn	Al
MIN	5.1	-	2.1	-	1.2	0.18	-	Remainder
MAX	6.1	0.40	2.9	0.5	2.0	0.30	0.30	

Mechanical Properties:

0.2 % proof stress : 420 N/mm². min.

Tensile strength : 480 N/mm². min.

Elongation (L– 5d) : 7 % min.

Electrical conductivity : 13 MS/m.

Tolerance on Straightness and twist : 0.8mm/Metre



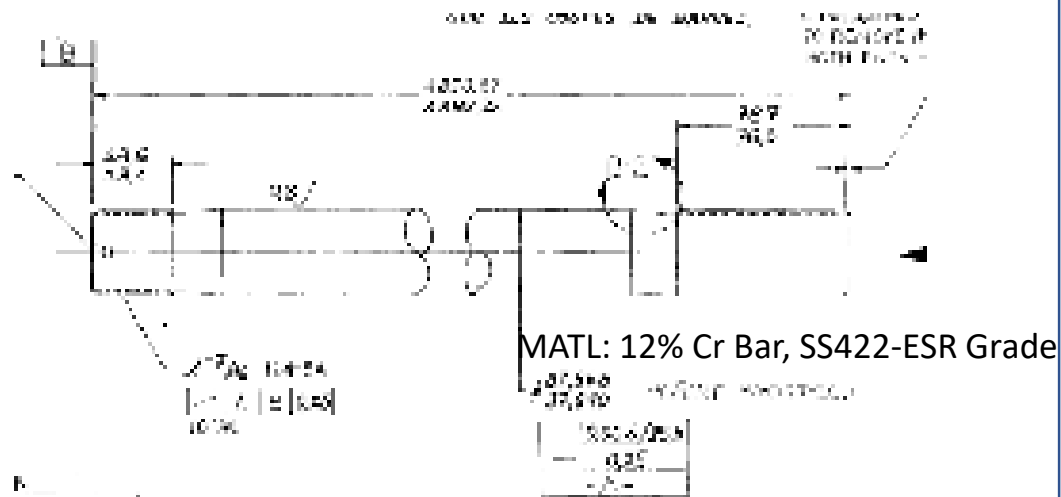
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Rotor Hardware

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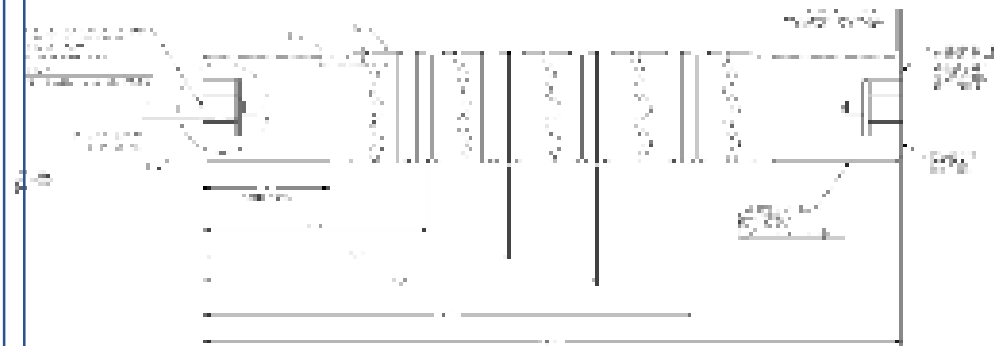
Compressor Rotor Hardware: Stud+ Ring Nut + Nut octagon



