

SPECIFICATION FOR SET OF METALLIC PIPE AND MOUNTING T- SENSOR FOR MAIN TRANSFORMER FOR 3-PHASE ELECTRIC LOCOMOTIVES

Specification No : CLW/ES/3/0253/R

Enclosures

SL.No	Drawing No
1	CLW/ES/3/SK-1/0253/R
2	CLW/ES/3/SK-2/0253/R
3	CLW/ES/3/SK-3/0253/R
4	CLW/ES/3/SK-4/0253/R
5	CLW/ES/3/SK-5/0253/R
6	CLW/ES/3/SK-6/0253/R
7	CLW/ES/3/SK-7/0253/R
8	CLW/ES/3/SK-11/0253/R
9	CLW/ES/3/SK-12/0253/R
10	CLW/ES/3/SK-13/0253/R
11	CLW/ES/3/SK-14/0253/R
12	CLW/ES/3/SK-15/0253/R
13	CLW/ES/3/SK-16/0253/R
14	CLW/ES/3/SK-17/0253/R

ISSUED BY

DY.CHIEF ELECTRICAL ENGINEER/D-II
CHITTARANJAN LOCOMOTIVE WORKS
CHITTARANJAN – 713331
Dist: BARDHAMAN (WEST)
WEST BENGAL (INDIA)

Prepared By	Checked By	Approved By
SSE-Design	AEE -Design	Dy.CEE/D-II

ALTERATION RECORD SHEET

Amendment Number	Date of Amendment	Page number	Alteration	Descriptions	Authority
1.	20-08-1998		A	i) Added Bellow drawing no-CLW/ES/3/SK-18/0253 ii) Description of SK.no-CLW/ES/SK-18/0253 in POS-2 of pipe A,B,C,D,F,G and K. iii) Description of SK.no-CLW/ES/SK-18/0253 in POS-1 of pipe D,M & L. iv) Correction on Annexure-IV at Pipe-D item no-3, Exp sleeve will be 180-LG/D76.1	Sd/-
2.	29-03-1999		B	i) Pipe L modified as per modification release received from M/s ADtranz. ii) SL.No-10 to 16 gasket & O Ring have been included with detail drawing. iii) Material spec. of pipe clarified as made of AISI 304 only. iv) Quality assurance program as recommended by ADtranz.	Sd/-
3.	18-01-2000		C	i) 1 no pipe B modified to pipe B1 as per SK-12, sheet no-32. This pipe will be fitted only with the transformer in the direction of CAB-1 side. ii) Pipe G modified as per SK-6, sheet-25, It will also be fitted only with the transformer in the direction of CAB-1 side. iii) Qty/Loco in the scope of supply at Sl.No-2 sheet no-13 for pipe B will be 1 instead of 2 & 1 no of pipe B1 has been added.	Sd/-
4.	19-05-2000		D	i) Range of pressure test increased to 10kg/cm ² at 85°C. ii) Clause of vibration test included. iii) thickness of "O" ring increased from 5 mm to 6mm in fig-4,5,6 of SK-11. For this purpose decrease the D also. iv) Anti corrosive oil should be easily removable in place of Shell Engine oil.	Sd/-

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5.	20-11-2001		E	i) "O" rings and washers are deleted from scope of supply and rearrange the SL.No. ii) Revised dimensional drawing attached for better clarity and to avoid oil leakage with new drawing. iii) Testing details has been added/ Corrected page no-6.	Sd/-
6.	23-02-2005		F	i) To change the Dimensions early mentioned in sheet no-SK-13, ABB IDENT no-416438P0202 from Dimensions Ø14 to Ø18. ii) To change IDENT no in sheet no-SK-11 from EHW470070P0002 to EHW470069P0002. iii) Correction the D2 & D3 dimension of ABB IDENT no. HBTB416429P1003 in SK-12.	Sd/-
7.	3-11-2007		G	Both end / side all the metallic pipes should be covered with rubber packing individually to protect dust entry inside.	Sd/-
8.	05-02-2008		H	To change the Dimension early mentioned in sheet no-SK-9 from Ø160 to Ø180.	Sd/-
9.	15-04-2009		I	Die penetration test and pressure test should be done on 100% during routine inspection.	Sd/-
10.	13-07-2009		J	To change the Dimension early mentioned in sheet no-SK-8 from fitting G1/4" to G3/4" in pipe-K.	Sd/-
11.	17-07-2009		K	In the drawing of Metallic pipe "G" angle 30° is deleted.	Sd/-
12.	03-09-2009		L	Alteration of Oil Cooling Pipe, Bellow thickness and Mounting arrangement for temp. Sensor Conical insert and check nut to be supplied by pipe manufacturers vide approval of CEE/Loco.Enclosed additional Sheet ,no-6A, 2d and drawing no-SK-15 .SK-16SK-17	Sd/-
13.	06-11-2010		M	Provision of Alternate material for Gland Nut M-36x2 and Fastening cone at page no-6A	Sd/-

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14.	03-01-2011		N	SS Hardware grade 304 to be supplied along with metallic pipe from the approved CLW vendors.	Sd/-
15.	26-05-2011		O	To arrest Oil leakage provision of 02 nos "O" ring at position no-5 at page-10.	Sd/-
16.	09-05-2014		P	Quantity of K,L,&M pipes has been revised from 02 nos to NIL with the approval of Dy.CEE/D-I on dt-08-05-2014 vide this office note no-ELDD/3254/Metallic pipe, dt-08-05-2014.	Sd/-
17.	25-09-2015		Q	Material and Qty of "O" ring revised in drawing no-CLW/ES/3/SK-15/0253 with the approval of C/A vide this office note no-ELDD/MOM, dt-15-09-2015.	Sd/-
18.			R	In the testing Clause No. 7.0,testing clause for test of Bellows included as Clause No. 7.8.at page no.8 of 9	

Note: Specification has been digitized and all the alteration i.e addition , deletion, modification etc. has been incorporated in the digitized specification.

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1.0 GENERAL

TECHNICAL SPECIFICATION FOR SET OF METALLIC PIPE FOR MAIN TRANSFORMER FOR THREE PHASE ELECTRIC LOCOMOTIVES

2.0 SCOPE

The speciation covers the design performance requirement metallic pipe for main transformer for three phase Electric Locomotive for 25 kV AC 50Hz system

3.0 SERVICE CONDITIONS

- Maximum atmospheric temperatures: Under Sun: +70°C , In shade.: + 50°C.
- Humidity : 100% saturation during rainy season

Reference Site Conditions

- Ambient Temperature(operating) : Max +55°C, Min 0°C
- Normal Humidity : 60%.
- Altitude : 100 m above mean sea level.
- Rainfall.: Very heavy in certain areas. The locomotive will be designed to permit it's running at 10 kilometer per hour in flood water level of 102 millimeter above rail level.
- Atmosphere during hot weather : Extremely dusty and desert terrain in certain areas.
- Coastal areas : Locomotive and equipment will be designed to work in coastal areas in humid and salt laden atmosphere.
- Vibration.: The equipment , subsystem and their mounting arrangement will be designed to withstand vibrations and shocks encountered in service as specified in corresponding IEC-61373 publications unless otherwise prescribed.

4.0 SCOPE OF SUPPLY

SL Ne	Description	Qty. / Loco	Drg. No.	Material
1.	Pipe A	1	CLW/ES/3/SK-1/0253	SST Gr
2.	Pipe B	1	CLW/ES/3/SK-2/0253	SST Gr
3.	Pipe B1	1	CLW/ES/3/SK-3/0253	SST Gr
4.	Pipe C	1	CLW/ES/3/SK-4/0253	SST Gr
5.	Pipe D	1	CLW/ES/3/SK-5/0253	SST Gr
6.	Pipe F	1	CLW/ES/3/SK-6/0253	SST Gr
7.	Pipe G	1	CLW/ES/3/SK-7/0253	SST Gr
8.	HEX Screw	40 nos	M12x30	SST
9.	HEX Screw	16 nos	M12x35	SST
10.	HEX Screw	30 nos	M12x15	SST
11.	SPRING WASHER	76nos	M12	SST
12.	HEX NUT	36 nos	0.8 M12	SST

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13.	HEX Screw	56 nos	M16x60	SST
14.	HEX BOLT	08 nos	M16x70/36	SST
15.	WASHER A	128 nos	17/20	SST
16.	WASHER A	80 nos	13/24	SST
17.	SPRING WASHER	64 nos	M16	SST
18.	HEX NUT	64 nos	OD M16	SST
19.	SCREW PLUG 3/4"	02 nos	CLW/ES/3/SK-14/0253	SST Gr304

5.0 Documents to be supplied by the Tenderer

The tenderer shall interalia furnish the following in one copy along with the quotation:-

- i) Clause wise comments on the specification and test programme.
- ii) Detailed drawings.
- iii) Past experience with supporting papers (if any).
- iv) Past test reports (if any).
- i) The tenderer should clearly indicate the manufacturing process of the Metallic Pipe and indicate the deviation of materials, if any from the attached bill of materials, at the time of quotation itself.

6.0 Documents to be supplied by the Supplier

The following documents to be supplied by the supplier as part of contract:-

- i) Type Test Report
- ii) Routine Test Report
- iii) Maintenance Manual
- iv) Detail Drawing

7.0 TESTS

FOLLOWING TESTS SHOULD BE CARRIED OUT ON SET OF METALLIC PIPE ASSEMBLY:

Sl. No	Test Description	Type Test	Routine Test
7.1	Physical Verification, Quality of Workmanship, and Dimensional measurement as per specification and drawing	Y	Y
7.2	Material test certificate (sealed by authorized representative of CLW/BLW for the oil pipes.	Y	Y
7.3	Leakage Test : Oil pipes with all sensor points be blocked and pressured with air at a pressure of 4Kg / cm ² for half an hour. The temperature of water shall be 85° C. Pipes dipped in water to check any leakage.	Y	Y
7.4	Sensor points checking :the dummysensor shall be provided on the mounting points and the pipe shall be pressurized at a pressure of 4 Kg/cm ² by air and with the help of soap bubble the leakage test may be performed.	Y	Y

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7.5	Die Penetration Test (DPT TEST & pressure test should be done in 100%	Y	Y
7.6	All the threads should be checked using go and not go gauge.	Y	Y
7.7	Conicity of sensor cone and thread insert to be colour matched and sensor cone should be provided with identification mark of the firm.	Y	Y
7.8	Leakage Test on Bellow : Bellow to be blocked and pressured with air at a pressure of 10Kg / cm ² for half an hour. The temperature of water shall be 85°C. Bellows dipped in water to check any leakage.	Y	No

8.0 MOUNTING T-SENSOR R1/4"

MOUNTING T-SENSOR R1/4"
ABB ID No-3EHP431130R0001

FASTENING CONE ABB ID No-3EHP431131P0001 POSITION NO-2 MATERIAL- CRMOS 17N STANDARD-DIN-670.81-10 SS AISI304 Grade 314/316	GLAND NUT M-36 X 2 ABB ID No-3EHP431132P0001 POSITION NO-3 MATERIAL-HEX BAR 41-X12 CROMOS I7N STANDARD-DIN176.72-03, 81-10 SS AISI304 Grade 314/316	ORM 0280-15* G60-015 ABB ID No-3EHN424203P0300 POSITION NO-5. MATERIAL: VITON RUBBER HARDNESS- 60 ± 5 (SHORE)
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9.0 Quality Assurance

Quality assurance should be as per ISO 9000.

10.0 PACKAGE :

The oil pipes shall be packed loco set wise on wooden crates. The temperature sensor mounting, pressure sensor mounting and ball valve mounting points shall be properly covered with thick plastic gauge cap to avoid damaged in transportation. Flanges also be protected by wooden/card boards.

11.0 HARDWARE

SS Hardware and Fasteners to be used should be of CLW/BLW/RDSO approved source only.

12.0 LABELING/MARKING : -

Suppliers should emboss Firms Identification mark, year and month of manufacture in the side face of both flange.

