

Fax : (0522)-2452581 Telephone: (0522)-2465737 Email : dsetplgroup@gmail.com	 सत्यमेव जयते	भारत सरकार – रेल मंत्रालय अनुसंधान अभिकल्प और मानक संगठन लखनऊ – 226011 Government of India - Ministry of Railways Research, Designs & Standards Organization, Lucknow - 226011
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No. EL/3.1.35/17

Dated: As signed

Principal Chief Electrical Engineer,

- Central Railway, HQs Office, 2nd floor, Parcel Office Bldg., Mumbai – 400 001.
- East Central Railway, Hajipur (Bihar) – 844 101.
- East Coast Railway, Railway Complex, Bhubaneswar – 751 023.
- Eastern Railway, Fairlie Place, Kolkata – 700 001.
- North Central Railway, Prayagraj – 211 001.
- North Eastern Railway, Gorakhpur – 273 001.
- North Western Railway, near Jawahar Circle, Jaipur – 302 017.
- Northeast Frontier Railways, Maligaon, Guwahati – 781 011
- Northern Railway, Baroda House, New Delhi – 110 001.
- Southern Railway, Park Town, Chennai – 600 003.
- South Central Railway, HQs Office, Rail Nilayam, Secunderabad – 500 071.
- South Eastern Railway, Garden Reach, Kolkata – 700 043.
- South East Central Railway, Bilaspur – 495 004.
- South Western Railway, Hubli – 580020.
- West Central Railway, HQs Office, Opp. Indira Market, Jabalpur – 482 001.
- Western Railway, Church gate, Mumbai – 400 020.
- Banaras Locomotive Works, Varanasi – 221 004.
- Chittaranjan Locomotive Works, Chittaranjan – 713 331 (WB).
- Patiala Locomotive Works, Patiala – 147 003.

MODIFICATION SHEET NO. RDSO/2024/EL/MS/0504 (Rev. '1')

1.0 Title:

Removal of Harmonic Filter from WAP5, WAP7 and WAG9H class of 3-phase electric locomotives fitted with M/s Alstom (erstwhile BTIPL), CGPISL and Medha make IGBT based Propulsion Equipment.

2.0 Brief History:

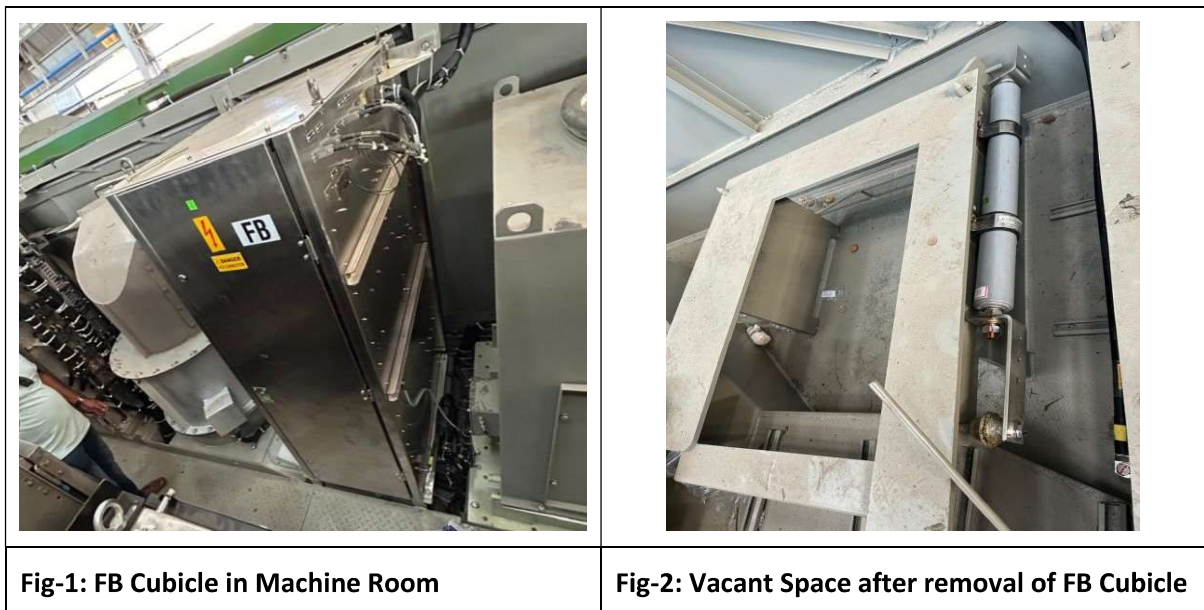
- 2.1** A detailed EMI/EMC tests and trials of 3-phase locos with Harmonic Filter in isolated condition was conducted by NCR in presence of representatives of Signal & Telecom Directorate of RDSO. NCR, vide letter No. NCR/EL/Loco/129/3-phase dtd. 14.08.24, submitted the trial reports. After scrutiny of EMI/EMC test results, Signal & Telecom Directorate has approved the permanent isolation of harmonic filters from 3-phase locomotives fitted with M/s Alstom, CGPISL and Medha make IGBT based Propulsion Equipment.

