

**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)

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**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 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 <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 test of 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	<p>A. Following Scope of supply has been amended in clause no. 4.0.</p> <p>i) Quantity of Hex Nut 0.8 M12 has been increased from 12 nos to 27 nos.</p> <p>ii) Size of Washer A has been changed from 17/20 to 17/30.</p> <p>iii) Hex Screw M12x45 of quantity 15 nos is added.</p> <p>iv) Quantity of Hex Screw M16x60 has been increased from 32 nos to 40 nos.</p> <p>v) Fastening cone, Gland nut ,ORM is included</p> <p>B. Test schedule has been amended in clause no. 6.0.</p>	

**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 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

Sl. No.	Description	Remarks
1.	Maximum atmospheric temperatures	Under Sun : +70°C. In shade : +50°C.
2.	Ambient Temperature(operating)	-20°C . . . +70°C
3.	Ambient Temperature (storage)	-30°C to +80°C
4.	Normal Humidity	60%.
5.	Maximum Humidity	100% saturation during rainy season.
6.	Altitude	1776 m above mean sea level against USBRL project condition.
7.	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 200 millimeter above rail level.
8.	Atmosphere during hot weather	Extremely dusty and desert terrain in certain areas.
9.	Coastal areas	Locomotive and equipment will be designed to work in coastal areas in humid and salt laden atmosphere.
10.	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 or latest publications unless otherwise prescribed.

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#### 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
8.	Hex Screw	16 nos	M12x35	SST Gr 304
9.	Spring washer	32 nos	M12	SST Gr 304
10.	Hex nut	<del>42 nos</del> 27 nos	0.8 M12	SST Gr 304
11.	Hex screw	<del>32 nos</del> 40 nos	M16x60	SST Gr 304
12.	Washer A	64 nos	<del>17/20</del> 17/30	SST Gr 304
13.	Washer A	32 nos	13/24	SST Gr 304
14.	Spring washer	32 nos	M16	SST Gr 304
15.	Hex nut	32 nos	OD M16	SST Gr 304
16.	HEX Screw	15 nos	M12x45	SST Gr 304
17.	Fastening cone	02 nos	-----	Material- CRMOS 17N Standard-DIN-670.81-10 SS AISI Grade 314/316
18.	Gland nut	02 nos	M-36 X 2	Material -HEX BAR 41X12 CRMOS 17N Standard -DIN176.72-03, 81-10 SS AISI Grade 314/316
19.	ORM 0280-15* G60-015	04 nos	-----	Material: Viton rubber

#### 5.0 DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER

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

- Maintanance Manual
- Detail Drawing

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## 6.0 TESTS

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

Sl.No	Test Description	Test			Remarks
		Routine* (100%)	Acceptance (bulk) 10%	Type (Proto) 100%	
				Inspected by as per PO	
6.1	Physical Verification, Quality of Workmanship, and Dimensional measurement as per specification and drawing	Yes	Yes	Yes	After complete assembled pipes.
6.2	Material test certificate (sealed by authorized representative of CLW/BLW for the oil pipes.	Yes	Yes	Yes	For raw materials.
6.3	<b>Leakage Test</b> : Oil pipes with all sensor points be blocked and pressured with air at a pressure of 4 Kg/cm <sup>2</sup> for half an hour. The temperature of water shall be 85°C. Pipes dipped in water to check any leakage.	Yes	Yes	Yes	After complete assembled pipes.
6.4	<b>Sensor points checking</b> :The dummy sensor 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.	Yes	Yes	Yes	After complete assembled pipes.
6.5	Die Penetration Test (DPT TEST & pressure test should be done in 100%)	Yes	Yes	Yes	After complete assembled pipes.
6.6	All the threads should be checked using go and not go gauge.	Yes	Yes	Yes	After complete assembled pipes.
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.	Yes	Yes	Yes	After complete assembled pipes.
6.8	<b>Leakage Test on Bellow</b> : 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.	Yes	No	Yes	For bellows.

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- \* Routine test to be carried treated as firm's internal inspection which is to be submitted by firm during acceptance test (bulk/regular inspection) as well as type test (prototype).

## **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 AISI <del>304</del> Grade 314/316	<b>GLAND NUT M-36 X 2</b> ABB ID No-3EHP431132P0001 POSITION NO-3 MATERIAL-HEX BAR 41-X12 CRMOS 17N STANDARD-DIN176.72-03, 81-10 SS AISI <del>304</del> -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.

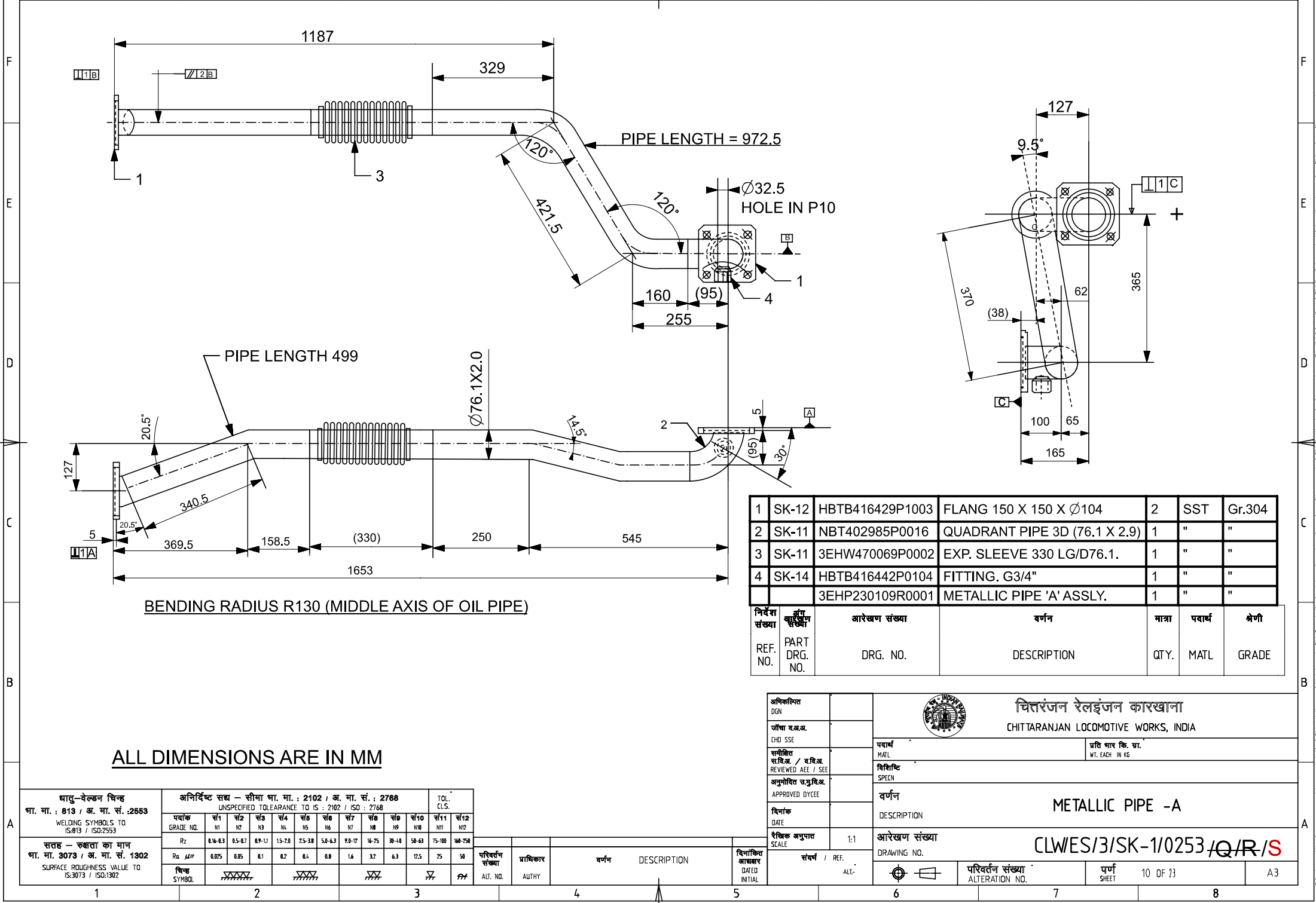
5.2.4 During the Welding process the Oil Pipes have to filled with forming gas e.g Carbon Acid 3.0 to total 35 gas.

