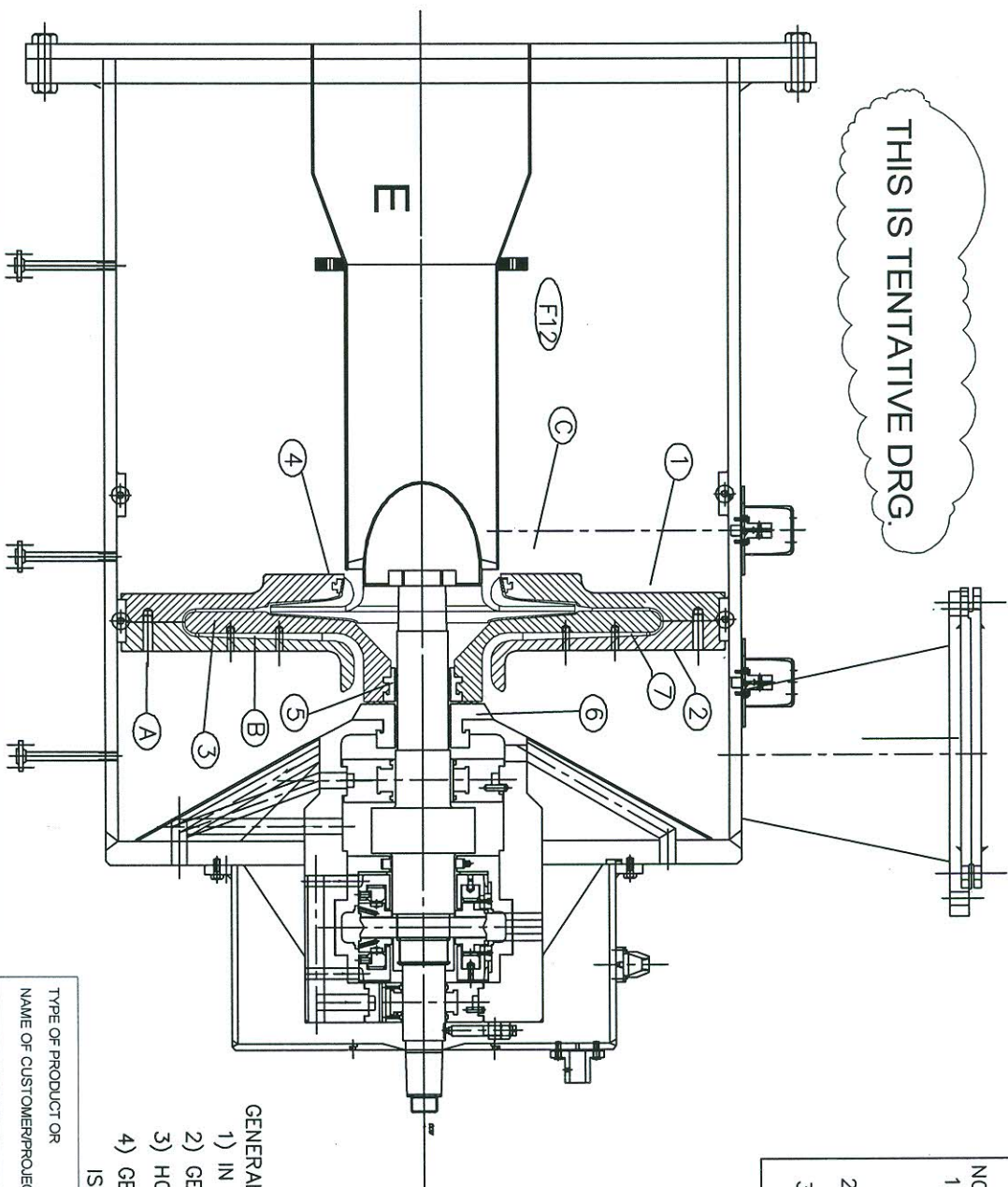


THIS IS TENTATIVE DRG.



NOTE:

- 1) THIS DRAWING IS STUDY DRAWING WHICH SHOWS THE NEW PARTS TO BE MANUFACTURED FOR F-12 2D IMPELLER TEST RIG.
- 2) ALL DIAPHRAGM SHOULD BE MADE 2062-FE-410-W
- 3) MECHANICAL SEALS SHOULD BE MADE AVONAL-14

FASTENER LIST

ITEM	DESIGNATION	SIZE	QTY.
C	HEX. HEADED BOLT	M12X30L	16
B	HEX. HEADED BOLT	M12X60L	16
A	HEX. HEADED BOLT	M16X85L	16

GENERAL NOTE:

- 1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK.
- 2) GENERAL TOLERANCE ± 0.1
- 3) HORIZONTAL SPLIT
- 4) GENERAL SURFACE FINISH WHERE IT IS NO MENTIONED IS 3.2 MICRONS.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT
PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER
(B-F-20-15-752-RD-50)



भारत भारी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
Corp. R&D Division, Vikasnagar
HYDERABAD - 500 093

DRN	NAME	SIGN.	DATE	NO. OF VAR.
CHD	P. G. SHANKAR		18.04.16	NA
APPD.	P. G. SHANKAR		18.04.16	

DEPT. TML	UNTO. DIMS. GR	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS
050	CM/F	N.T.S				NA

TITLE	CARD CODE	DRAWING NO.	REV.
ASSEMBLY OF F-3 DIA. 500 MM 2D IMPELLER STAGE (STUDY DRAWING) SECTIONAL FRONT VIEW	N.A.	RD DG 3 TM 16 F12-1A	

INVENTORY NO

COMPUTER FILE NAME

B3320900169-S00-R00.DWG

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GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

