सत्यमेव जयते

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No. EL/3.2.182 **Date: 15.11.2017**

प्रमुख वद्युत् अ भयंता, 1. मध्य रेलवे, मुम्बई सीएसटी –400 001 2. पूर्व मध्य रेलवे, हाजीपुर–844 101 3. पूर्व तटीय रेलवे, चन्द्रषेखरपुर, भुबनेश्वर–751 023 4. पूर्व रेलवे, फेयर्ली प्लेस, कोलकाता–700 001 5. उत्तर मध्य रेलवे, ब्लाक ए–2, सुबेदारगंज इलाहाबाद – 211 033 6. उत्तर रेलवे, बड़ौदा हाऊस, नई दिल्ली–110 001 7. उत्तर पश्चिम रेलवे जयपुर– 302006 8. उत्तर पूर्व रेलवे गोरखपुर– 273001 9. उत्तर पूर्व फ्रेन्टीयर रेलवे मालीगॉव गुवाहाटी–781011 10.दक्षिण मध्य रेलवे, रेल निलायम, सिकंदराबाद–500 371 11.दक्षिण पूर्व मध्य रेलवे, बिलासपुर – 495 004 12.दक्षिण पूर्व रेलवे, गार्डेनरीच, कोलकाता–700 043 13.दक्षिण रेलवे, पार्क टाउन, चेन्नई–600 003 14.दक्षिण पश्चिम रेलवे हुबली–580020 15.पश्चिम मध्य रेलवे, जबलपुर–482 001 16.पश्चिम रेलवे, चर्चगेट, मुम्बई– 400 020 17.चित्तरंजन रेल इंजन कारखाना, चित्तरंजन – 713331 18.डीजल रेल इंजन कारखाना, वाराणसी–221004 19. डीजल आधुनिकीकरण कारखाना, पटियाला, पंजाब	**Principal Chief Electrical Engineer,** 1. Central Railway, Mumbai, CST-400 001. 2. East Central Railway, Hazipur-844 101. 3. East Coast Railway, Chandrashekharpur, Bhubaneshwar-751 016. 4. Eastern Railway, Fairlie Place, Calcutta-700 001. 5. North Central Railway, Block-A, Subedarganj, Allahabad- 211 033. 6. Northern Railway, Baroda House, New Delhi-110 001. 7. North Western Railway, Jaipur- 302 006 8. North Eastern Railway, Gorakhpur-273001 9. North East Frontier Railway, Maligaon, Guwahati-781011 10. South Central Railway, Secunderabad-500 071. 11. South East Central Railway, Bilaspur-495 004. 12. South Eastern Railway, Garden Reach, Kolkata-700 043. 13. Southern Railway, Park Town, Chennai-600 003. 14. South Western Railway, Hubli- 580020 15. West Central Railway, Jabalpur-482 001. 16. Western Railway, Churchgate, Mumbai-400 020 17. Chittaranjan Locomotive Works, Chittaranjan-713 331 18. Diesel Locomotive Works, Varanasi-221 004. 19. Diesel Modernization Works, Patiala, Punjab

Modification Sheet No. RDSO/2017/EL/MS/ 0466 (Rev '0') Dated 15.11.2017

1. **Title:**
Modification in drawing of Outer bearing cap DE to achieve adequate lateral thrust in Traction motor (TM) assembly of 6FRA6068 TM in WAG9/ WAP7 class of locomotives**.**

2. **Object:**
To modify drawing of Outer bearing cap DE to achieve adequate lateral thrust in TM assembly of 6FRA6068 TM in WAG9/ WAP7 class of locomotives**.**

3. **Existing arrangement with cross references of respective design document :**
3.1. Background:
3.1.1. RDSO had issued Modification Sheet No. RDSO/2017/EL/MS/0460 dated 12.06.2017 to alter drawing no. 3TWD.096.032 Alt. 6 for ensuring adequate lateral thrust by changing the step of NDE bearing cap dimension from 9.5 mm to 9.5 +0.2/-0 mm so that the clearance between outer face of end shield and inner face of bearing

cap NDE will change from existing 0.5±0.45 mm to 0.5 +0.45/-0.25 mm, which will ensure adequate lateral thrust and improve the reliability of the NDE bearing of TM type 6FRA6068TM.

