

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

**Specification No : CLW/ES/3/0253/~~R~~ **S****

**Enclosures**

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

**ISSUED BY**

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

<b>Prepared By</b>	<b>Checked By</b>	<b>Approved By</b>
SSE-Design	SEE-Design	Dy.CEE/D-I

**ALTERATION RECORD SHEET**

Amendment Number	Date of Amendment	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 B1as 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 <sup>2</sup> 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 ternp. 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/-
14.	03-01-2011	N	SS Hardware grade 304 to be supplied along with metallic pipe from the approved CLW vendors.	Sd/-

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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.	02-07-2024	R	In the testing Clause No. 6.0,testing clause for leakage testof Bellows included as Clause No. 6.8.at page no.7 of 9 Nos of Hardwares have been revised in Clause no.4.0 of Scope of Supply at page .no.6 of 9	Sd/-
19.		S	i) Quantity of Hex Nut 0.8 M12 has been increased from 12 nos to 27 nos. ii) Size of Washer A has been changed from 17/20 to 17/30. iii) Hex Screw M12x45 of quantity 15 nos is added. All above is incorporated in scope of supply Cl.No.4.0 at Page 6 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 AND MOUNTING T- SENSOR FOR MAIN TRANSFORMER OF THREE PHASE ELECTRIC LOCOMOTIVES

## 2.0 SCOPE

The specification 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 No	Description	Qty. / Loco	Drg. No.	Material
1.	Pipe A	1	CLW/ES/3/SK-1/0253	SST Gr 304
2.	Pipe B	1	CLW/ES/3/SK-2/0253	SST Gr 304
3.	Pipe B1	1	CLW/ES/3/SK-3/0253	SST Gr 304
4.	Pipe C	1	CLW/ES/3/SK-4/0253	SST Gr 304
5.	Pipe D	1	CLW/ES/3/SK-5/0253	SST Gr 304
6.	Pipe F	1	CLW/ES/3/SK-6/0253	SST Gr 304
7.	Pipe G	1	CLW/ES/3/SK-7/0253	SST Gr 304
9.	HEX Screw	16 nos	M12x35	SST
11.	SPRING WASHER	32 nos	M12	SST
12.	HEX NUT	<del>12 nos</del> 27 nos	0.8 M12	SST

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13.	HEX Screw	32 nos	M16x60	SST
15.	WASHER A	64 nos	17/20 17/30	SST
16.	WASHER A	32 nos	13/24	SST
17.	SPRING WASHER	32 nos	M16	SST
18.	HEX NUT	32 nos	OD M16	SST
19.	HEX Screw	15 nos	M12x45	SST

#### 5.0 Documents to be supplied by the Supplier

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

- i) Maintenance Manual
- ii) Detail Drawing

#### 6.0 TESTs

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

SI.No	Test Description	Type Test	Routine Test
6.1	Physical Verification, Quality of Workmanship, and Dimensional measurement as per specification and drawing	Y	Y
6.2	Material test certificate (sealed by authorized representative of CLW/BLW for the oil pipes.	Y	Y
6.3	Leakage Test : Oil pipes with all sensor points be blocked and pressured with air at a pressure of 4Kg / cm <sup>2</sup> for half an hour. The temperature of water shall be 85° C. Pipes dipped in water to check any leakage.	Y	Y
6.4	<b>Sensor points checking</b> :the dummysensor shall be provided on the mounting points and the pipe shall be pressurized at a pressure of 4 Kg/cm <sup>2</sup> by air and with the help of soap bubble the leakage test may be performed.	Y	Y
6.5	Die Penetration Test (DPT TEST& pressure test should be done in 100%)	Y	Y
6.6	All the threads should be checked using go and not go gauge.	Y	Y
6.7	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
6.8	Leakage Test on Bellow : Bellow to be blocked and pressured with air at a pressure of 10Kg /cm <sup>2</sup> for half an hour. The temperature of water shall be 85°C. Bellows dipped in water to check any leakage.	Y	No

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## **7.0 MOUNTING T-SENSOR R1/4"**

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

<b>FASTENING CONE</b> ABB ID No- 3EHP431131P0001 POSITION NO-2 MATERIAL- CRMOS 17N STANDARD-DIN-670.81-10 SS AISI304 Grade 314/316	<b>GLAND NUT M-36 X 2</b> 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	<b>ORM 0280-15* G60-015</b> ABB ID No- 3EHN424203P0300 POSITION NO-5. MATERIAL: VITON RUBBER HARDNESS- 60 ± 5 (SHORE)
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## **8.0 Quality Assurance**

Quality assurance should be as per ISO 9000.

## **9.0 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.

## **10.0 HARDWARE**

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

## **11.0 LABELING/ MARKING : -**

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

## **12.0 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:

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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.

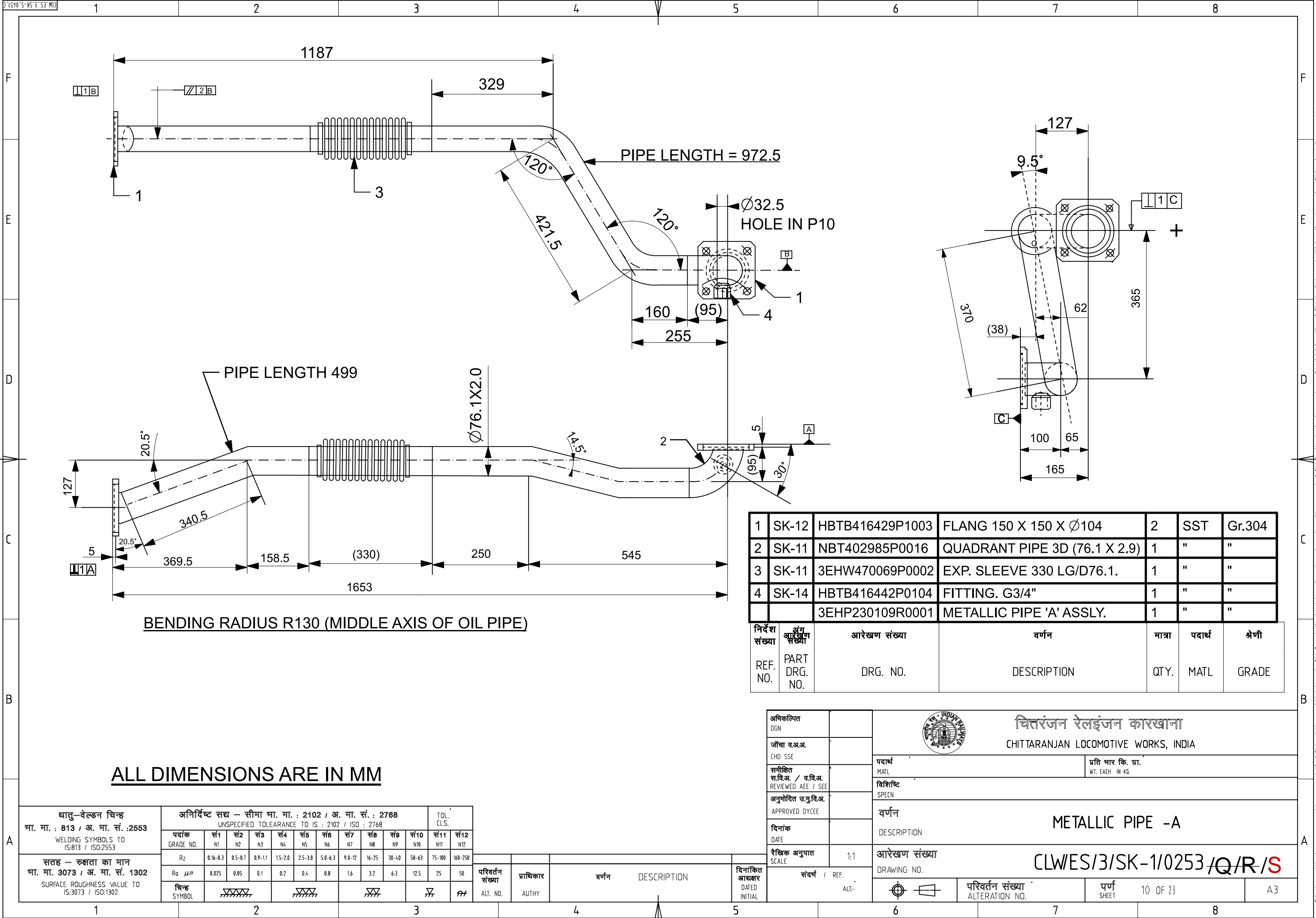
5.2.4 During the Welding process the Oil Pipes have to filled with forming gas e.g Carbon Acid 3.0 to total 35 gas.