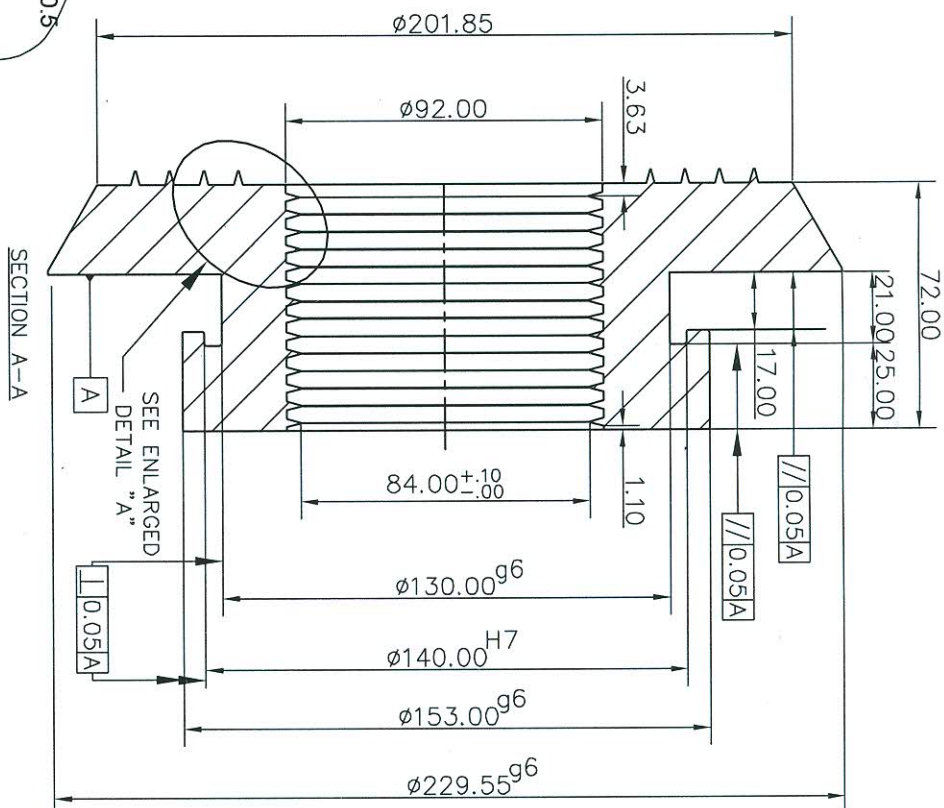
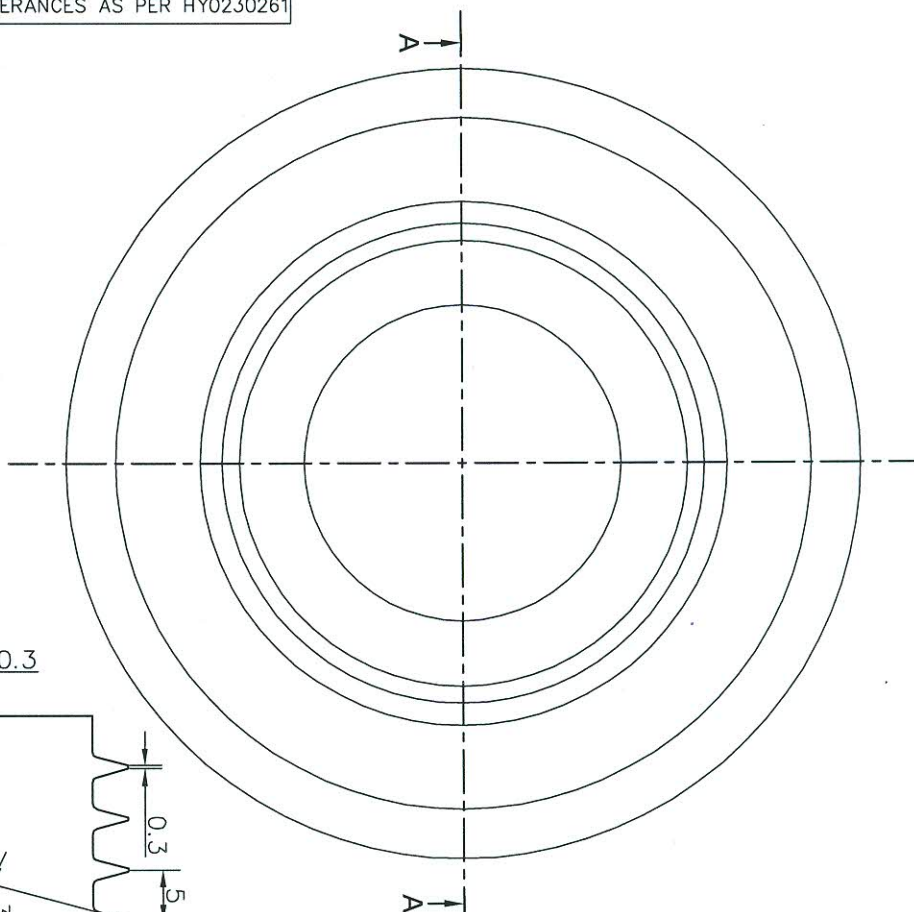
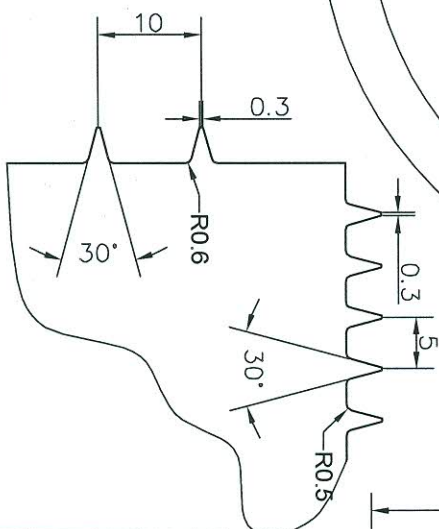
ITEM	DESCRIPTION	DRAWING NO.	NO. OF Sht.	MATERIAL
7	RETURN CHANNEL VANE	RD DG 3 16 F3-9	1	IS: 2062 FE 410 W
6	BEARING SEAL	RD DG 3 16 F3-8	1	AVONAL-14
5	SHAT SEAL	RD DG 3 16 F3-7	1	AVONAL-14
4	IMPELLER SEAL	RD DG 3 16 F3-6	1	AVONAL-14
3	DIAPHRAGM-3	RD DG 3 16 F3-5	1	IS: 2062 FE 410 W
2	DIAPHRAGM-2	RD DG 3 16 F3-4	1	IS: 2062 FE 410 W
1	DIAPHRAGM-1	RD DG 3 16 F3-3	1	IS: 2062 FE 410 W