3.1.2. The assembly pattern of DE side is also similar to NDE side

3.1.3. It is observed that as per drawings, to ensure lateral thrust on outer racer of DE bearing, there must be a nominal clearance of 0.5 mm between outer face of end shield and inner face of Outer bearing cap DE

3.1.4. Calculations as shown below had been made to consider the effect of tolerances of various components on this clearance:

SN	Description	Drawing Number	Nominal Value in mm	Max limit in mm	Min. Limit in mm
A	Depth of DE End Frame Housing bearing seating	Drg. No. 1TWD.096.005 Alt. 8	101+0/-0.2	101.00	100.80
B	Inner Labyrinth DE on End Frame	Drg. No. 4TWD.096.028 Alt.4	5.0±0.05	5.05	4.95
C	Step of DE Outer Bearing Cap pressing the Outer racer	Drg. No. 1TWD.096.006 Alt. 4	10.5*	10.70	10.30
D	Width of DE outer bearing racer	NU 2236 M/s FAG & SKF.	86+0/-0.25	86.00	85.75

*The tolerance for Dim 10.5 is taken from IS:2102 (Part-1):1993 as 10.5±0.2 for medium tolerance class

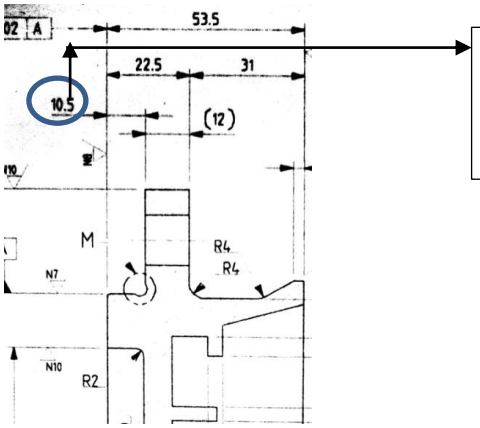
The Range of Clearance /Gap between outer face of end shield (DE) and inner face of outer bearing cap DE = (B+C+D)-A

Minimum Clearance/Gap = (4.95+10.30+85.75)-101.00 =**0.00**

Maximum Clearance/Gap = (5.05+10.70+86)-100.80 =**0.95**

3.1.5. From the above calculations, it is observed that the clearance between outer face of end shield and inner face of outer bearing cap DE is 0.5 +0.45/-0.5 mm due to manufacturing tolerances of various components. Thus, the value of this clearance is 0.5 +0.45/-0.5 mm, with range from 0.00 mm to 0.95 mm. If this clearance is not available, it will cause inadequate lateral thrust on the outer racer of the DE bearing

3.1.6. To ensure adequate lateral thrust, it is decided to increase this clearance by changing the dimension of step of Outer Bearing Cap DE from 10.5 mm to 10.5 +0.2/-0 mm. For this, CLW had been advised vide letter no. EL/3.2.182 dated 26.05.2017 to modify the drawing No. 1TWD.096.006 Alt. 4 as shown below :



To be modified from existing 10.5 to 10.5+ 0.2/-0

3.1.7. With this proposed modification, the clearance between outer face of end shield and inner face of outer bearing cap DE will be 0.5 +0.45/-0.3 i.e. from 0.20 mm to 0.95 mm, which will ensure adequate lateral thrust and improve the reliability of the DE bearing of TM type 6FRA6068TM.

3.1.8. CLW had modified the drawing accordingly and issued modified drawing no. 1TWD.096.006 Alt. 6 vide letter number CLW/TM/18059/Part dated 28.10.2017.

3.2.Existing drawing:

Outer Bearing Cap DE as per drawing No. 1TWD.096.006 Alt. '4' or Alt '5'.

4. **Modified Instructions :-**

4.1. Description of kit of labyrinths for TM type 6FRA-6068 shall be modified to include modified drawing of Outer Bearing Cap DE i.e. Drawing Number 1TWD.096.006 Alt. 6 for future procurement.

4.2. During the assembly of Traction motor, Outer Bearing Cap DE as per Drawing No. 1TWD.096.006 Alt'6'(or latest) to be used.

5. **Application to class of Locomotives:**

WAP7/WAG9/WAG9H class of locomotives.

6. **Material Required:**

Outer Bearing Cap DE as per drawing No. 3TWD.096.006 Alt '6'.

7. **Material Rendered Surplus:**

Outer Bearing Cap DE as per drawing No. 1TWD.096.006 Alt '4' or Alt '5'.