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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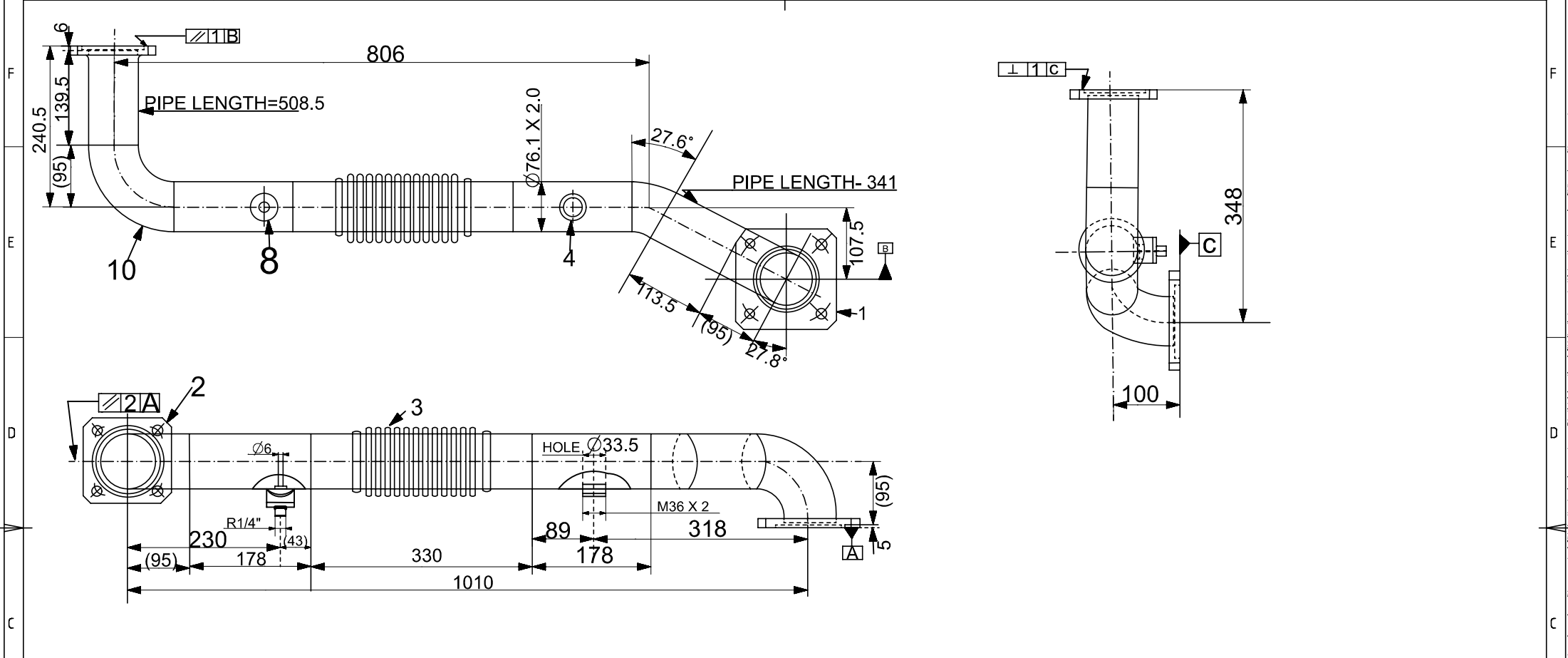
BENDING RADIUS R130 (MIDDLE AXIS OF OIL PIPE)

ALL DIMENSIONS ARE IN MM

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	आरेख संख्या	वर्णन	मात्रा	पदार्थ	श्रेणी	
REF. NO.	DRG. NO.	DESCRIPTION	QTY.	MATL	GRADE	

अधिकृत DGN			चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
चौथा व.अ.अ. CHD SSE			प्रमाण MATL	प्रति भाग कि. मा. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE			विवरण SPECN	
अनुमोदित च.प्र.वि.अ. APPROVED DYCEE			वर्णन DESCRIPTION	
दिनांक DATE		आरेख संख्या DRAWING NO.	METALLIC PIPE -A	
रेखक अनुपात SCALE	1:1		CLW/ES/3/SK-1/0253/Q/R/S	
संशोधन / REF. ALT-		परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET	10 OF 23
आवृत्ति DATED INITIAL				A3

धातु-वेल्डिंग चिन्ह धा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट संधि - सीमा मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768	TOL. CLS.
सतह - रुखाता का मान धा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	पदार्थ 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
	Ra	0.025
	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 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-वेल्डिंग चिन्ह भा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553		अनिर्दिष्ट सख - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.				
		पवांक 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	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50				
		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 - रूखाता का मान भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302		चिन्ह SYMBOL																
		परिवर्तन संख्या ALT. NO.	AUTHY			वर्णन			DESCRIPTION									

ALL DIMENSION ARE IN MM

अधिकारित  
DGN

चौथा व.अ.अ.  
CHD SSE

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

अनुमोदित  
अ.प्र.अ.  
APPROVED DYCEE

दिनांक  
DATE

रैखिक अनुपात  
SCALE

चितरंजन रेलइंजन कारखाना  
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

प्रति भाग कि. मा.  
WT. EACH IN KG

वर्णन  
DESCRIPTION

आरेखण संख्या  
DRAWING NO.

परिवर्तन संख्या  
ALTERATION NO.