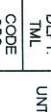
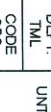
33320900169-S00-R00.DWG

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

DETAIL "A"

THIS IS TENTATIVE DRG



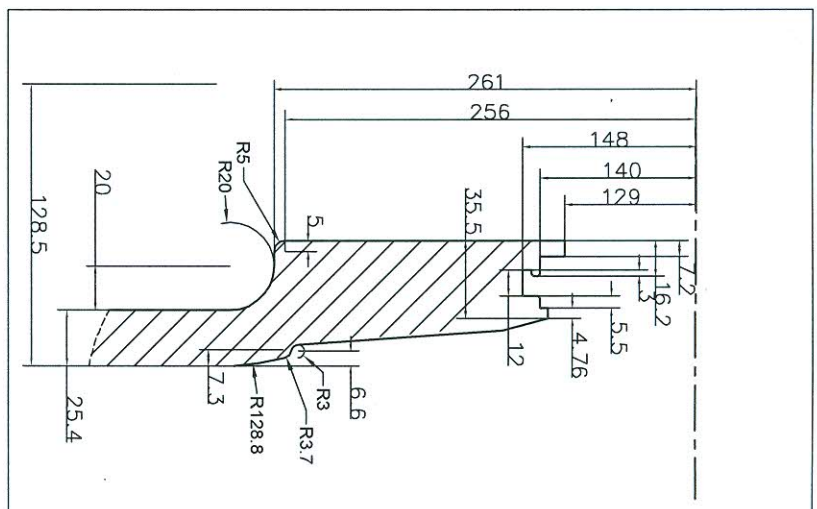
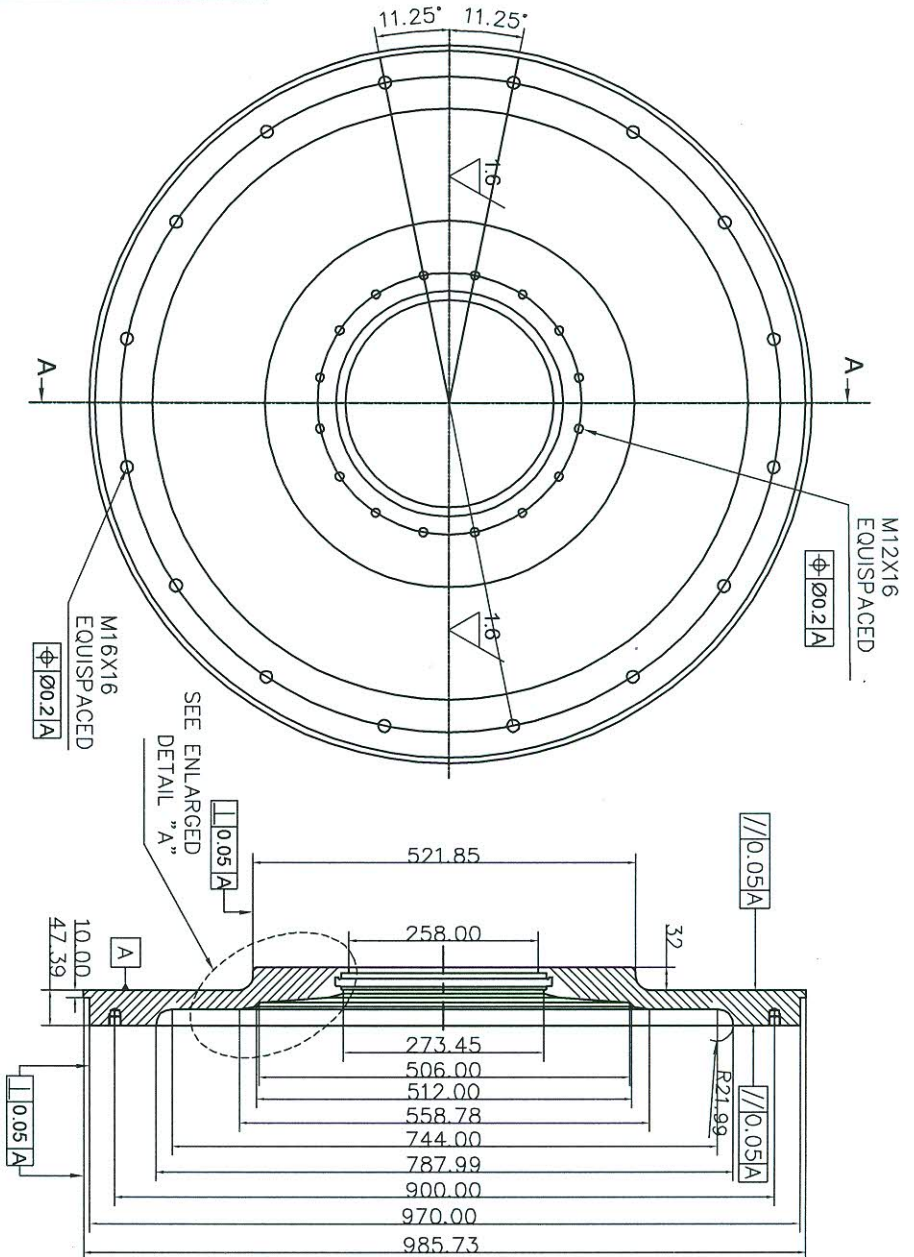
TYPE OF PRODUCT OR		PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER							
NAME OF CUSTOMER/PROJECT		(B-F-20-15.752-RD-50)							
 BHARAT HEAVY ELECTRICALS LIMITED Corp. R&D Division, Vikasnagar HYDERABAD - 500 093		 N.T.S		SCALE WEIGHT (KG)		CARD CODE			
						N.A.			
						DRAWING NO.			
						RD DG 3 TM 16 F12-8			
						REV/			
DEPT. T.M.L CODE 050	UNTO. DIMS. GR C/M/F	 N.T.S		SCALE		WEIGHT (KG)		CARD CODE	
TITLE		BEARING SEAL		N.A.		DRAWING NO.		RD DG 3 TM 16 F12-8	
SHT. No		1		NO OF SHT.		1		REV/	
RD DG 3 TM 16 F12-8		RD DG 3 TM 16 F12-1A		REF. TO ASSY. DRG.		ITEM NO.		NO OF ITEMS	
N.A.		P. G. SHANKAR		P. G. SHANKAR		18.04.16		N/A	
SIGN		DATE		18.04.16		18.04.16		N/A	
NO OF VAR		N/A		NO OF ITEMS		N/A		REV/	

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COMPUTER FILE NAME
B3320900169-S00-R00.DWG

INVENTORY NO

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261



SPLIT IN TO TWO PARTS

ENLARGED DETAIL "A"

THIS IS TENTATIVE DRG.