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13.0 Note:

Note: 1.0 Oil cooling pipe to be made from seamless pipe SS-304.

2.0 Bellow to be manufactured with 0.3mm thick sheet in 2 Ply.

3.0 Mounting arrangement for temperature sensor that is conical insert and check nut to be supplied by pipe manufacturers.

4.0 Both end of each metallic pipe to be covered by Rubber packing individually to protect dust entry inside.

5.0 To maintain the quality of the product following Instruction shall be followed by the manufacturers:

5.1 In order to have no dirt and rust in the oil pipes which may cause major damages on electrical components e.g valve sets, It is to be ensured that oil pipes at supplier premises right after the welding process should be cleared and welding shall be proper.

5.2 Following checks should be done:

5.2.1. Application of V notch according to standard.

5.2.2 Application of welding according to DIN /ISO: 4063/141

5.2.3 Flange must be welded from Inside and Outside.

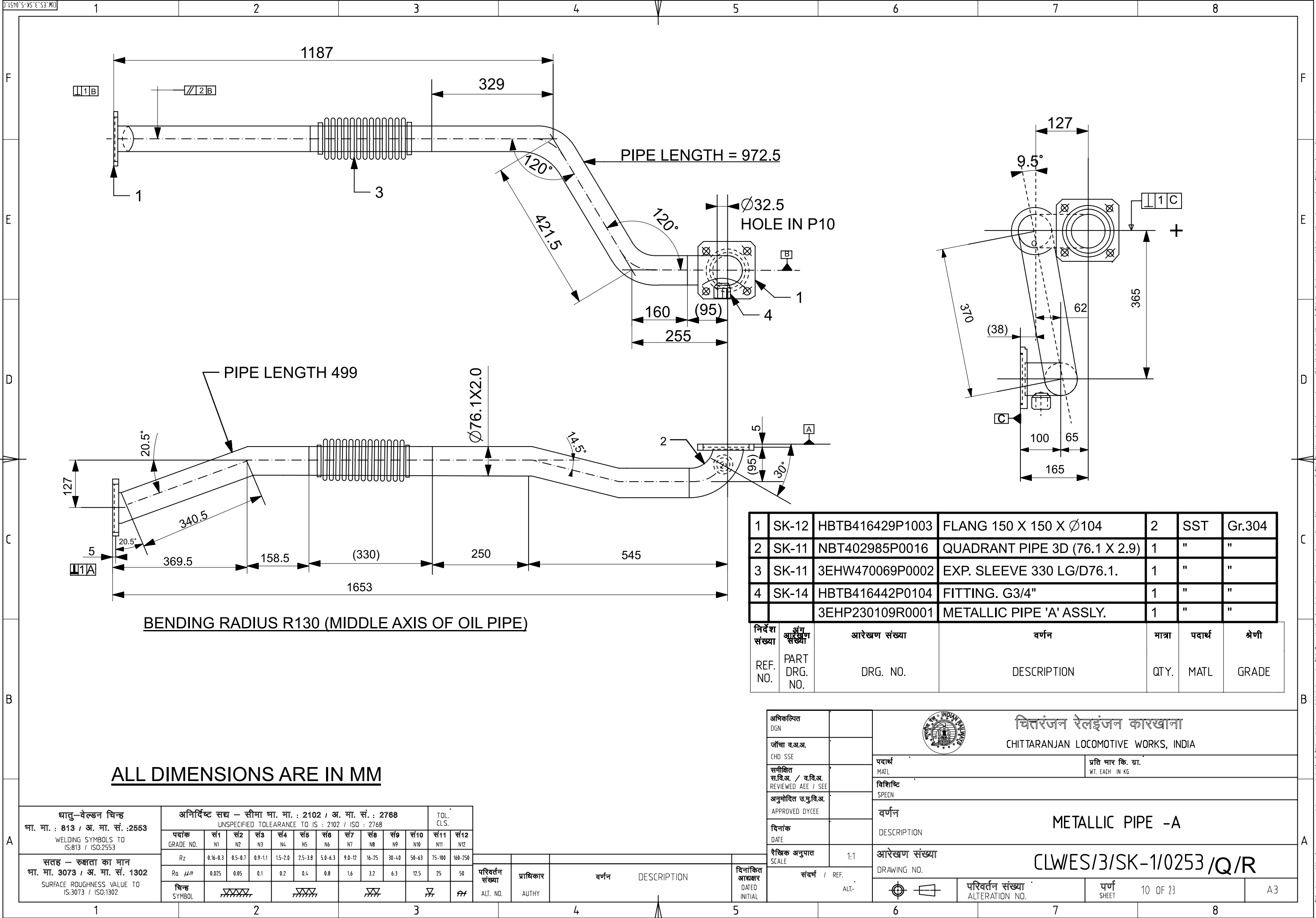
5.2.4 During the Welding process the Oil Pipes have to filled with forming gas e.g Carbon Acid 3.0 to total 35 gas.

5.2.5 Right after completion of the welding process the pipes have to be treated as follows:

- Degrease with alkaline agent
- Rinsing
- Bleaching with phosphorus Acid
- Hot Rinsing
- Cold Rinsing
- Passivation at 90⁰ C
- Drying at 90⁰ C

6.0 Before welding of flanges to the tubes, the sealing surface shall be flat grinded to prevent punch mark. After completion no further rectification shall be carried out on flanges.

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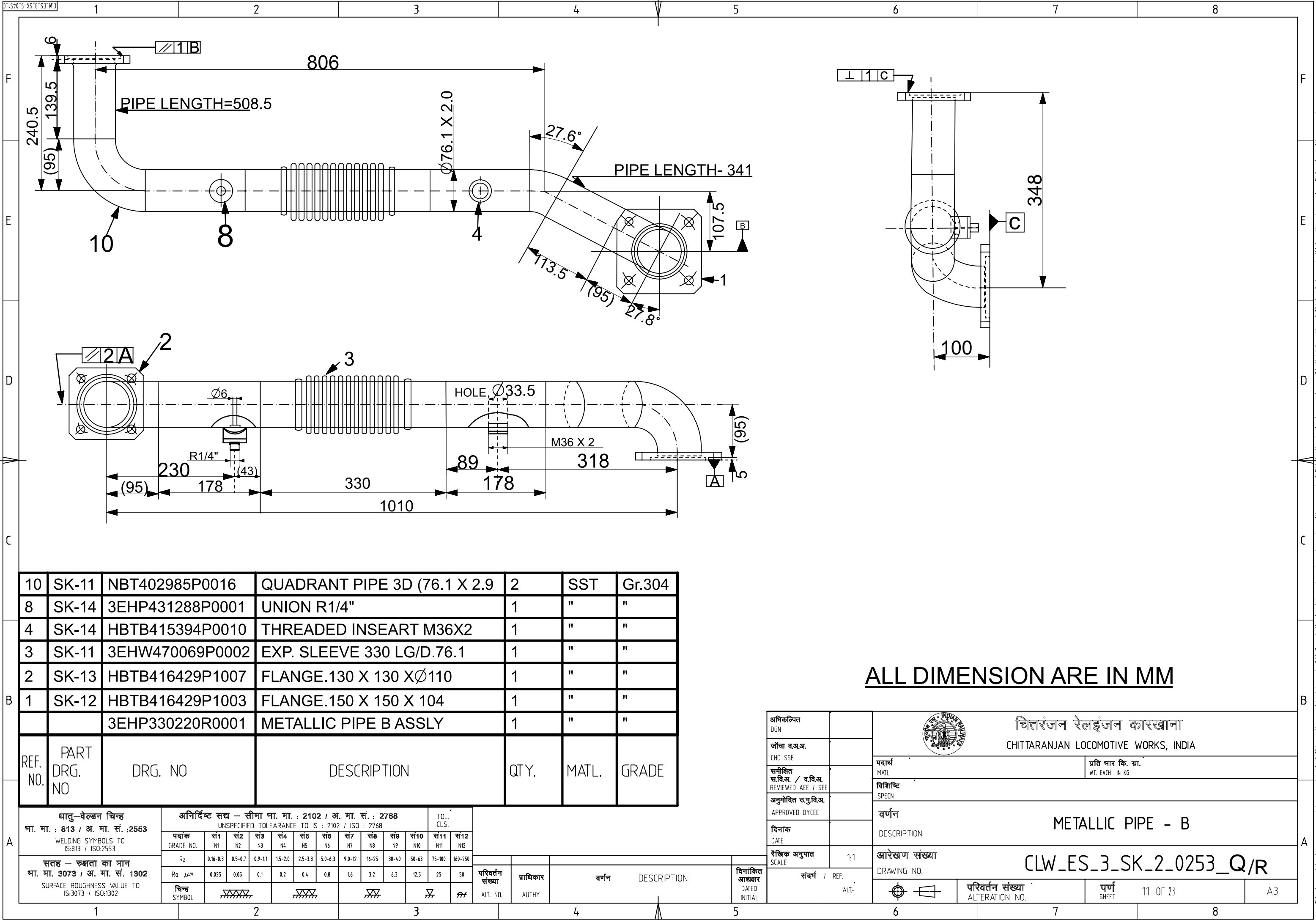


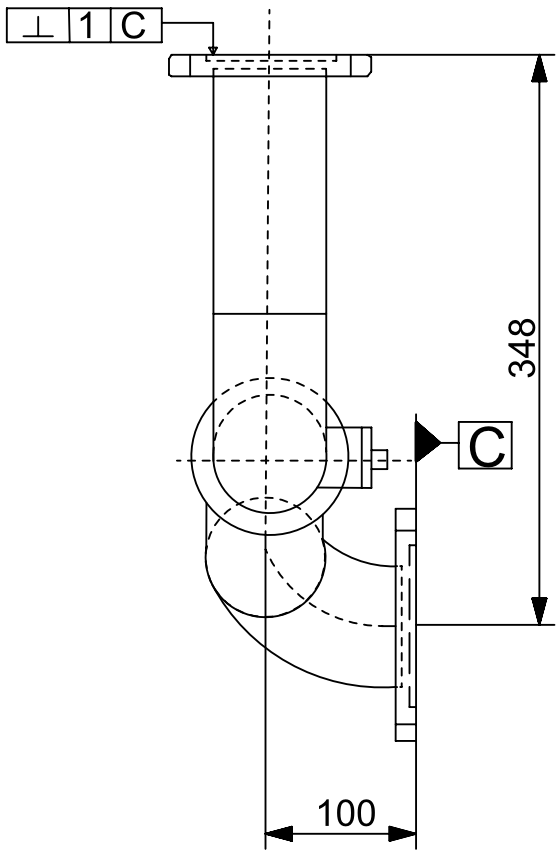
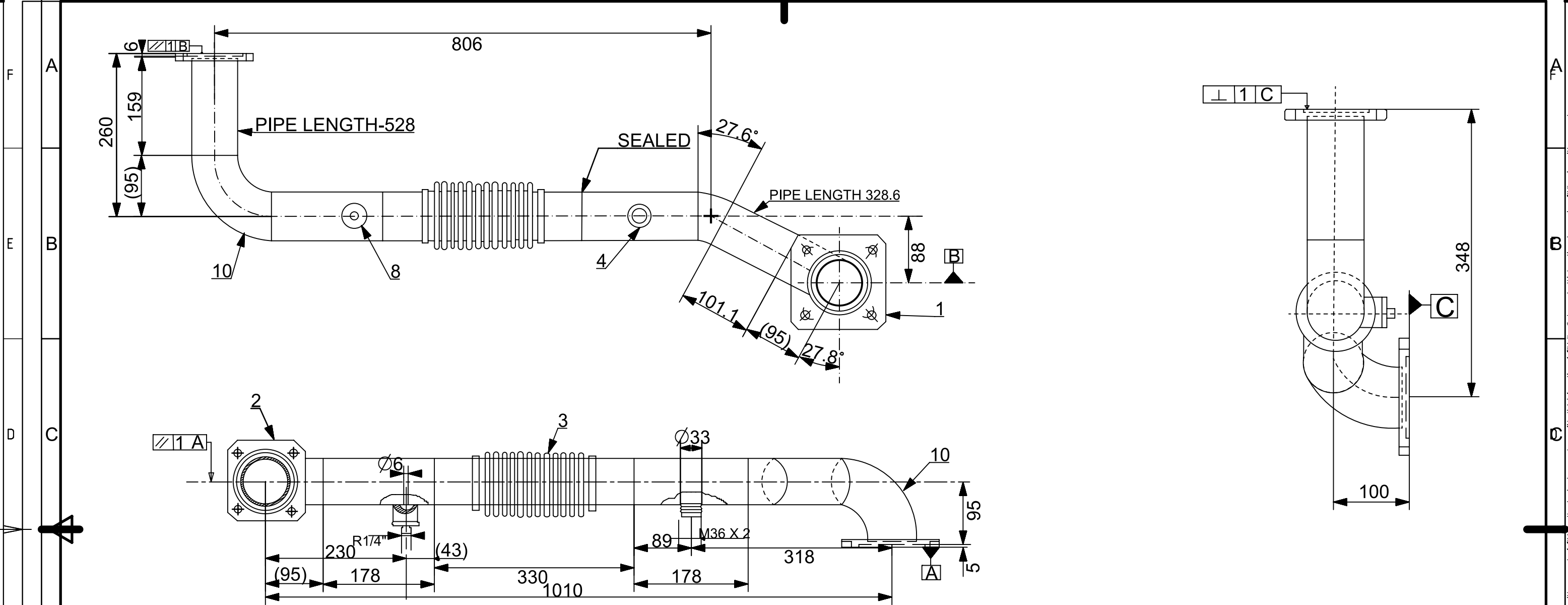
ALL DIMENSIONS ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं.:2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य — सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
सतह — रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	चिन्ह SYMBOL												

