

SCHEDULE 1

PB FIXED ROLL SHAFT (20 - 072 / 08)

PUSH BENCH FIXED ROLL SHAFT

DRAWING NO : 20.ST.192.01.072/09

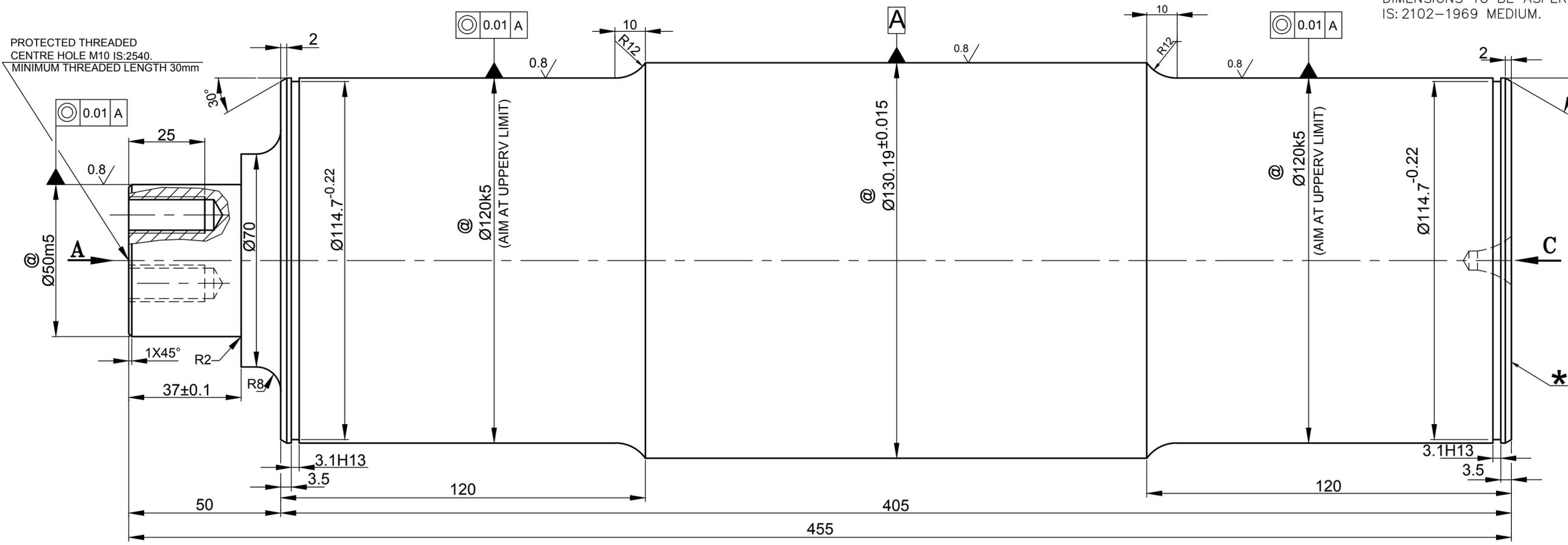
CAUTION: THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANYWAY DETERMINAL TO INTEREST OF THE COMPANY

ALL DIMENSIONS ARE IN MILLIMETERS

DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE ASPER IS: 2102-1969 MEDIUM.

1.6 / 0.8

3.1	H 13	+0.140 0
50	m5	+0.020 +0.009
120	k5	+0.018 +0.009



NOTE TO SUPPLIER

- 01) MATERIAL CHEMISTRY-NABL ACCREDITED LAB TEST CERTIFICATE IS TO BE PROVIDED
- 02) HARDNESS, HEAT TREATMENT & TENSILE TEST CERTIFICATES ARE TO OBTAINED FROM THE HEAT TREATERS IS TO BE PROVIDED
- 03) LIQUID PENETRANT TEST TO BE CONDUCTED ON ENTIRE SURFACE AND SHALL BE CERTIFIED BY N D T LEVEL-2 QUALIFIED PERSONNEL AS PER SNT-TC-1A
- 04) THREADED AREA TO BE PROPERLY PROTECTED, COATED WITH RUST PREVENTIVE OIL AND PACKED TO AVOID DAMAGES DURING TRANSIT

NOTE: ANY ONE OF THE FOLLOWING MATERIAL SHALL BE USED

MATERIAL: 40Cr4Mo3 IS:4367-1991

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo
0.35	0.10	0.50	0.90	0.20
0.45	0.35	0.80	1.20	0.35

HEAT TREAT TO 95-105 Kg/mm²

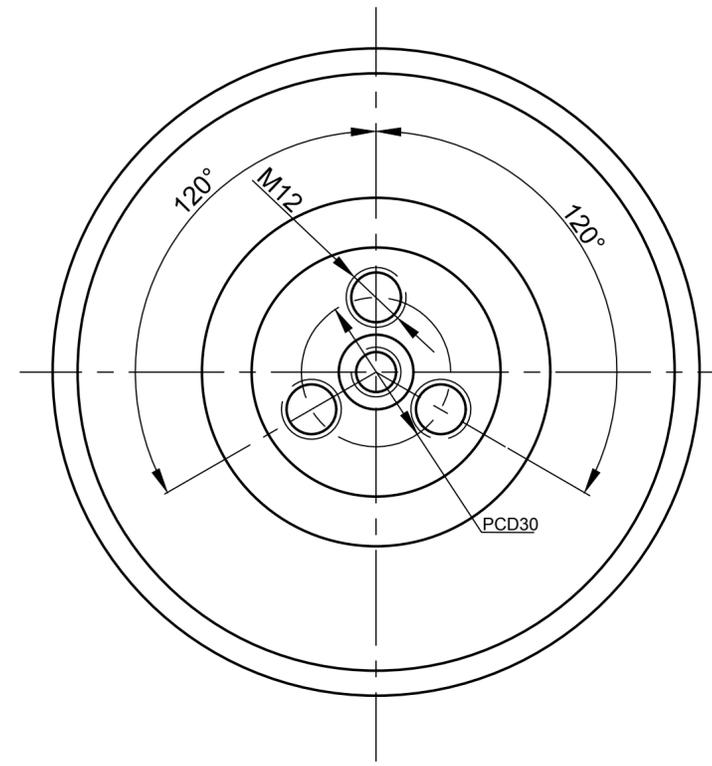
HARDNESS 29-32 HRC

EQUIVALENT MATERIAL: 42CrMo4 (DIN 1.7225)

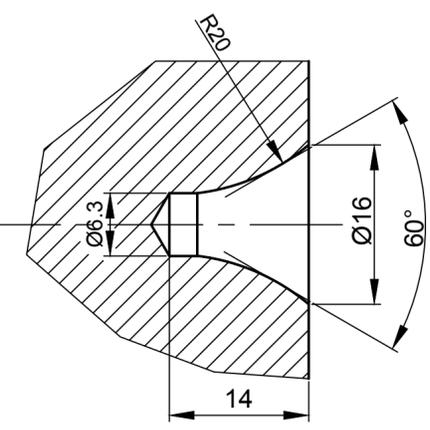
@ MARKED DIMENSIONS ARE TO BE GROUND BETWEEN CENTRES.

* MARK MATERIAL CODE No.: 69 06 21 0041, FIRMS NAME & P O No.

VIEW-A



**CENTRE DETAIL-C
(SCALE 2:1)**



<p>Bharat Heavy Electricals Ltd SEAMLESS STEEL TUBE PLANT TIRUCHIRAPALLI - 620014</p>	DRN	R.KUMAR	SIGNATURE	DATE	02.04.09
	CHD	N ARUMUGANAINAR	N. A. Natar		
	APPD	M MARUDHAVANAN	M. Marudhavanan		
DEPT	GRADE OF UNTOL. DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO	ITEM NO
		1:1 2:1	40	10.....030	
TITLE	SHAFT (PUSH BENCH FIXED)		CARD CODE	REF TO OLD DWG NO	REV
			U 01	RW 39379/1	09
			DRAWING NO :	20-ST-192-01-072	

REV	DATE	ALTERED	REV	DATE	ALTERED
09	12-04-16	M. Marudhavanan	08	28.08.09	N. A. Natar
ZONE	DIMENSION CHANGED Ø114.7 WAS Ø115.5			NOTE TO SUPPLIER ADDED	

SCHEDULE 2

PB ADJUSTABLE ROLL SHAFT (20- 026/07)