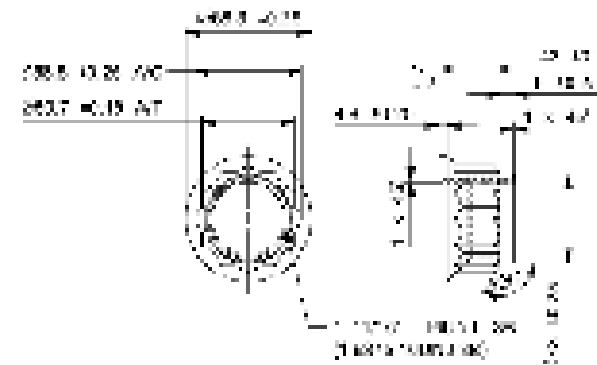
MATL: 12% Cr Bar, SS422

MATL: ASTM A193 Gr-B16

Turbine Rotor Hardware: Stud+ 12Pt self Locking Nut



MATL: 12% Cr Bar, SS422-ESR Grade

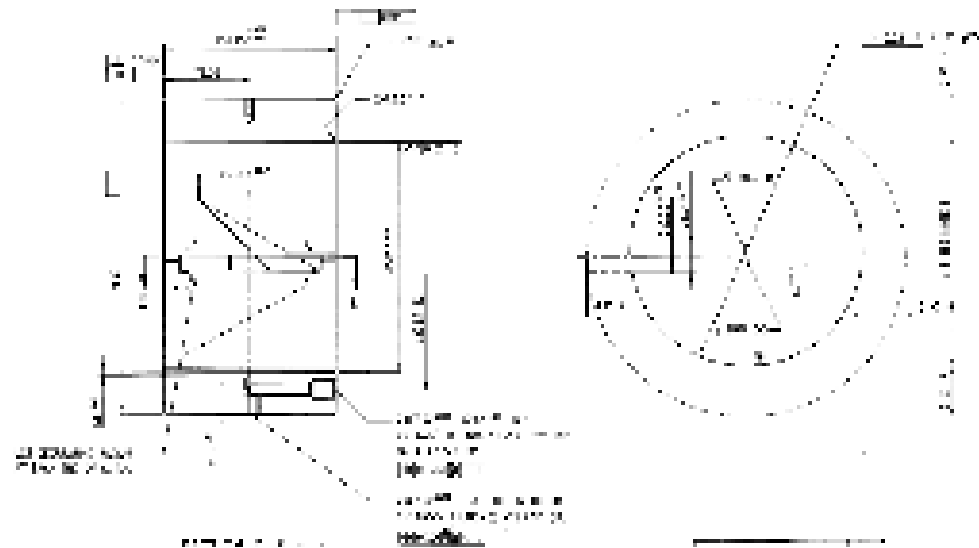


Major Operations:

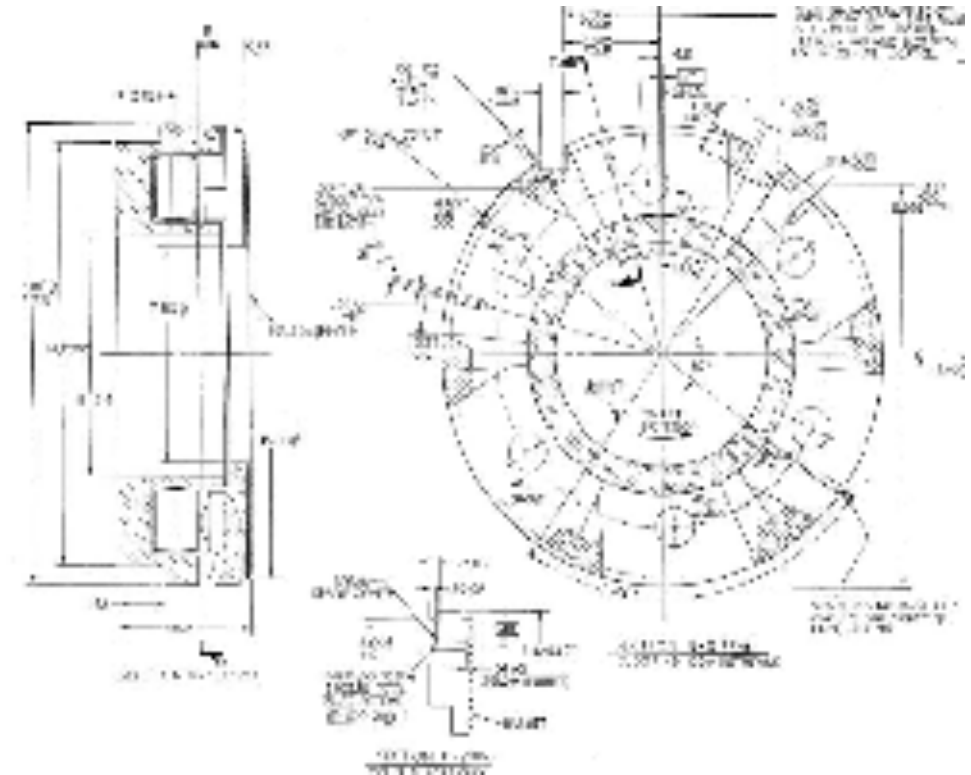
- Turning
- Thread Rolling
- Grinding
- Shot Peening