परिवर्तन संख्या	प्राधिकार	वर्णन	DESCRIPTION	दिनांकित आधार
ALT. NO.	AUTHY			DATED INITIAL

अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN	
दिनांक DATE		वर्णन DESCRIPTION	METALLIC PIPE -A
रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-1/0253/Q/R
संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.	पूर्ण SHEET
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10	SK-11	NBT402985P0016	QUADRANT PIPE 3D (76.1 X 2.9)	2	SST	Gr.304
8	SK-14	3EHP431288P0001	UNION R1/4"	1	"	"
4	SK-14	HBTB415394P0010	THREADED INSERT M36 X 2	1	"	"
3	SK-11	3EHW470069P0002	EXP. SLEEVE 330LG /D.76.1	1	"	"
2	SK-13	HBTB416429P1007	FLANGE-130 X130 X Ø110	1	"	"
1	SK-12	HBTB416429P1003	FLANGE-150 X150 X Ø104	1	"	"
		3EHP330220R0002	METALLIC PIPE. B1 ASSLY	1	"	"

REF. NO.	PART DRG. NO	DRG. NO	DESCRIPTION	QTY.	MATL.	GRADE
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आ. मा. : 813 / अ. मा. सं. :2553

WELDING SYMBOLS TO IS:813 / ISO:2553

सतह - रुक्षता का मान

आ. मा. 3073 / अ. मा. सं. 1302

SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302

अनिर्दिष्ट सद्य - सीमा मा. मा. : 2102 / अ. मा. सं. : 2768

UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768

TOL. CLS.

पदांक	सं1	सं2	सं3	सं4	सं5	सं6	सं7	सं8	सं9	सं10	सं11	सं12
GRADE NO.	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
Ra μ m	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
चिन्ह	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या	संख्या
SYMBOL												

परिवर्तन संख्या

ALT. NO.

प्राधिकार

AUTHY

वर्णन

DESCRIPTION

दिनांकित आधार

DATED INITIAL

संदर्भ / REF.

ALT-

अधिकृत DGN

जॉचा व.अ.अ. CHD SSE

समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE

अनुमोदित च.मु.वि.अ. APPROVED DYCEE

दिनांक DATE

रैखिक अनुपात SCALE

चित्तरंजन रेलइंजन कारखाना
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

पदार्थ MATL

प्रति भार कि. ग्रा. WT. EACH IN KG

विशिष्ट SPECN

वर्णन DESCRIPTION

आरेखण संख्या

DRAWING NO.

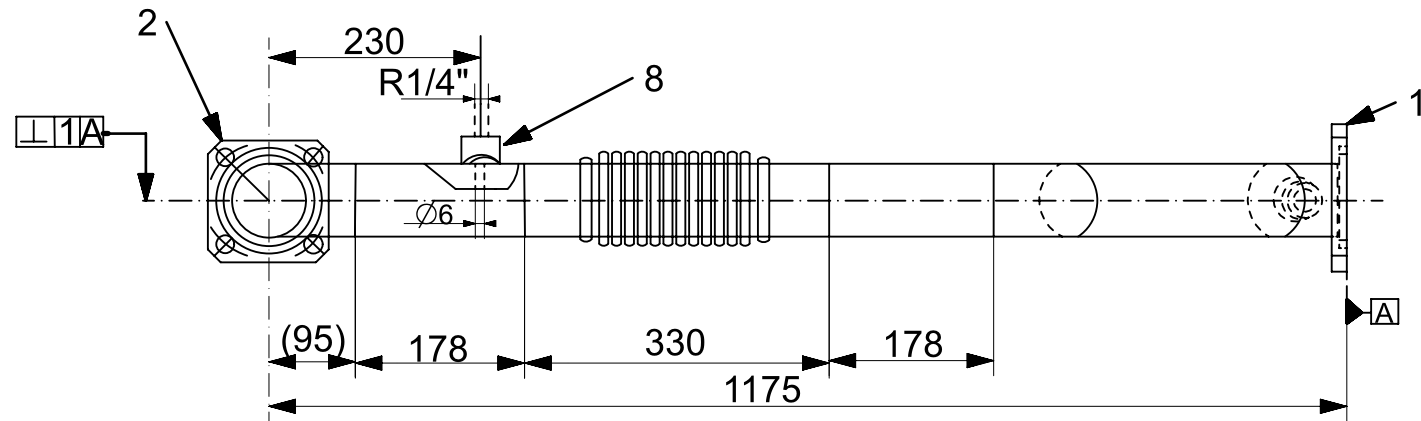
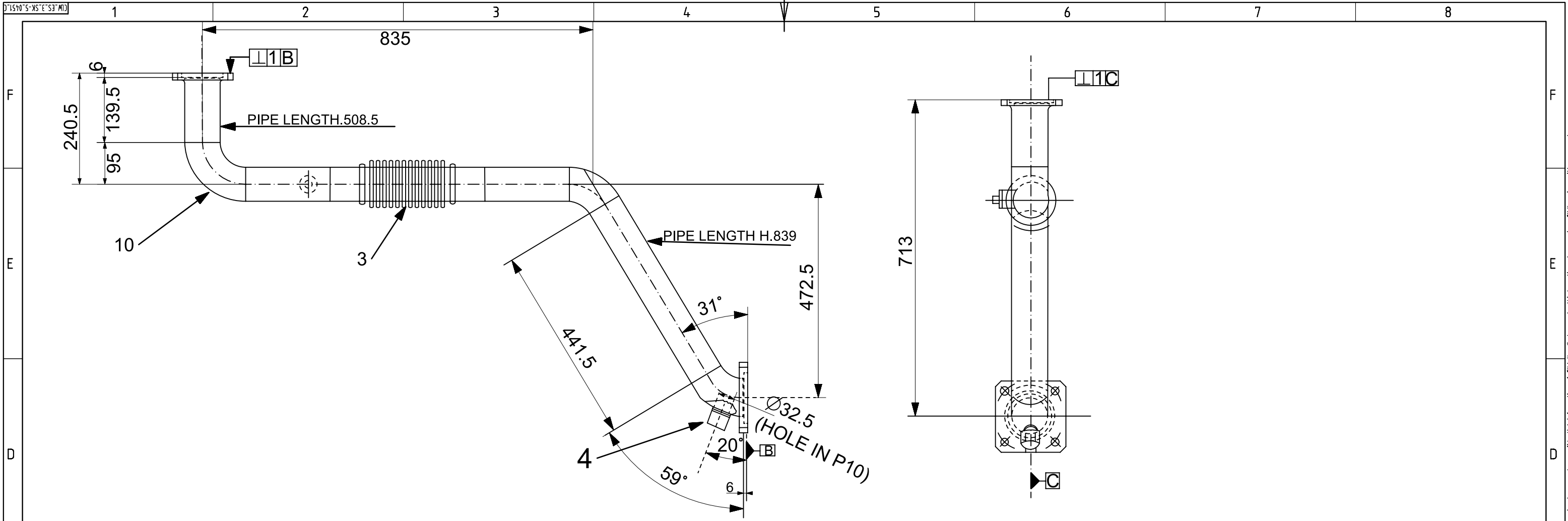
परिवर्तन संख्या ALTERATION NO.