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 90° C
- Drying at 90° 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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BENDING RADIUS R130 (MIDDLE AXIS OF OIL PIPE)

1	SK-12	HBTB416429P1003	FLANG 150 X 150 X Ø104	2	SST	Gr.304
2	SK-11	NBT402985P0016	QUADRANT PIPE 3D (76.1 X 2.9)	1	"	"
3	SK-11	3EHW470069P0002	EXP. SLEEVE 330 LG/D76.1.	1	"	"
4	SK-14	HBTB416442P0104	FITTING. G3/4"	1	"	"
		3EHP230109R0001	METALLIC PIPE 'A' ASSLY.	1	"	"

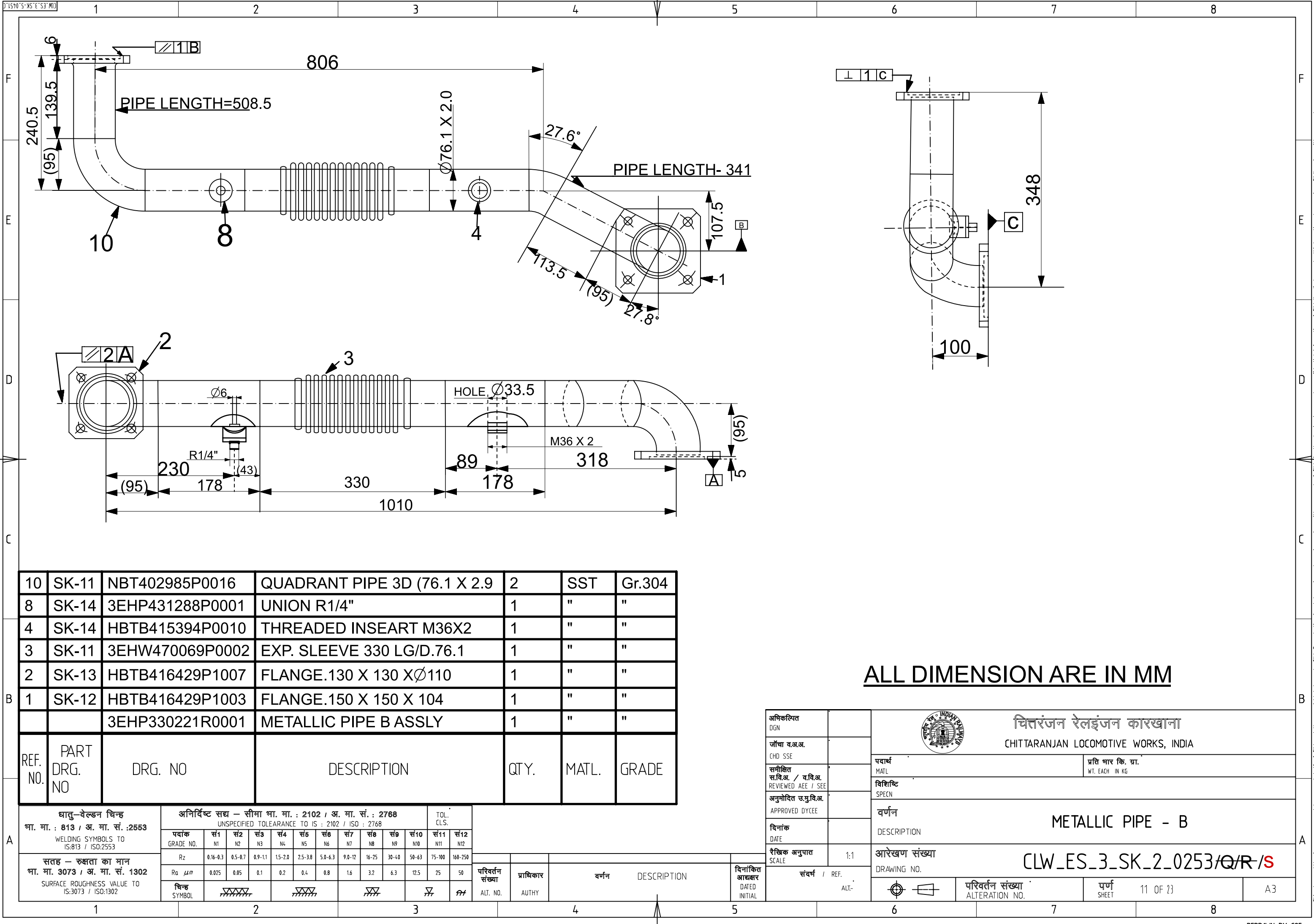
निर्देश संख्या	आरेखण संख्या	वर्णन	मात्रा	पदार्थ	श्रेणी
REF. NO.	PART DRG. NO.	DRG. NO.	DESCRIPTION	QTY.	MATL GRADE

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.	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 $\mu m$	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	प्राधिकार	वर्णन	DESCRIPTION	दिनांकित आधार
ALT. NO.	AUTHY			DATED INITIAL

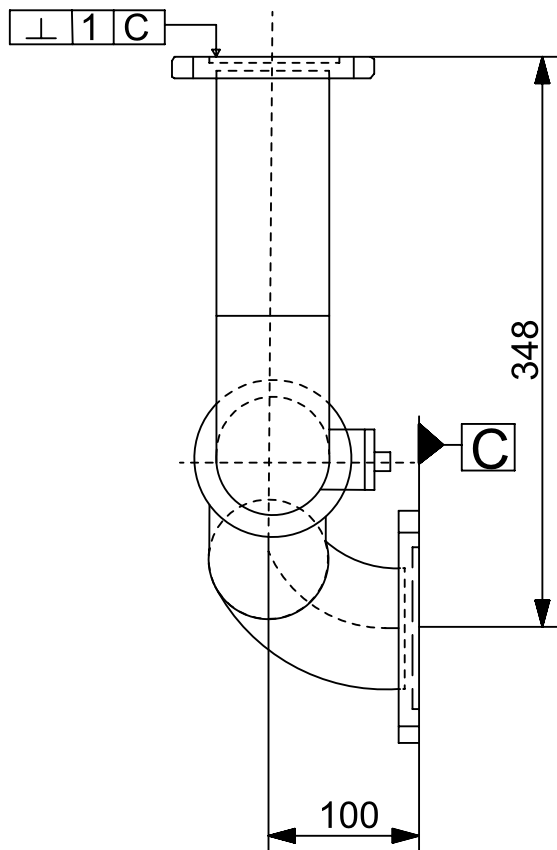
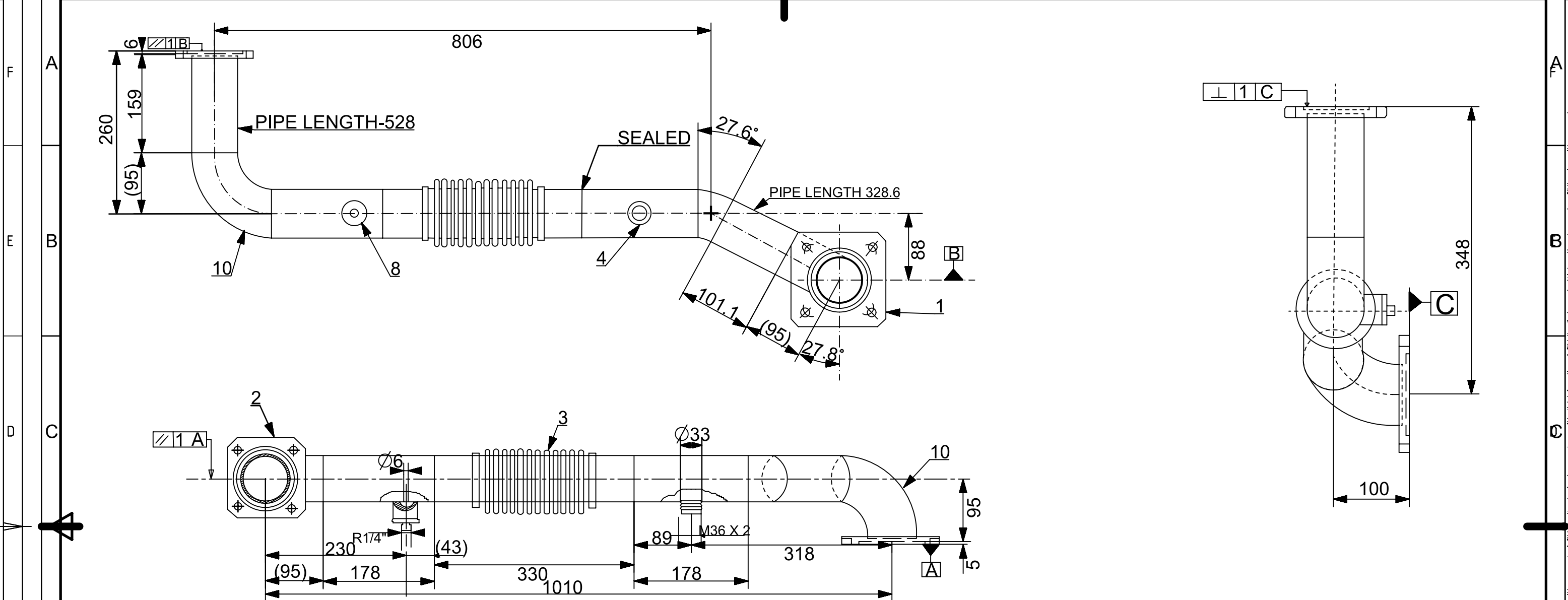
अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL	प्रति भार कि. ग्रा. WT. EACH IN KG
अनुमोदित च.यु.वि.अ. APPROVED DYCEE		विशिष्ट SPECN	
दिनांक DATE		वर्णन DESCRIPTION	METALLIC PIPE -A
रैखिक अनुपात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



ALL DIMENSION ARE IN MM

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 INSEART M36X2	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 X 104	1	"	"
		3EHP330221R0001	METALLIC PIPE B 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 $\mu m$	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	चिन्ह SYMBOL												
	</												



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	"	"
		3EHP330221R0002	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 $\mu$ 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

चिह्न

INDIAN RAILWAYS

चित्तरंजन रेलइंजन कारखाना

CHITTARANJAN LOCOMOTIVE WORKS, INDIA

पदार्थ

MATL

प्रति भार कि. ग्रा.