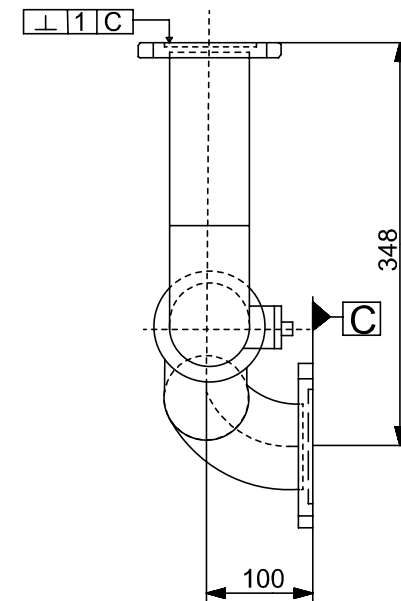
पृष्ठ  
SHEET

11 OF 23


A3

हार्ड / REF.  
ALT-

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REF. NO.	PART DRG. NO	DRG. NO	DESCRIPTION	QTY.	MATL.	GRADE
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अधिकारित DGN		 <div>चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA</div>	
पॉचा व.अ.व. CHD SSE			
समीक्षित व.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		प्रसार्य MAIL	प्रति वार फि. रा. WT. EACH IN KG
अनुमोदित व.मु.वि.अ. APPROVED DYCEE		लिफ्टि SPECN	
वर्णक DATE		वर्णन DESCRIPTION	METALLIC PIPE 'B'
रैखिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-3/0253 <del>Q/R</del> /S
संशर्ष / REF. ALT-		परिवर्तन संख्या ALTERATION NO.	पार्श्व SHEET
			12 OF 13
			A3

चित्तरंजन रेलइंजन कारखाना  
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

प्रति भार कि. ग्रा.  
WT. EACH IN KG

वर्णन  
DESCRIPTION

METALLIC PIPE 'B1'

आरेखण संख्या  
DRAWING NO.

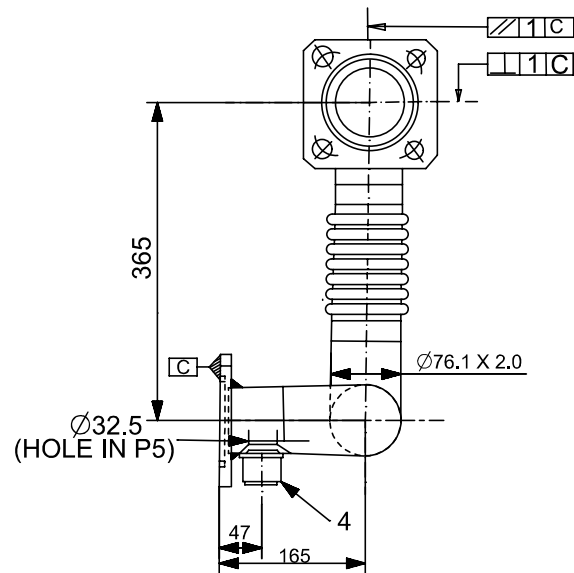
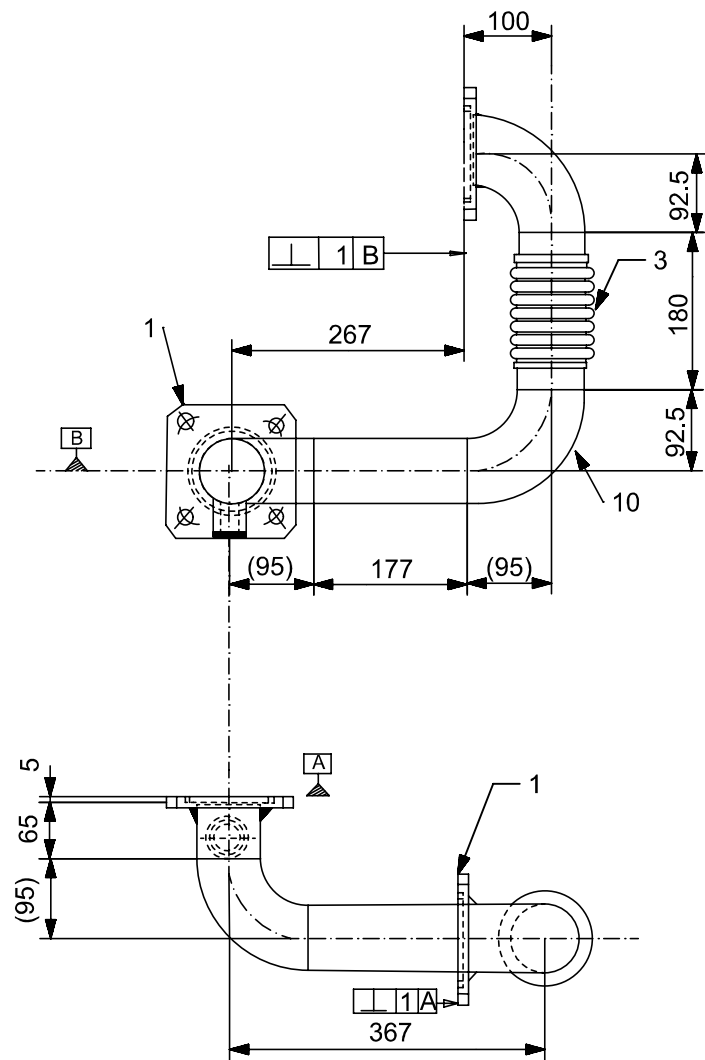
CLW/ES/3/SK-3/0253 ~~Q/R~~/S