PUSH BENCH ADJUSTABLE ROLL SHAFT

DRAWING NO. : 20.ST.192.02.026/08

CAUTION: THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANYWAY DETERMINAL TO INTEREST OF THE COMPANY

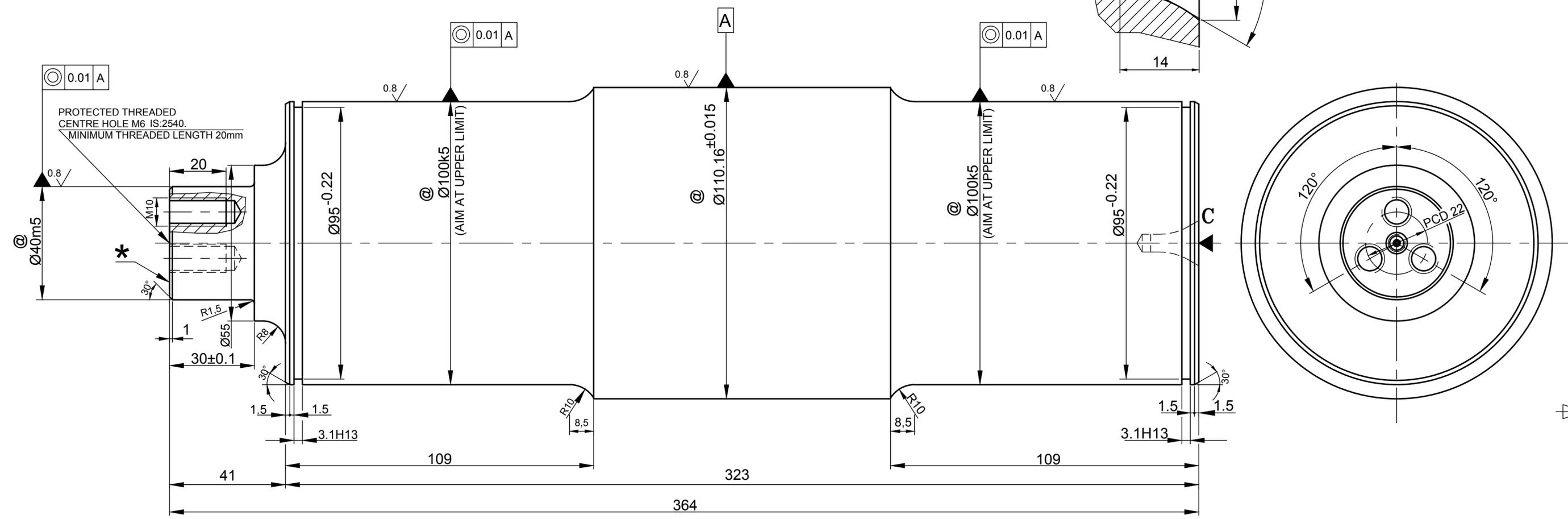
ALL DIMENSIONS ARE IN MILLIMETERS

CENTRE DETAIL-C (SCALE 2:1)

DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE ASPER IS: 2102-1969 MEDIUM.

1.6 / 0.8

3.1	H 13	+0.140 0
40	m5	+0.020 +0.009
100	k5	+0.018 +0.003



NOTE TO SUPPLIER

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- 03) LIQUID PENETRANT TEST TO BE CONDUCTED ON ENTIRE SURFACE AND SHALL BE CERTIFIED BY N D T LEVEL-2 QUALIFIED PERSONNEL AS PER SNT-TC-1A
- 04) THREADED AREA TO BE PROPERLY PROTECTED, COATED WITH RUST PREVENTIVE OIL AND PACKED TO AVOID DAMAGES DURING TRANSIT

NOTE: ANY ONE OF THE FOLLOWING MATERIAL SHALL BE USED

MATERIAL: 40Cr4Mo3 IS: 4367-1991

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo
0.35	0.10	0.50	0.90	0.20
0.45	0.35	0.80	1.20	0.35

HEAT TREAT TO 95-105 Kg/mm²

HARDNESS 29-32 HRC

EQUIVALENT MATERIAL: 42CrMo4 (DIN 1.7225)

@ MARKED DIMENSIONS ARE TO BE GROUND BETWEEN CENTRES.

* MARK MATERIAL CODE No.: 69 06 31 0020, FIRMS NAME & P O No.

REV 08 DATE 12-04-16 ALTERED <i>M. Marudhavanan</i> APPROVED <i>M. Marudhavanan</i> ZONE DIMENSION CHANGED Ø95 WAS Ø96		REV 07 DATE 28.08.09 ALTERED APPROVED ZONE NOTE TO SUPPLIER ADDED		DEPT SEAMLESS STEEL TUBE PLANT TIRUCHIRAPALLI - 620014 GRADE OF UNTOL. DIM C/M/F		SCALE 1:1 2:1 WEIGHT (Kg) 21.8		DRN R.KUMAR NAME SIGNATURE DATE 02.04.09	
								CHD N ARUMUGANAINAR NAME SIGNATURE	
TITLE SHAFT (PUSH BENCH ADJ.)				REF TO ASSY DWG NO 10.....033		REF TO OLD DWG NO RW 39386/1		DRAWING NO : 20-ST-192-02-026 REV 08	

SCHEDULE 3

Shaft for reeller top roll (20-076)

SHAFT FOR REELER TOP ROLL

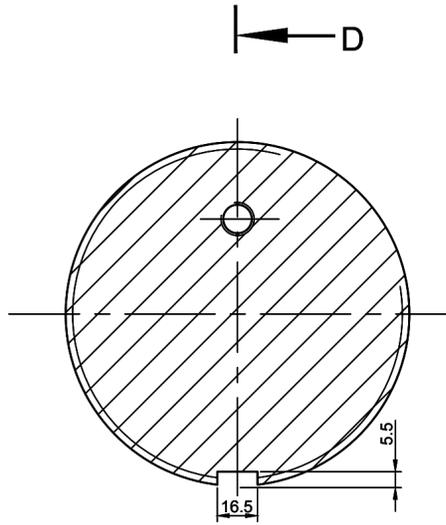
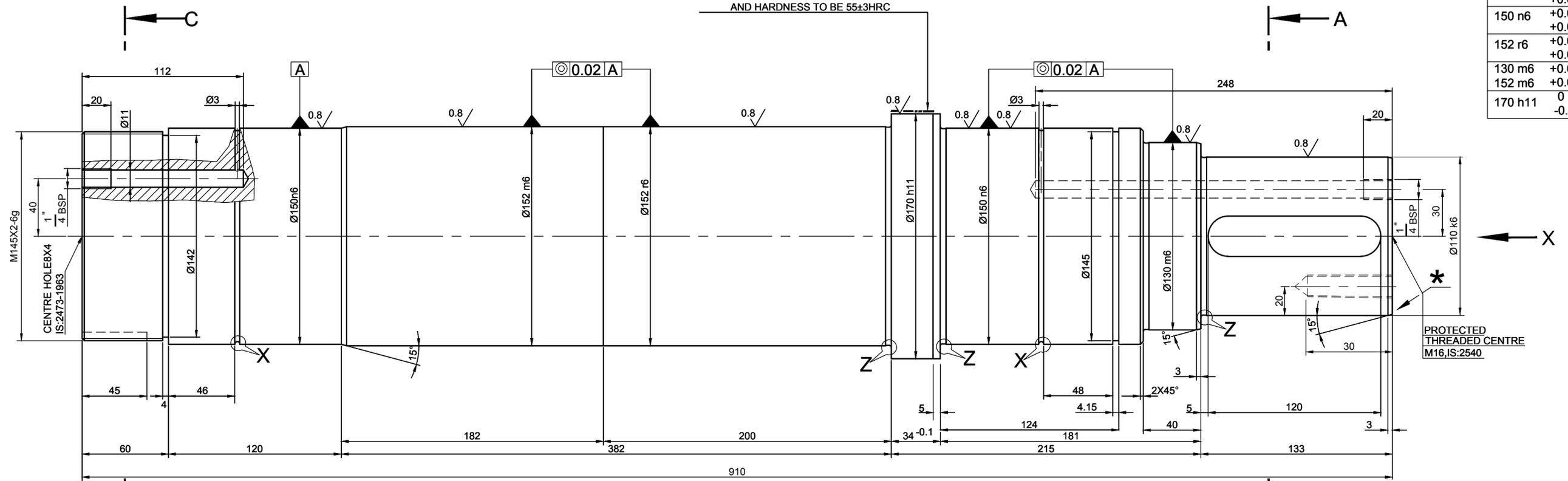
Drwg No-20-ST-110-01-076/06

THD.SPCN.	PITCH	MAJOR Ø max. min.	PITCH Ø max. min.	WIRE Ø	OVER WIRE Ø max. min.
M145-6g	2	144.962 144.682	143.663 143.473	1.35	145.983 145.793

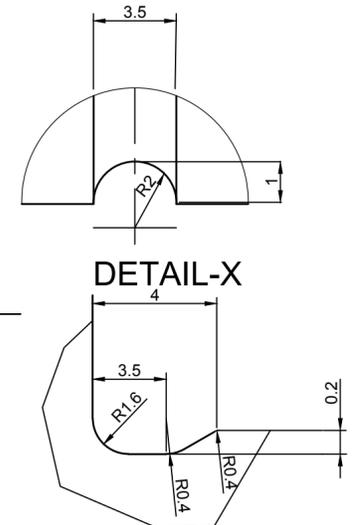
ALL DIMENSIONS ARE IN MILLIMETERS
 DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE AS PER IS: 2102-1969 MEDIUM.

