

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

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

### Enclosures

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

### 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**

<b>Amendment Number</b>	<b>Date of Amendment</b>	<b>Alteration</b>	<b>Descriptions</b>	<b>Authority</b>
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 SI.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) Anticorrosive oil should be easily removable in place of Shell Engine oil.	Sd/-

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**SET OF METALLIC PIPE AND MOUNTING T- SENSOR**

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.	03-11-2007	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-16, SK-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.	17-06-2025	S	A. Following Scope of supply has been amended in clause no. 4.0. i) Quantity of Hex Nut 0.8DxM12 has been increased from 12 nos to 27 nos. ii) Quantity of Hex Screw M16x60 has been increased from 32 nos to 40 nos. iii) Size of Washer A has been changed from 17/20 to 17/30. iv) Quantity of Hex Nut 0.8DxM16 has been increased from 32 nos to 40 nos. v) Hex Screw M12x45 of quantity 15 nos is added. vi) Fastening cone, Gland nut ,ORM is included in scope of supply. B. Test schedule has been amended in clause no. 6.0. C. In Cl.no.12 para 2.0, SS304 is included.	Sd/-

**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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**TABLE OF CONTENTS**

<b>SL. No.</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
1.	GENERAL	6
2.	SCOPE	6
3.	SERVICE CONDITIONS	6
4.	SCOPE OF SUPPLY	7
5.	DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER	7
6.	TEST	8
7.	MOUNTING T-SENSOR	9
8.	QUALITY ASSURANCE	9
9.	PACKAGE	9
10.	HARDWARE	9
11.	LABELING/MARKING	9
12.	NOTE	9

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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	27 nos	0.8Dx M12	SST Gr 304
11.	Hex screw	40 nos	M16x60	SST Gr 304
12.	Washer A	64 nos	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	40 nos	0.8Dx 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	To be carried out on all Pipes.
6.2	Material test certificate (sealed by authorized representative of CLW/BLW) for the oil pipes.	Yes	Yes	Yes	Pipes and all other 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	Complete assembled pipes with expansion sleeve proper secured.
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	For pipes B and B1.
6.5	Die Penetration Test (DPT TEST) & pressure test should be done in 100%.	Yes	Yes	Yes	Complete assembled pipes.
6.6	All the threads should be checked using go and not go gauge.	Yes	Yes	Yes	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	For pipes B and B1.
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	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 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-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 SS 304.
- 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.

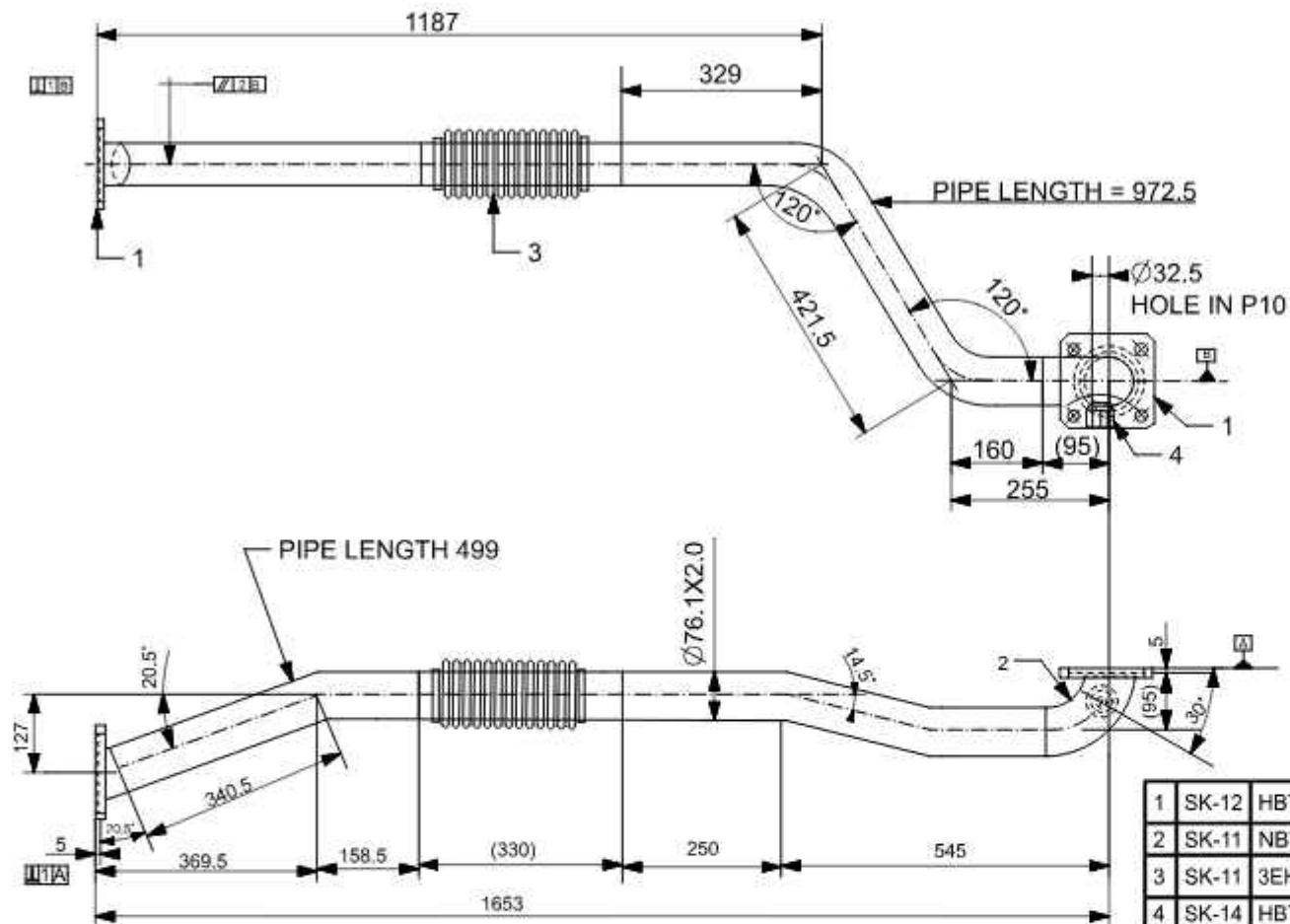
5.2.4 During the Welding process the Oil Pipes have to filled with forming gas e.g Carbon Acid 3.0 to total 35 gas.