परिवर्तन संख्या  
ALTERATION NUMBER

पृष्ठ  
SHEET 12 OF 23

EDRAWN BY COE







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

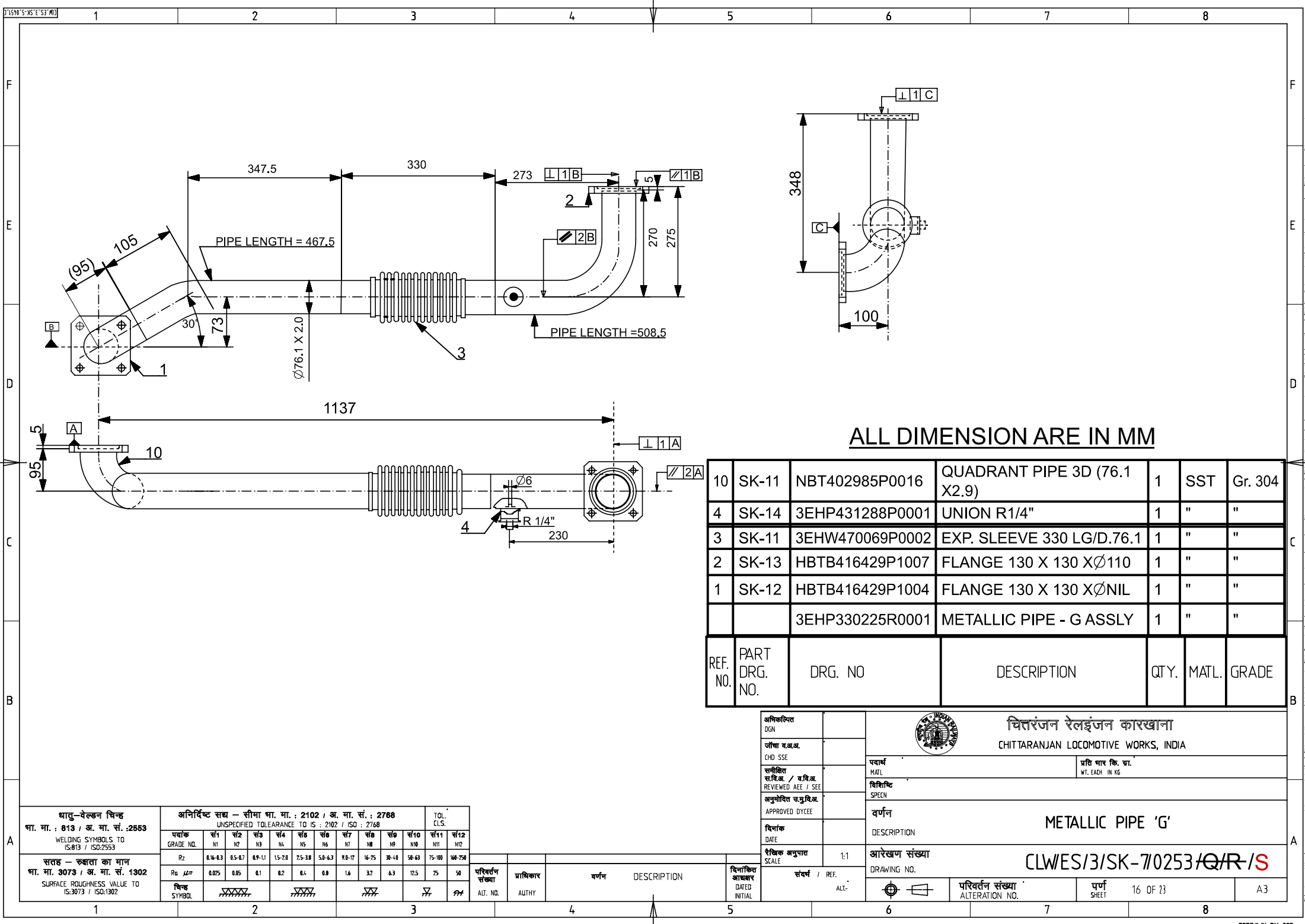
धातु-वेल्डिंग चिन्ह भा. मा. : 813 / अ. मा. सं. : 2553		अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768										TOL. CLS.
पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
Rz	0.16-0.3	0.5-0.7	0.9-1.3	1.5-2.0	2.5-3.0	3.0-4.3	4.0-5.0	5.0-6.3	6.3-8.0	8.0-10.0	10.0-12.5	12.5-16.0
Ro $\mu m$	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 आवृत्ति DATED INITIAL
-----------------------------	--------------------	----------------------	--------------------------------------

अधिकृत DGN			चित्तारंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
जोधा व.अ.अ. CHD SSE			पदार्थ MATERIAL	प्रति भार कि. ग्राम. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE			नियमित SPECIFICATION	
अनुमोदित उ.प्र.वि.अ. APPROVED DYCEE			वर्णन DESCRIPTION	METALLIC PIPE D
दिनांक DATE		DESCRIPTION		
रैखिक अनुपात SCALE		1:1	आरेखण संख्या DRAWING NO. CLW/ES/3/SK-510253 #Q/R/S	
संघर्ष / REF.		परिवर्तन संख्या ALTERATION NO.		
ALT.			पृष्ठ SHEET	1 OF 1
			A3	













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-वेल्डिंग चिन्ह धा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO (S.813 / ISO.2553)		अनिर्दिष्ट सख - सीमा धा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768										TOL. CLS.
पर्वक 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	2.5-3.0	5.0-6.3	9.0-12	16-25	30-40	50-63	75-100	160-250
Ro 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												

F

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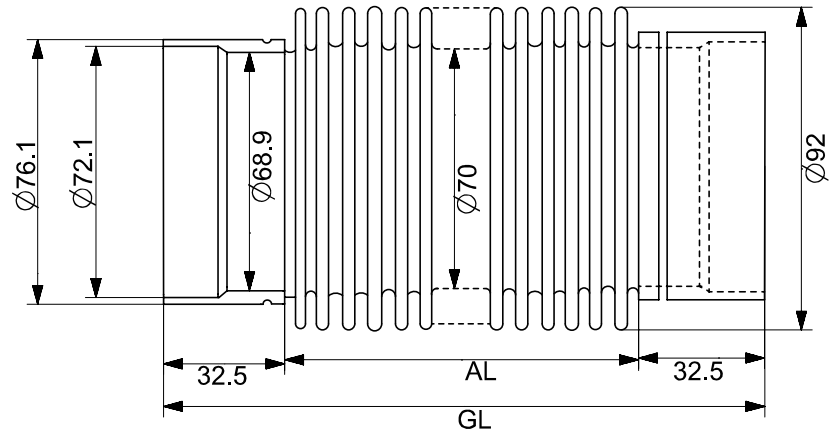
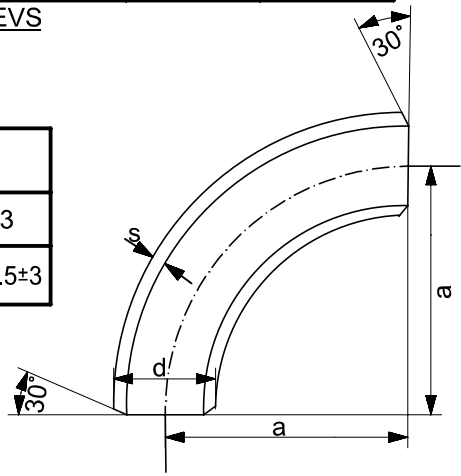


ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470069P0002	265	330	±10	±20	2 X 6	10KG/cm²	A,B,C,F,G
3EHW470069P0001	115	180	±5	±8	11	"	D

EXP. SLEEVS

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



QUADRANT PIPE

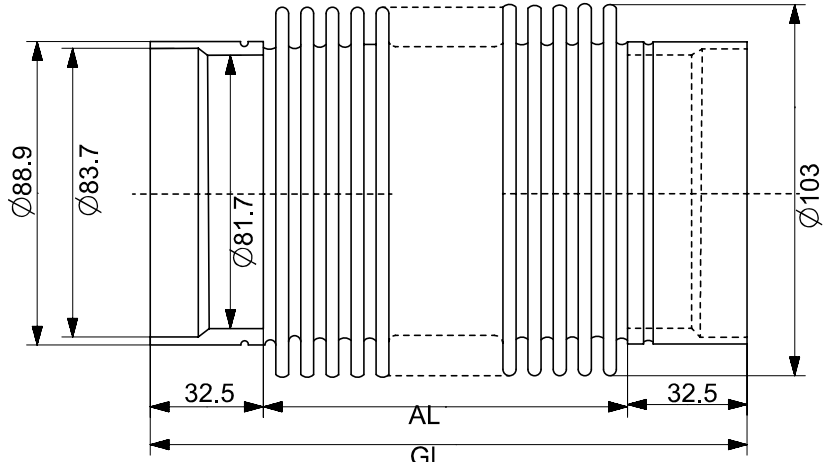








ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO. OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470070P0001	115	180	±5	±8	11	10 KG/cm²	LM
3EHW470070P0002	265	330	±10	±20	2 X 5	"	K