GENERAL NOTE:

- 1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK.
- 2) GENERAL TOLERANCE ± 0.1
- 3) HORIZONTAL SPLIT
- 4) MATERIAL: IS: 2062 FE 410 W
- 5) GENERAL SURFACE FINISH WHERE IT IS NOT MENTIONED IS 3.2 MICRONS.

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER (B-F-20-15-752-RD-50)	
BHARAT HEAVY ELECTRICALS LIMITED Corp. R&D Division, Vikasnagar HYDERABAD - 500 093		DRN. VINAY KUMAR CHD. P. G. SHANKAR APPD. P. G. SHANKAR	
DEPT. TML	UNTO. DIMS. GR. CM/F	SCALE N.T.S	WEIGHT (KG)
CODE 050			
TITLE DIAPHRAM PART-1		CARD CODE N.A	NO. OF ITEMS N.A
DRAWING NO. RD DG 3 TM 16 F12-3		SHT. No 1	NO. OF SHT. 1
NAME VINAY KUMAR		DATE 18.04.16	NO. OF VAR. N.A
SIGN. [Signature]		DATE 18.04.16	NO. OF ITEMS N.A
REF. TO ASSY. DRG. RD DG 3 TM 16 F12-1A		ITEM NO.	NO. OF ITEMS N.A

33320900169-S00-R00.DWG

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

Φ	0.02	A
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MECHANISM FOR
PROBE ARRANGEMENT

18 NO. OF HOLES DIA. 13
FOR M12BOLTSEQUISPACED

Φ	0.02	A
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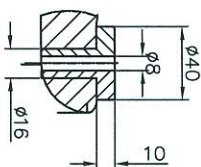
18 NO. OF HOLES DIA. 13
FOR M12BOLTSEQUISPACED

SEE ENLARGED
DETAIL "A"

THIS IS TENTATIVE DRG

GENERAL NOTE:

- 1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK
- 2) GENERAL TOLERANCE ± 0.1
- 3) HORIZONATL SPLIT
- 4) MATERIAL: IS: 2062 FE 410 W
- 5) GENERAL SURFACE FINISH WHERE IT IS NO MENTIONED



DETAIL "B"



SEE ENLARGED
DETAIL "B"



SPLIT IN TO TWO PARTS

TYPE OF PRODUCT OR		PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER	
NAME OF CUSTOMER/PROJECT		(B-F-20-15-752-RD-50)	
		BHARAT HEAVY ELECTRICALS LIMITED Corp. R&D Division, Vikasnagar HYDERABAD - 500 093	
DEPT. T.M.L. CODE 050	UNTOOL GR C/M/F		SCALE N.T.S
TITLE		WEIGHT (KG)	
DIAPHRAM PART-2		CARD CODE N.A.	
DRAWING NO.		REF. TO ASSY. DRG.	
RD DG 3 TM 16 F12-4		RD DG 3 TM 16 F12-1A	
REV.		ITEM NO.	
00		N/A	
SHT. No		NO. OF SHT.	
1		1	

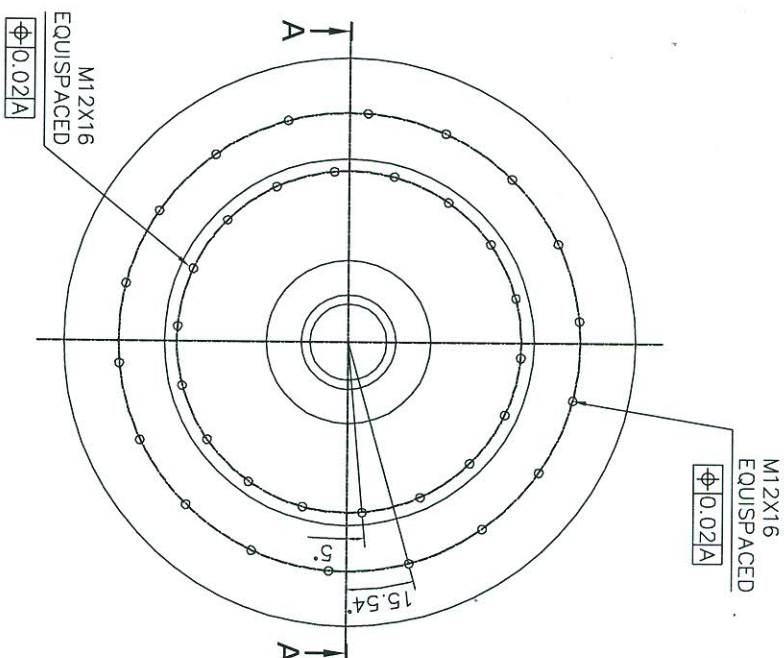
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COMPUTER FILE NAME