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

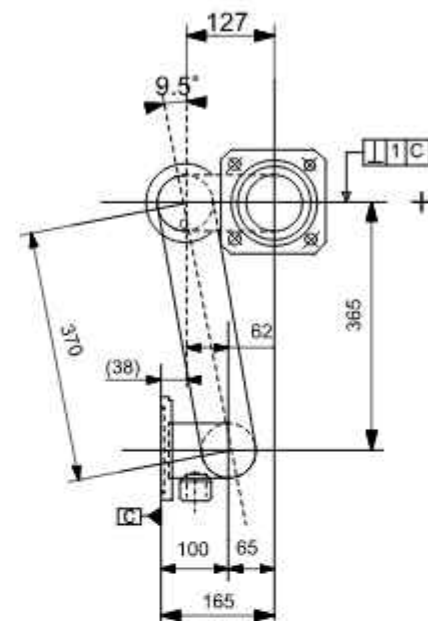
- Degrease with alkaline agent
- Rinsing
- Bleaching with phosphorus Acid
- Hot Rinsing
- Cold Rinsing
- Passivation at 90°C
- Drying at 90°C

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)





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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	"	"

पिच संख्या	पार्ट संख्या	कारखाना संख्या	वर्णन	मात्रा	सामान	श्रेणी
REF. NO.	PART DRG. NO.	DRG. NO.	DESCRIPTION	QTY.	MATL.	GRADE

ALL DIMENSIONS ARE IN MM

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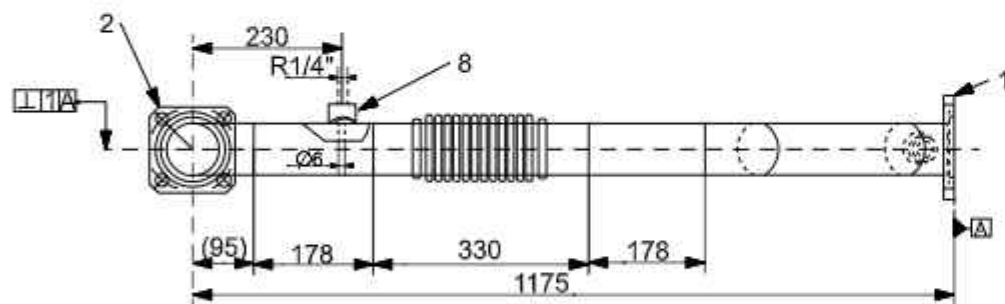
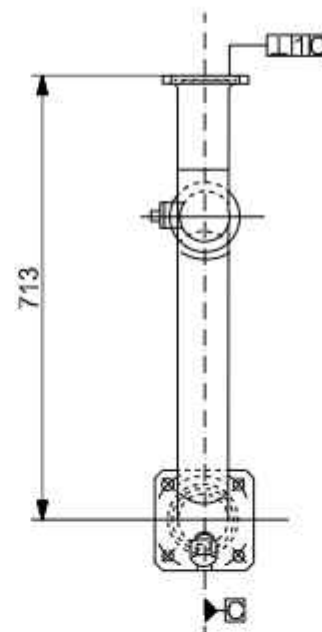
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प्रो. वा. सं. सं. DND CODE			<b>पर्याप्त</b> NREL	<b>प्रति वा. सं. सं.</b> WL EAD: 0118
अभिप्रेत परि. सं. / परि. सं. REVISED AEE / SER		<b>प्रतिपि</b> SPECN		
अनुमोदित परि. सं. APPROVED DNDCE		<b>वर्णन</b> DESCRIPTION	<b>METALLIC PIPE -A</b>	
परि. सं. DND		<b>कारखान संख्या</b> DRAWING NO.	<b>CLW/ES/3/SK-1/0253/S</b>	
रेखांक अनुपात SCALE	1:1		<b>परिवर्तन संख्या</b> ALTERATION NO.	<b>पृष्ठ</b> SHEET
<b>पर्याप्त</b> / <b>अन्य</b> AEE-			10 OF 13	<b>A3</b>