28 N9	0
	-0.052
110 k6	+0.025
	+0.003
150 n6	+0.052
	+0.027
152 r6	+0.090
	+0.065
130 m6	+0.040
152 m6	+0.015
170 h11	0
	-0.250

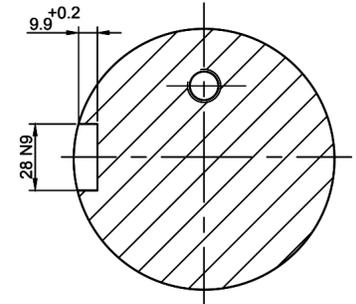
CASE HARDENED TO A DEPTH OF 2mm AND HARDNESS TO BE 55±3HRC



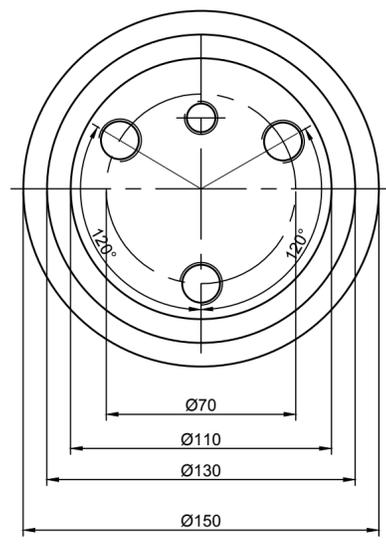
SECTION-CD
NOTE TO SUPPLIER



DETAIL-X
DETAIL-Z



SECTION-AB



VIEW X

NOTE: ANY ONE OF THE FOLLOWING MATERIAL SHALL BE USED

MATERIAL: 40Cr4Mo3 IS: 4367-1991

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo
0.35	0.10	0.50	0.90	0.20
0.45	0.35	0.80	1.20	0.35

HEAT TREAT TO 80-95 Kg/mm²

HARDNESS

EQUIVALENT MATERIAL: 42CrMo4 (DIN 1.7225)

@ MARKED DIMENSIONS ARE TO BE GROUND BETWEEN CENTRES.

* MARK MATERIAL CODE No.: 69 07 11 0024 , FIRMS NAME & P O No.

- 01) MATERIAL CHEMISTRY-NABL ACCREDITED LAB TEST CERTIFICATE IS TO BE PROVIDED
- 02) HARDNESS, HEAT TREATMENT & TENSILE TEST CERTIFICATES ARE OBTAINED FROM THE HEAT TREATERS IS TO BE PROVIDED
- 03) ULTRASONIC TEST TO BE CONDUCTED ON ENTIRE SURFACE AND SHALL BE CERTIFIED BY N D T LEVEL-2 QUALIFIED PERSONNEL AS PER SNT-TC-1A
- 04) THREADED AREA TO BE PROPERLY PROTECTED, COATED WITH RUST PREVENTIVE OIL AND PACKED TO AVOID DAMAGES DURING TRANSIT

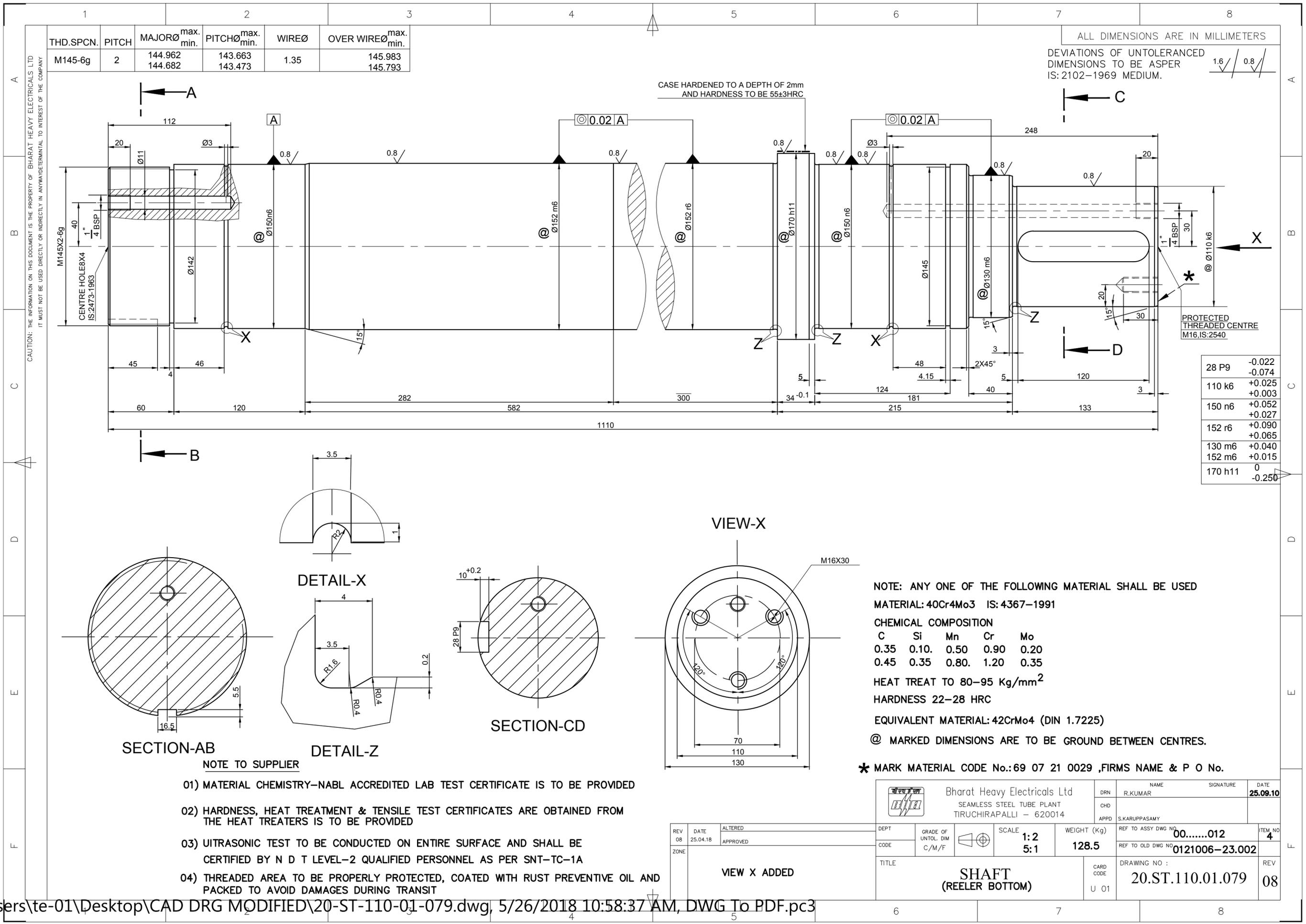
		Bharat Heavy Electricals Ltd SEAMLESS STEEL TUBE PLANT TIRUCHIRAPALLI - 620014		NAME R.KUMAR	SIGNATURE	DATE 25.04.18
DEPT CODE	GRADE OF UNTOL. DIM C/M/F	SCALE 1:2 5:1	WEIGHT (Kg) 100/-	REF TO ASSY DWG NO 10.....096	REF TO OLD DWG NO 0121006-22.008	ITEM NO 2
TITLE SHAFT (REELER TOP)			CARD CODE U 01	DRAWING NO : 20.ST.110.01.076		REV 06

SCHEDULE 4

Shaft for reelar bottom roll (20-079)

PUSH BENCH FIXED ROLL SHAFT

DRAWING NO : 20.ST.192.01.072/09



THD.SPCN.	PITCH	MAJOR Ø max. min.	PITCH Ø max. min.	WIRE Ø	OVER WIRE Ø max. min.
M145-6g	2	144.962 144.682	143.663 143.473	1.35	145.983 145.793

ALL DIMENSIONS ARE IN MILLIMETERS
 DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE ASPER IS: 2102-1969 MEDIUM.