8. **Modification Drawing:**

CLW Drawing No. 1TWD.096.006 Alt '6'.

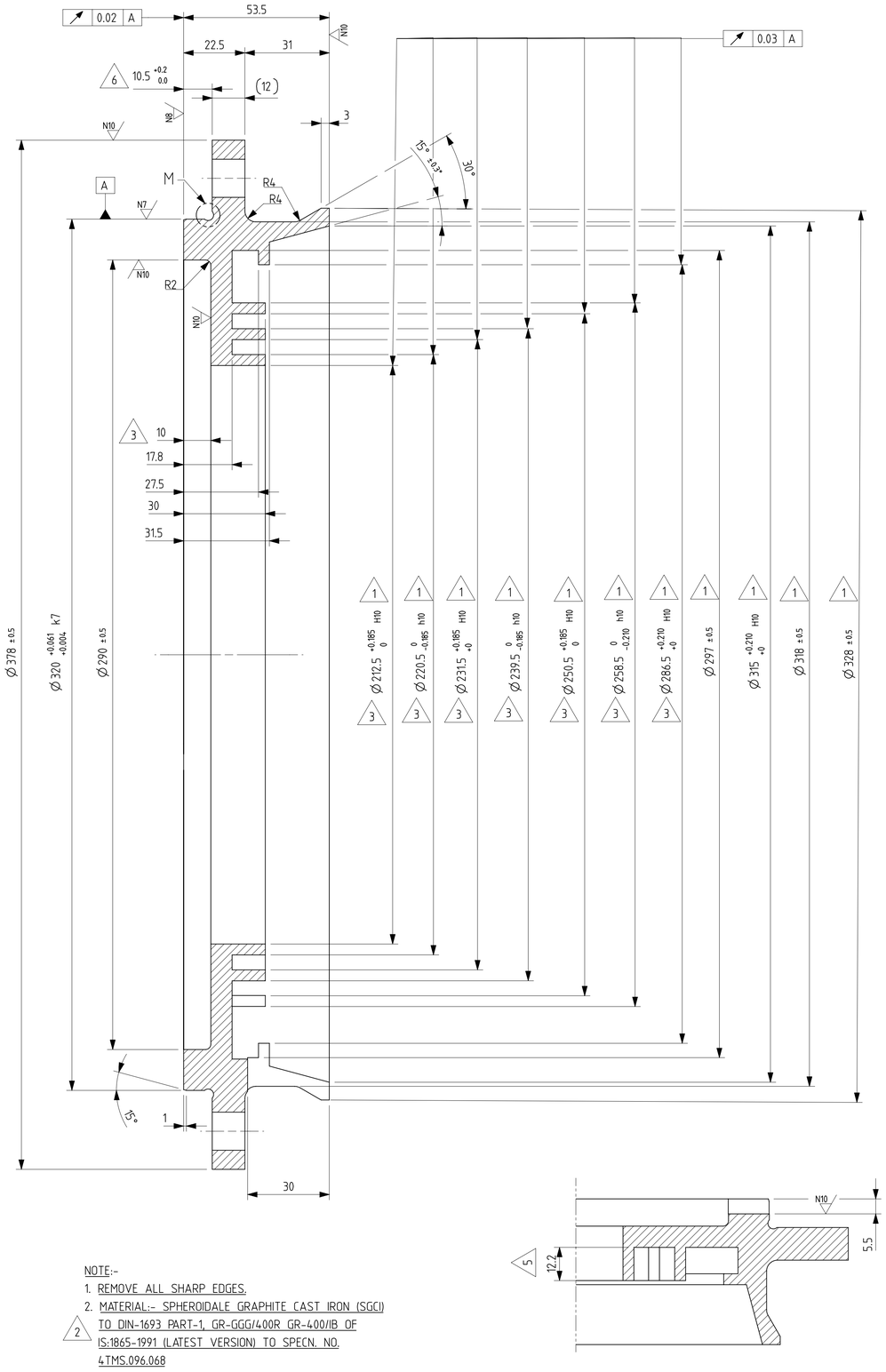
9. **Agency of Implementation:-**

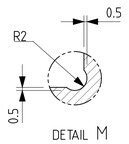
CLW, Workshops carrying out POH of Electric locomotives, all Electric Loco Sheds and TM manufacturers.