पृष्ठ SHEET

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A3

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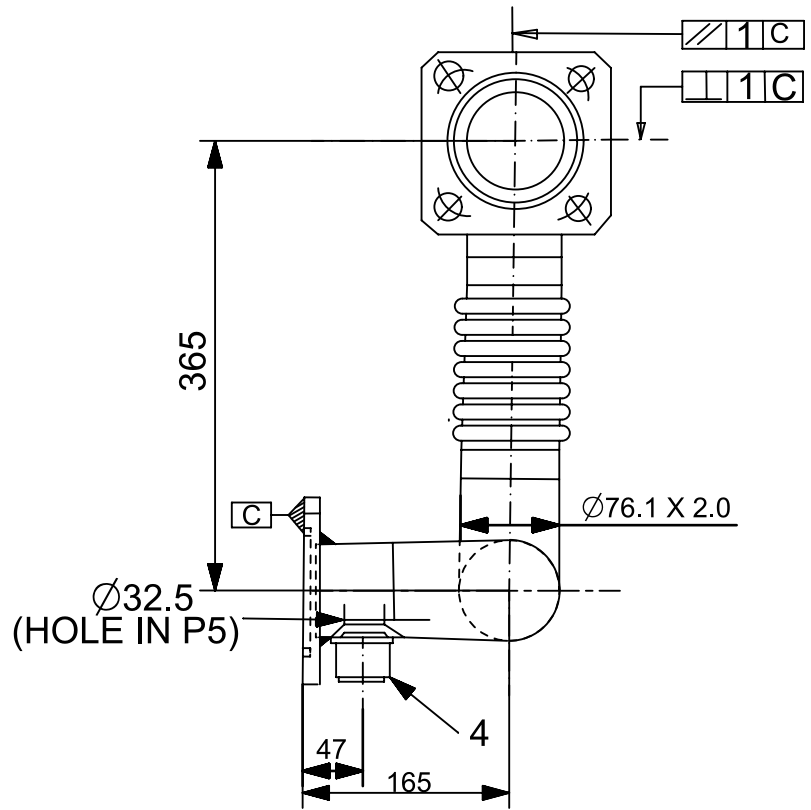
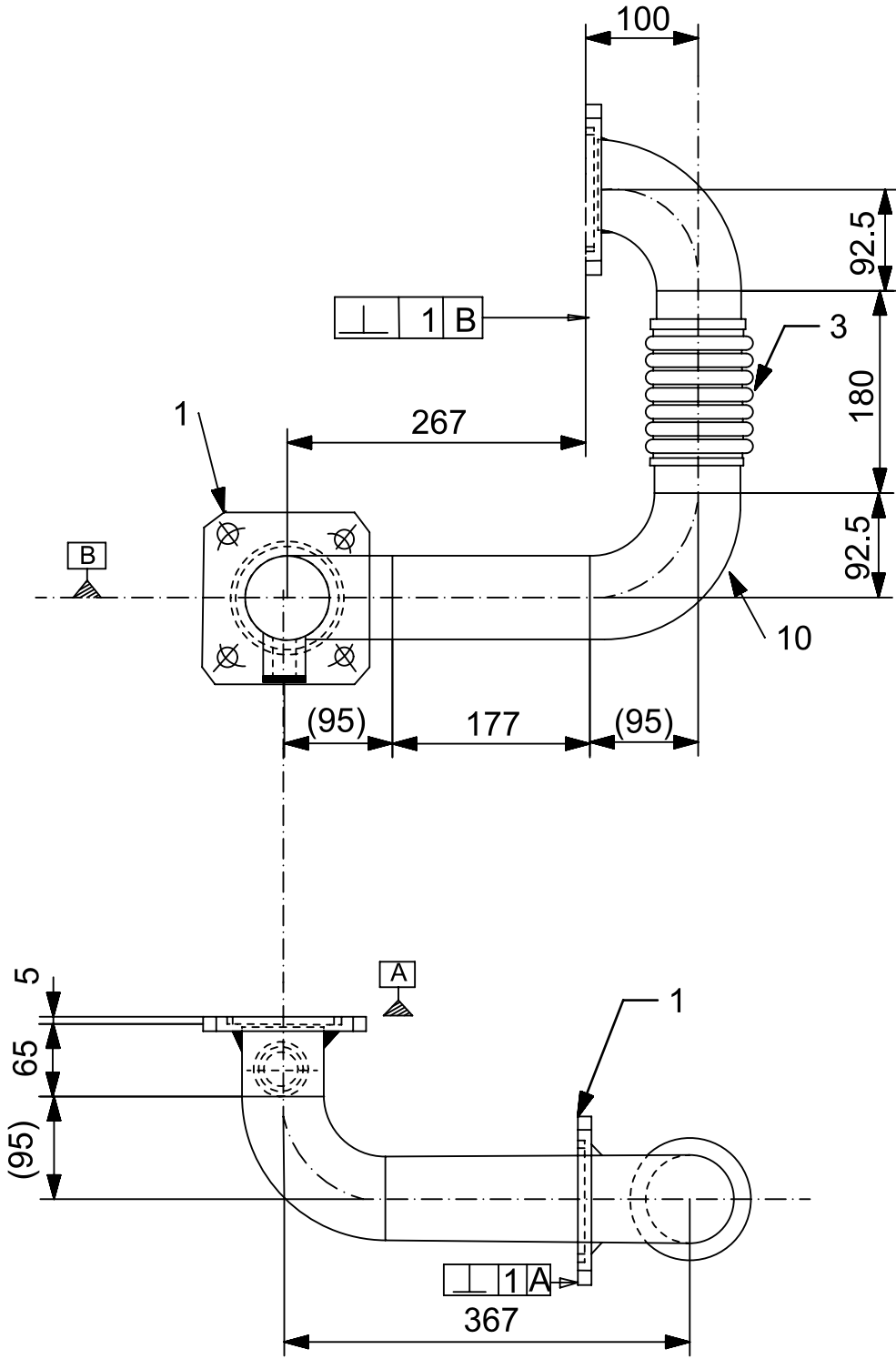
10	SK-11	NBT402985P0016	QUADRANT PIPE 3D (76.1 X2.9)	1	SST	Gr. 304
8	SK-14	3EHP431288P0001	UNION R1/4"	1	"	"
4	SK-14	HBTB416442P0104	FITTING G 3/4"	1	"	"
3	SK-11	3EHW470069P0002	EXP. SLEEVE 330 LG/D.76.1	1	"	"
2	SK-13	HBTB416429P1007	FLANGE 130 X 130 XØ110	1	"	"
1	SK-12	HBTB416429P1003	FLANGE 150 X 150 XØ104	1	"	"
		3EHP230110R0001	METALLIC PIPE - C ASSLY	1	"	"
REF. NO.	PART DRG. NO	DRG. NO	DESCRIPTION	QTY.	MATL.	GRADE

ALL DIMENSION ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा मा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μ m	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
सतह - रुकता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	चिन्ह SYMBOL												

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ALT. NO.	AUTHY			DATED INITIAL

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जोचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN	
दिनांक DATE		वर्णन DESCRIPTION	
स्केल अनुपात SCALE	1:1	आरेखन संख्या DRAWING NO.	CLW/ES/3/SK-4/0253/Q/R
संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET
			13 OF 23
			A3




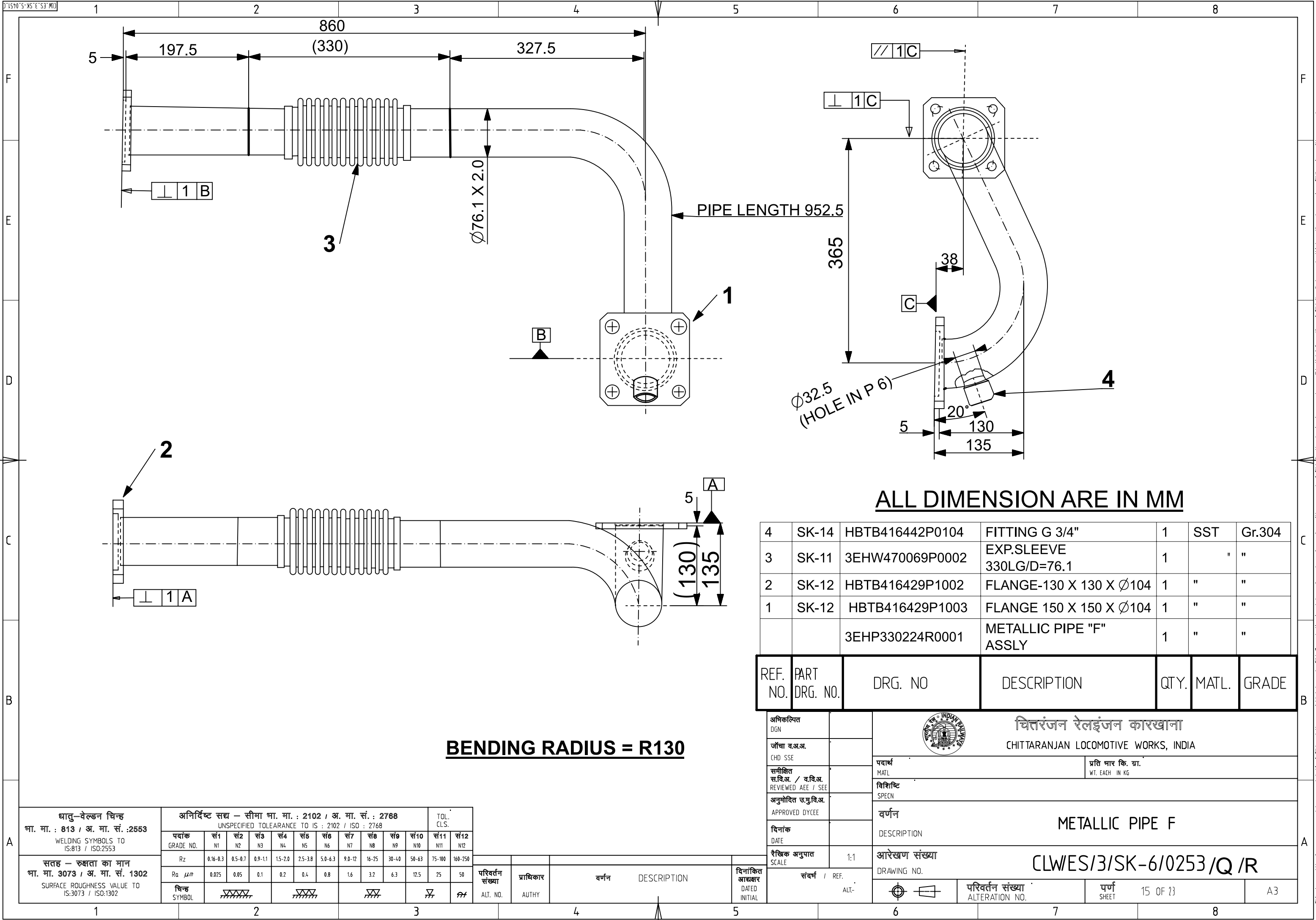
ALL DIMENSION ARE IN MM

10	SK-11	NBT402985P0516	QUADRANT PIPE 3D (76.1 X 2.9	3	SST	Gr 304
4	SK-14	HBTB416442P0104	FITTING-G3/4"	1	"	"
3	SK-11	3EHW470069P0001	EXP.SLEEVE 130LG/D-76.1	1	"	"
1	SK-12	HBTB416429P1003	FLANGE 150 X150 XØ104	2	"	"
		3EHP330222R0001	METALLIC PIPE "D" ASSLY	1	"	"
REF NO	PART DRG. NO.	DRG. NO.	DESCRIPTION	QTY.	METL.	GRADE

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
सतह - रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित आधार DATED INITIAL
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अधिकृत/पत DGN		<div></div> <div>चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA</div>				
जोधा व.अ.अ. CHD SSE			पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG		
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE			विशिष्ट SPECN			
अनुमोदित च.यु.वि.अ. APPROVED DYCEE			वर्णन METALLIC PIPE D			
दिनांक DATE			वर्णन DESCRIPTION			
रैखिक अनुपात SCALE			आरेखण संख्या DRAWING NO.			
संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.		पूर्ण SHEET	1 OF 1	A3







ALL DIMENSION ARE IN MM

4	SK-14	HBTB416442P0104	FITTING G 3/4"	1	SST	Gr.304
3	SK-11	3EHW470069P0002	EXP.SLEEVE 330LG/D=76.1	1	"	"
2	SK-12	HBTB416429P1002	FLANGE-130 X 130 X $\phi 104$	1	"	"
1	SK-12	HBTB416429P1003	FLANGE 150 X 150 X $\phi 104$	1	"	"
		3EHP330224R0001	METALLIC PIPE "F" ASSLY	1	"	"

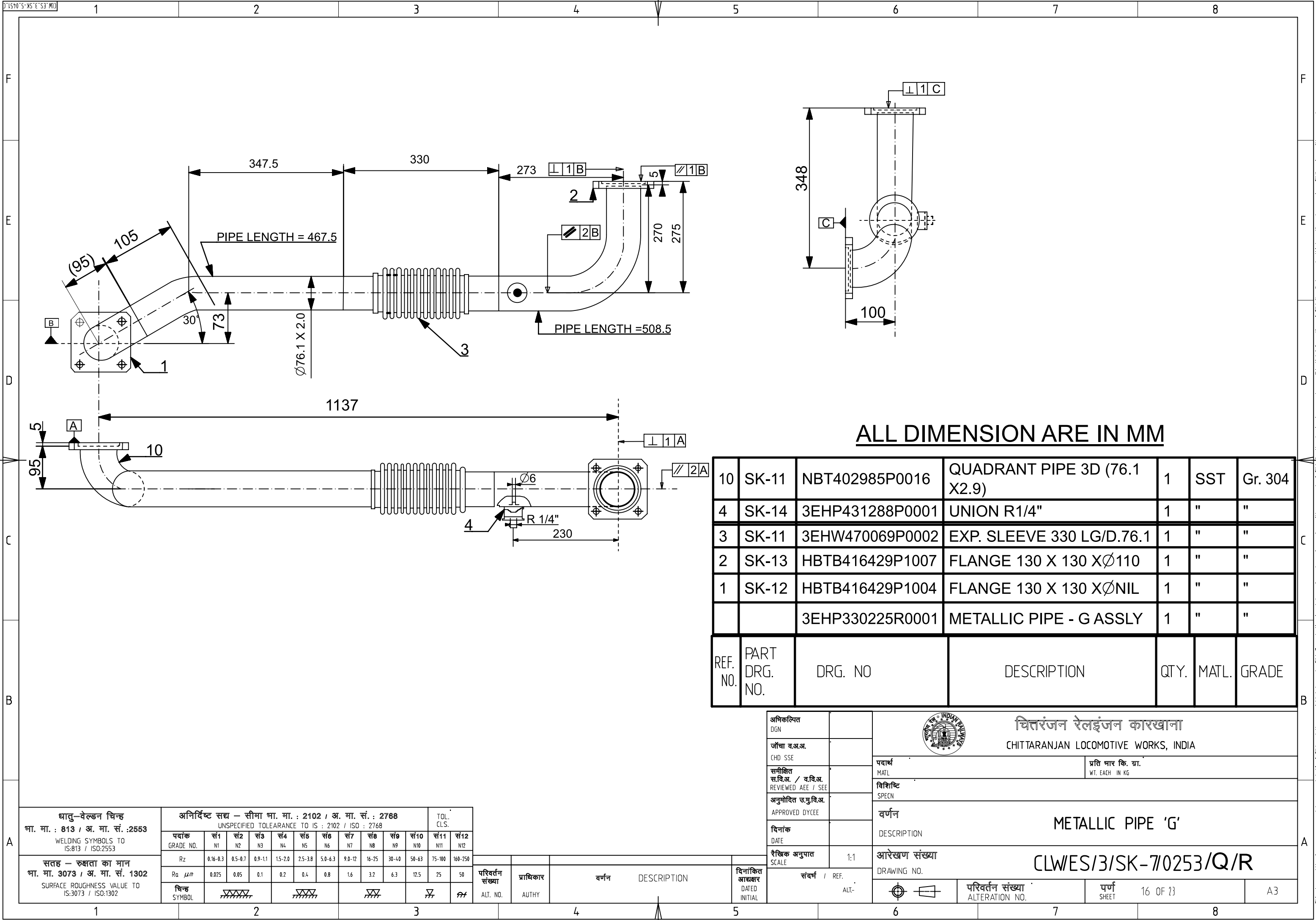
REF. NO.	PART DRG. NO.	DRG. NO	DESCRIPTION	QTY.	MATL.	GRADE
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अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA				
जॉचा व.अ.अ. CHD SSE						
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL		प्रति भार कि. ग्रा. WT. EACH IN KG		
अनुमोदित उ.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN		वर्णन DESCRIPTION		
दिनांक DATE		आरेखण संख्या DRAWING NO.		CLW/ES/3/SK-6/0253/Q/R		
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.		पूर्ण SHEET		A3
संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.		पूर्ण SHEET		A3