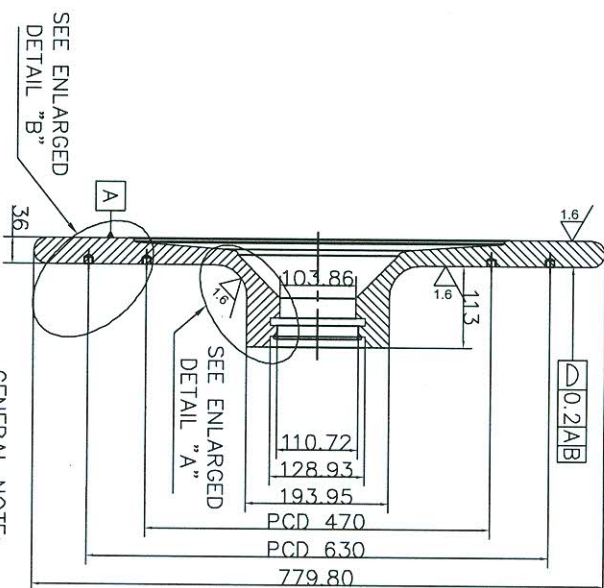
B3320900169-S00-R00.DWG

INVENTORY NO

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261



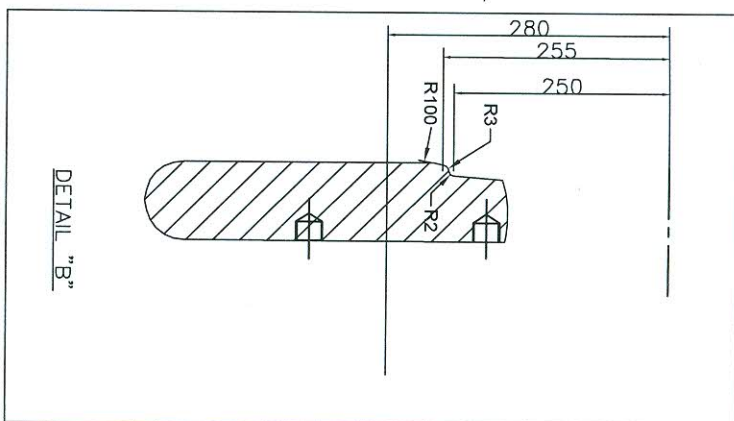
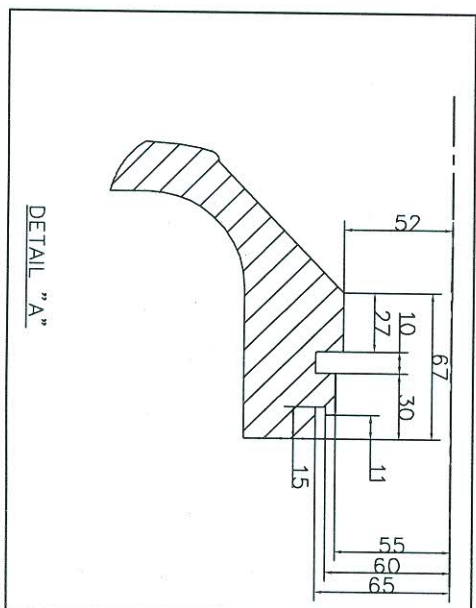
THIS IS TENTATIVE DRG.



SECTION A-A

GENERAL NOTE:

- 1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK.
- 2) GENERAL TOLERANCE ± 0.1
- 3) HORIZONTAL SPLIT
- 4) MATERIAL: IS: 2062 FE 410 W
- 4) GENERAL SURFACE FINISH WHERE IT IS NO MENTIONED IS 3.2 MICRONS.



TITLE

DIAPHRAM PART-3

DEPT. T.M.

CODE

CM/F

SCALE

N.T.S

WEIGHT (KG)

REF. TO ASSY. DRG.

RD DG 3 TM 16 F12-1A

ITEM NO.

NO. OF ITEMS

N.A

REV.

00



BHARAT HEAVY ELECTRICALS LIMITED
Corp. R&D Division, Vikasnagar
HYDERABAD - 500 093