Encl: Above modified drawing

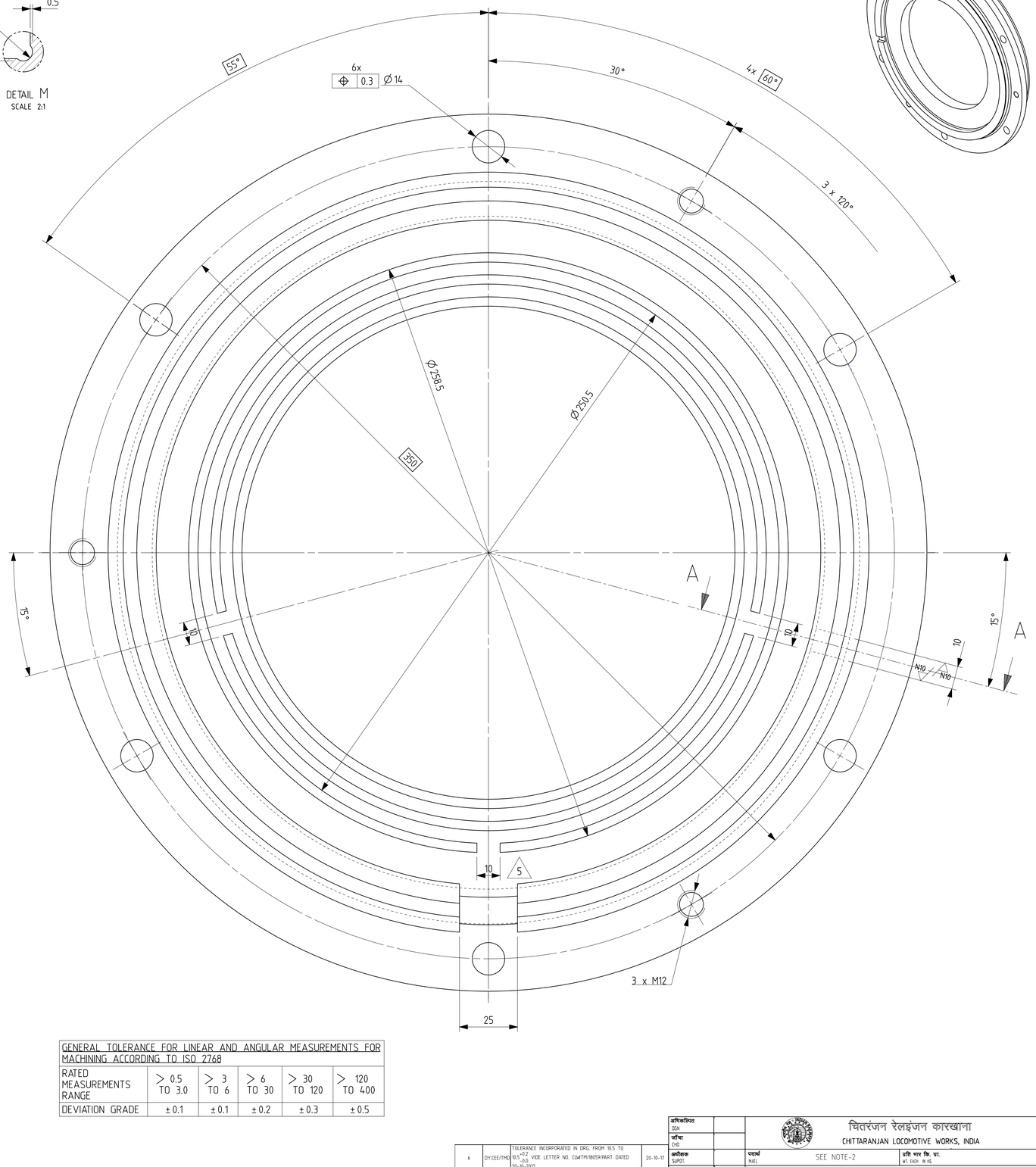
15.11.17

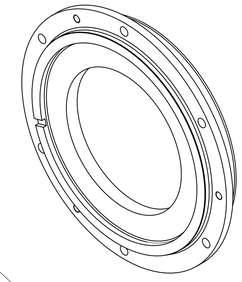
(P. K. Saraswat)
for Director General/Electrical