28 P9	-0.022 -0.074
110 k6	+0.025 +0.003
150 n6	+0.052 +0.027
152 r6	+0.090 +0.065
130 m6	+0.040
152 m6	+0.015
170 h11	0 -0.250

- NOTE TO SUPPLIER**
- MATERIAL CHEMISTRY-NABL ACCREDITED LAB TEST CERTIFICATE IS TO BE PROVIDED
 - HARDNESS, HEAT TREATMENT & TENSILE TEST CERTIFICATES ARE OBTAINED FROM THE HEAT TREATERS IS TO BE PROVIDED
 - UITRASONIC TEST TO BE CONDUCTED ON ENTIRE SURFACE AND SHALL BE CERTIFIED BY N D T LEVEL-2 QUALIFIED PERSONNEL AS PER SNT-TC-1A
 - THREADED AREA TO BE PROPERLY PROTECTED, COATED WITH RUST PREVENTIVE OIL AND PACKED TO AVOID DAMAGES DURING TRANSIT

REV	DATE	ALTERED
08	25.04.18	APPROVED

		Bharat Heavy Electricals Ltd SEAMLESS STEEL TUBE PLANT TIRUCHIRAPALLI - 620014		NAME R.KUMAR	SIGNATURE	DATE 25.09.10
DEPT	GRADE OF UNTOL. DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO.		ITEM NO
		1:2 5:1	128.5	00.....012		4
TITLE			CARD CODE	REF TO OLD DWG NO.		REV
VIEW X ADDED			U 01	0121006-23.002		08
SHAFT (REELER BOTTOM)				DRAWING NO :		
				20.ST.110.01.079		

SCHEDULE 5

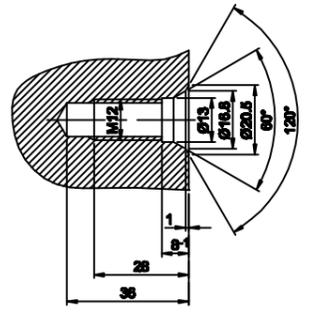
DRIVE SHAFT SRM 380 (10 - 042/02)

DRIVE SHAFT FOR SRM 380

STAND DRAWING NO.: 10. ST.115.01.042/02

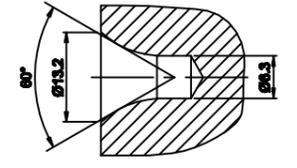
TDC NO.: TDC/TE/MFG-02 REVISION NO.: 03 DATE :17.03.09

1.6 / 0.8
 DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE AS PER IS: 2102 - 1989 MEDIUM

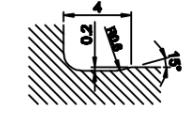


DETAIL OF CENTRE HOLE
 VIEW FROM -Q

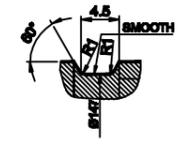
THE SHARP EDGES ARE TO BE ROUND
 TEMPERED $\delta B = 800 + 150 N / MM^2$
 SHAFT TO BE FORGED INDIVIDUALLY
 SHAFT TO BE BATH NITRIDED THICKNESS 0.10 TO 0.15 mm
 HARDNESS 50 HRC.
 MATERIAL CODE NO: 69 11 11 008 4
 SUPPLY TO BE AS PER TDC / TE / MFG -02



DETAIL OF CENTRE HOLE
 VIEW FROM -P



DETAIL OF UNDER CUT

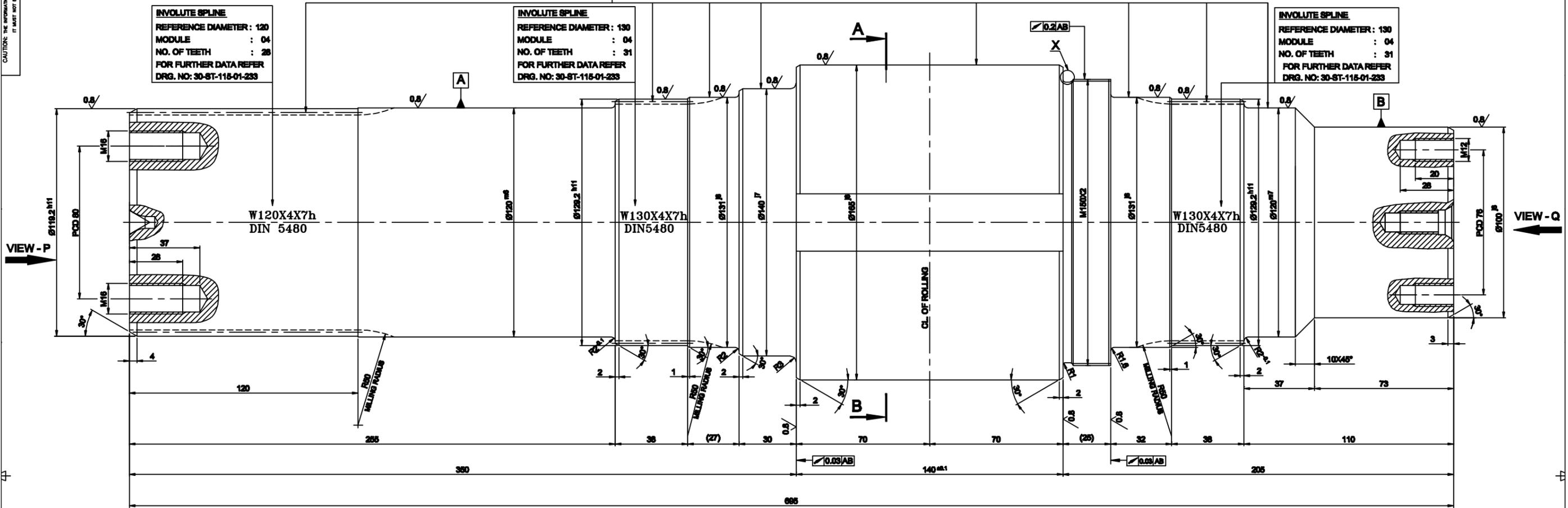


DETAIL-X

INVOLUTE SPLINE
 REFERENCE DIAMETER : 120
 MODULE : 04
 NO. OF TEETH : 28
 FOR FURTHER DATA REFER
 DRG. NO: 30-ST-115-01-233

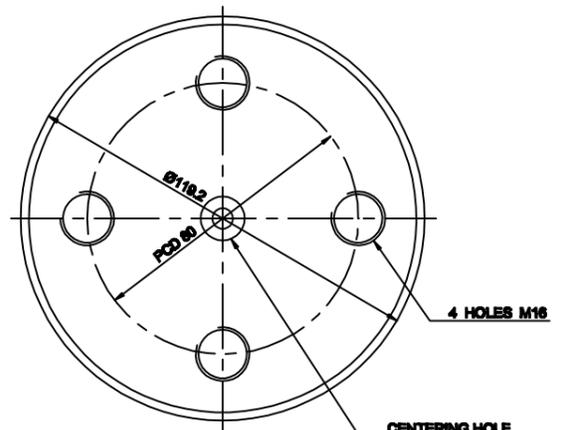
INVOLUTE SPLINE
 REFERENCE DIAMETER : 130
 MODULE : 04
 NO. OF TEETH : 31
 FOR FURTHER DATA REFER
 DRG. NO: 30-ST-115-01-233

INVOLUTE SPLINE
 REFERENCE DIAMETER : 130
 MODULE : 04
 NO. OF TEETH : 31
 FOR FURTHER DATA REFER
 DRG. NO: 30-ST-115-01-233

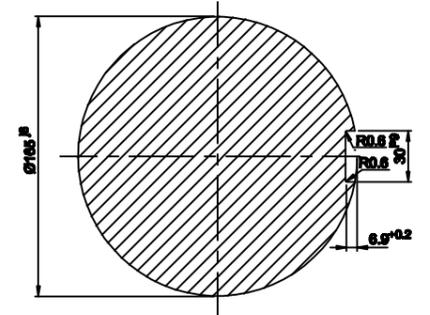


VIEW - P

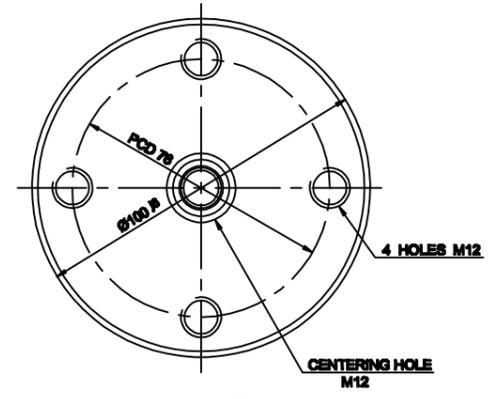
VIEW - Q



VIEW - P
 (SCALE=1:1)