BENDING RADIUS = R130

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं.:2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य — सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												
सतह — रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302													

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित DATED INITIAL
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ALL DIMENSION ARE IN MM

10	SK-11	NBT402985P0016	QUADRANT PIPE 3D (76.1 X2.9)	1	SST	Gr. 304
4	SK-14	3EHP431288P0001	UNION R1/4"	1	"	"
3	SK-11	3EHW470069P0002	EXP. SLEEVE 330 LG/D.76.1	1	"	"
2	SK-13	HBTB416429P1007	FLANGE 130 X 130 XØ110	1	"	"
1	SK-12	HBTB416429P1004	FLANGE 130 X 130 XØNIL	1	"	"
		3EHP330225R0001	METALLIC PIPE - G ASSLY	1	"	"
REF. NO.	PART DRG. NO.	DRG. NO	DESCRIPTION	QTY.	MATL.	GRADE

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य — सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
सतह — रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												

परिवर्तन संख्या	प्राधिकार	वर्णन	DESCRIPTION
ALT. NO.	AUTHY		

दिनांकित आधार	DATED INITIAL
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संदर्भ / REF.	ALT-
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अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN	
दिनांक DATE		वर्णन DESCRIPTION	
रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-7/0253/Q/R
		परिवर्तन संख्या ALTERATION NO.	पुर्ण SHEET
			16 OF 23
			A3

D:\S70\5-WS-E\S3\MD

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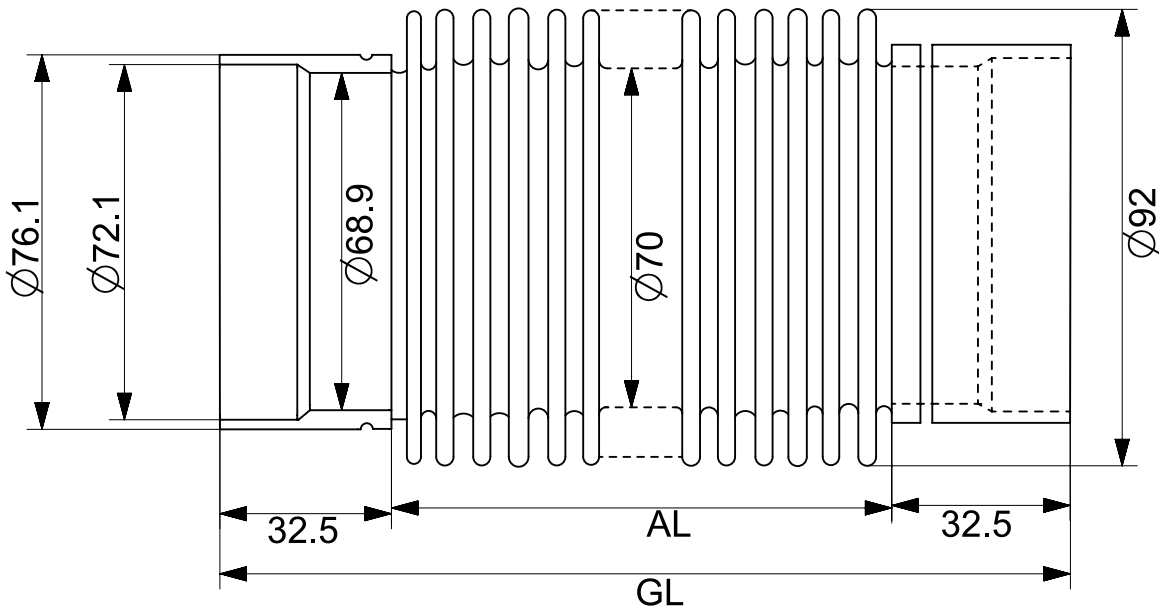
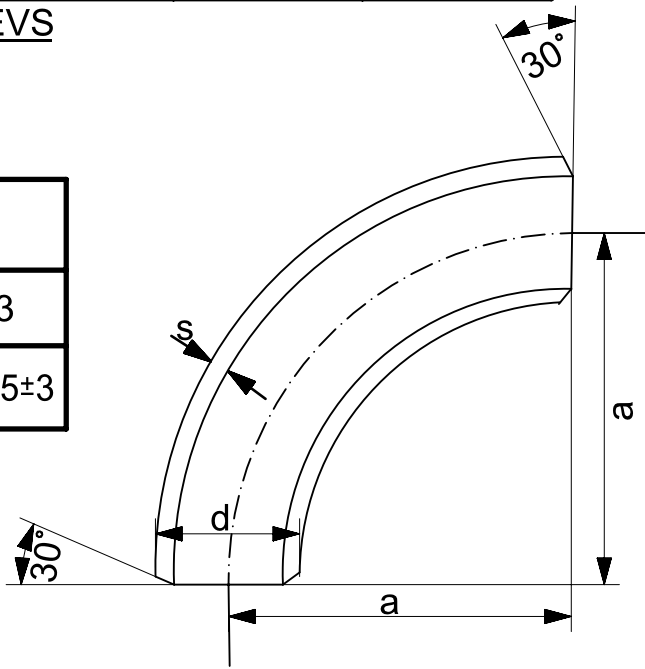


ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470069P0002	265	330	±10	±20	2 X 6	10KG/cm ²	A,B,C,F,G
3EHW470069P0001	115	180	±5	±8	11	"	D

EXP. SLEEVES

ABB IDENT. NO	d	s	a
NBT402985P0016	76.1	2.9	95±3
NBT402985P0018	88.9	3.2	114.5±3



QUADRANT PIPE

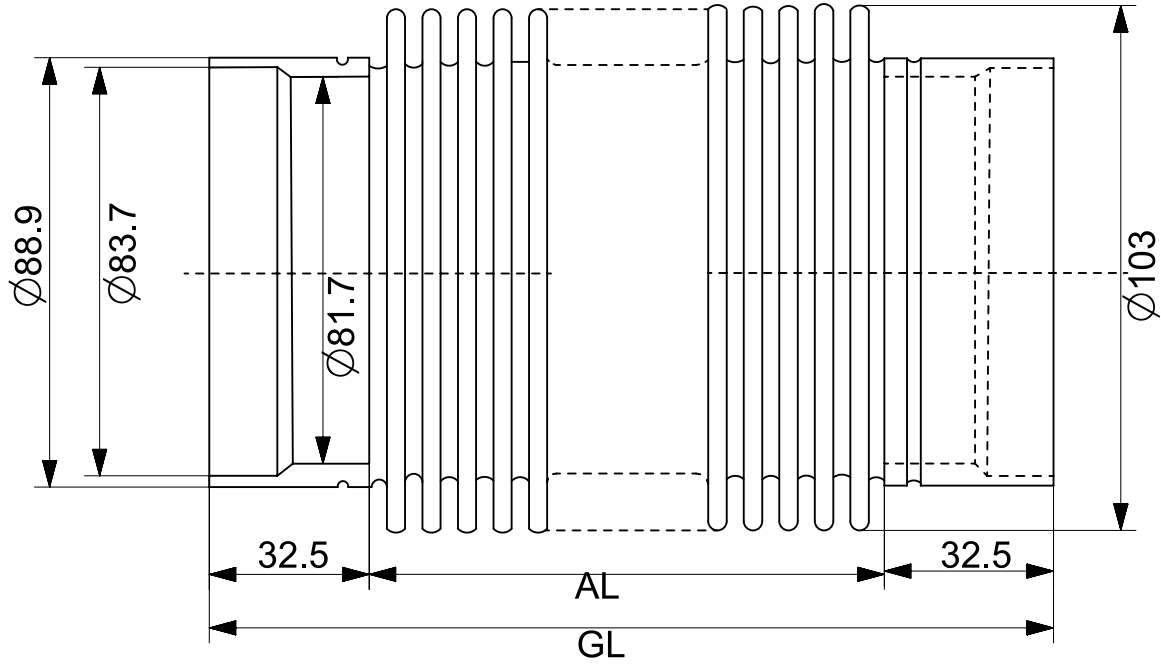


ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO. OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470070P0001	115	180	±5	±8	11	10 KG/cm ²	LM
3EHW470070P0002	265	330	±10	±20	2 X 5	"	K

EXP. SLEEVES

ALL DIMENSION ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य – सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	पदांक GRADE NO.	स1 N1	स2 N2	स3 N3	स4 N4	स5 N5	स6 N6	स7 N7	स8 N8	स9 N9	स10 N10	स11 N11	स12 N12
सतह – रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μ m	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित आद्यक्षर DATED INITIAL

अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN	
दिनांक DATE		वर्णन DESCRIPTION	PIPE EXP. SLEEVS AND BENDS
रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-11/0253/Q/R
संदर्भ / REF. ALT.-		परिवर्तन संख्या ALTERATION NO.	पुर्ण SHEET
			17 OF 23
			A3