DRN.	NAME	SIGN.	DATE	NO. OF VAR.
CHD.	VINAY KUMAR		18.04.16	N.A
APPD.	P. G. SHANKAR		18.04.16	N.A

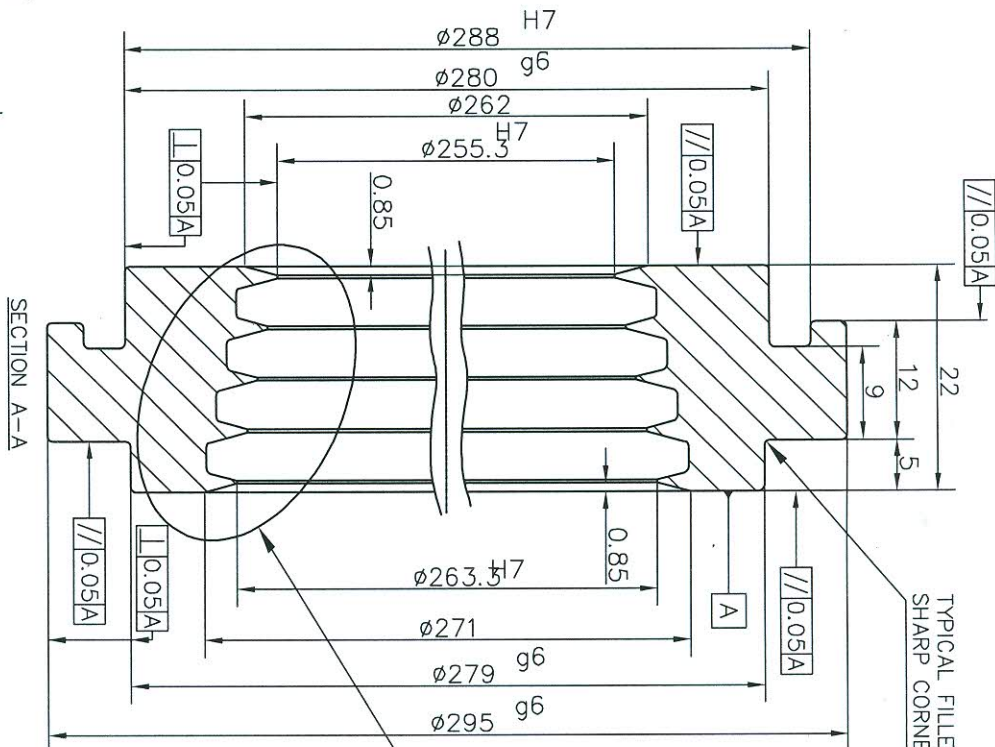
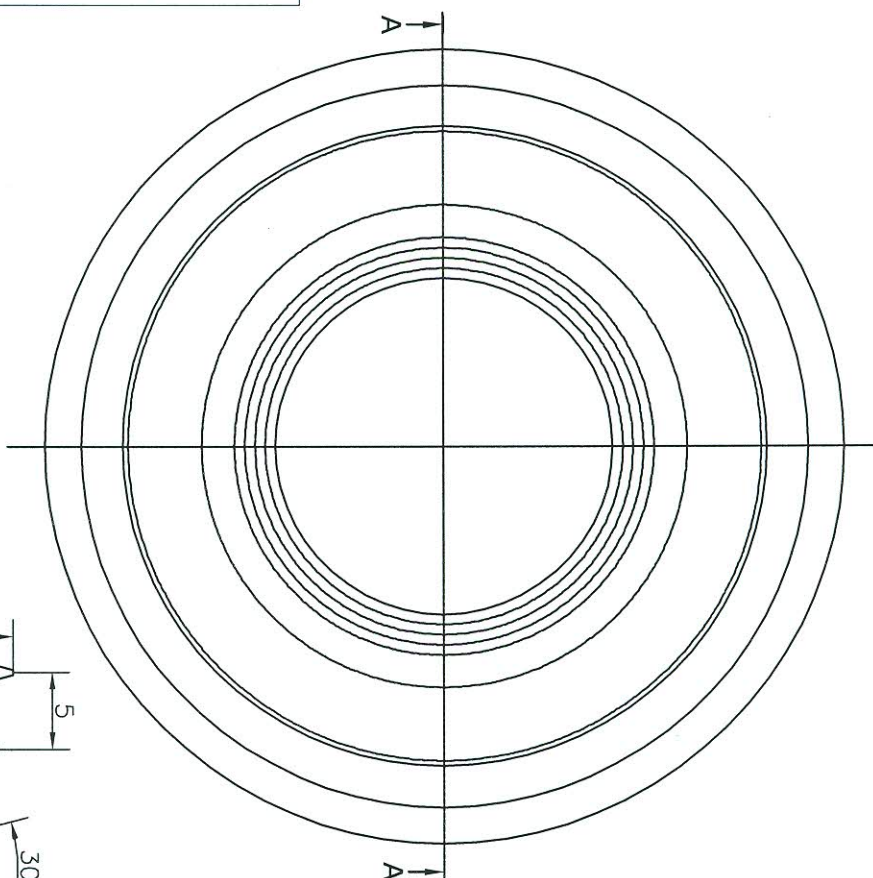
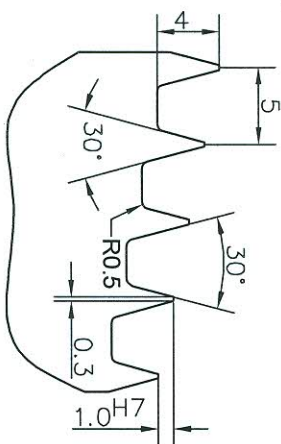
TYPE OF PRODUCT OR PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER
NAME OF CUSTOMER/PROJECT (B-F-20-15-752-RD-50)

DEPT. T.M.	CODE	CM/F	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS	REV.
050			N.T.S		RD DG 3 TM 16 F12-1A		N.A	00
DRAWING NO. RD DG 3 TM 16 F12-5								
CARD CODE	N.A.	SHT. No	1	NO. OF SHT.	1			

GENERAL NOE:

- 1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK. DETAIL "A"
- 2) GENERAL TOLERANCE ± 0.1
- 3) HORIZONTAL SPLIT
- 4) MATERIAL: AVIONAL-14
- 5) GENERAL SURFACE FINISH WHERE IT IS NOT MENTIONED IS 3.2 MICRONS.
- 6) SEAL DIMENSIONS SHOULD BE MATCHED WITH THE CORRESPONDING GROOVE IN THE DIAPHRAGM-1.
- 47

DETAIL "A"



SEE ENLARGED
DETAIL "A"

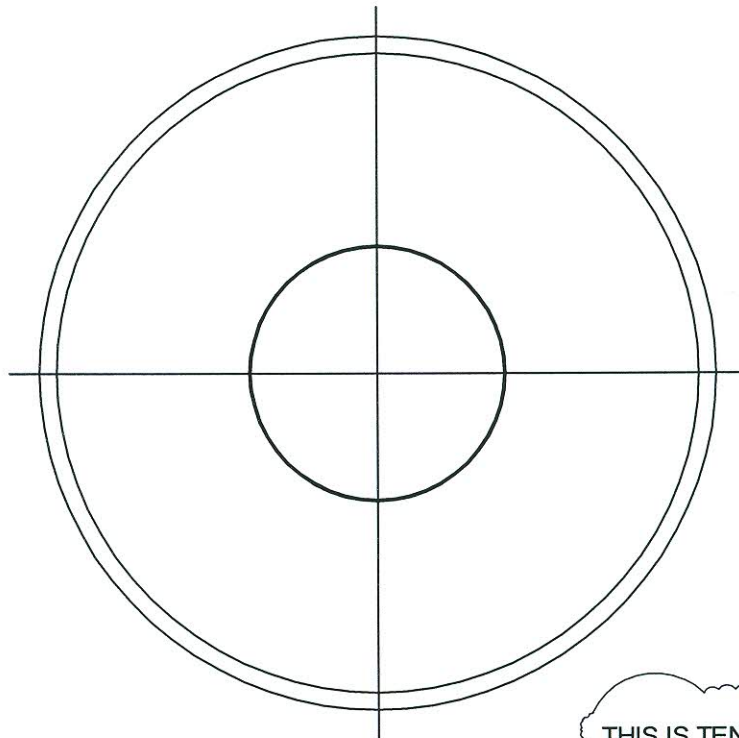
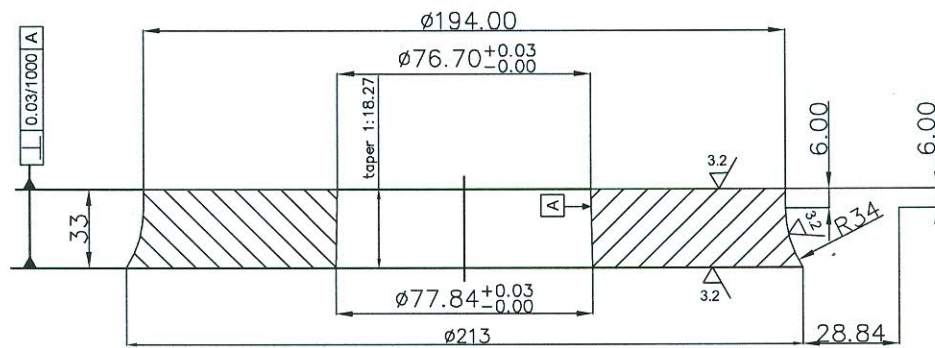
TYPICAL FILLET IS ALL
SHARP CORNERS IS R0.5