Liner & Thrust Bearing

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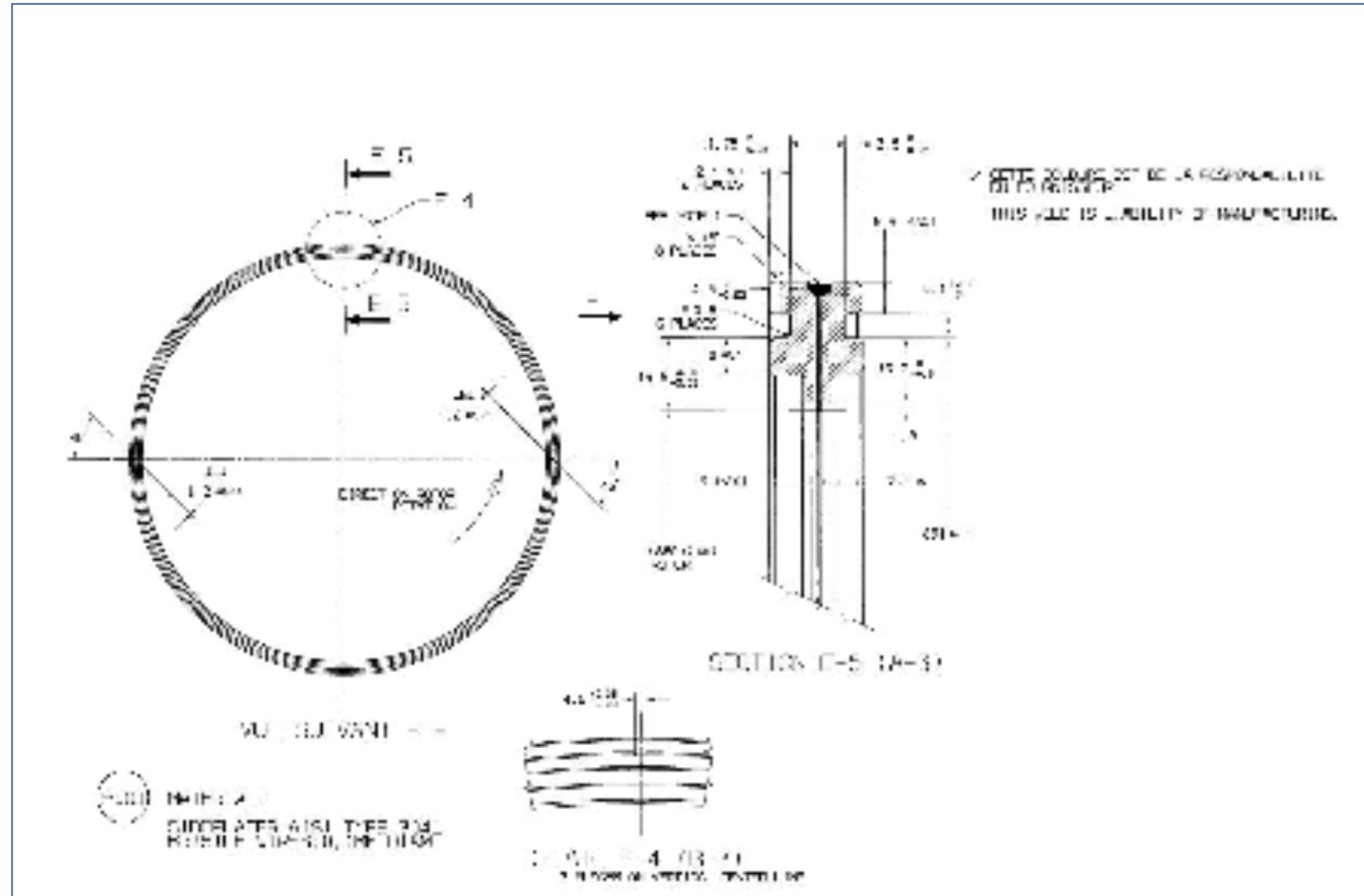