EXP. SLEEVS

ALL DIMENSION ARE IN MM

धातु-वेल्डिंग चिन्ह धा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य – सीमा धा. 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
	Ro μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
सतह – रुखाता का मान धा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	चिन्ह SYMBOL												

F

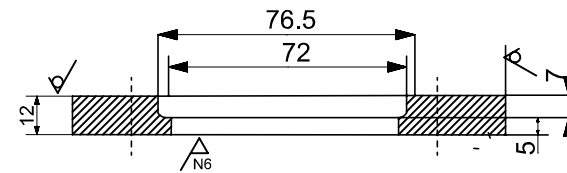
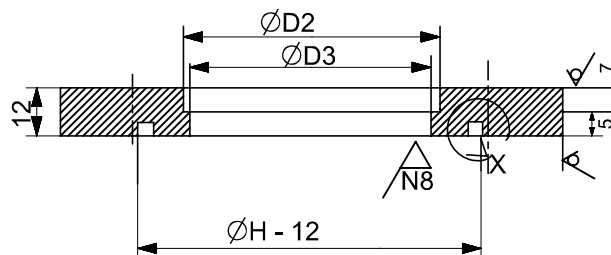
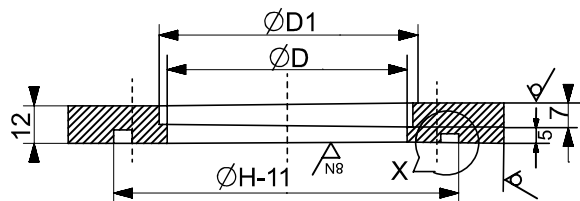
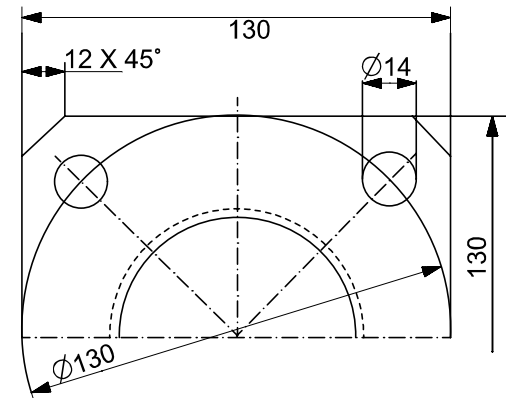
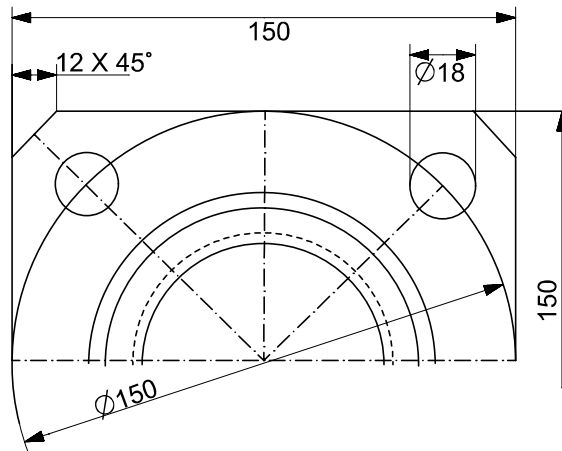
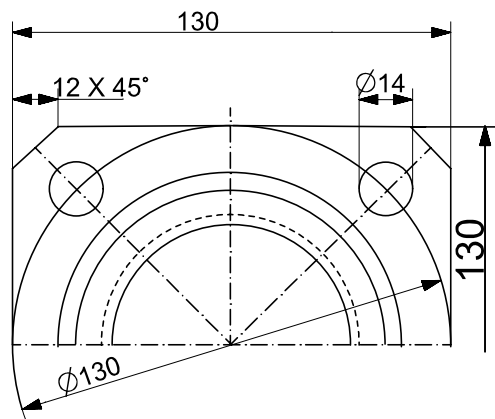
E

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DETAIL OF 'X'

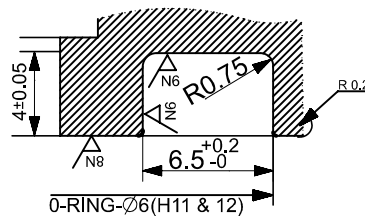


ABB IDENT. NO	D	D1	PIPE DIA	GROVE ØH11
HBTB416429P1002	72	76.5	Ø76.1	Ø104
HBTB416429P1102	85	89.5	Ø88.9	Ø110

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

HBTB416429 P1004

ALL DIMENSION ARE IN MM

धातु-वेल्डन चिह्न धा. मा. : 813 / अ. मा. सं. : 2563 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सतह - सीमा धा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
	पंक्ति GRADE	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
	Rz	6.3-12.5	6.3-12.5	6.3-12.5	12.5-25	12.5-25	12.5-25	12.5-25	12.5-25	12.5-25	12.5-25	12.5-25	12.5-25
	चिह्न SYMBOL												

परिवर्तन संख्या	आधिकार	वर्णन	DESCRIPTION	दिनांकित आधिकार
ALT. NO.	AUTHY			DATED INITIAL

अधिकारित DGN				चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
पॉषा व.अ.अ. CHD SSE				प्रति भाग कि. मा. WT. EACH IN KG	
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		वर्णन DESCRIPTION		PIPE FLANGES	
अनुमोदित APPROVED DYCEE		आरेखण संख्या DRAWING NO.		CLWES/3/SK-12/0253/Q/R/S	
दिनांक DATE		परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	
रैखिक अनुपात SCALE	1:1	संशोधन / REF. ALT-		18 OF 23	