TYPE OF PRODUCT OR		PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER				
NAME OF CUSTOMER/PROJECT		(B-F-20.15.752-RD-50)				
 भारत भारी HEAVY ELECTRICALS LIMITED Corp. R&D Division, Vikasnagar HYDERABAD - 500 093		TITLE		IMPELLER SEAL		
		DEPT. T/M L	UNTO. DIMS.	SCALE	WEIGHT (KG)	
		CODE 050	GR C/M/F		N.T.S	
		CARD CODE	CARD NO.	DRAWING NO.		
		SHT. No	1	NO. OF SH.		
RD DG 3 TM 16 F12-6		RD DG 3 TM 16 F12-1A		ITEM NO.	NO. OF ITEMS	
N/A		18.04.16		18.04.16	N/A	
REV.		00		00		

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

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NOTE:-

1. MATERIAL IS TO BE HEAT TREATED TO A HARDNESS 230/260 BHN.
2. CONCENTRICITY ON ALL DIAMETERS W.R.F. (A) IS 0.02.
3. GENERAL TOLERANCE IS ± 0.1 MM.

THIS IS TENTATIVE DRG.

INVENTORY NO	SIGN. AND DATE	REF. DRG. NO.	REMARKS		ITEM NO	DESCRIPTION	STD	MATL. CODE	A/C	UNIT	UNIT Wt.	QTY.
								MATL. SPEN.				
			 BHARAT HEAVY ELECTRICALS LTD. HYDERABAD					NAME	SIGN.	DATE	NO.OF VAR.	
							DRN.	VINAY KUMAR		18.04.16		
							CHD.	P.G.S		18.04.16	-N.A-	
							APPD.	P.G.S		18.04.16		
DEPT. I.T.D		UNTOL. DIM. GR.		SCALE		WEIGHT (KG)		REF. TO ASSY DRG.		ITEM NO.	NO.OF ITEMS	
DEPT. CODE 415		C/M/F		NTS				-N.A-		-N.A-	-N.A-	
TITLE LOCK NUT FOR F-12 DIA 500MM 2D IMPELLER							CARD CODE	DRAWING NO.			REV.	
								RD DG 4 TM 16 F12-12				
								SHT No.	1	NO OF SHT.	1	

(ALL DIVISIONS ARE IN 1111)

INVENTORY NO	COMPUTER FILE NAME	333202000169-S00-S00-R00.DWG	NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY
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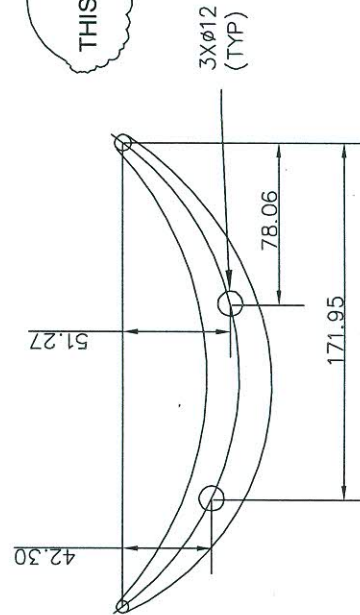
GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

Diagram illustrating a 1° wedge detail. The detail shows a horizontal line with a small vertical step on the left. A line extends from the top of the step, sloping upwards at an angle of 1°. The angle is labeled "1°". The detail is labeled "DETAIL 'C'" on the right.

GENERAL NOE:

- GENERAL TOL.:
- 1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK.
 - 2) GENERAL TOLERANCE $\pm$ 0.1.
 - 3) HORIZONATL SPLIT.
 - 4) TOTAL VANES: 18 NOS.
 - 4) MATERIAL: IS: 2062 FE 410 W.
 - 4) GENERAL SURFACE FINISH WHERE IT IS NOT MENTIONED IS 3.2 MICRONS.

THIS IS TENTATIVE DRG.



TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT										PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER (B-F-20-15-752-RD-50)									
भारत भारती  BHARAT HEAVY ELECTRICALS LIMITED Corp. R&D Division, Vikasnagar HYDERABAD - 500 093										DRN.		NAME		SIGN.		DATE		NO.OF VAR.	
										CHD.		P. G SHANKAR				18.04.16		N/A	
										APPD.		P. G SHANKAR				18.04.16			
DEPT. TML		UNTO. DIMS. GR. C/M/F		 SCALE N.T.S		WEIGHT (KG)		REF. TO ASSY. DRG. RD DG 3 TM 15 F12-1A				ITEM NO.		NO.OF ITEMS					
CODE 050								DRAWING NO. RD DG 3 TM 16 F12-9						REV. 00					
TITLE										RETURN CHANNEL VANES									
										SHT. No		1		NO. OF SHT.		1			

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NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY

THIS IS TENTATIVE DRG:

1) IN CASE OF DOUBT, DON'T ASSUME, PLEASE ASK.