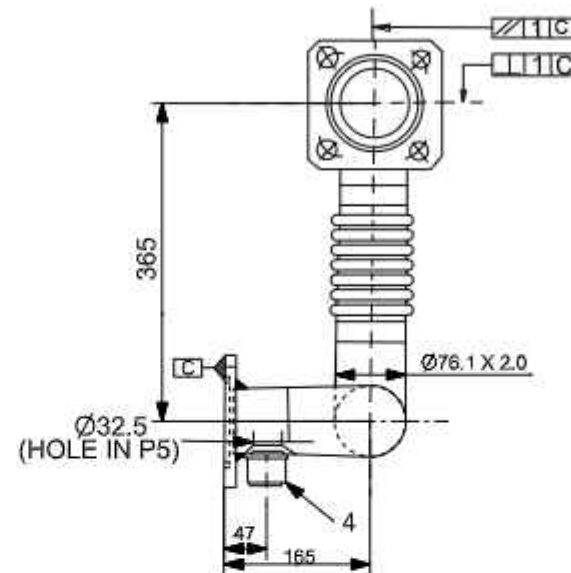
10	SK-11	NBT402985P0016	QUADRANT PIPE 3D (76.1 X2.9)	1	SST	Gr. 304
8	SK-14	3EHP431288P0001	UNION R1/4"	1	"	"
4	SK-14	HBTB416442P0104	FITTING G 3/4"	1	"	"
3	SK-11	3EHW470069P0002	EXP. SLEEVE 330 LG/D.76.1	1	"	"
2	SK-13	HBTB416429P1007	FLANGE 130 X 130 XØ110	1	"	"
1	SK-12	HBTB416429P1003	FLANGE 150 X 150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

कंपनिका COE			चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA			
मशीन का नाम CND 502			वजन MT.	प्रति मीटर व. व. WT. EACH MTR.		
संशोधित परिवर्तन / प्रमाणित REVIEWED BY / SEE			विशेषता SPECN			
अनुमोदित कर्मचारी APPROVED BYEE			वर्णन DESCRIPTION	METALLIC PIPE - C		
दिनांक DATE			कारखान संख्या DRAWING NO.	CLWES/3/SK-4/0253+S		
रेलवे अनुमति SCALE	1:1					
पृष्ठ / पृष्ठ A/C			परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET	13 OF 21	A3



ALL DIMENSION ARE IN MM

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परिचालन क्रमांक	प्रतिफल	वर्णन	DESCRIPTION	विशेष टिप्पणी
AD. NO.	MARK			DATES NOTES



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.SLEEV 130LG/D-76.1	1	"	"
1	SK-12	HBTB416429P1003	FLANGE 150 X150 XØ104	2	"	"
		3EHP330222R0001	METALLIC PIPE "D" ASSLY	1	"	"
REF NO.	PART ORG. NO.	DRG. NO.	DESCRIPTION	QTY.	METL.	GRADE