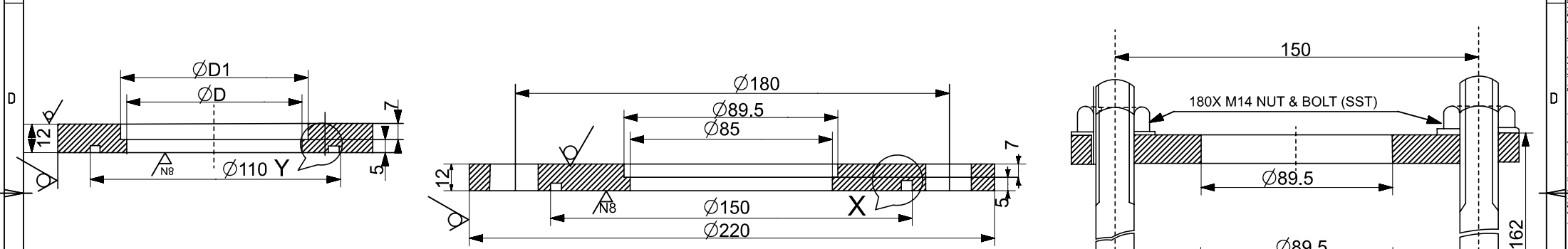
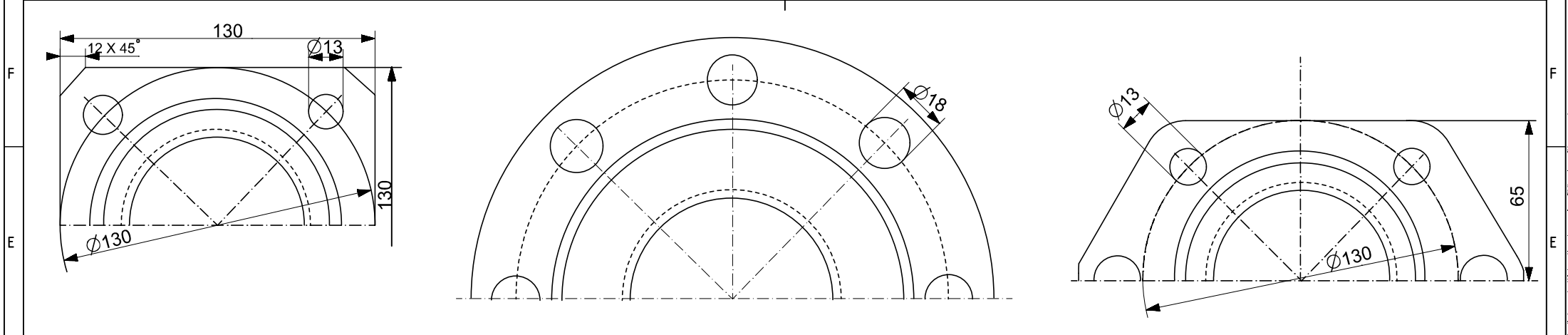
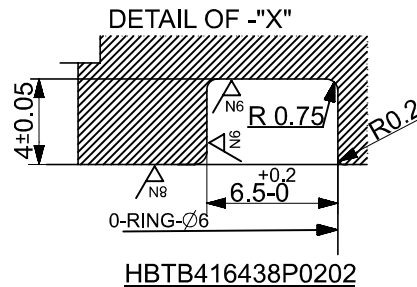
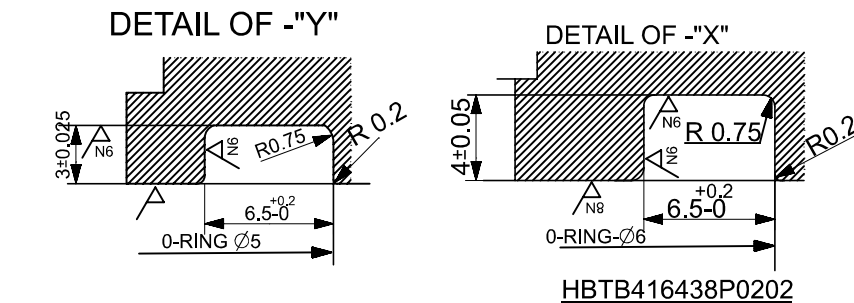


ABB IDENT NO	D	D1	PIPE DIA	NAME OF THE PIPE
HBTB41642 9P1007	72	76.5	Ø76.1	B.C.G
„ P1107	85	89.5	Ø88.1	L.M.



HBTB416438P0202

3EHP330248P0003

धातु-वेल्डन चिन्ह  
भा. मा. : 813 / अ. मा. सं. : 2563  
WELDING SYMBOLS TO  
IS:813 / ISO:2553

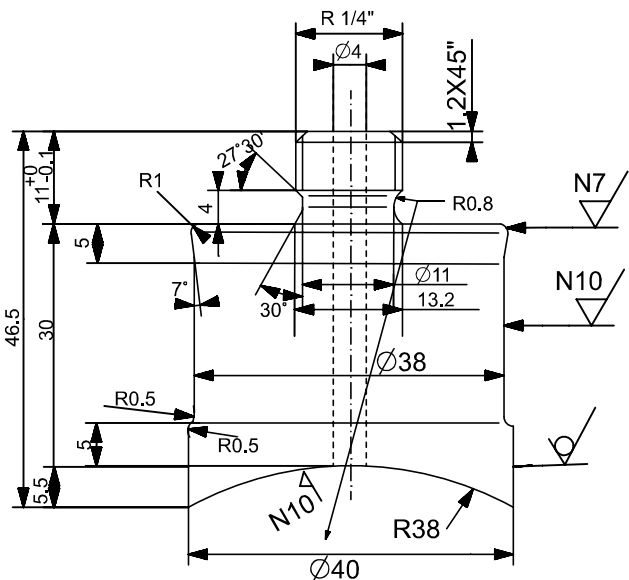
सतह - रुखाता का मान  
भा. मा. 3073 / अ. मा. सं. 1302  
SURFACE ROUGHNESS VALUE TO  
IS:3073 / ISO:1302

अनिर्दिष्ट सतह - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768												TOL.	
UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												CLS.	
पदार्थ GRADE NOL	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	0.16-4.3	0.5-8.7	0.9-1.3	1.5-2	2.5-3.8	5.0-6.3	9.8-12	16	25	38-48	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													

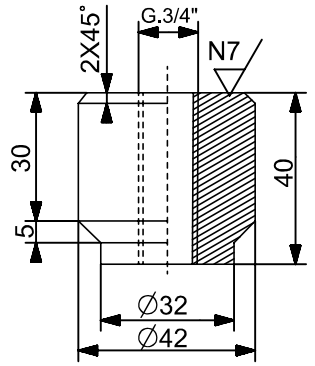
ALL DIMENSION ARE IN MM

परिवर्तन संख्या	प्राधिकार	वर्णन	DESCRIPTION	दिनांकित DATED INITIAL
AUT. NO.	AUTHY			

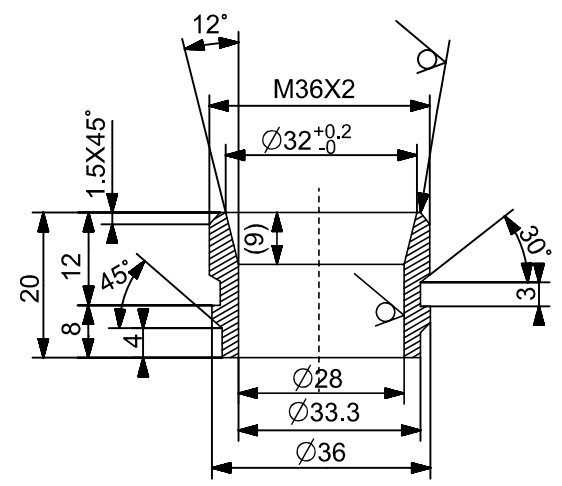
अधिकृत DGN				चितारंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
पॉषा व.अ.अ. CHD SSE				प्रकार MATE	प्रति भार कि. मा. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		विवरित SPECN	वर्णन DESCRIPTION <b>PIPE FLANGES</b>		
अनुमोदित अ.प्र.वि.अ. APPROVED DYCEE					
दिनांक DATE		वर्णन DESCRIPTION	आरेखण संख्या DRAWING NO. <b>CLWES/3/SK-13/0253/Q/R/S</b>		
रेखिक अनुपात SCALE	1:1				
संशोधन / REF.	ALT-	परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET	19 OF 23	A3