WT. EACH IN KG

वर्णन

DESCRIPTION

आरेखण संख्या

DRAWING NO.

परिवर्तन संख्या

ALTERATION NO.

पृष्ठ

SHEET

12 OF 23

A3

1

2

3

4

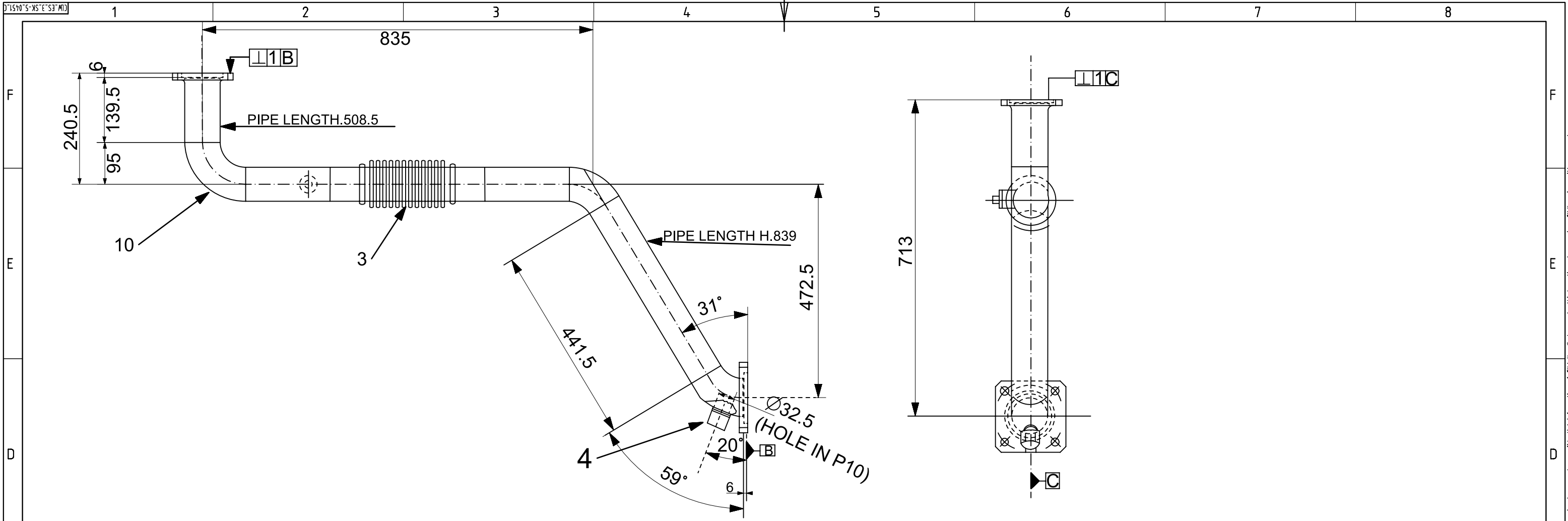
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6

7

8





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

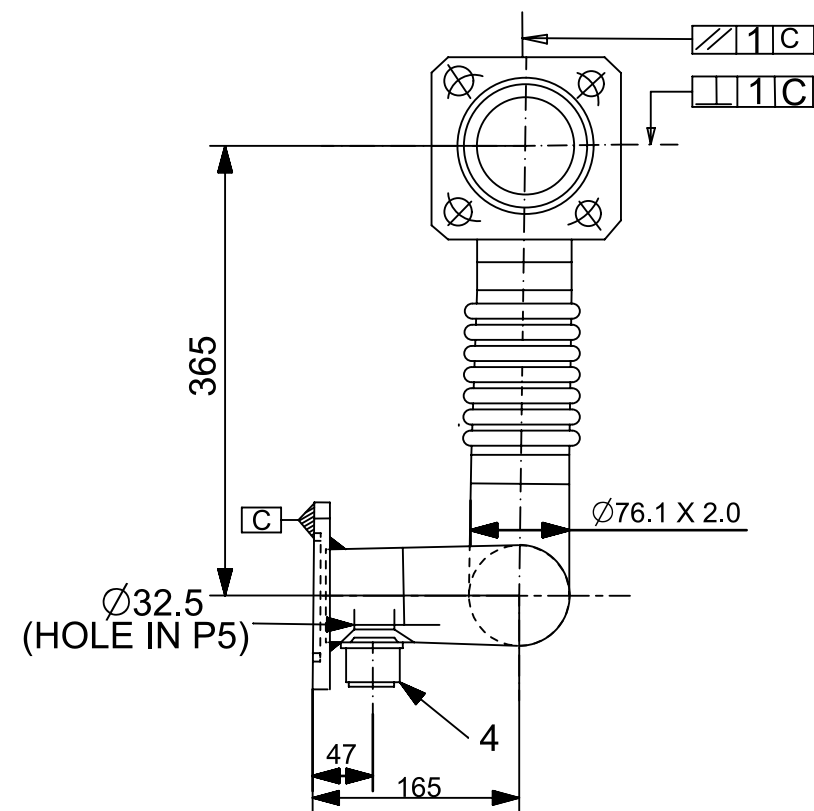
ALL DIMENSION ARE IN MM

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 $\mu$ 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												






परिवर्तन संख्या	प्राधिकार	वर्णन	DESCRIPTION
ALT. NO.	AUTHY		

दिनांक	SCALE	संदर्भ / REF.
DATE	1:1	ALT-

अधिकृत DGN			चित्तरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
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		वर्णन DESCRIPTION	
अनुमोदित च.यु.वि.अ. APPROVED DYCEE	आरेखन संख्या DRAWING NO.		परिवर्तन संख्या ALTERATION NO.	
दिनांक DATE	परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	13 OF 23
रैखिक अनुपात SCALE	परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	13 OF 23