कर्मचारी DOH		 <div> <b>चितरंजन रेलइंजन कारखाना</b>  <b>CHITTARANJAN LOCOMOTIVE WORKS, INDIA</b> </div>	
प्रमाण चक्रमा. DHD 552			<div> <b>पदार्थ</b>  MATERIAL </div> <div> <b>प्रति भाग कि. प्र.</b>  WT. TAKEN IN KG. </div>
कर्मचारी चक्रमा. / चक्रमा. REVIEWED BY / DESIGNED BY		<div> <b>निर्माण</b>  SPECIFICATION </div>	
अनुमोदित चक्रमा. APPROVED BY/EE		<div> <b>वर्णन</b>  DESCRIPTION </div>	<div> <b>METALLIC PIPE D</b> </div>
दिनांक DATE			
चक्रमा. अनुमोदित SCALE	1:1	<div> <b>कारखाना संख्या</b>  DRAWING NO. </div>	<div> <b>CLWES/3/SK-5/0253 / S</b> </div>
<div> <b>चक्रमा. / REVISION</b>  NO. </div>		<div>  <b>परिवर्तन संख्या</b>  ALTERATION NO. </div>	<div> <b>पृष्ठ</b>  SHEET </div> <div> <b>1 OF 1</b> </div>
			A3

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परिचय संख्या	प्रतिफल	वर्णन DESCRIPTION	दिनांक DATE
AC-100	80%		





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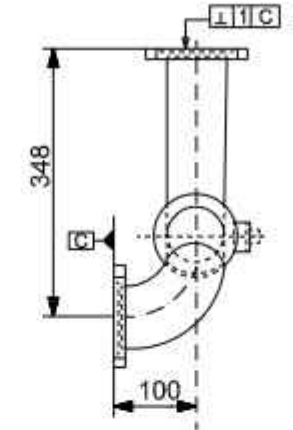
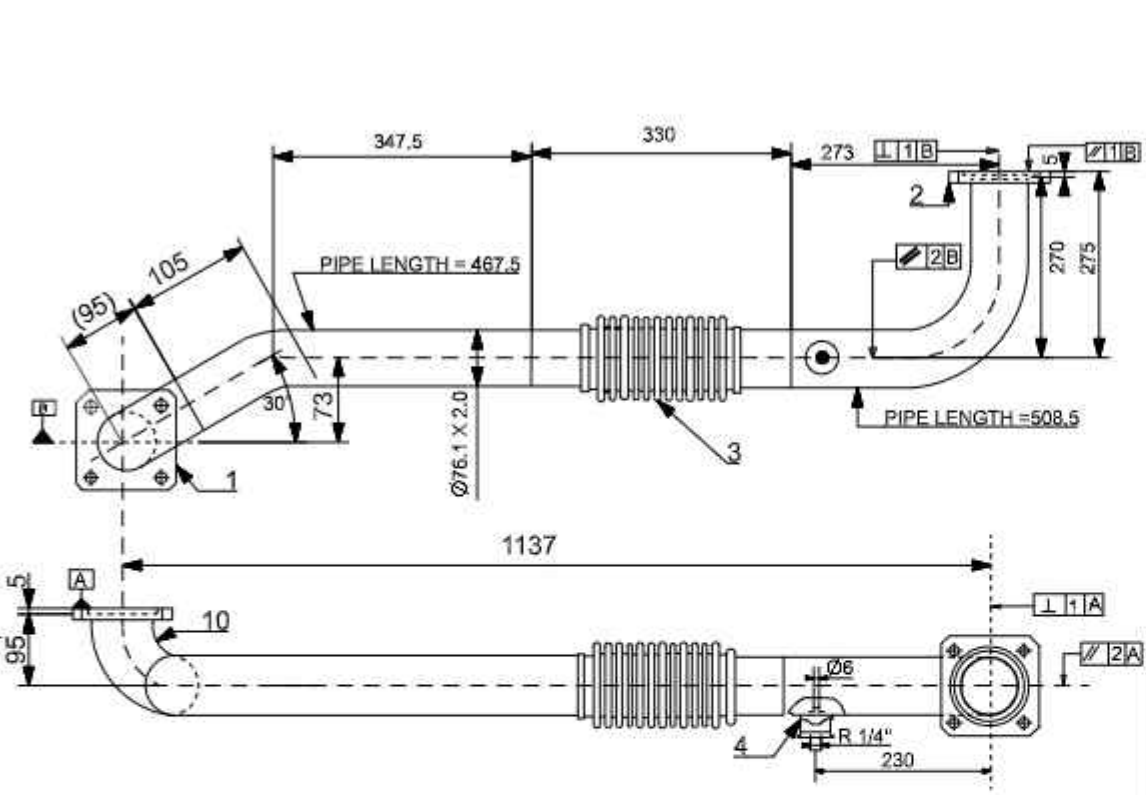
E

D

C

B

A



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-रेलवेन पिप मा. मा. : 813 / अ. मा. सं. : 2583 WELDING SYMBOLS TO IS 813 / IS 2583		अनिर्दिष्ट सतह - सीमा मा. मा. : 2102 / अ. मा. सं. : 2788 UNSPECIFIED TOLERANCE TO S : 2102 / ISO : 2788										TOL CLS
क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.	क्र.सं.
CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.	CRACK NO.
R2	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7
IN MP	0.05	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
सिग	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX	XXXXXX

वर्णन	DESCRIPTION	विभागीय आदेश SHEET INITIAL
आ.सं.	आ.सं.	आ.सं.