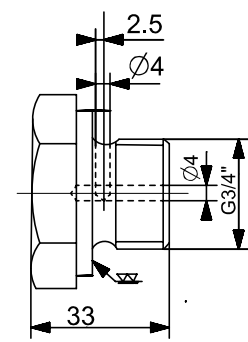
UNION- R 1/4"  
3EHP431288P0001



FITTING- G 3/4"  
HBTB416442P0104



THREADED INSERT M36X2  
HBTB415394P0010



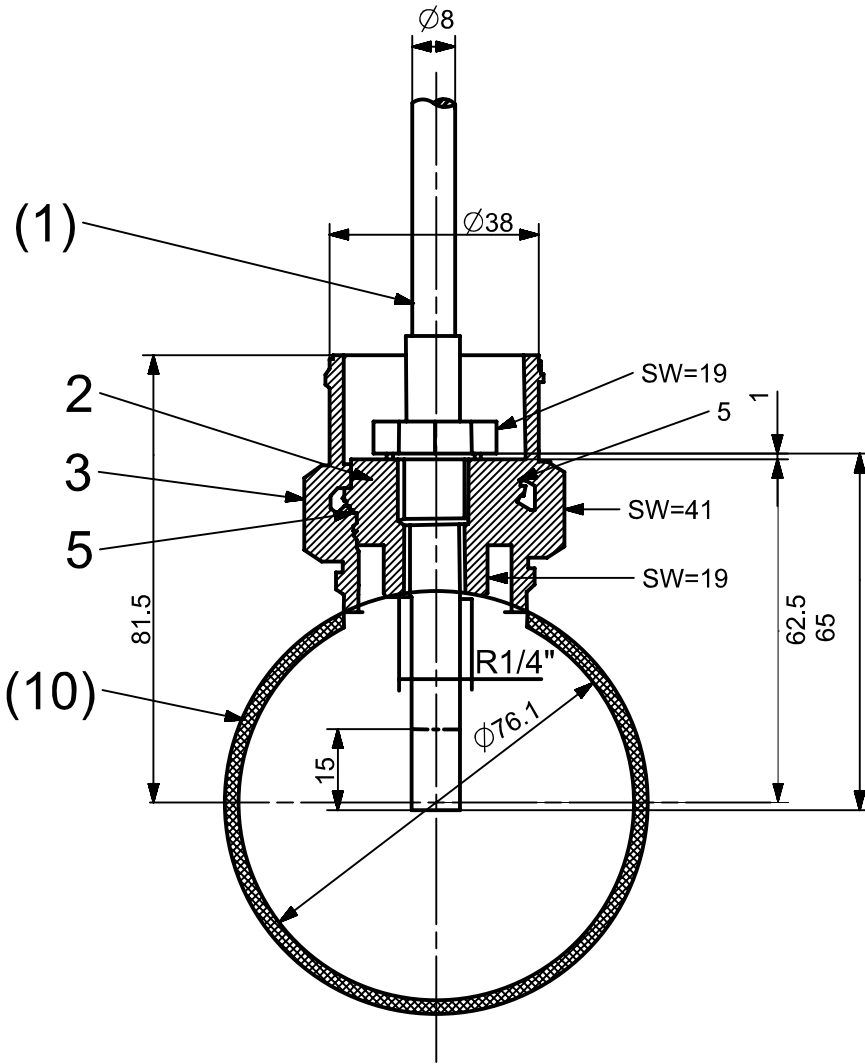
SCREW PLUG  
HBTB430968P0001

ALL DIMENSION ARE IN MM

धातु-वेल्डिंग चिन्ह धा. मा. : 813 / अ. मा. सं. : 2553 WELDING SYMBOLS TO IS:813 / ISO:2553		अनिर्दिष्ट सद्य - सीमा धा. 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	XXXX		XXXX		XXXX		XXXX		XXXX		XXXX	

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

अधिकृत DGN		चित्तरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
चौथा व.अ.अ. CHD SSE		प्रकार MATERIAL	प्रति भाग कि. घा. WT. EACH IN KG
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		विवरण SPECN	
अनुमोदित च.प्र.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION	PIPE FITTINGS
दिनांक DATE		आरेखण संख्या DRAWING NO.	CLW/ES/3/SK-14/0253/QR/S
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	परि 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-वेल्डिंग चिन्ह		अनिर्दिष्ट सहा - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768												TOL.
भा. मा. : 813 / अ. मा. सं. : 2563		UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												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	8.16-8.3	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		
Ro 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 - रुखाता का मान  
 भा. मा. 3073 / अ. मा. सं. 1302  
 SURFACE ROUGHNESS VALUE TO  
 IS:3073 / ISO:1302


परिवर्तन संख्या  
 ALT. NO.

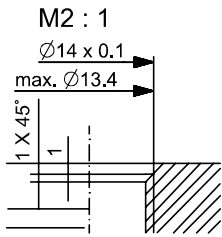
प्राधिकार  
 AUTHY

वर्णन  
 DESCRIPTION

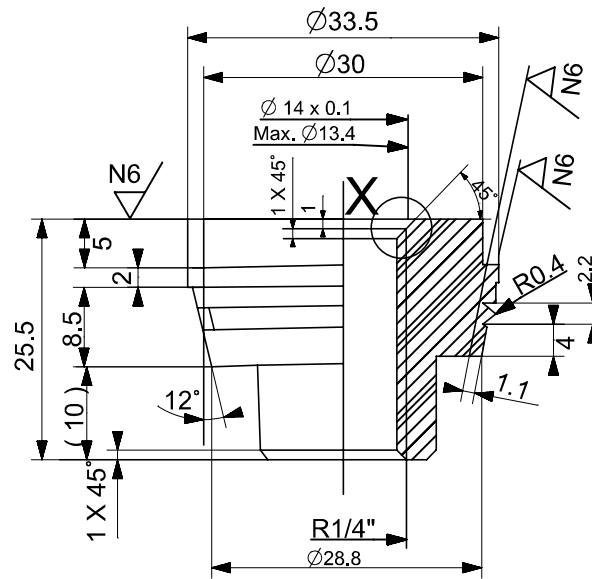
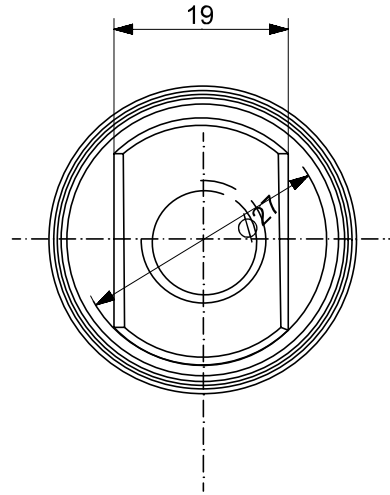
दिनांक  
 DATED