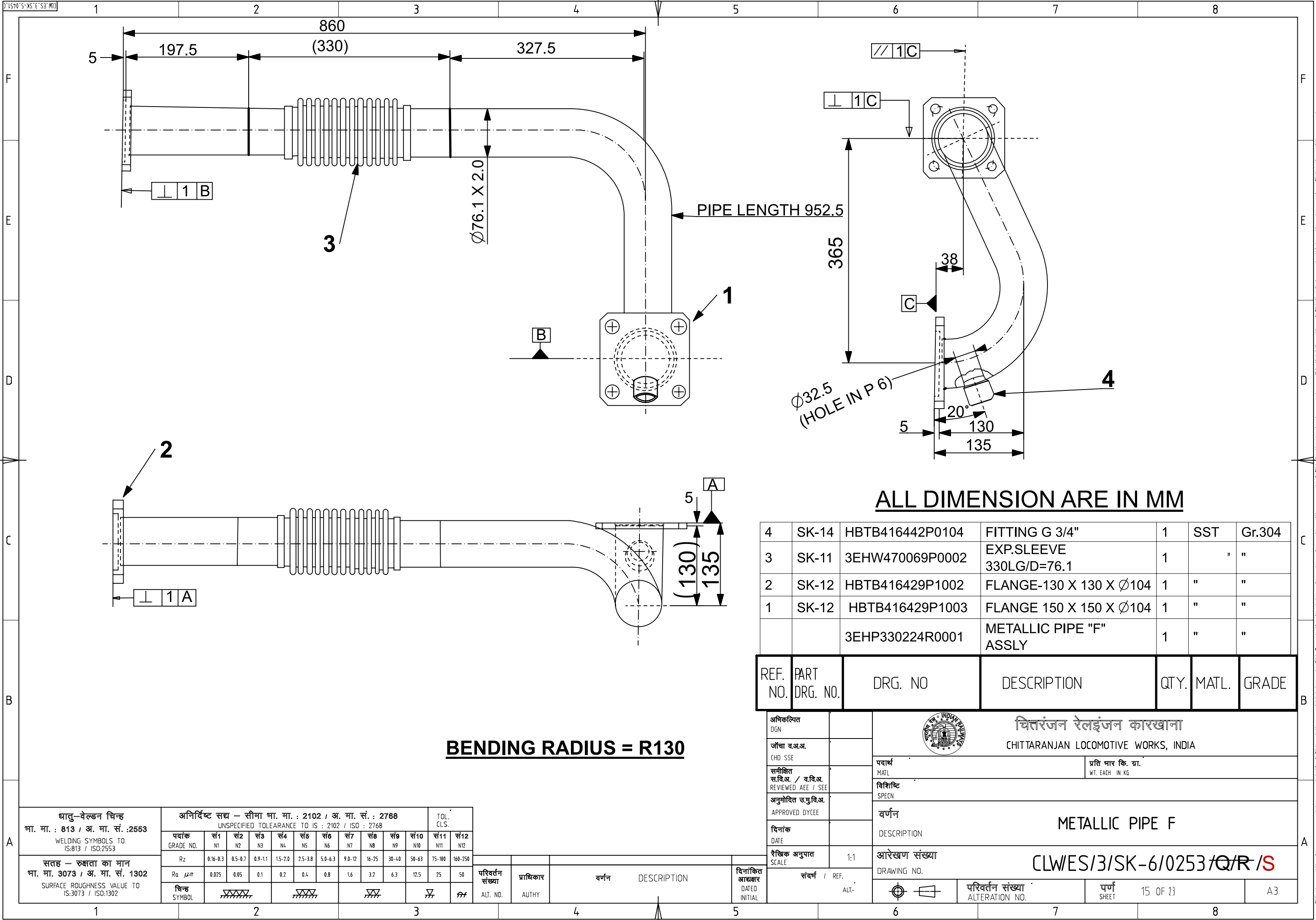


10	SK-11	NBT402985P0516	QUADRANT PIPE 3D (76.1 X 2.9	3	SST	Gr 304
4	SK-14	HBTB416442P0104	FITTING-G3/4"	1	"	"
3	SK-11	3EHW470069P0001	EXP.SLEEVE 130LG/D-76.1	1	"	"
1	SK-12	HBTB416429P1003	FLANGE 150 X150 XØ104	2	"	"
		3EHP330222R0001	METALLIC PIPE "D" ASSLY	1	"	"
REF NO	PART DRG. NO.	DRG. NO.	DESCRIPTION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

<b>धातु-वेल्डिंग चिन्ह</b> <b>भा. मा. : 813 / अ. मा. सं. :2553</b> WELDING SYMBOLS TO IS:813 / ISO:2553	<b>अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768</b> UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768											TOL. CLS.	
	<b>पदांक</b> GRADE NO.	<b>स1</b> N1	<b>स2</b> N2	<b>स3</b> N3	<b>स4</b> N4	<b>स5</b> N5	<b>स6</b> N6	<b>स7</b> N7	<b>स8</b> N8	<b>स9</b> N9	<b>स10</b> N10	<b>स11</b> N11	<b>स12</b> N12
<b>सतह - रूक्षता का मान</b> <b>भा. मा. 3073 / अ. मा. सं. 1302</b> 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 $\mu m$	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
	<b>चिन्ह</b> SYMBOL												

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0°15'0" S - 95°45'0" E S3° M10








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	"	"

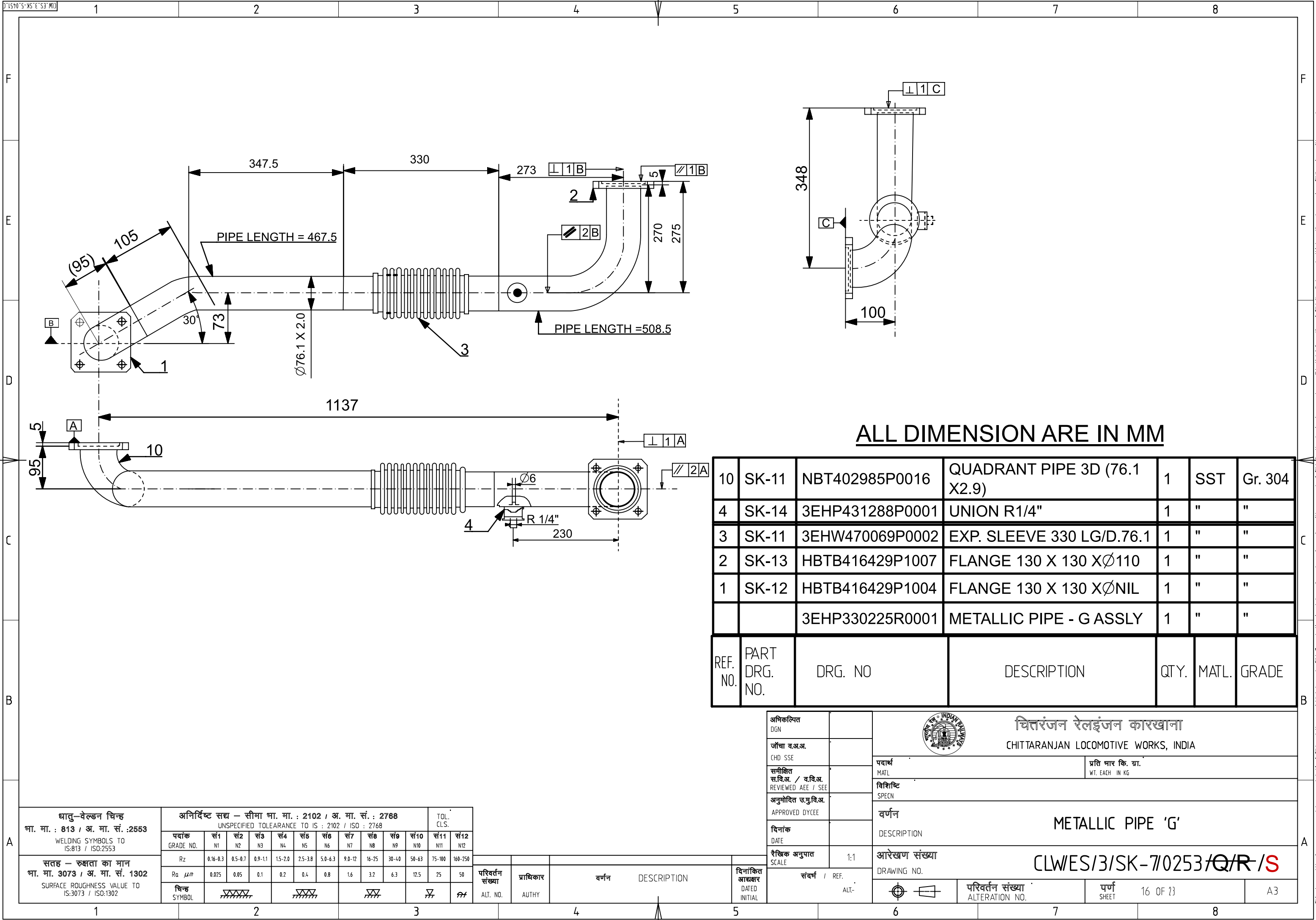
REF. NO.	PART DRG. NO.	DRG. NO	DESCRIPTION	QTY.	MATL.	GRADE
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अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA				
जॉचा व.अ.अ. CHD SSE						
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATL		प्रति भार कि. ग्रा. WT.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

BENDING RADIUS = R130

धातु-वेल्डिंग 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 $\mu$ m	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 ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित DATED INITIAL
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D:\S70\5-WS-E\S3\MD

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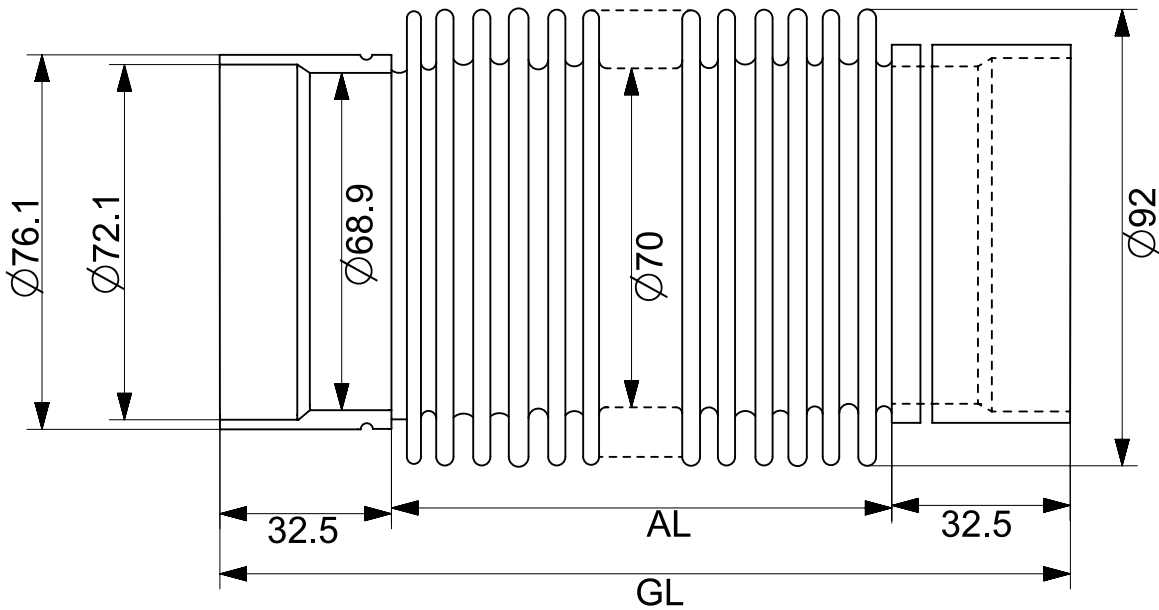
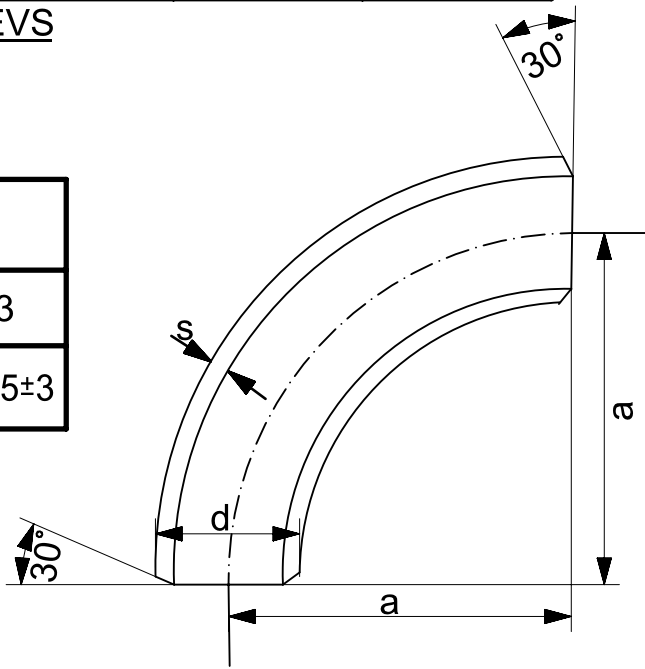


ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470069P0002	265	330	±10	±20	2 X 6	10KG/cm <sup>2</sup>	A,B,C,F,G
3EHW470069P0001	115	180	±5	±8	11	"	D

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

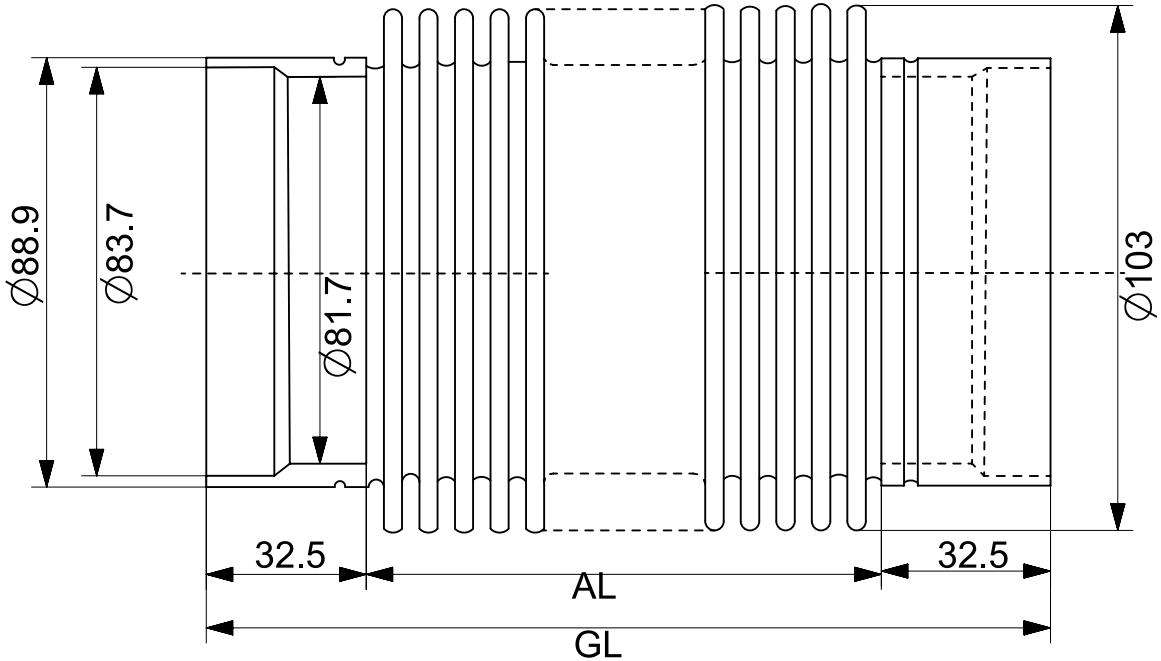


ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO. OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470070P0001	115	180	±5	±8	11	10 KG/cm <sup>2</sup>	LM
3EHW470070P0002	265	330	±10	±20	2 X 5	"	K

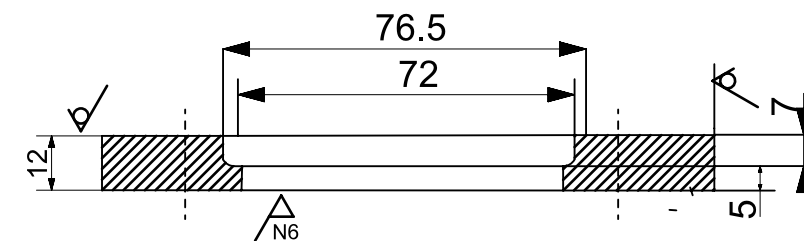
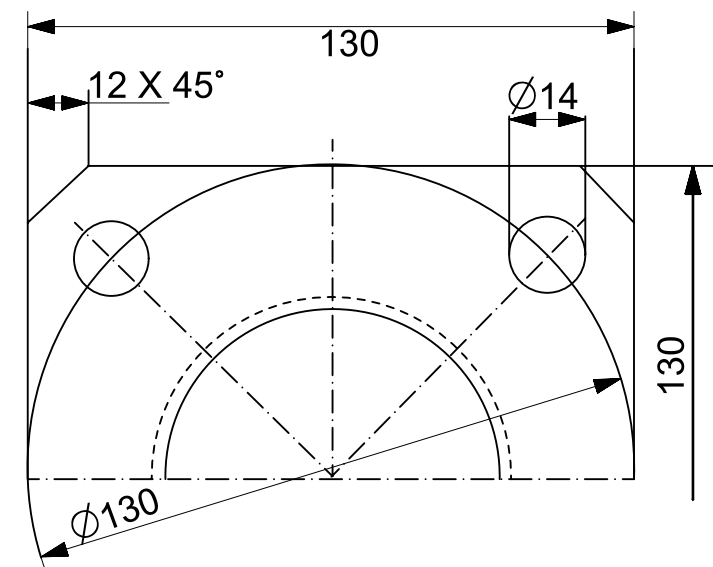
EXP. SLEEVES

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 $\mu$ 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. SLEEVES AND BENDS
रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-11/0253/Q/R/S
संदर्भ / REF. ALT.-		परिवर्तन संख्या ALTERATION NO.	पूर्ण SHEET
			17 OF 23
			A3



4±0.05

N6

N6

R0.75

R0.2

6.5<sup>+0.2</sup><sub>-0</sub>

0-RING-Ø6(H11 & 12)


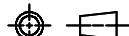
N8

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

HBTB416429 P1004

ALL DIMENSION ARE IN MM

परिवर्तन संख्या ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांक आरम्भ DATED INITIAL
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अधिकारित DGN			चित्तरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
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 स.मु.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION	PIPE FLANGES	
दिनांक DATE		आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-12/0253/Q/R/S	
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	पर्ण SHEET	18 OF 23
संदर्भ / REF.	ALT-			A3