आदेशिका DOA		वितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA
परीक्षा संख्या CHK NO.		
आदेशिका आदेशिका / आदेशिका REVIEWED AET / SET		आदेशिका सं. सं. AT (AET) NO. NO.
आदेशिका सं. सं. APPROVED BY/EE		वर्णन DESCRIPTION
वर्णन SCALE	1:1	आदेशिका सं. सं. DRAWING NO.
आदेशिका सं. सं. ALTERATION NO.		वर्णन SHEET
आदेशिका सं. सं. ALTERATION NO.		वर्णन SHEET

This drawing is the property of the organization and is to be kept confidential. It is to be used for the purpose intended and is not to be reproduced or used in any manner without the written consent of the organization.

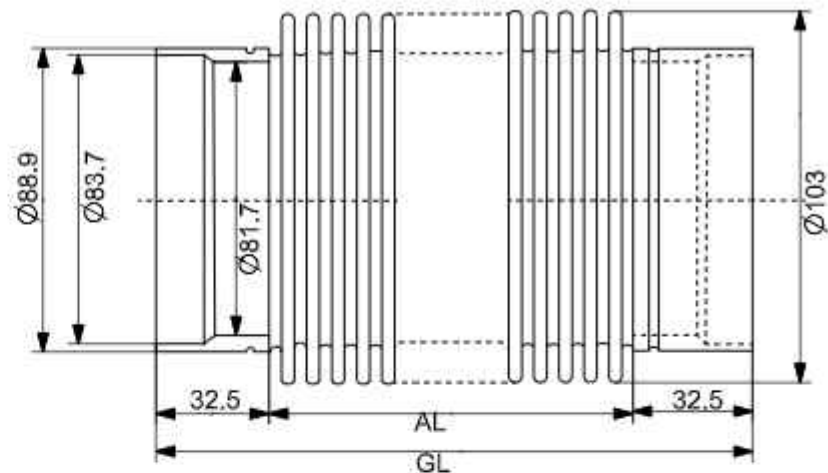
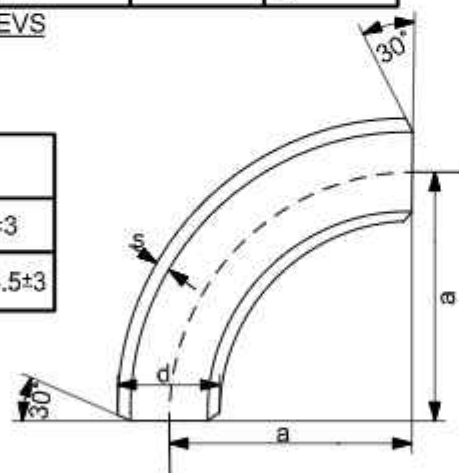


ABB IDENT NO	AL	GL	AXIAL PLAY	LATERAL PLAY	NO OF CORRUGATION	PRESSURE AT 85°C	FOR PIPE
3EHW470069P0002	265	330	±10	±20	2 X 6	10KG/cm <sup>2</sup>	A,B,C,F,G
3EHW470069P0001	115	180	±5	±8	11	"	D

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
3EHN470070P0001	115	180	±5	±8	11	10 KG/cm²	LM
3EHN470070P0002	265	330	±10	±20	2 X 5	"	K

EXP. SLEEVES

ALL DIMENSION ARE IN MM

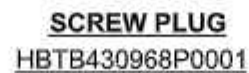
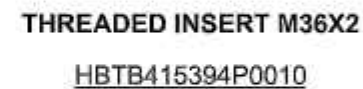
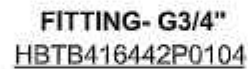
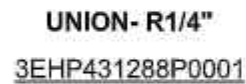
धातु-वैयन विन वा. मा. : 819 / अ. मा. स. : 2589 WELONS SYMBOLS TO IS-819 / IS-2589	अतिरिक्त सध - सीमा वा. मा. : 2102 / अ. मा. स. : 2788 UNSPECIFIED TOLERANCE TO IS : 2102 / ISD : 2788												TOL CLS
	चकत (RAKE)	स 32	स 32	स 32	स 32	स 32	स 32	स 32	स 32	स 32	स 32	स 32	स 32
सतह - कलता का नन वा. मा. 3073 / अ. मा. स. 1302 SURFACE ROUGHNESS VALUE TO IS-3073 / IS-1302	Rz	0.4-0.7	0.7-1.3	1.3-2.5	2.5-5.0	5.0-8.3	8.3-12.5	12.5-20	20-32	32-50	50-63	63-80	80-100
	Fa μm	0.05	0.05	0.1	0.2	0.4	0.6	1.0	1.6	2.5	4.0	6.3	10
	विन (400X)	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX	XXXX