रैखिक अनुपात  
 SCALE

अधिकृत DGN		 <b>चितारंजन रेलइंजन कारखाना</b> CHITTARANJAN LOCOMOTIVE WORKS, INDIA	प्रकार MATERIAL	प्रति भाग कि. मा. WT. EACH IN KG
चौथा व.अ.अ. CHD SSE			समीक्षा स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE	विधि SPECN
अनुमोदित APPROVED DYCEE		वर्णन DESCRIPTION	MOUNTING T-SENSOR	
दिनांक DATE		आरेखण संख्या DRAWING NO.	CLWES/3/SK-15/0253-Q/R/S	
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET	21 OF 23









DETAIL OF X



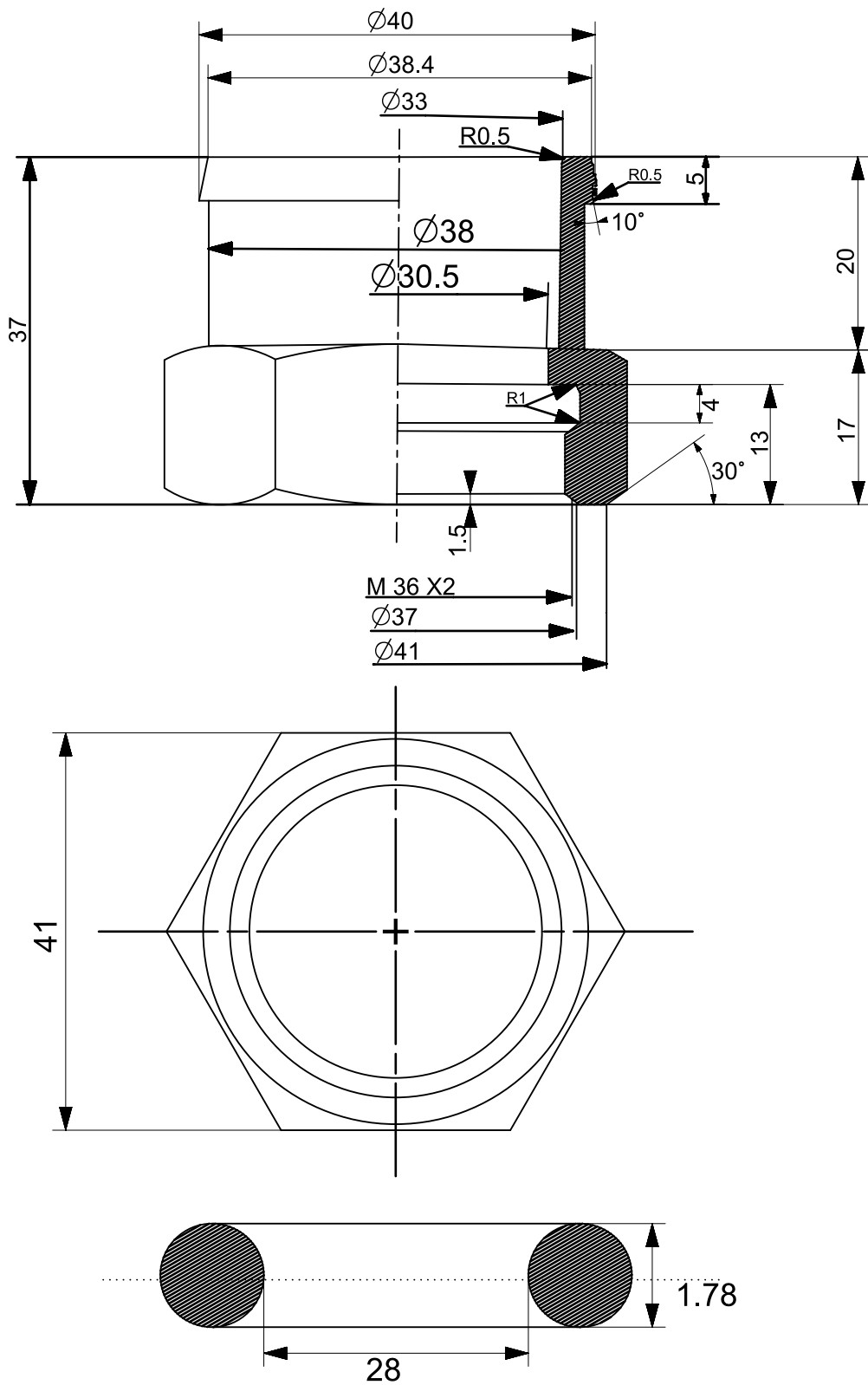
Outer Dia with 'O' ring in the  
fastening cone will  $31.5^{+0}_{-0.15}$

ALL DIMENSION ARE IN MM








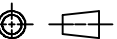
धातु-वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं.:2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सद्य - सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
	पदांक GRADE NO.	सं1 N1	सं2 N2	सं3 N3	सं4 N4	सं5 N5	सं6 N6	सं7 N7	सं8 N8	सं9 N9	सं10 N10	सं11 N11	सं12 N12
	Rz	8.16-8.3	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.0	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 आवृत्ति
ALT. NO.	AUTHY			DATED INITIAL

अधिकृत DGN				चितारंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
पौचा व.अ.अ. CHD SSE				प्रति भाग कि. मा. WT. EACH IN KG	
समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		प्रकार MATERIAL		विशिष्ट SPECN	
अनुमोदित अ.प्र.वि.अ. APPROVED DYCEE		वर्णन DESCRIPTION		FASTENING CONE	
दिनांक DATE		आरेखण संख्या DRAWING NO.		CLWES/3/SK-16/0253/QR/S	
रैखिक अनुपात SCALE	1:1	परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	22 OF 23
हार्बर / REF.	ALT-	परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET	A3



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ALL DIMENSION ARE IN MM													अभिकल्पित DGN		 <div>चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA</div>						
												जॉचा व.अ.अ. CHD SSE		पदार्थ MATL			प्रति भार कि. ग्रा. WT. EACH IN KG				
परिवर्तन संख्या ALT.NO.		प्राधिकार AUTHY		वर्णन DESCRIPTION						दिनांकित बाधक INITIAL		समीक्षित स.वि.अ. / व.वि.अ. REVIEWED AEE / SEE		विशिष्ट SPECN		वर्णन  GLAND NUT					
सतह — रुखाता का मान मा. मा. 3073 / अ. मा. सं. 1302 <small>SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302</small>				अनिर्दिष्ट सह — सीमा मा. मा. : 2102 / अ. मा. सं. : 2768 <small>UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768</small>						TOL. CLS.		अनुमोदित उ.मु.वि.अ. APPROVED DYCEE		दिनांक DATE							
				धातु-वेल्डन चिन्ह मा. मा. : 813 / अ. मा. सं. : 2553 <small>WELDING SYMBOLS TO IS:813 / ISO:2553</small>								रेखिक अनुपात SCALE		1:1		आरेखण संख्या DRAWING NO. CLW/ES/3/SK/-17/0253 /Q/R/S					
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														संदर्भ / REF.		ALT.-		 <div>परिवर्तन संख्या ALTERATION. NO.</div>		पर्ण SHEET 23 OF 23	A4