Liner Bearing



Tilting Pad Thrust Bearing

Brush Seal

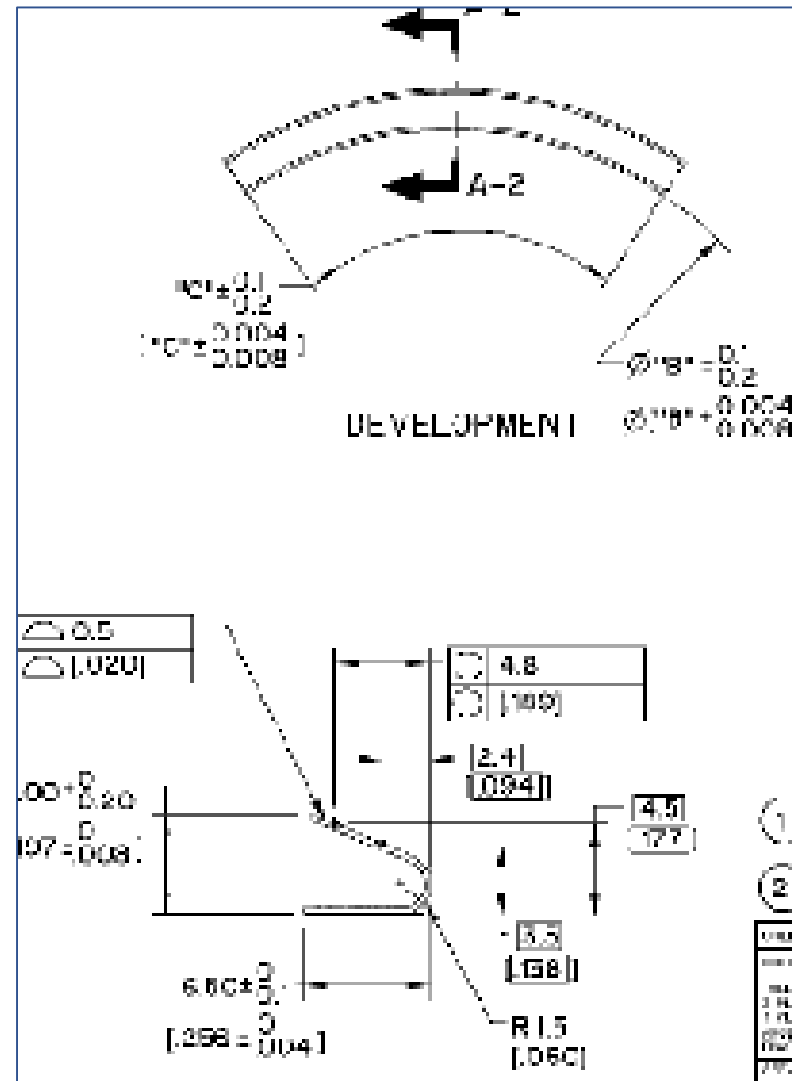


Bristle Material: Haynes L605



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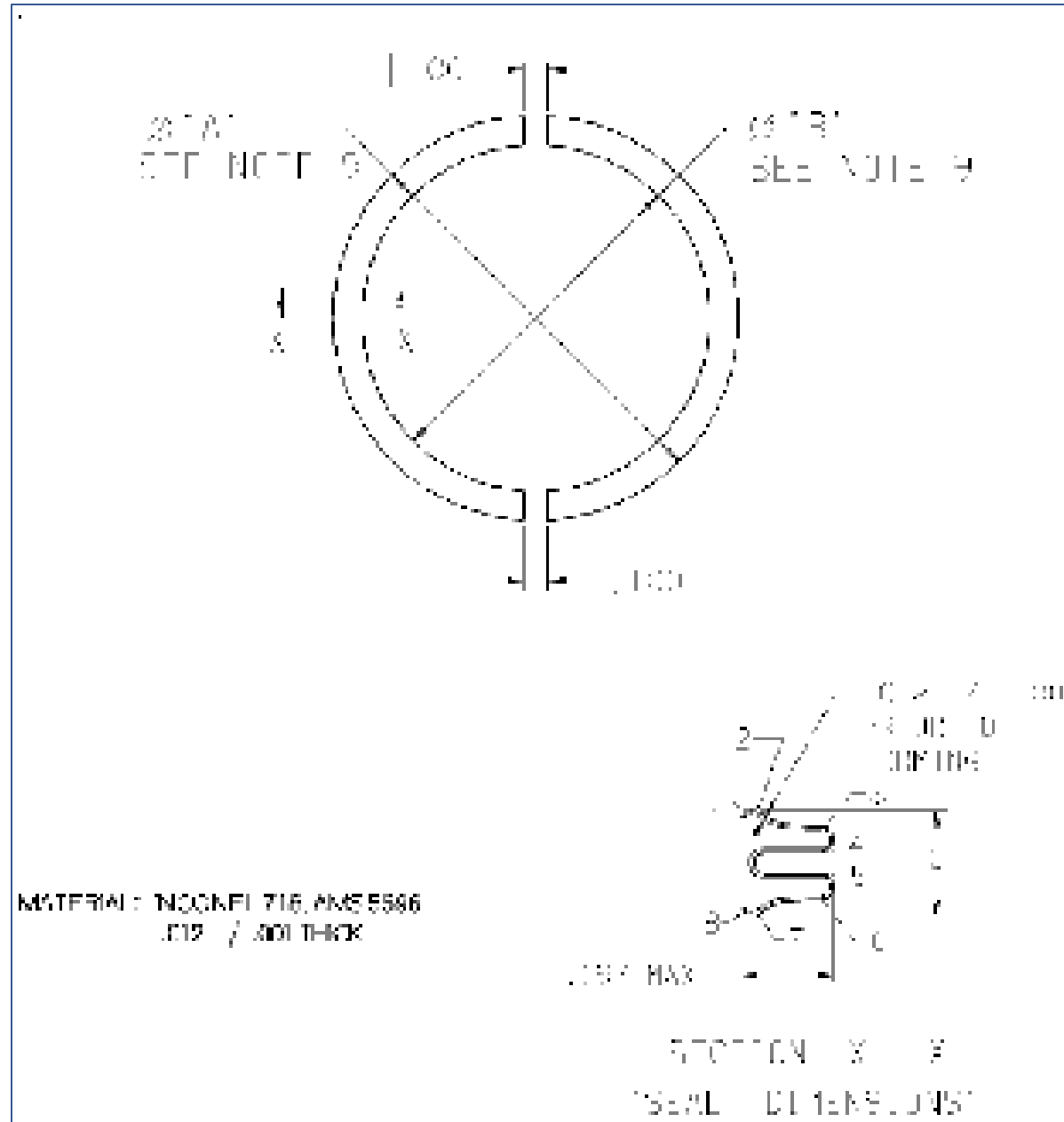
C- Seal