परिचालन संख्या	प्रतिफल	वर्णन	DESCRIPTION	निष्पत्ति आकृति
ACT NO.	ACTIFY			GRADED ACTIVITY

[illegible]







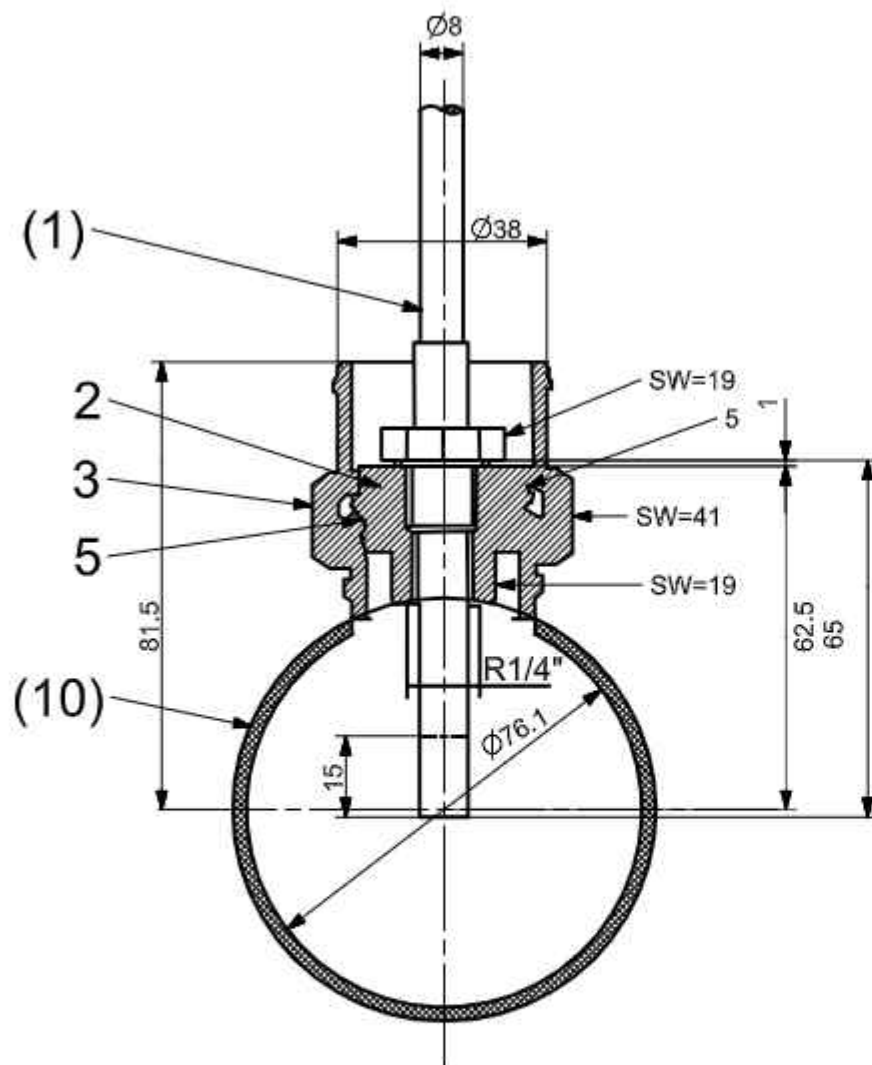


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[illegible]