SECTION - AB
 (SCALE=1:2)



VIEW - Q
 (SCALE=1:1)

30	p 9	-0.022 -0.074
110.2	h11	+0.0 -0.222
120.2	h11	+0.0 -0.280
120	m6	+0.035 -0.013
120	m7	+0.048 -0.013
100	j6	+0.013 -0.009
131	j6	+0.014 -0.011
165	j6	+0.014 -0.011
140	j7	+0.022 -0.018

SL.NO:	MATERIAL	CHEMICAL COMPOSITION.					
		C	Mn	Si	S	P	Cr
01	50CrMo4 DIN 1.7228	0.46	0.50	0.25 (Max 0.035)	(Max 0.035)	0.90	0.15
		0.54	0.80	0.50			1.20

1.35	150.981	M150X2	2	MAX 149.982	MAX 148.663
	150.791			MIN 149.662	MIN 148.473
WIRE Ø	MAX.OVER WIRE Ø	THREAD DESIG - NATION	PITCH	MAJOR Ø	PITCH Ø
	MIN.OVER WIRE Ø				

REV	DATE	ALTERED	CHECKED	APPROVED	DEPT	TE	GRADE OF UNTOLED. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO	ITEM NO
							C/M/F	1:1	74.2	00-ST-115-01-008	
TITLE										CARD CODE	REV
DRIVE SHAFT (SRM-380)										U 01	02
Bharat Heavy Electricals Ltd SEAMLESS STEEL TUBE PLANT TIRUCHIRAPALLI - 620014										DRN	DATE
										MLB	03.01.11
										APPD	
										REF TO OLD DRG NO	
										0107048-10.008/008	
										DRAWING NO :	
										10.ST.115.01.042	

BHEL, Tiruchirapalli-620 014	SSTP / Tool Engineering	Technical Delivery Conditions
Product : DRIVE SHAFT		

Document No.	Revision No.	Effective Date	Page No.
TDC/TE/MFG- 02	03	17.03.2009	1 of 2
Revision Record	03 - TDC reviewed and revised		

1.0 PRODUCT:

Sl.No.	Equipment / Product	Drg. No.	Drg. Rev. No.
1.	Drive Shaft SRM 300	10.ST.115.02.037	AS PER LATEST ENQUIRY / PURCHASE ORDER
2.	Drive Shaft SRM 380	10.ST.115.01.042	

2.0 APPLICATION:

The Drive shaft is used for transmitting the power of the motor to the rolls of Stretch Reducing Mill Stand.

3.0 MATERIAL:

Grade **50CrMo4** of **DIN 17200**

Conduct Ultrasonic Test on Raw Material after proof machining in accordance with SA 388.

Acceptance Standard in accordance with AM 203.2(c), ASME Sec VIII Div.2. Shall be certified by NDT Level II qualified personnel as per **SNT-TC-1A (Society for Non destructive Testing)**

Chemistry shall be certified based on :

1. Original Mill Test Certificate (or)
2. NABL accredited Lab test certificate

4.0 CONDITION OF SUPPLY:

Each shaft shall be individually forged, hardened and tempered. The shafts shall be case hardened by bath nitriding.

5.0 DIMENSION AND TOLERANCES:

As given in the drawing.

6.0 HEAT TREATMENT:

Hardened and tempered to 80 to 95 Kg / mm square tensile strength. Bath nitrided to a depth of 0.10 to 0.15 mm and hardness 50 HRC. Test coupon in the same heat treated condition of the drive shaft shall be prepared as per **DIN 50125** to carryout tensile test as given in clause 7.3

7.0 INSPECTION AND TESTING:

7.1 DIMENSIONAL INSPECTION

Dimensional inspection shall be carried out by the supplier and report for the same shall be sent along with the supplies.

7.2 LIQUID PENETRANT INSPECTION

To be conducted on entire surface after finish machining as per **ASTM E165-02** and shall be certified by **NDT Level II qualified personnel as per SNT-TC-1A**

BHEL, Tiruchirapalli-620014	SSTP / Tool Engineering	Technical Delivery Conditions
Product : DRIVE SHAFT		

Document No.	Revision No.	Effective Date	Page No.
TDC/TE/MFG- 02	03	17.03.2009	2 of 2
Revision Record	03 - TDC reviewed and revised		

7.3 MECHANICAL TEST :

1. Tensile Test on test coupon as per **DIN 50125** - Acceptance as per Drawing
2. Hardness Test on job & test coupon as per **DIN EN ISO 6508-1** - Acceptance as per Drawing
3. Checking of case depth on specimen of suitable size in the same heat treated condition of the Shaft - Acceptance as per drawing

8.0 MARKING:

Shall be done as given in the drawing.

9.0 TEST CERTIFICATE:

Following test certificates shall be sent with Materials..

1. Raw Material Chemistry (**Clause 3.0**)
2. Hardness, Tensile Test & Case Depth (**Clause 7.3**)
3. Temperature-Time-Recorder Graph for the Heat Treatment Cycle followed
4. Ultrasonic Test Report for Raw Material (**Clause 3.0**)
5. Liquid Penetrant Test (**Clause 7.2**)
6. Dimension Report (**Clause 7.1**)

10.0 PRESERVATION & PACKING :

1. Supply with rust preventive coating which shall be dry after application and removable by common solvents.
2. Pack suitably to avoid transit & handling damages.

Prepared By	Reviewed By	Approved By
 STE / TE	 SM / QA&C	 SDGM / TE

SCHEDULE 6

ROLL SHAFT (SRM 380)

ROLL SHAFT (SRM380)

DRAWING No: 20. ST.115.01.119/01

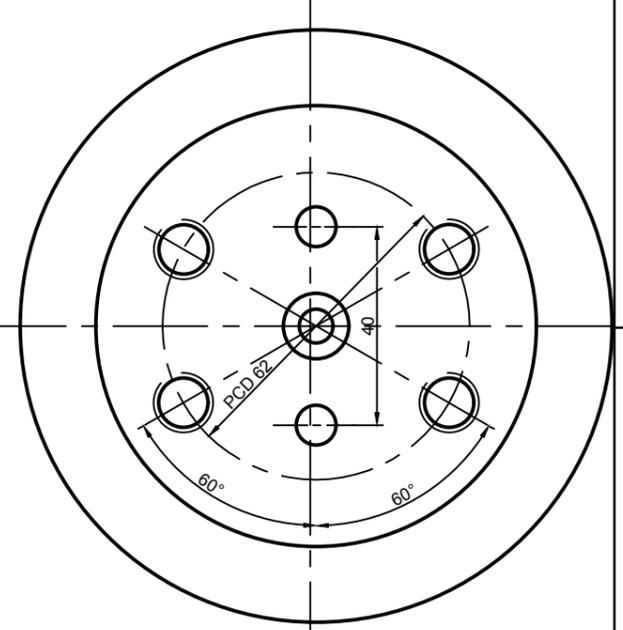
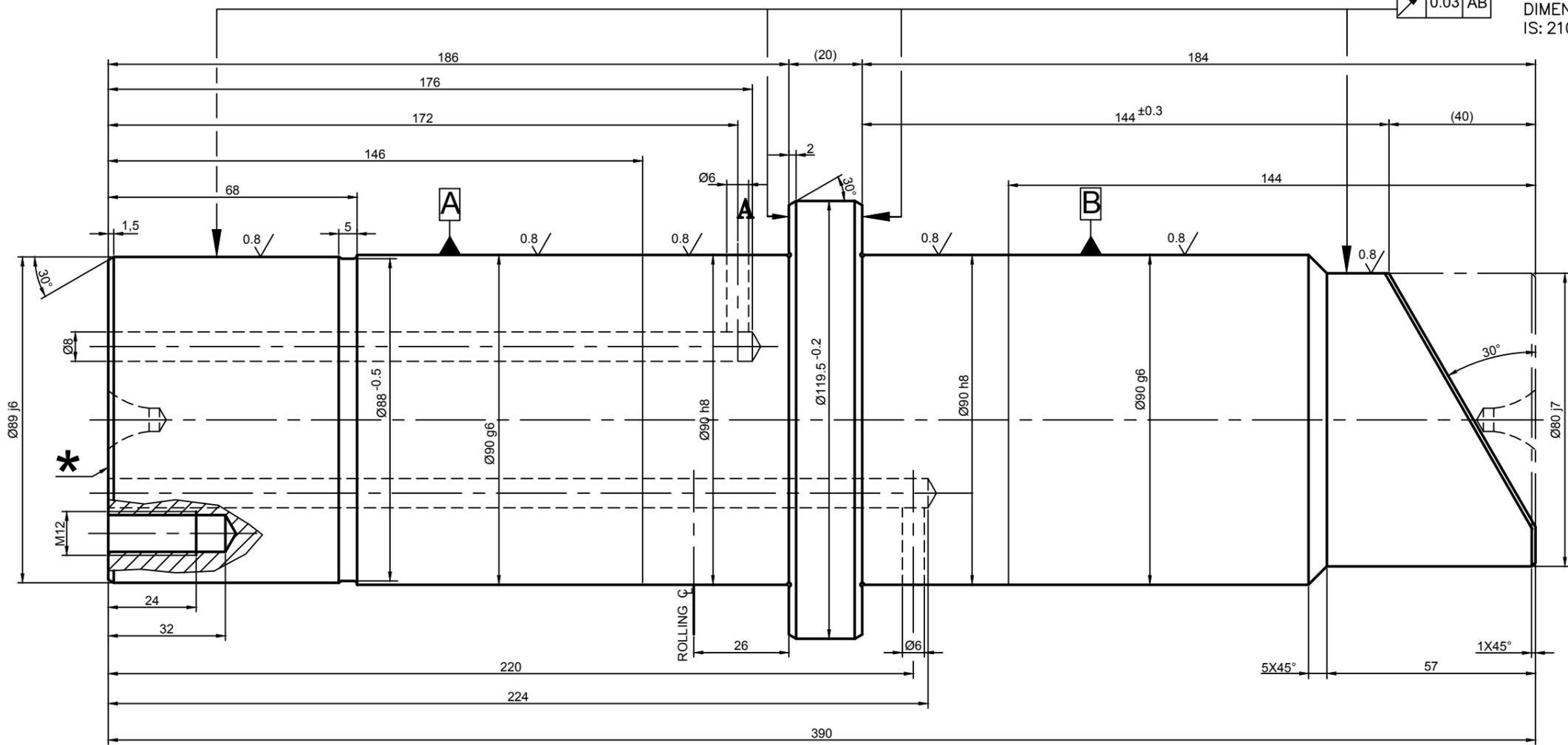
1 2 3 4 5 6 7 8