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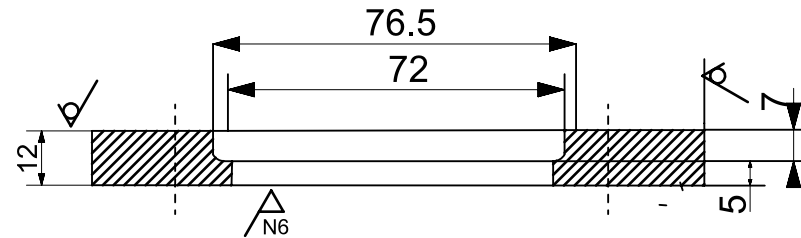
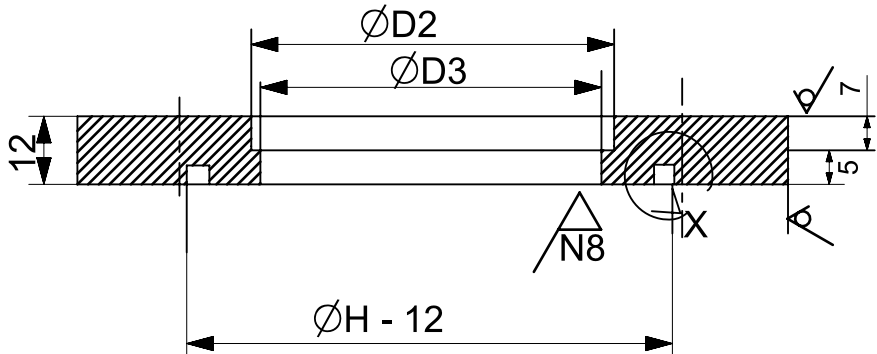
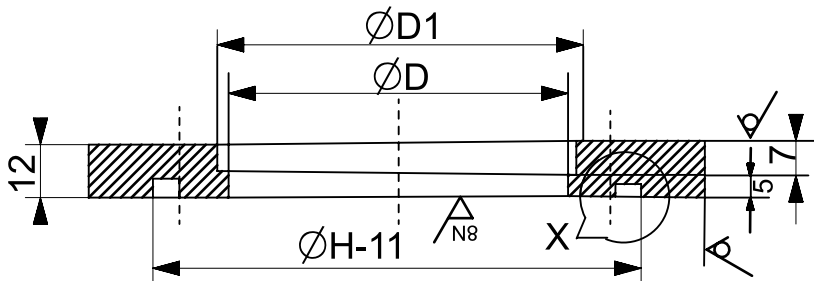
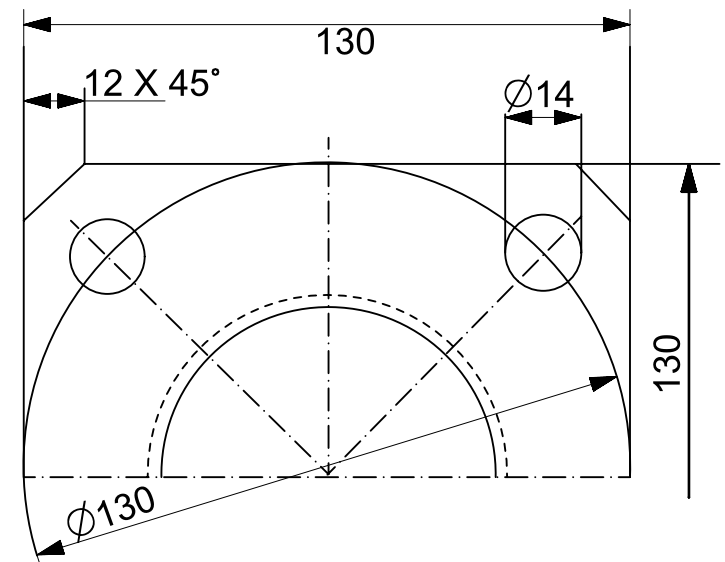
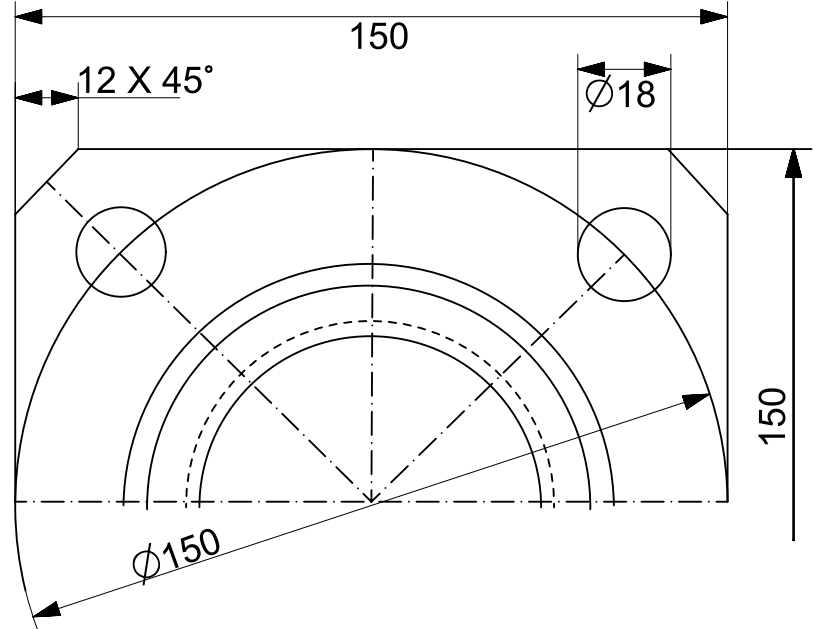
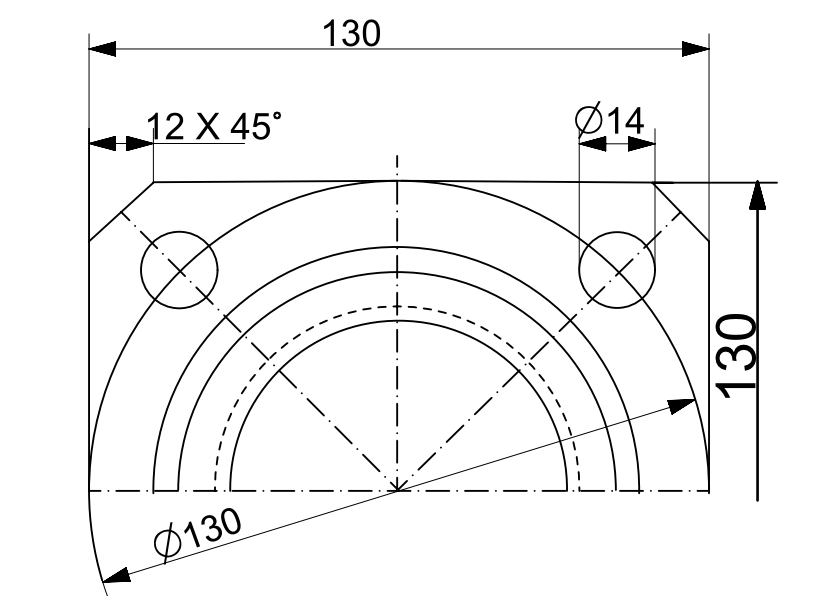
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DETAIL OF ' X '

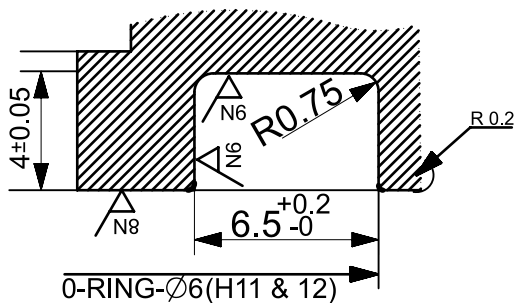


ABB IDENT. NO	D3	D2	PIPE DIA	GROVE ØH12
HBTB416429P1003	72	76.5	Ø76.1	Ø104


ABB IDENT. NO	D	D1	PIPE DIA	GROVE ØH11
HBTB416429P1002	72	76.5	Ø76.1	Ø104
HBTB416429P1102	85	89.5	Ø88.9	Ø110

HBTB416429 P1004

ALL DIMENSION ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा मा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12	
Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250	
Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50	
चिन्ह SYMBOL													

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित आधार DATED INITIAL

अधिकृत DGN		 चित्तारंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जॉचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN	
दिनांक DATE		वर्णन DESCRIPTION	
रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	
संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.	
		पृष्ठ SHEET	18 OF 23
			A3

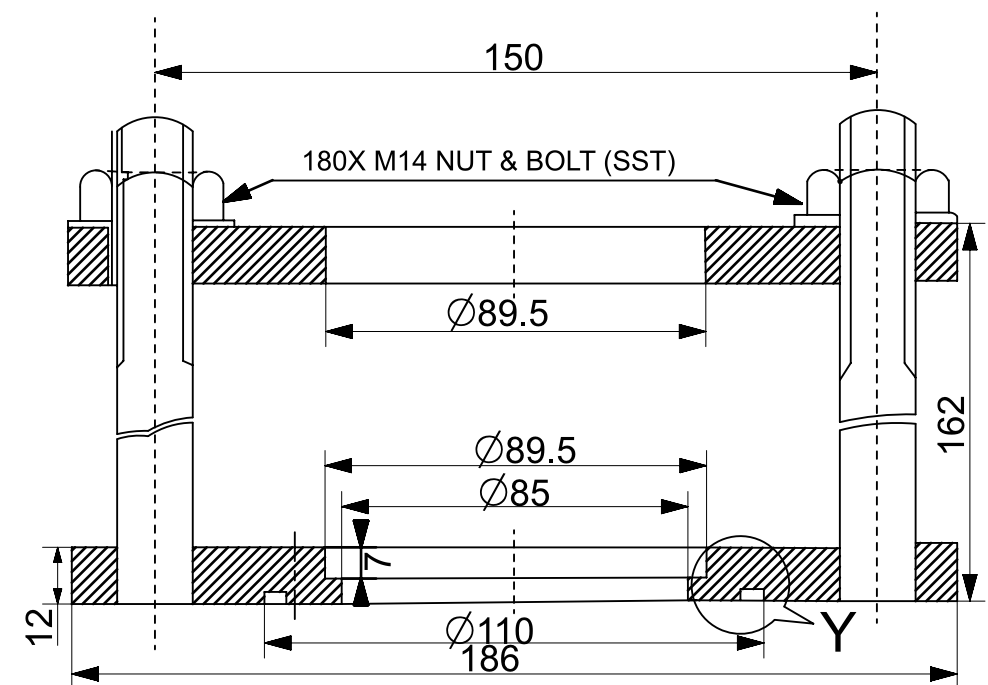
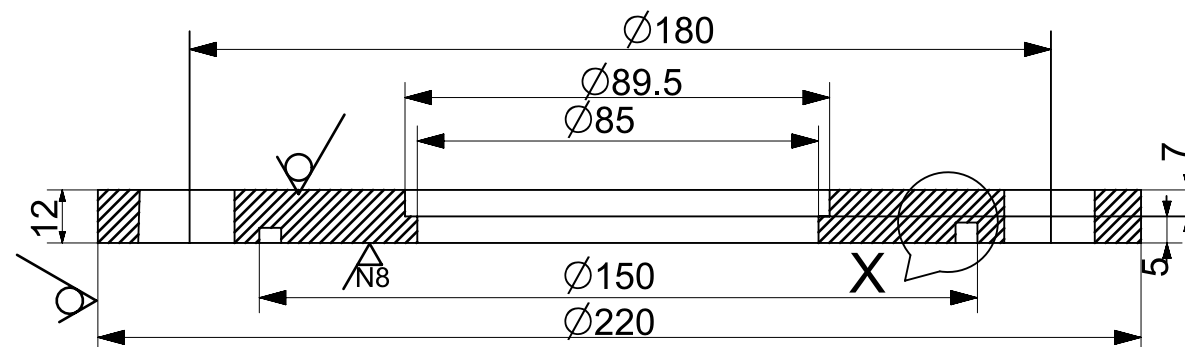
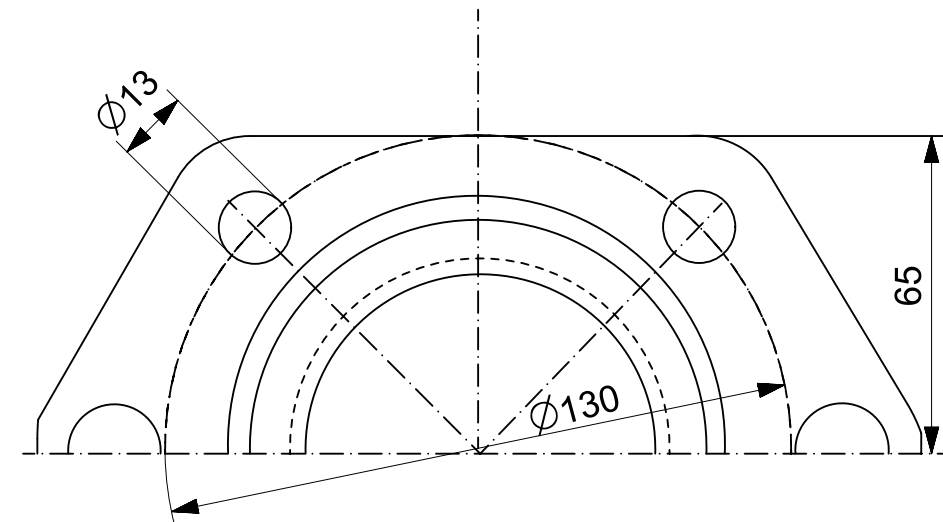
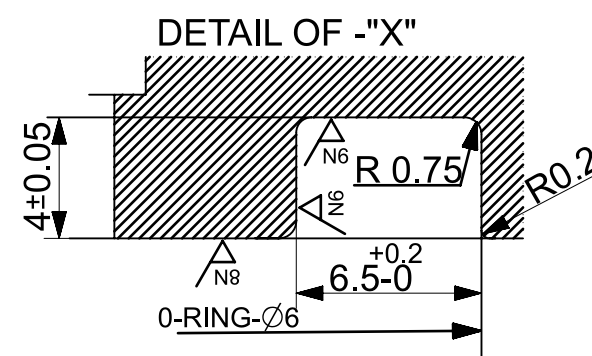
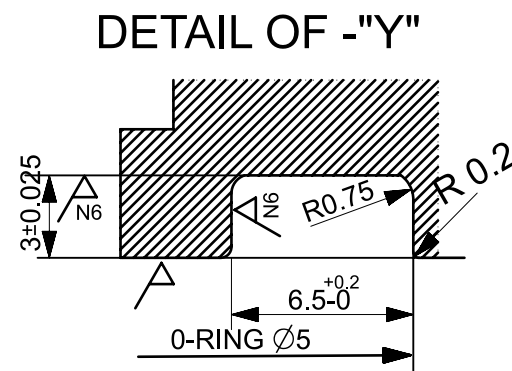