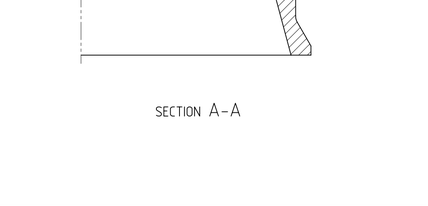




DETAIL M
SCALE 2:1







SECTION A–A

NOTE:-
1. REMOVE ALL SHARP EDGES.
2. MATERIAL:- SPHEROIDALE GRAPHITE CAST IRON (SGCI) TO DIN-1693 PART-1, GR-GGG/400R GR-400/IB OF IS:1865-1991 (LATEST VERSION) TO SPECN. NO. 4TMS.096.068

GENERAL TOLERANCE FOR LINEAR AND ANGULAR MEASUREMENTS FOR MACHINING ACCORDING TO ISO 2768					
RATED MEASUREMENTS RANGE	> 0.5 TO 3.0	> 3 TO 6	> 6 TO 30	> 30 TO 120	> 120 TO 400
DEVIATION GRADE	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5

धातु–वेल्डन चिन्ह भा. मा. : 813 / अ. मा. सं. :2553 WELDING SYMBOLS TO IS:813 / ISO:2553	अनिर्दिष्ट सत्रह – सीमा भा. मा. : 2102 / अ. मा. सं. : 2768 UNSPECIFIED TOLERANCE TO IS : 2102 / ISO : 2768												TOL. CLS.
	ग्रेड GRADE NO.	घरा N1	घरा N2	घरा N3	घरा N4	घरा N5	घरा N6	घरा N7	घरा N8	घरा N9	घरा10 N10	घरा11 N11	घरा12 N12	
	मि Rz	0.16-0.63	0.5-0.7	0.9-1.1	1.5-2.0	2.5-3.8	3.8-6.3	9.0-12	16-75	30-48	50-63	75-100	100-750	
खराद – एकसरा का भाग भा. मा. 3073 / अ. मा. सं. 1302 SURFACE ROUGHNESS VALUE TO IS:3073 / ISO:1302	Ra µm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50	
	चिन्ह SYMBOL													

परिवर्तन संख्या AUT. NO.	प्राधिकार AUTHY.	वर्णन DESCRIPTION	दिनांकित आक्षर DATED INITIAL
6	DY.CEE/TMS	TOLERANCE INCORPORATED IN DRG. FROM 10.5 TO $10.5^{+0.2}_{0.0}$ VIDE LETTER NO. CLW/TM/18059/PART DATED 20-10-2017	20-10-17
5	DY.CEE/TMS	03 CHANNELS (10mmx12.2mm) ARE CUT FOR DRAINAGE OUT THE INGRESS OF GEAR CASE. VIDE L NO. EL/3.2.282, DT. 30.6.2015	02-05-15
4		REFERWITH IN N.V. WITH 3RD ANGLE PROJECTION	20-11-09
3	DY.CEE/TMS	DRG. TOLERANCES ALTERED COMPARED TO H.T.M.	30-02-09
2	DY.CEE/TMS	MATERIAL GRADE & SPECIFICATION CHANGED VIDE NOTE NO. CLW/TM/18009 DATED 6-11-2007. NOTE 2 ADDED.	20-11-07
1	DY.CEE/TMS	TOLERANCE VALUE AND GENERAL TOLERANCE TABLE INCORPORATED	02-02-99

अभिकल्पित DSN		चितरंजन रेलइंजन कारखाना CHITTARANJAN LOCOMOTIVE WORKS, INDIA		
जाँचा CHD				
अधीक्षक SUPDT.		पदार्थ MAT.	SEE NOTE-2	प्रति गाय कि. ग्रा. WT. EACH IN KG
परीक्षित स.अ PEVIEWED SE		तिथि/दि SPECN	SEE NOTE-2	
अनुमोदित प.इ.वि.अ APPROVED DYEE		दर्शन DESCRIPTION	OUTER BEARING CAP. (DE) (MACHD.)	
दिनांक DATE	11-10-96			
ऐकिक अनुपात SCALE	1:1	आरेखण संख्या DRAWING NO.	1TWD.096.006	
चर्खन्ड / REF. 3EHM112045 ALT-		परिवर्तन संख्या ALTERATION NO.	6	पर्ण SHEET 1 OF 1 A1