ALL DIMENSIONS ARE IN MILLIMETERS

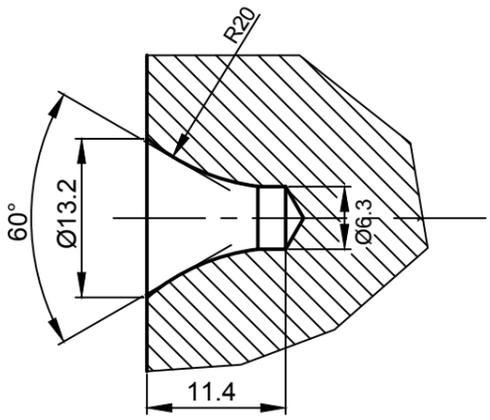
DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE ASPER IS: 2102-1969 MEDIUM.

80 j7	+0.18 -0.012
89 j6	+0.013 -0.009
90 h8	0 -0.054
90 g6	-0.012 -0.034

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**CENTRE DETAIL-C
(SCALE 2:1)**



NOTE TO SUPPLIER

- 01) MATERIAL CHEMISTRY-NABL ACCREDITED LAB TEST CERTIFICATE IS TO BE PROVIDED
- 02) HARDNESS, HEAT TREATMENT & TENSILE TEST CERTIFICATES ARE TO OBTAINED FROM THE HEAT TREATERS IS TO BE PROVIDED
- 03) ULTRASONIC TEST TO BE CONDUCTED ON ENTIRE SURFACE AND SHALL BE CERTIFIED BY N D T LEVEL-2 QUALIFIED PERSONNEL AS PER SNT-TC-1A

NOTE: ANY ONE OF THE FOLLOWING MATERIAL SHALL BE USED

MATERIAL: 40Cr4Mo3 IS:4367-1991

CHEMICAL COMPOSITION

C	Si	Mn	Cr	Mo
0.35	0.10	0.50	0.90	0.20
0.45	0.35	0.80	1.20	0.35

EQUIVALENT MATERIAL: 42CrMo4 (DIN 1.7225)

TEMPERED TO $850+150 \text{ N/mm}^2$

BATH NITRIDED TO 58-60 RC FOR A DEPTH OF 0.8 - 1 mm

* MARK MATERIAL CODE No.:69 11 11 0114, FIRMS NAME & P O No.

	Bharat Heavy Electricals Ltd SEAMLESS STEEL TUBE PLANT TIRUCHIRAPALLI - 620014		DRN	R.KUMAR	SIGNATURE	DATE	15.07.11
	CHD		APPD	S.KARUPPASAMY			
DEPT	GRADE OF UNTOL. DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO	REF TO OLD DWG NO	ITEM NO	
		1:1	18.9	00.ST.115.01.006	0107048-10.004	5	
TITLE	ROLL SHAFT (SRM 380)		CARD CODE	DRAWING NO :	REV		
			U 01	20.ST.115.01.119	01		

1 2 3 4 5 6 7 8

SCHEDULE 7

DRIVE SHAFT SRM 300 (10 - 037/05)

DRIVE SHAFT - SRM 300

DRAWING NO.: 10. ST.115.02.037/05

TDC NO.: TDC/TE/MFG-02

REVISION NO.: 03 DATE: 17.03.09

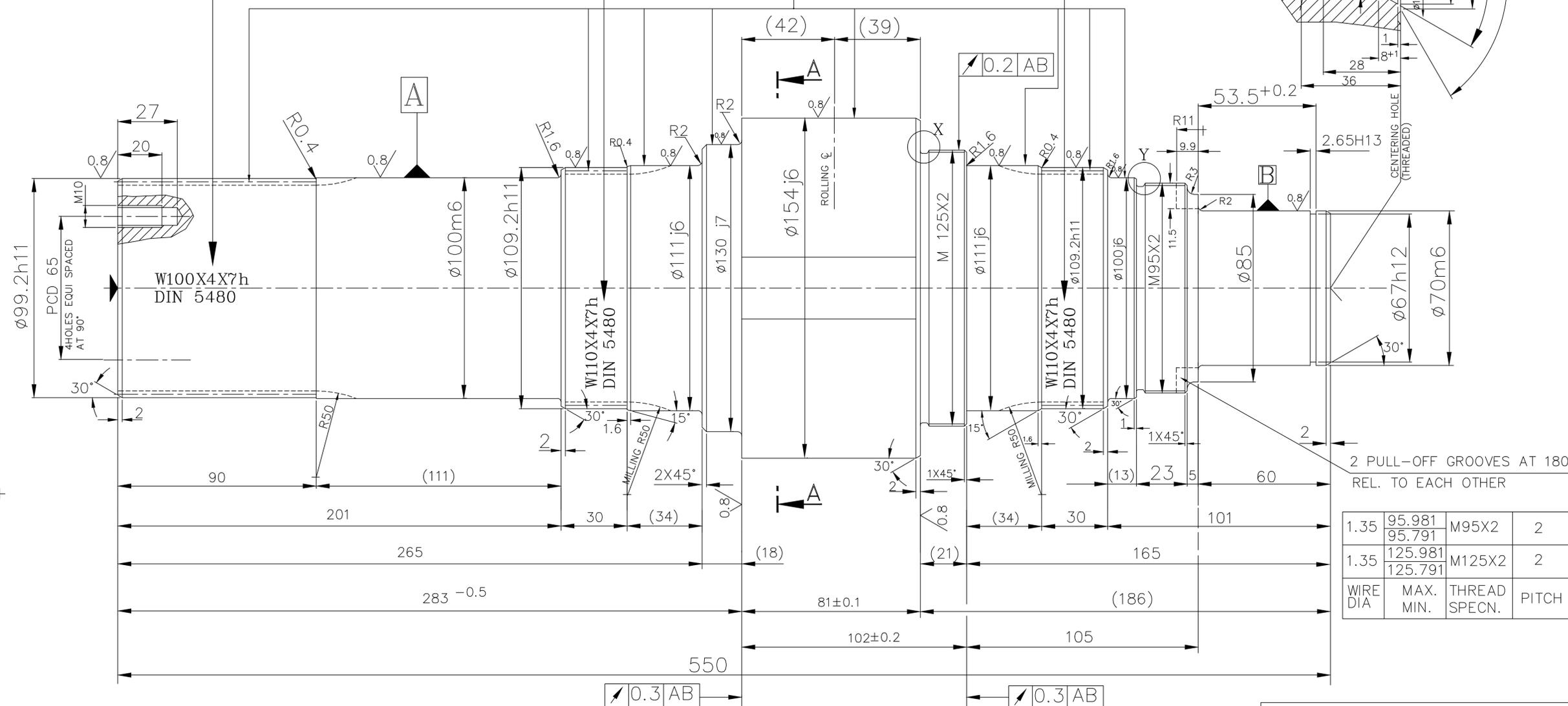
ALL DIMENSIONS ARE IN MILLIMETERS

1.6/0.8/

DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE AS PER IS: 2102-1969 MEDIUM