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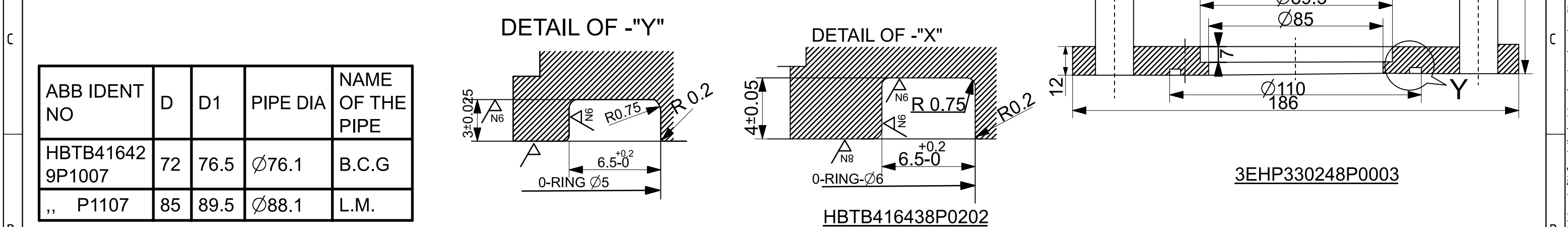
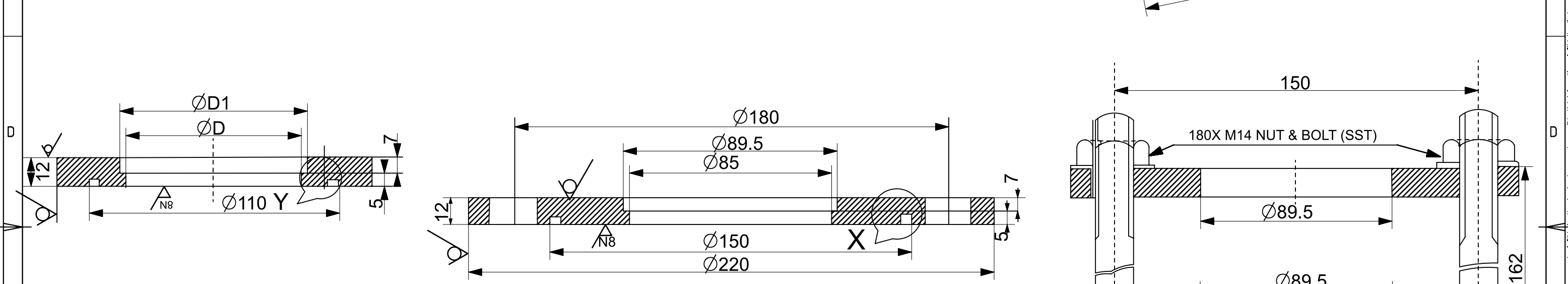
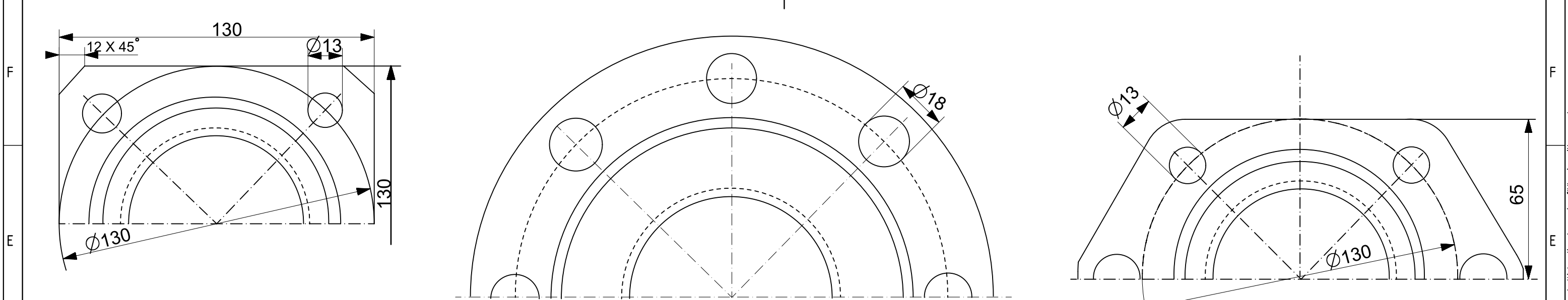
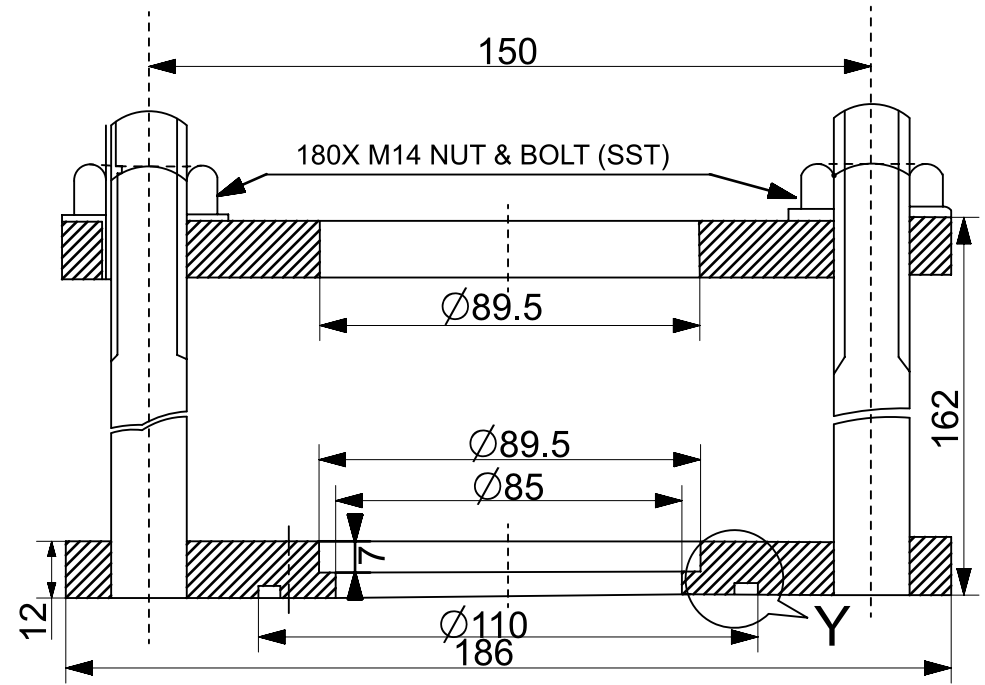
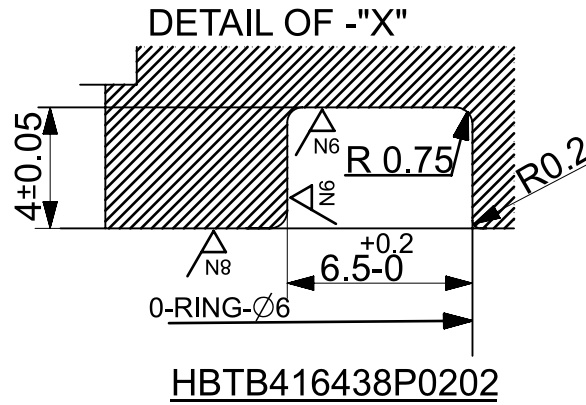
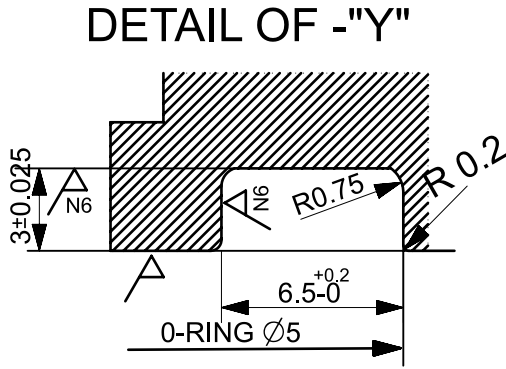


ABB IDENT NO	D	D1	PIPE DIA	NAME OF THE PIPE
HBTB41642 9P1007	72	76.5	Ø76.1	B.C.G
„ P1107	85	89.5	Ø88.1	L.M.



3EHP330248P0003

घातु-वेल्डन चिन्ह  
भा. मा. : 813 / अ. मा. सं. :2553  
WELDING SYMBOLS TO  
IS:813 / ISO:2553

सतह – रुक्षता 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												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 $\mu$ 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 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.यु.वि.अ.  
APPROVED DYCEE

दिनांक  
DATE

रैखिक अनुपात  
SCALE

चिततरंजन रेलइंजन कारखाना  
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

पदार्थ  
MATL

विशिष्ट  
SPECN

वर्णन  
DESCRIPTION

आरेखण संख्या  
DRAWING NO.

प्रति भार कि. ग्रा.  
WT. EACH IN KG

परिवर्तन संख्या  
ALTERATION NO.

पुर्ण  
SHEET

19 OF 23

A3

ALL DIMENSION ARE IN MM

CLW/ES/3/SK-13/0253/Q/R/S

परिवर्तन संख्या  
ALTERATION NO.पुर्ण  
SHEET

19 OF 23

A3

DT570-S-WS-E-S3-MD

F

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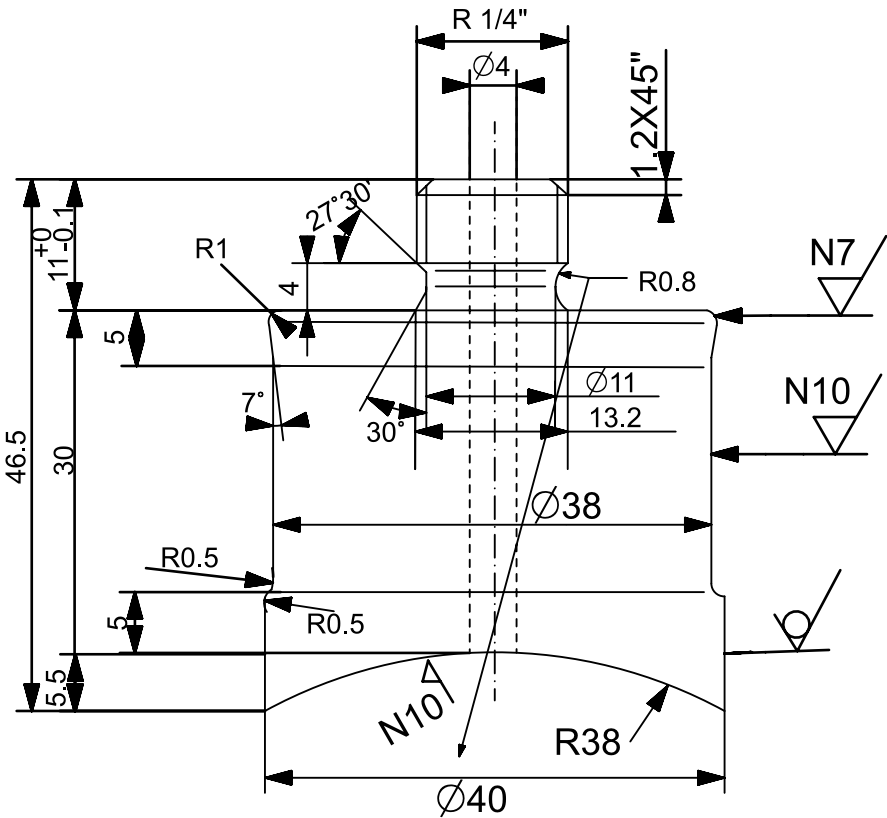
D