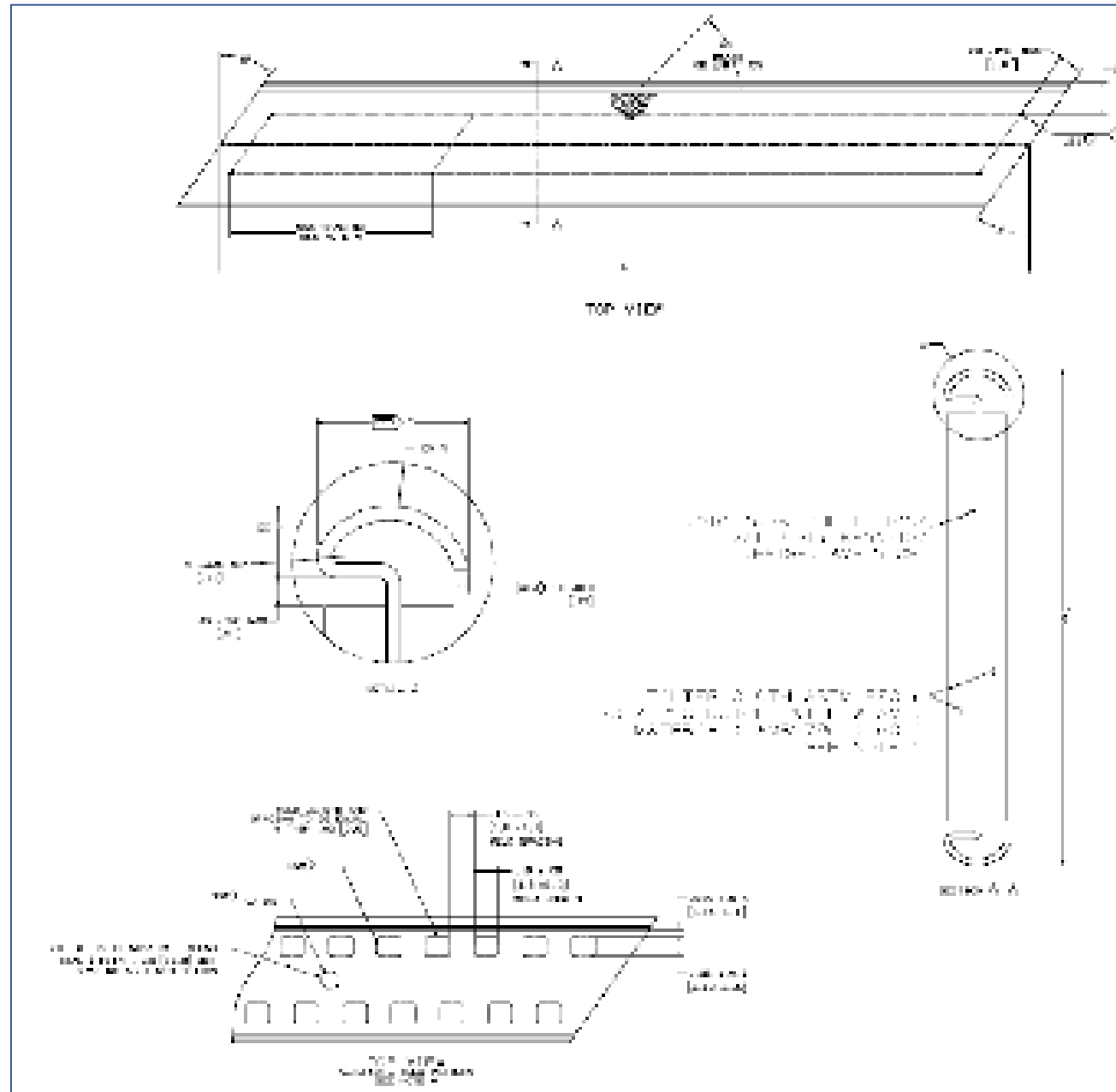
Material-IN718

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