INVOLUTE SPLINE
 REFERENCE DIAMETER 100
 MODULE 4
 No.OF TEETH 24
 FURTHER DATA REFER DRG.NO.30.ST.115.01.233

INVOLUTE SPLINE
 REFERENCE DIAMETER 110
 MODULE 4
 No.OF TEETH 26
 FURTHER DATA REFER DRG.NO.30.ST.115.01.233



2.65 H13	+0.140
	0
28 N9	0
	-0.052
67 h12	0
	-0.300
70 m6	+0.030
	+0.011
100 m6	+0.035
	+0.013
99.2 h11	0
	-0.220
109.2 h11	0
	-0.220
100 j6	+0.013
	-0.009
111 j6	+0.013
	-0.009
154 j6	+0.014
	-0.011
130 j7	+0.022
	-0.018

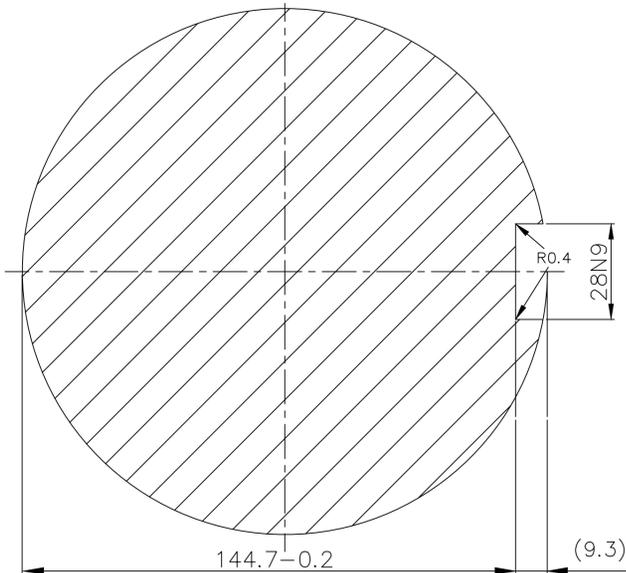
1.35	95.981	M95X2	2	94.962	93.663
	95.791			94.682	93.473
1.35	125.981	M125X2	2	124.962	123.663
	125.791			124.682	123.473
WIRE DIA	MAX. MIN.	THREAD SPECN.	PITCH	MAJOR Ø MAX. MIN.	PITCH Ø MAX. MIN.

CHEMICAL COMPOSITION						
MATERIAL	C	Si	Mn	Cr	Mo	P S
40Cr4Mo3	0.35	0.10	0.50	0.90	0.20	-
IS: 4367-1991	0.45	0.35	0.80	1.20	0.35	-
50CrMo4	0.46	0.25	0.50	0.90	0.15	MAX.0.035
DIN(1.7228)	0.54	0.50	0.60	1.20	0.25	MAX.0.035

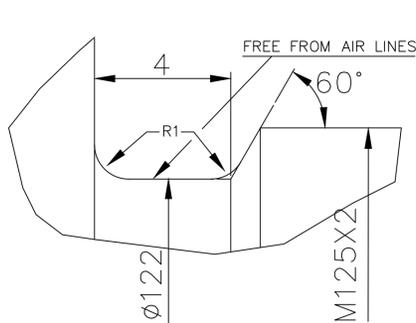
SUPPLY TO BE AS PER TDC/TE/MFG-02
 SHAFT TO BE FORGED INDIVIDUALLY
 HARDEN AND TEMPER TO 85-100Kg/mm²
 SHAFT TO BE BOTH NITRIDED THICKNESS 0.10-0.15mm±
 HARDNESS 50HRC

MATERIAL CODE No.: 69 12 51 010 8

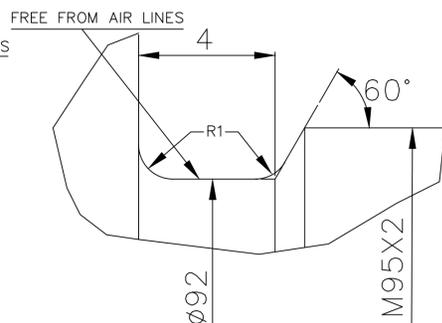
SECTION-AA



DETAIL X



DETAIL Y



REV 01	DATE	ALTERED	CHECKED	APPROVED
02		THREADED CENTER ADDED.		
03		OVERWIRE DIM IN TABL ADDED.		
04		EQVT.MATL DELETED.		
05		IN INVOLUTE SPLINE REFERENCE DIA100		
		No.OF TEETH 24 WAS WRONGLY MENTIONED AS		
		CHEMICAL COMPOSITION ADDED		

Bharat Heavy Electricals Ltd		DRN	R.KUMAR	NAME	SIGNATURE	DATE	06.01.10
SEAMLESS STEEL TUBE PLANT		CHD					
TIRUCHIRAPALLI - 620014		APPD	SKARUPPASAMY				
DEPT	T E	GRADE OF UNTO. DIM C/M/F	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO	ITEM NO	
			1:1	41.0	00.ST.115.02.001	4	
TITLE				CARD CODE	DRAWING NO :	REV	
DRIVE SHAFT (SRM300)				U 01	10-ST-115-02-037	05	

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BHEL, Tiruchirapalli-620 014	SSTP / Tool Engineering	Technical Delivery Conditions
Product : DRIVE SHAFT		

Document No.	Revision No.	Effective Date	Page No.
TDC/TE/MFG- 02	03	17.03.2009	1 of 2
Revision Record	03 - TDC reviewed and revised		

1.0 PRODUCT:

Sl.No.	Equipment / Product	Drg. No.	Drg. Rev. No.
1.	Drive Shaft SRM 300	10.ST.115.02.037	AS PER LATEST ENQUIRY / PURCHASE ORDER
2.	Drive Shaft SRM 380	10.ST.115.01.042	

2.0 APPLICATION:

The Drive shaft is used for transmitting the power of the motor to the rolls of Stretch Reducing Mill Stand.

3.0 MATERIAL:

Grade **50CrMo4** of **DIN 17200**

Conduct Ultrasonic Test on Raw Material after proof machining in accordance with SA 388.

Acceptance Standard in accordance with AM 203.2(c), ASME Sec VIII Div.2. Shall be certified by NDT Level II qualified personnel as per **SNT-TC-1A (Society for Non destructive Testing)**

Chemistry shall be certified based on :

1. Original Mill Test Certificate (or)
2. NABL accredited Lab test certificate

4.0 CONDITION OF SUPPLY:

Each shaft shall be individually forged, hardened and tempered. The shafts shall be case hardened by bath nitriding.

5.0 DIMENSION AND TOLERANCES:

As given in the drawing.

6.0 HEAT TREATMENT:

Hardened and tempered to 80 to 95 Kg / mm square tensile strength. Bath nitrided to a depth of 0.10 to 0.15 mm and hardness 50 HRC. Test coupon in the same heat treated condition of the drive shaft shall be prepared as per **DIN 50125** to carryout tensile test as given in clause 7.3

7.0 INSPECTION AND TESTING:

7.1 DIMENSIONAL INSPECTION

Dimensional inspection shall be carried out by the supplier and report for the same shall be sent along with the supplies.

7.2 LIQUID PENETRANT INSPECTION

To be conducted on entire surface after finish machining as per **ASTM E165-02** and shall be certified by **NDT Level II qualified personnel as per SNT-TC-1A**

BHEL, Tiruchirapalli-620014	SSTP / Tool Engineering	Technical Delivery Conditions
Product : DRIVE SHAFT		

Document No.	Revision No.	Effective Date	Page No.
TDC/TE/MFG- 02	03	17.03.2009	2 of 2
Revision Record	03 - TDC reviewed and revised		

7.3 MECHANICAL TEST :

1. Tensile Test on test coupon as per **DIN 50125** - Acceptance as per Drawing
2. Hardness Test on job & test coupon as per **DIN EN ISO 6508-1** - Acceptance as per Drawing
3. Checking of case depth on specimen of suitable size in the same heat treated condition of the Shaft - Acceptance as per drawing

8.0 MARKING:

Shall be done as given in the drawing.