C

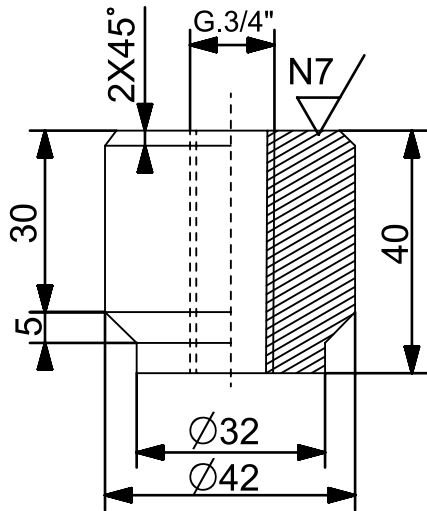
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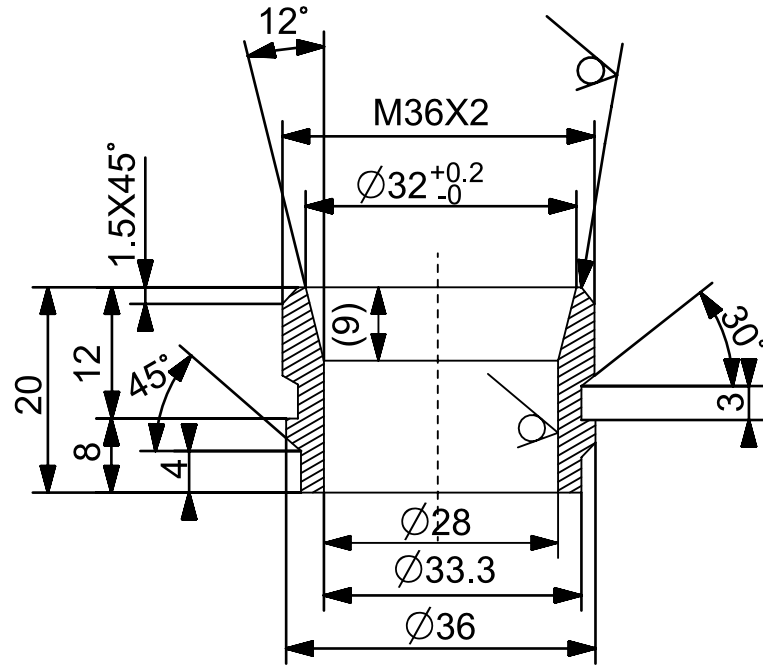
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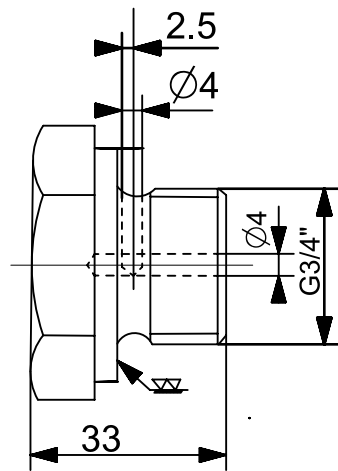
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3EHP431288P0001



FITTING- G3/4"  
HBTB416442P0104



THREADED INSERT M36X2  
HBTB415394P0010



SCREW PLUG  
HBTB430968P0001

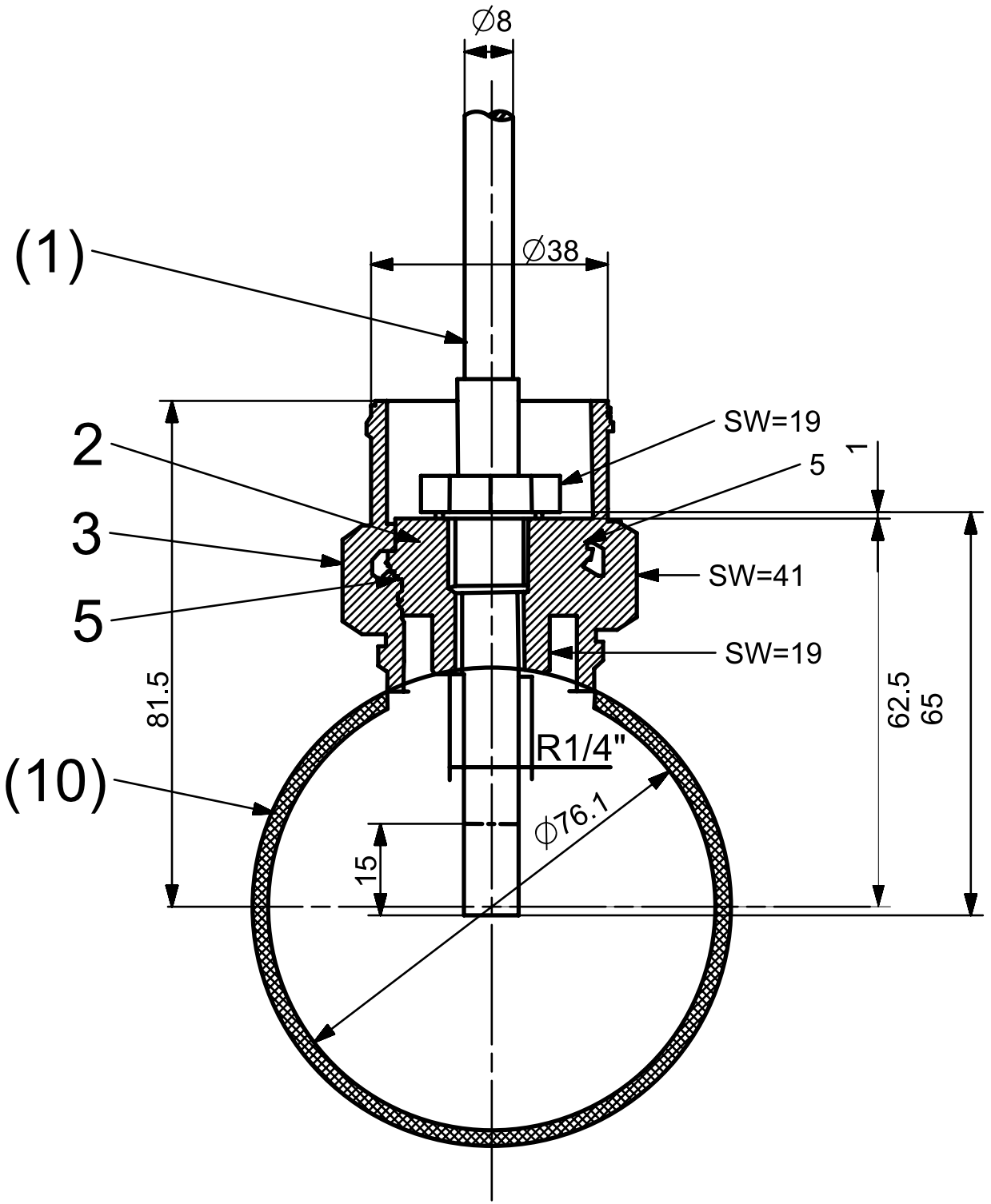
ALL DIMENSION ARE IN MM

धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा 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 $\mu m$	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 आद्यक्षर
ALT. NO.	AUTHY			DATED INITIAL

अधिकृत DGN		 चिततरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE			
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		पदार्थ MATERIAL	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-14/0253/Q/R/S
संदर्भ / REF. ALT.-		परिवर्तन संख्या ALTERATION NO.	पूर्ण SHEET
			20 OF 23
			A3





**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 मा. 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 $\mu m$	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 आधार DATED INITIAL		संदर्भ / REF. ALT-			
		MOUNTING T-SENSOR												
		आरेखण संख्या DRAWING NO. CLW/ES/3/SK-15/0253/Q/R/S												
				परिवर्तन संख्या ALTERATION NO.		पर्ण SHEET 21 OF 23		A3						

अधिकृत DGN				चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोधा व.अ.अ. CHD SSE		पदार्थ MATERIAL		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/S	
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	
				21 OF 23	
				A3	