ABB IDENT NO	D	D1	PIPE DIA	NAME OF THE PIPE
HBTB41642 9P1007	72	76.5	Ø76.1	B.C.G
„ P1107	85	89.5	Ø88.1	L.M.




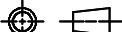
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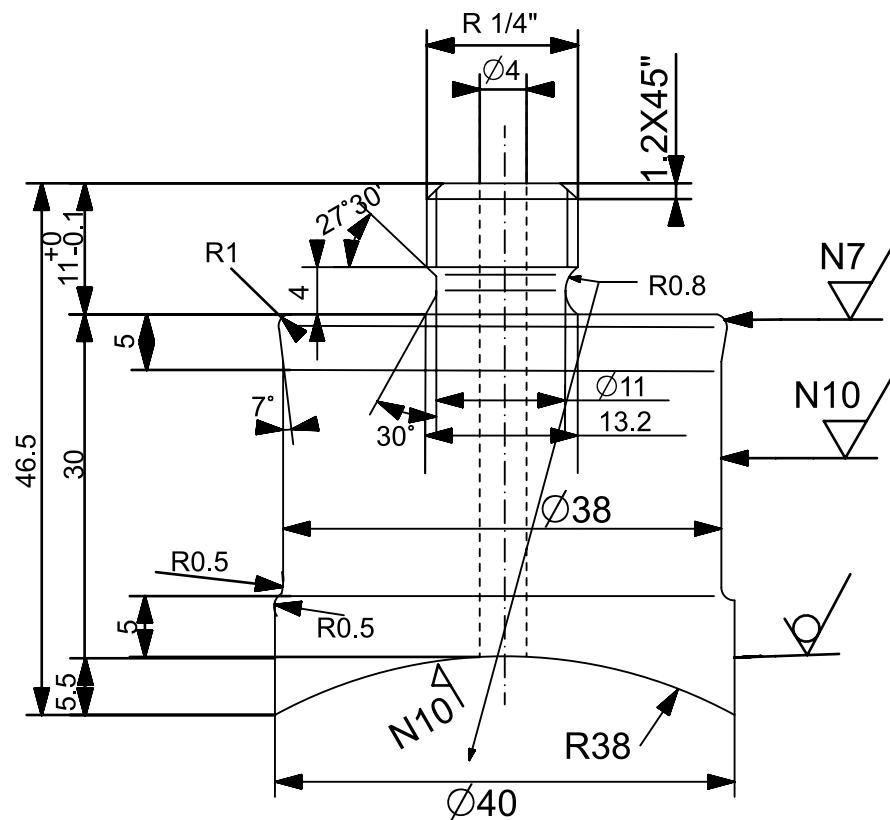
3EHP330248P0003

<div>धातु-वेल्डन चिन्ह</div> <div>भा. मा. : 813 / अ. मा. सं. :2553</div> <div>WELDING SYMBOLS TO IS:813 / ISO:2553</div>	अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768												TOL.
	UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												C.L.S.
	पदांक	सं1	सं2	सं3	सं4	सं5	सं6	सं7	सं8	सं9	सं10	सं11	सं12
	GRADE NO.	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
<div>सतह - रक्षता का मान</div> <div>भा. मा. 3073 / अ. मा. सं. 1302</div> <div>SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302</div>	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												

ALL DIMENSION ARE IN MM

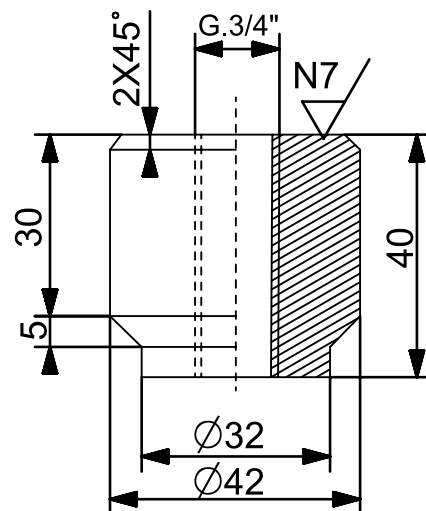
परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांक DATE आरम्भ INITIAL
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अभिलेखित DGN		 <div>चितरंजन रेलइंजन कारखाना</div> <div>CHITTARANJAN LOCOMOTIVE WORKS, INDIA</div>	
जॉचा व.अ.अ. CHD SSE			प्रति वार कि. ग्रा. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		विशिष्ट SPECN	
अनुमोदित स.यु.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION	PIPE FLANGES
दिनांक DATE		आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-13/0253/Q /R
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET
संदर्भ / REF.	ALT-		19 OF 23
			A3



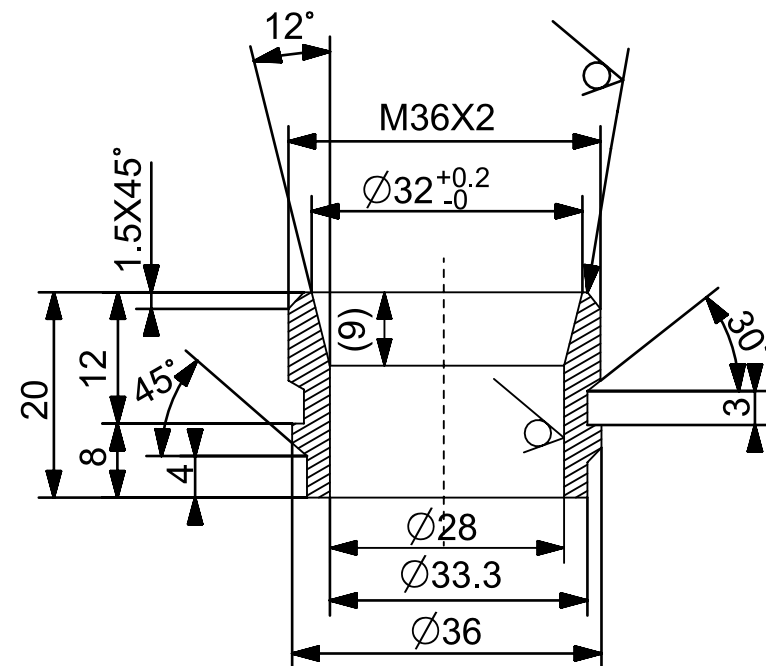
UNION- R1/4"

3EHP431288P0001



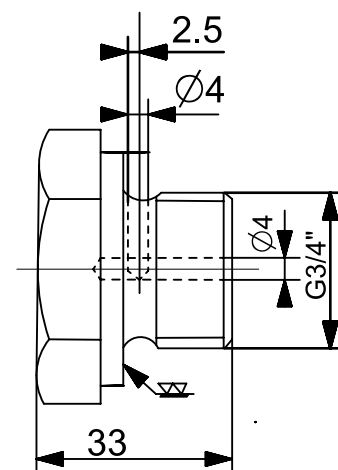
FITTING- G3/4"

HBTB416442P0104



THREADED INSERT M36X2






HBTB415394P0010




SCREW PLUG

HBTB430968P0001

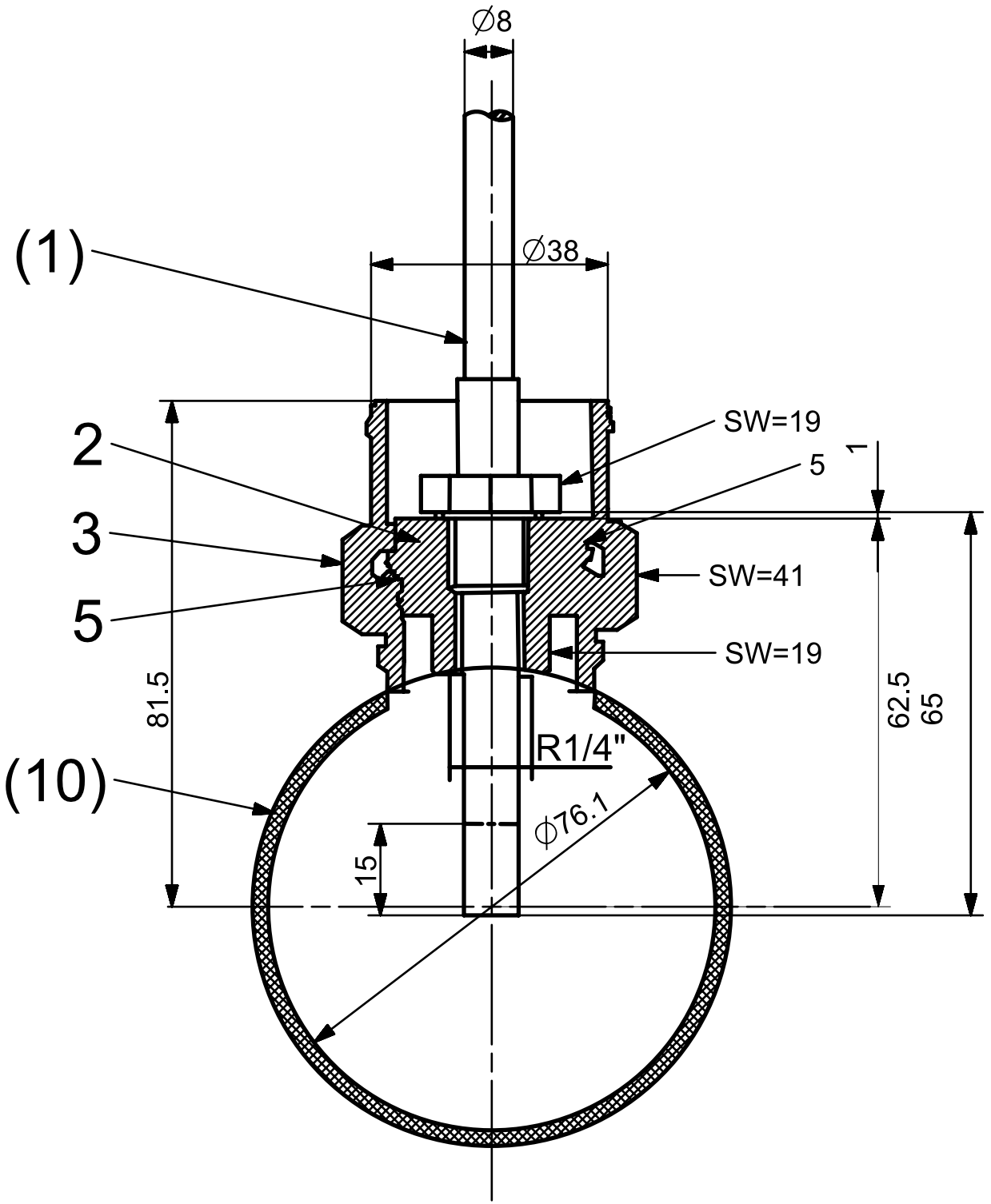
ALL DIMENSION ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
सतह - रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												