9.0 TEST CERTIFICATE:

Following test certificates shall be sent with Materials..

1. Raw Material Chemistry (**Clause 3.0**)
2. Hardness, Tensile Test & Case Depth (**Clause 7.3**)
3. Temperature-Time-Recorder Graph for the Heat Treatment Cycle followed
4. Ultrasonic Test Report for Raw Material (**Clause 3.0**)
5. Liquid Penetrant Test (**Clause 7.2**)
6. Dimension Report (**Clause 7.1**)

10.0 PRESERVATION & PACKING :

1. Supply with rust preventive coating which shall be dry after application and removable by common solvents.
2. Pack suitably to avoid transit & handling damages.

Prepared By	Reviewed By	Approved By
 STE / TE	 SM / QA&C	 SDGM / TE

SCHEDULE 8

ROLL SHAFT-FOR SRM 300(20.111/01)

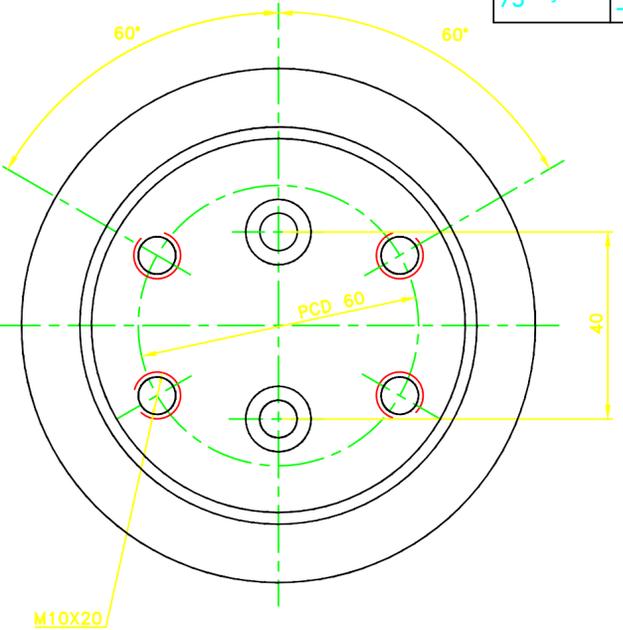
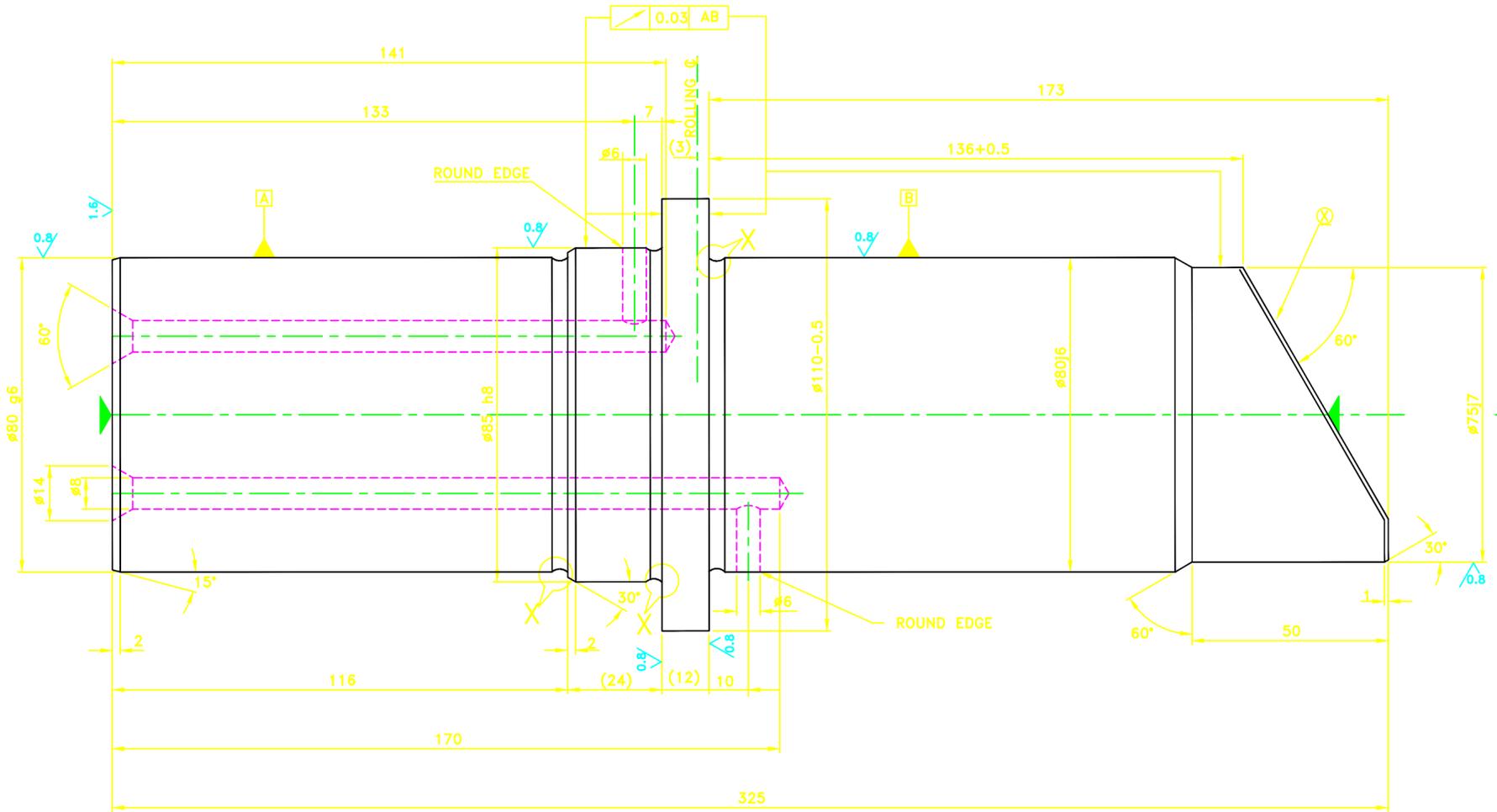
ROLL SHAFT-FOR SRM 300

DRAWING NO: 20.ST.115.02.111/01

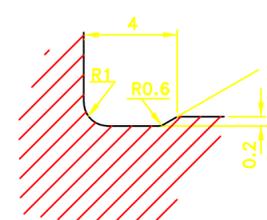
ALL DIMENSIONS ARE IN MILLIMETERS

DEVIATIONS OF UNTOLERANCED DIMENSIONS TO BE AS PER IS:2102-1969 MEDIUM

85	h8	0
		-0.054
80	g6	-0.010
		-0.029
75	j7	+0.018
		-0.012



DETAIL-X



NOTE:-

HARDEN AND TEMPER TO 100-150Kg/mm²
CASE TO BE NITRIDED TO 58-60Rc

⊗ MARK MATERIAL CODE No.:69 12 51 013 2

EQUIVALENT MATERIAL:IS:1570-40Cr1Mo28

EQUIVALENT MATERIAL CHEMICAL COMPOSITION:-

C	Mn	Si	Cr	Mo
0.352	0.5	0.1	0.9	0.2
0.45	0.8	0.35	1.2	0.35

ITEM NO	DESCRIPTION	DRAWING NO	42CrMo4	UNIT WT
			MATL SPEC	QTY

DRN	NAME	SIGNATURE	DATE
CHD	R.KUMAR		19.11.99
APPD	P.GANESAN		

DEPT	TE	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO	ITEM NO
		C/M/F	1:1	12.0	00.ST.115.2.001	05
TITLE				CARD CODE	DRAWING NO :	REV
ROLL SHAFT (S R M 300)				U 01	20.ST.115.02.111	01

REV	DATE	ALTERED	R.KUMAR
01	28.10.99	CHECKED	P.GANESAN
ZONE	IN NITRIDED NOTE 58-60RC ADDED		

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Pre-Qualifying Criteria

1. The vendor should have supplied similar machined tools to any of production, manufacturing, support services departments in any Central/State/Govt organisation/PSU Company/ Public Listed company during the last 7 Financial years (2015-2022).
2. Work Order copy of the same for min 10 Lakhs is to be furnished.

D
ABHIGHNA



Digitally signed
by D ABHIGHNA
Date: 2023.08.18
15:48:22 +05'30'