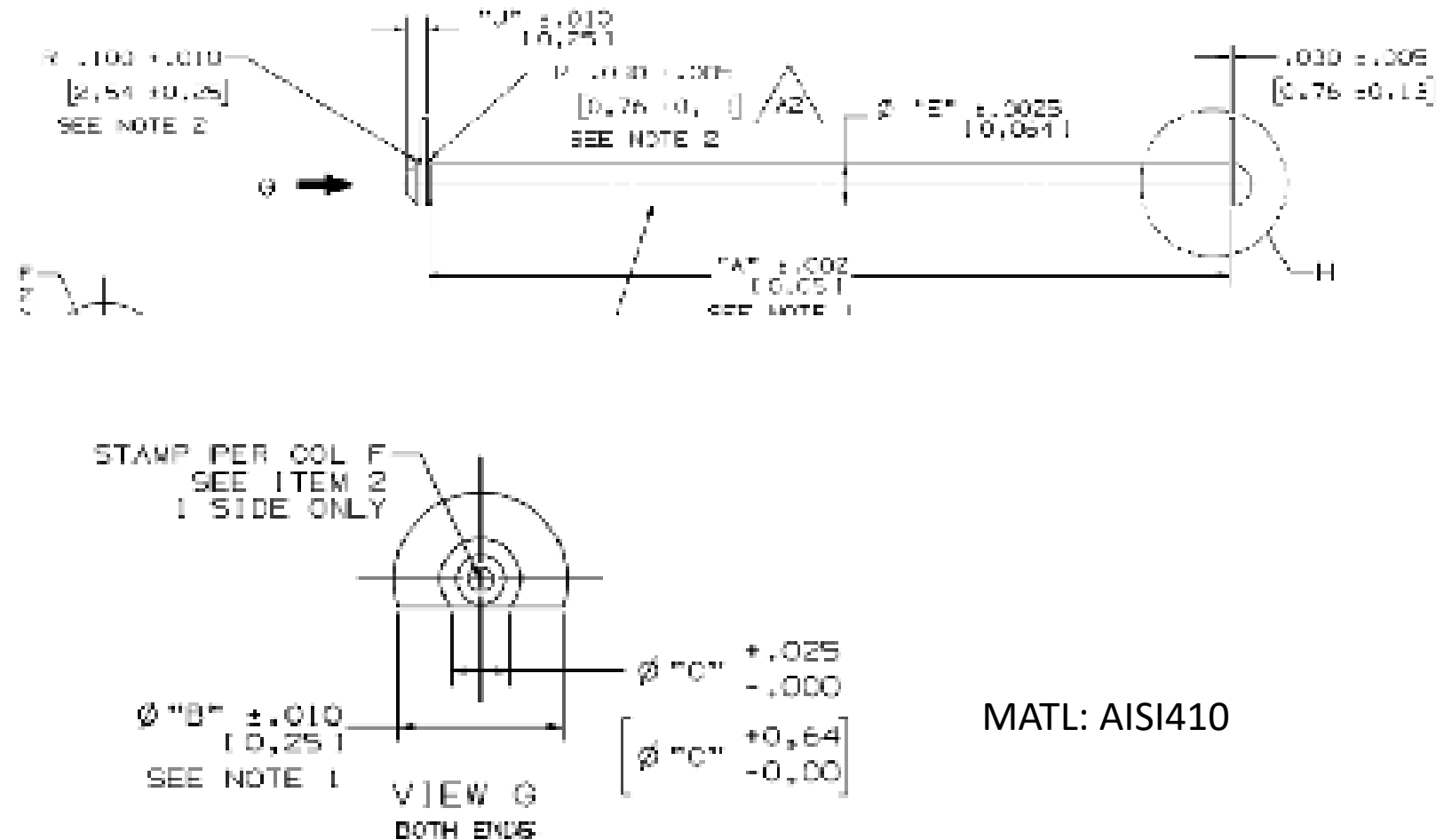
E-Seal/ W-Seal