परिवर्तन संख्या	प्राधिकार	वर्णन	DESCRIPTION	दिनांक
ALT. NO.	AUTHY			DATED
				INITIAL

अधिकल्पित DGN		 <div> <div>चितरंजन रेलइंजन कारखाना</div> <div>CHITTARANJAN LOCOMOTIVE WORKS, INDIA</div> </div>		
जॉचा व.अ.अ. CHD SSE			पदार्थ MATL	प्रति भार कि. ग्राम. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE			विशिष्ट SPECN	
अनुमोदित उ.यु.वि.अ. APPROVED DYCEE			वर्णन DESCRIPTION	PIPE FITTINGS
दिनांक DATE			आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-14/0253 /Q /R
रैखिक अनुपात SCALE	1:1			
संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET	20 OF 23
				A3

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POSITION NO.2.
MATERIAL-CRMOS17N
STANDARD-DIN 670.81-10
SSAISI Grade 314/316

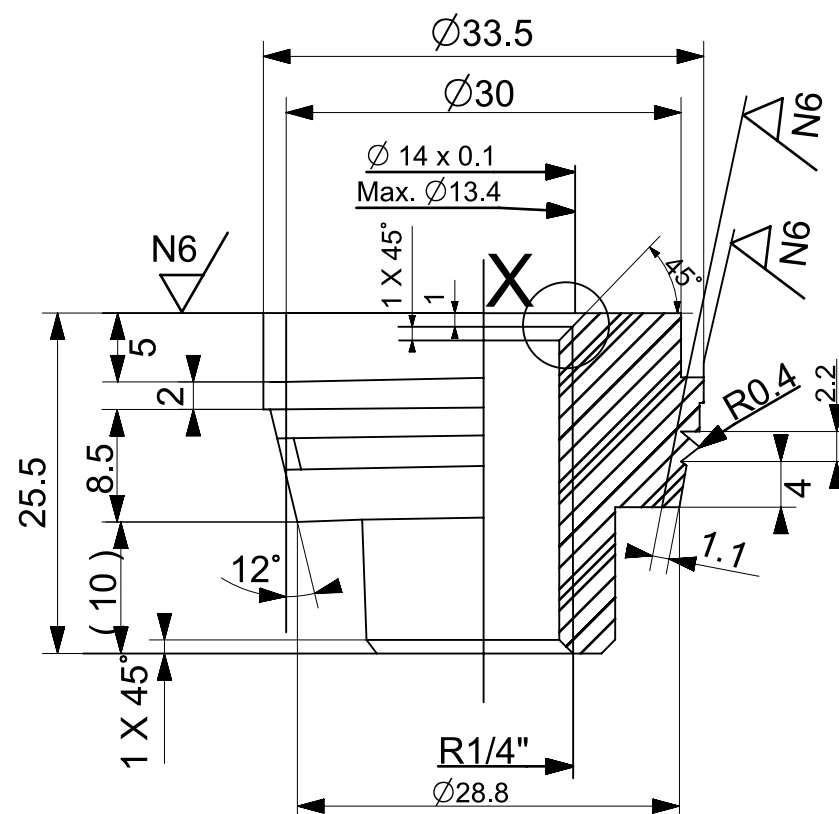
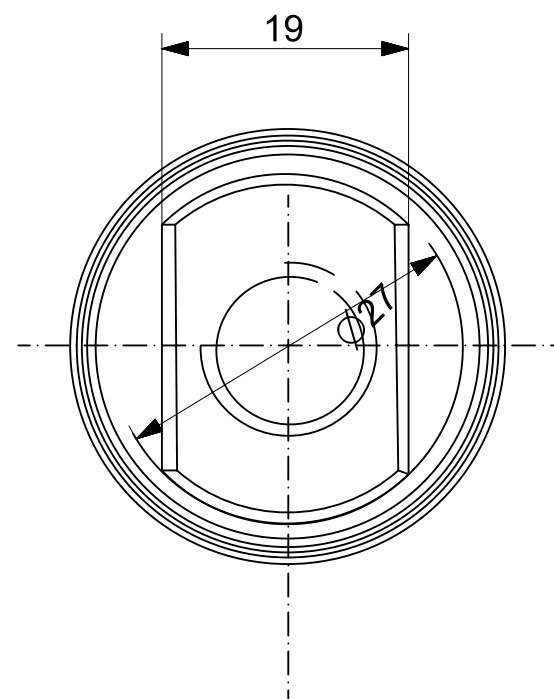
POSITION.NO.3.
MATERIAL-HEX BAR 41-X12
CROMOS17N. STANDARD DIN.176.72-03.81-10
SSAISI Grade 314/316

POSITION.NO.5
MATERIAL-VITON RUBBER
HARDNESS.60±5 SHORE
QTY. PER SENSOR 04 Nos
(LOOSE SUPPLY)
TO BE PACKED SEPARATELY

ALL DIMENSION ARE IN MM






धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553		अनिर्दिष्ट सद्य – सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768										TOL. CLS.					
		पदांक GRADE NO.	स1 N1	स2 N2	स3 N3	स4 N4	स5 N5	स6 N6	स7 N7	स8 N8	स9 N9	स10 N10	स11 N11	स12 N12			
सतह – रुक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302		Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250			
		Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50			
		चिन्ह SYMBOL															
		परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY		वर्णन DESCRIPTION				दिनांकित आधार DATED INITIAL		संदर्भ / REF. ALT-		परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	21 OF 23	A3

अधिकृत DGN		 चिततरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE		पदार्थ MTRL	प्रति भार कि. ग्रा. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		विशिष्ट SPECN	
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION	MOUNTING T-SENSOR
दिनांक DATE		आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-15/0253/Q /R
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	
		पृष्ठ SHEET	21 OF 23
		परिवर्तन संख्या ALTERATION NO.	A3


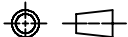


Outer Dia with 'O' ring in the fastening cone will $31.5^{+0}_{-0.15}$

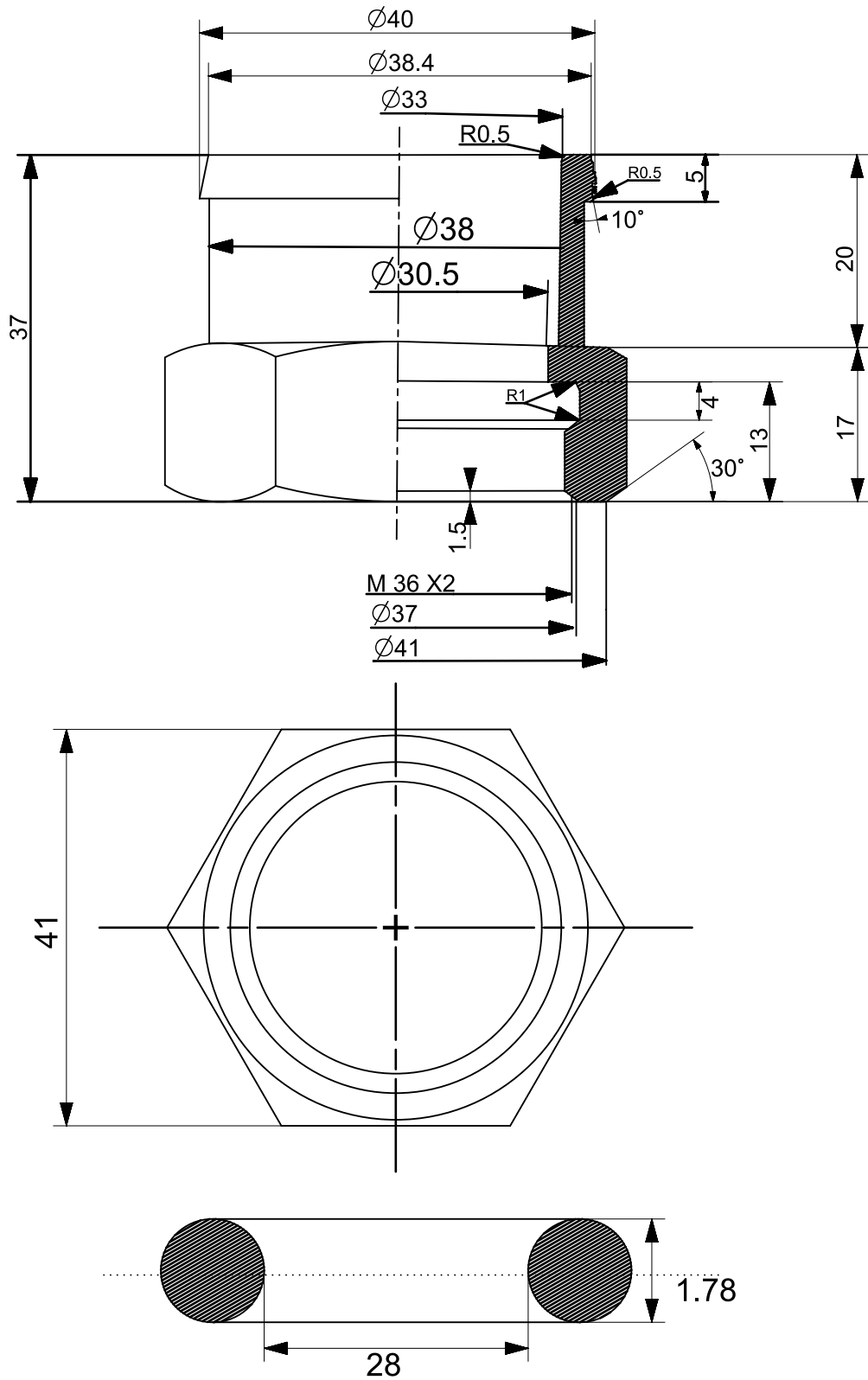
ALL DIMENSION ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
सतह - रक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.6	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
	Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												







परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांक आद्यस DATED INITIAL
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अभिकल्पित DGN		 <div> <div>चित्तरंजन रेलइंजन कारखाना</div> <div>CHITTARANJAN LOCOMOTIVE WORKS, INDIA</div> </div>		
जॉचा व.अ.अ. CHD SSE			पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE			विशिष्ट SPECN	
अनुमोदित उ.यु.वि.अ. APPROVED DYCEE			वर्णन DESCRIPTION	FASTENING CONE
दिनांक DATE			आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-16/0253 /Q/R
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	पर्ण SHEET	22 OF 23
संदर्भ / REF. ALT-				A3

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ALL DIMENSION ARE IN MM

						CHD SSE				पदार्थः MATL		प्रति भार कि. ग्रा. WT. EACH IN KG					
परिवर्तन संख्या ALT.NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION				दिनांकित बाह्य DATED INITIAL		समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		विशिष्ट SPECN							
सतह - रूक्षता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302		अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768 धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553				TOL. CLS.		अनुमोदित उ.पु.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION		GLAND NUT					
पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12	दिनांक DATE	रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-17/0253/Q/R
Rz	0.16-0.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250	संदर्भ / REF.				
Ra μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50	ALT. -				
चिन्ह SYMBOL													परिवर्तन संख्या ALTERATION. NO.		पर्ण SHEET	23 OF 23	A4