F

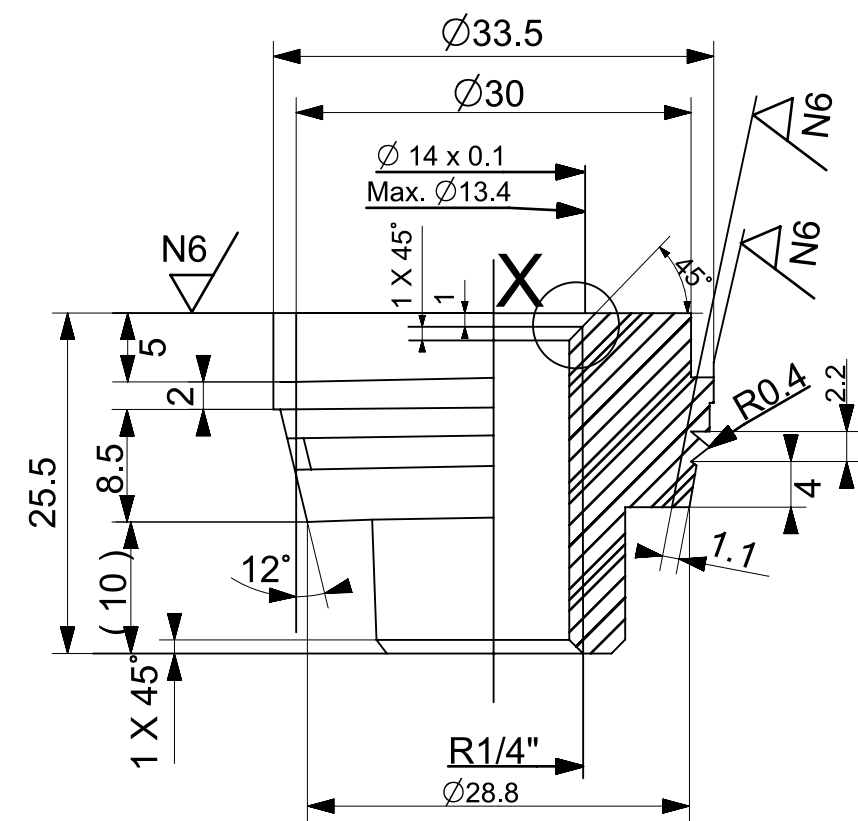
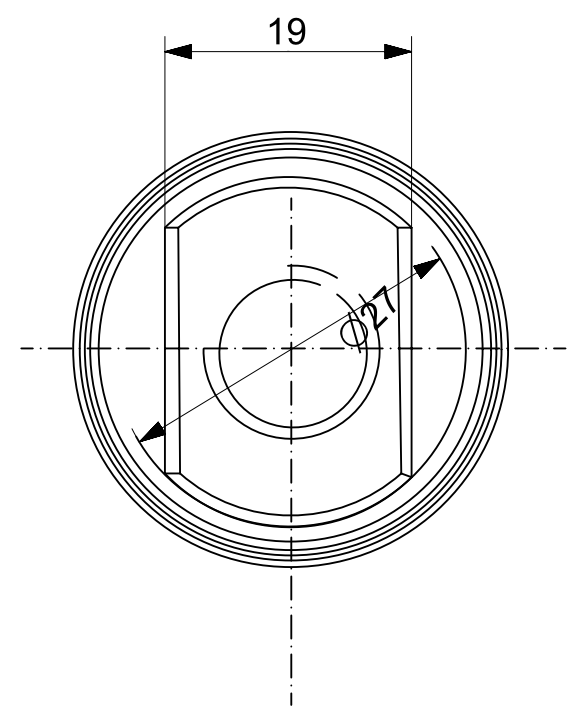
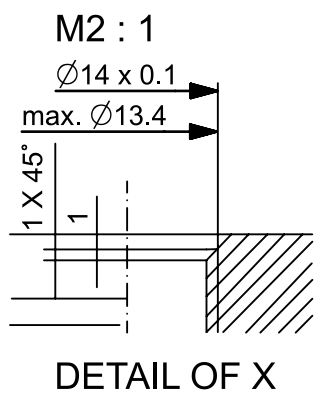
E

D

C

B

A



Outer Dia with 'O' ring in the fastening cone will 31.5 <sup>+0</sup><sub>-0.15</sub>

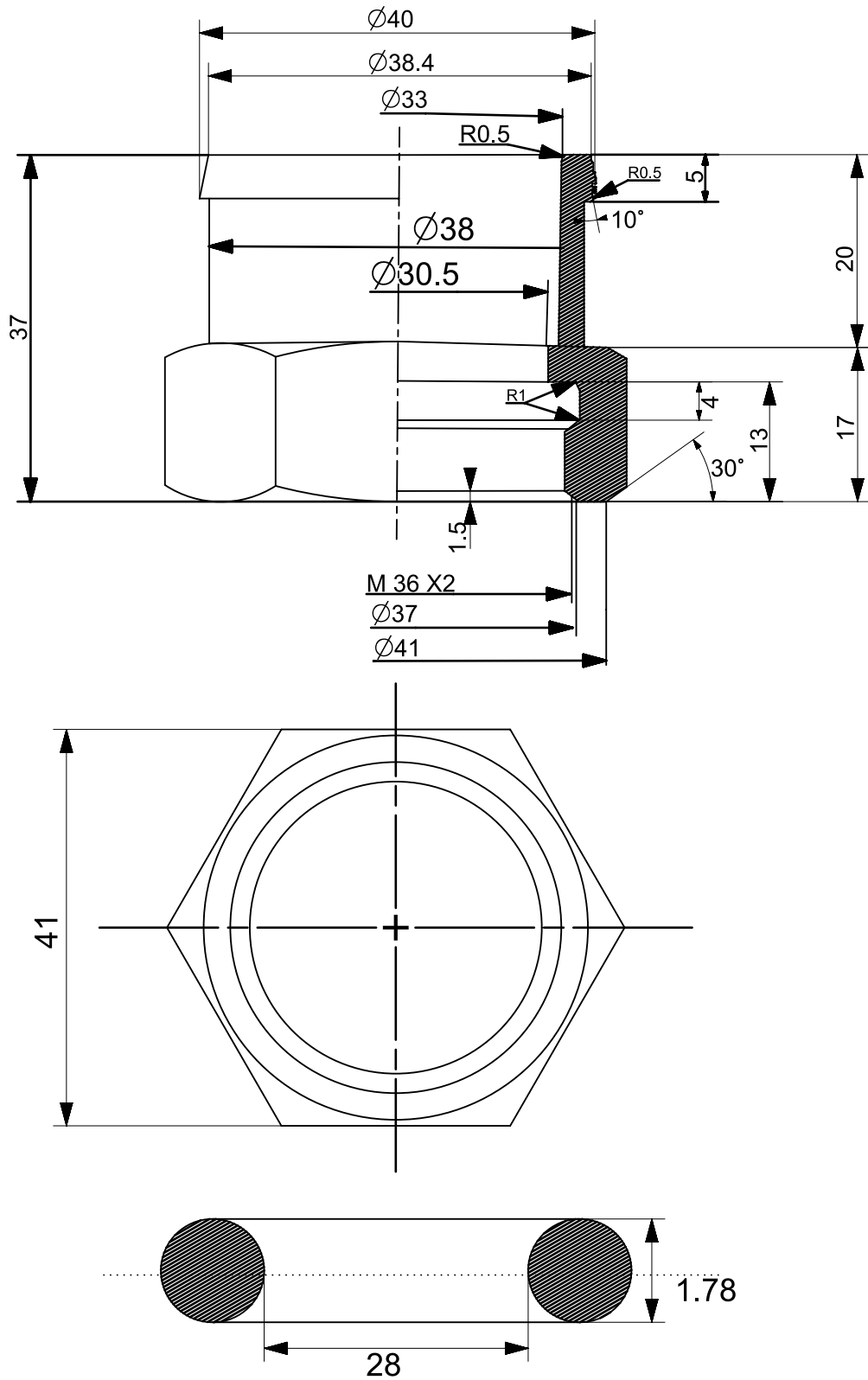
ALL DIMENSION ARE IN MM

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
	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 $\mu m$	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 ALT. NO.	प्राधिकार AUTHY	वर्णन DESCRIPTION	दिनांकित आधार DATED INITIAL
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अधिकृत DGN		 चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोचा व.अ.अ. CHD SSE		पदार्थ MATERIAL	प्रति भार कि. ग्रा. WT. EACH IN KG
समीक्षित सं.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/S
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	पुर्ण SHEET
संदर्भ / REF. ALT-		22 OF 23	A3

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**ALL DIMENSION ARE IN MM**

						CHD SSE				पदार्थ' 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 - रक्षता का मान मा. 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.		अनुमोदित स.पु.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION		GLAND NUT						
		धातु-वेल्डन चिन्ह मा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553						दिनांक DATE										
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	रेखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK/-17/0253 /Q/R/S		
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 $\mu m$	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50						
चिन्ह SYMBOL													संदर्भ / REF. ALT. -		 	परिवर्तन संख्या ALTERATION. NO.	पर्ण SHEET 23 OF 23	A4