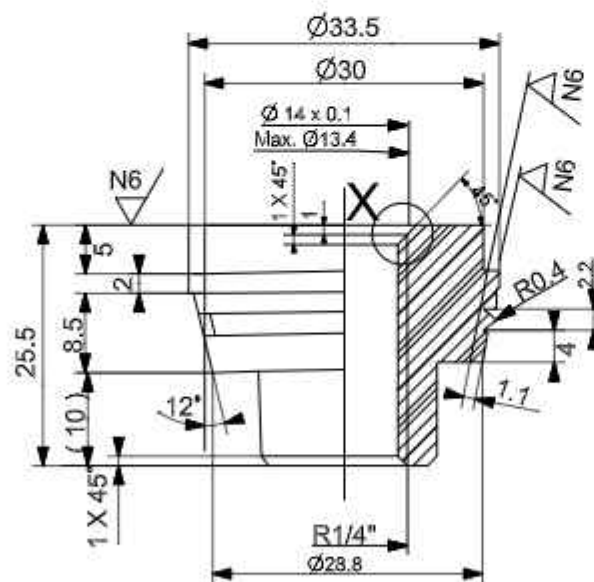
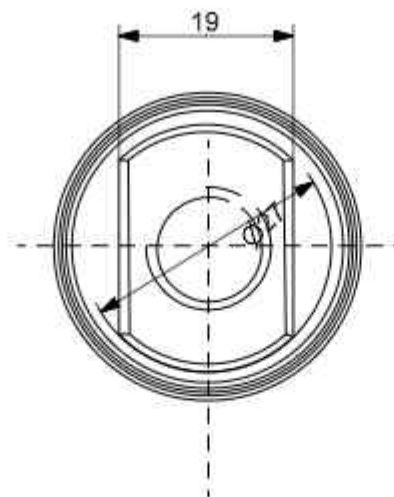
सं	प्रतिपादन संख्या	प्रतिपादन	वर्णन	DESCRIPTION	विषय
	AC. NO.	DATE			QUEST

अविवरणिका CON			चित्तरंजन रेलमोड्युल कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
प्रमाण चिह्न Dwg No.			परामर्श H.M.L.	प्रति पात्र वि. प्र. MT. JAIN. M. K.
संशोधन परिवर्तन / बदल REVISED AND / SEE		विनिर्देश SPECN		
अनुमोदित चिह्न APPROVED BY/EE		वर्णन PIPE FITTINGS		
दिनांक DATE		DESCRIPTION		
चिह्न अनुपात SCALE	1:1	कार्यालय संख्या CLW/ES/3/SK-14/0253+S		
प्रारंभ / अंत NO.			परिवर्तन संख्या ALTERATION NO.	पृष्ठ 20 OF 23
				A3



ALL DIMENSION ARE IN MM

अवधि/दिनांक DOA			चितरंजन रेलमूँजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA	
प्रो. नं. / प्र. नं. DND NO.			वर्ष YEAR	प्रति पात्र नि. प्र. WT. (A) & (B)
संशोधन प्र. नं. / प्र. नं. RESEARCH NO. / PR. NO.		विधि SPEC.		
अनुमोदित प्र. नं. APPROVED BY/EE		वर्णन DESCRIPTION	MOUNTING T-SENSOR	
दिनांक DATE				
रेलक अनुमति SCALE	1:1	कारखान संख्या DRAWING NO.	CLW/ES/3/SK-15/0253+S	
प्रारंभ / अंत AG-		परिवर्तन संख्या ALTERATION NO.	पृष्ठ SHEET	21 OF 23
				A3