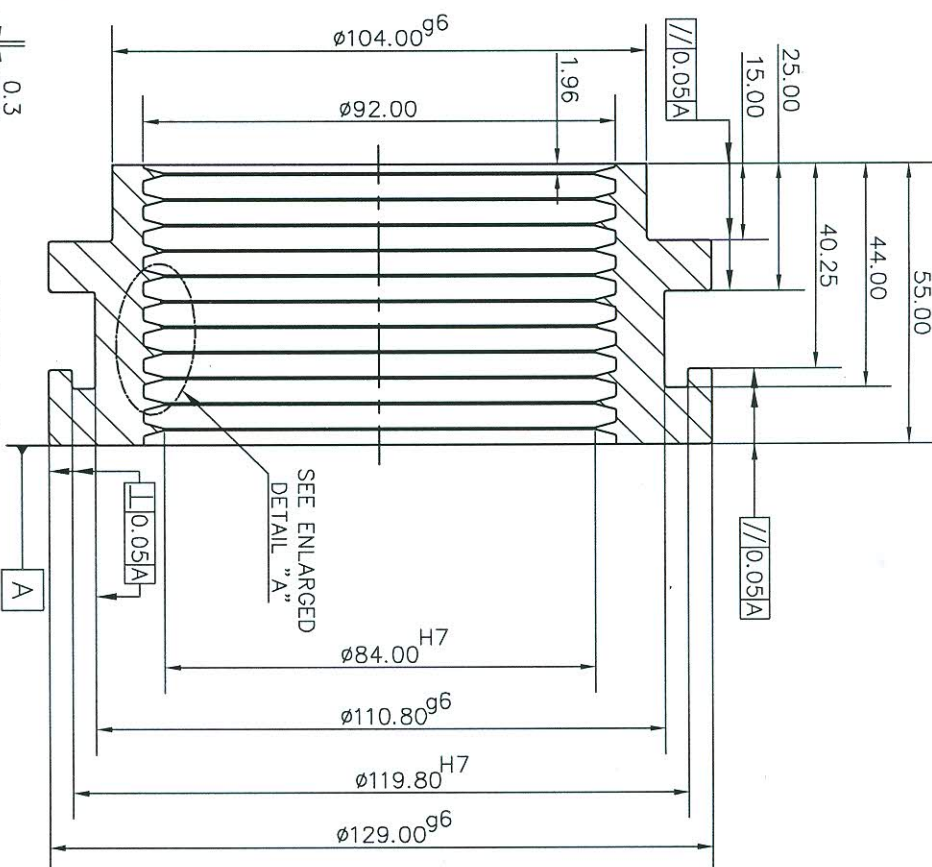
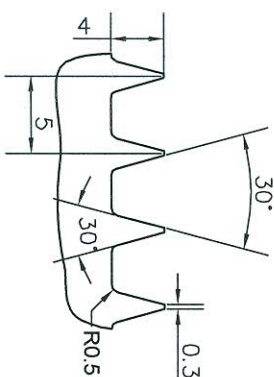
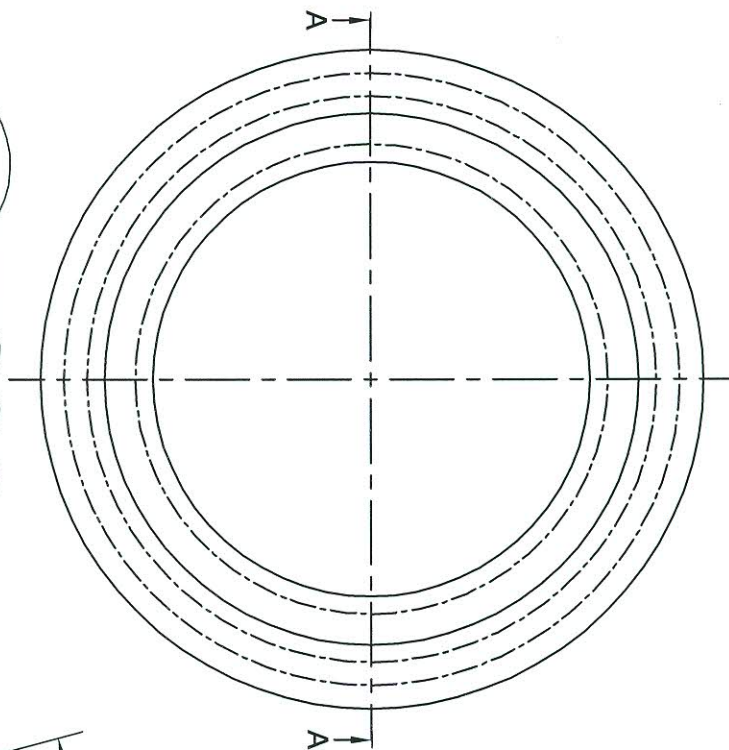
2) GENERAL TOLERANCE ± 0.1

3) HORIZONATL SPLIT

4) MATERIAL: AVIONAL-14

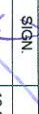
5) GENERAL SURFACE FINISH WHERE IT IS NOT MENTIONED IS 3.2 MICRONS.

6) SEAL DIMENSIONS SHOULD BE MATCHED WITH THE CORRESPONDING GROOVE IN THE DIAPHRAGM-2.



SECTION A-A

SEE ENLARGED
DETAIL "A"

TYPE OF PRODUCT OR		PERFORMANCE TESTING OF 500 MM DIA. 2D F12 IMPELLER	
NAME OF CUSTOMER/PROJECT		(B-F-20-15-752-RD-50)	
		BHARAT HEAVY ELECTRICALS LIMITED Corp. R&D Division, Vikasnagar HYDERABAD - 500 093	
DEPT. T.M.L. CODE 050	UNTOOL DIMS. GR C/M/F		SCALE N.T.S
TITLE SHAFT SEAL		WEIGHT (KG)	CARD CODE N.A.
SMT. No	1	NO. OF SMT.	1
DRAWING NO. RD DG 3 TM 16 F12-7		REF. TO ASSY. DRG. RD DG 3 TM 16 F12-1A	NO. OF ITEMS N/A
REV. 00		DATE 18.04.16	NO. OF VAR N/A
		NAME VINAY KUMAR	SIGN 
		CHD. P. G. SHANKAR	DATE 18.04.16
		APPD. P. G. SHANKAR	DATE 18.04.16