Cloth Seal




Precision Machined Pins



Stainless steel metallic flexible hoses



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Filters (hydraulic, lube oil)



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LP CO2 system with control system & accessories




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Valves (Control, non-return, pneumatic, 6-way transfer valves)



Cooling air blowers



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Pumps – LP & HP (Oil, liquid fuel – AC & DC motor driven / with mechanical shaft drive)



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Tube connectors (Swagelok / Parker equivalent)




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Oil mist eliminator



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Hydraulic actuators - IGV



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Gas Turbine starting turning gear mechanism with auto disengage clutch



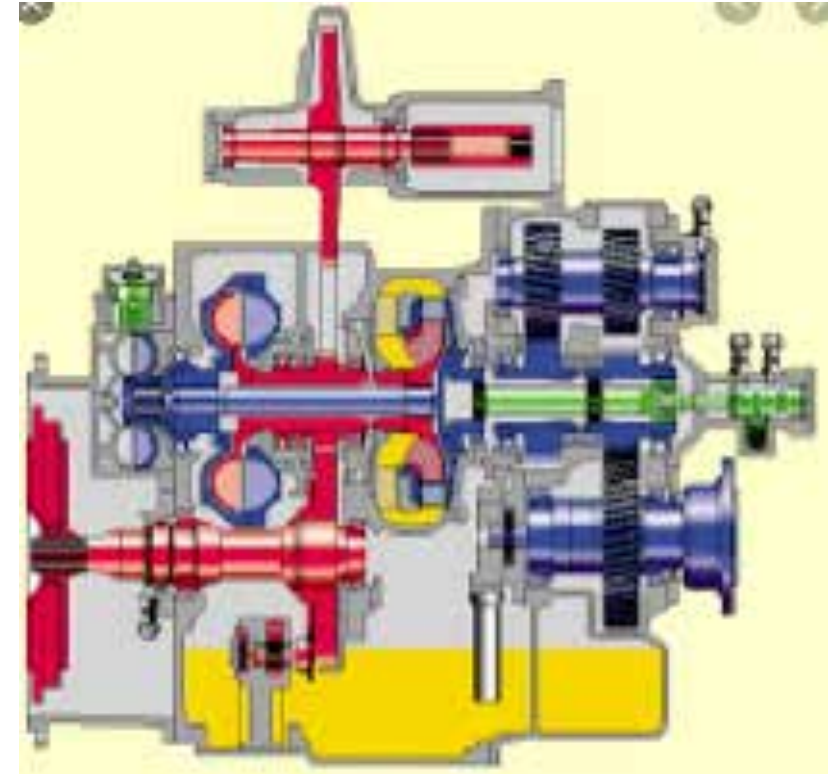
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Rotary air compressor / blower (with / without motor drive)



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Torque converter



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Water wash nozzles



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