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

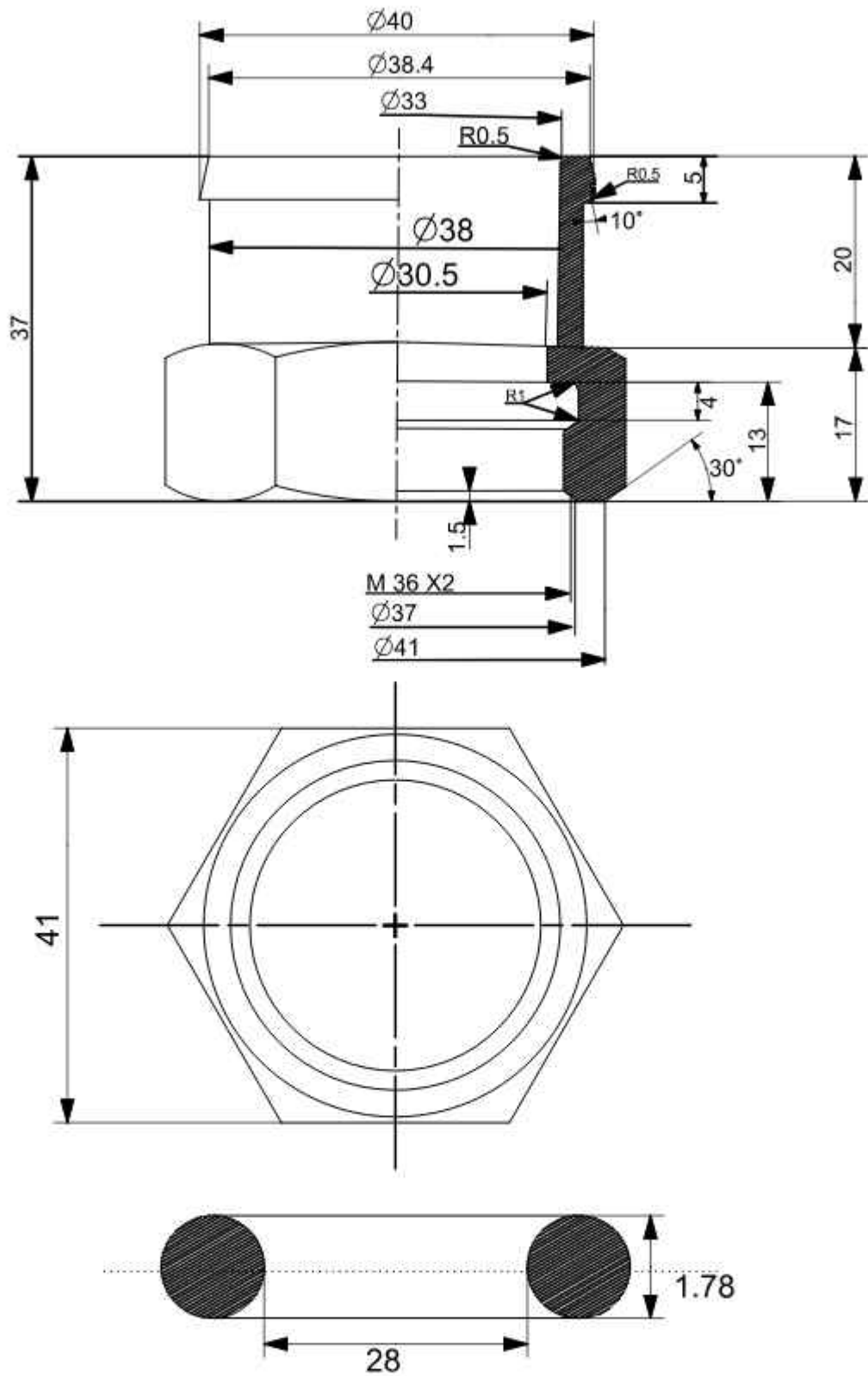
ALL DIMENSION ARE IN MM

[illegible]

परिचालन संख्या	प्रतिफल	वर्णन	DESCRIPTION	दिनांक
ACT NO.	ACTIVITY			DATED

<b>अभिज्ञानिका</b> DON		 <div style="text-align: center;"> <b>चितरंजन रेलइंजन कारखाना</b>              CHITTARANJAN LOCOMOTIVE WORKS, INDIA         </div>	<b>वर्ग</b> HRL	<b>प्रति मास कि. घा.</b> MT TONN. M.H
<b>प्रीत कालक.</b> DND DDA			<b>विनिधि</b> SPEN	
<b>अभिज्ञान चक्रिज. / दक्षिज.</b> REYERHOLD AGT / SEE			<b>वर्णन</b>	<b>FASTENING CONE</b>
<b>अनुमोदित बद्धकिज.</b> APPROVED BYICE			<b>विवरण</b> DESCRIPTION	
<b>दिनांक</b> DATE			<b>कारेखाण संख्या</b> DRAWING NO.	<b>CLWES/3/SK-16/0253+S</b>
<b>चित्रक अनुपात</b> SCALE	1:1		<b>परिवर्तन संख्या</b> ALTERATION NO.	<b>पृष्ठ</b> PAGE
<b>आदेश / अर्थ</b> AC-			22 OF 33	A3





ALL DIMENSION ARE IN MM

परिवर्तन संख्या ALT. NO.		प्राधिकार AUTHY		वर्णन DESCRIPTION		रिवीज संख्या DATED INITIAL		समीक्षा REVIEWED AEE / SEE		अनुमोदित संयोजक APPROVED BYCEE		दिनांक DATE		रेखण संख्या DRAWING NO.		परिवर्तन संख्या ALTERATION NO.		पृष्ठ SHEET		पृष्ठ OF		पृष्ठ A4	
सं1		सं2		सं3		सं4		सं5		सं6		सं7		सं8		सं9		सं10		सं11		सं12	
R2		0.05		0.05		0.1		0.2		0.4		0.8		1.6		3.2		6.3		12.5		25	
SYMBOL		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX		XXXXXX	



चित्तारंजन रेलइंजन कारखाना  
CHITTARANJAN LOCOMOTIVE WORKS, INDIA

प्रकार MATERIAL	प्रति भार कि. घा. WT. EACH IN KG
विशिष्ट SPECN	
वर्णन DESCRIPTION	GLAND NUT
आरेखण संख्या DRAWING NO.	CLW/ES/3/SK/17/0253/S
संदर्भ / REF.	ALT.