2.2 Considering above, modification sheet No. RDSO/2024/EL/MS/0504, Rev. '0' was issued for isolation of harmonic filter from 3-phase locomotives fitted with M/s Alstom, CGPISL and Medha make IGBT based Propulsion Equipment. After satisfactory performance of modified locomotives, complete removal of harmonic filter is proposed for WAP5, WAP7 and WAG9H class of 3-phase electric locomotives fitted with M/s Alstom, CGPISL and Medha make IGBT based Propulsion Equipment.

2.3 In order to remove FB cubicle, BLW has developed a new housing, the "Primary Current Sensor Box for FB Removal" to relocate the primary current sensors and their associated surge arrester. These components were originally housed in the FB Cubicle. This modification has been successfully implemented by BLW, Varanasi in one WAP7 locomotive (37856) to accommodate primary current sensors and their associated surge arrester in the new housing.

3.0 Modified scheme:

Complete removal of the Filter Cubicle (FB Panel) from Machine Room-2 of the locomotive shall be done. Additionally, the harmonic filter resistor mounted on the locomotive roof, along with all power cables connecting the harmonic filter to its junction box, shall be removed. Furthermore, the two primary current sensors (6.2/1 & 6.2/2) and the surge arrester (6.21) associated with these sensors, currently housed in the Harmonic Filter Cubicle, shall be relocated. The photographs before removal of FB Cubicle and after removal are shown in Fig-1 & Fig-2 below:



The details are given in following paragraphs:

3.1 Power/Control Cable Arrangement:

a. FB Cable looms to be removed (No longer required)	Power Cables: Loom No. 123: 150 sq. mm 03 cables (FB to Resistance Harmonic Filter; Wire Marker: 5, 6 & 7). Loom No. 125: 70 sq. mm 04 cables; 02 cables wire marker 04 & 02 cables wire marker 12.
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		Control Cables: Loom No. 337: Harmonic Filter Current Sensor (8.5/1) to Traction Converter-1 (SR-1). Loom No. 340: Harmonic Filter Current Sensor (8.5/2) to Traction Converter-2 (SR-2). Earthing: Loom No. 130: (Earthing Cable size: 120 sq. mm).
b.	Length Changed in Looms	Power Cables: Loom No. 126: 70 sq. mm 02 cables (Transformer to FB; Wire Marker: 98) length changed from 14 m to 4.6 m. Loom No. 124: 120 sq. mm 01 cable (FB to Earthing Choke; Wire Marker: 100) length changed from 1.8m to 4.3 m. Control Cables: Loom No. 335: (6.2/1 Sub-D to SR-1) length changed from 17.0 m to 10.7 m.
c.	New Cables Required	16 sq. mm of 0.75 m; Cable to earth new Box at Spigot welded near Box with M-8 size hardware.

3.2 Earthing Choke Arrangement: In the current setup, the earthing choke is mounted on the right-side base of the FB cubicle. After the FB cubicle is removed, the choke coil shall be reinstated in the same position and on the same base as before. The same may be seen in Fig-3 & Fig-4 below:



Fig-3: Before removal of FB Cubicle



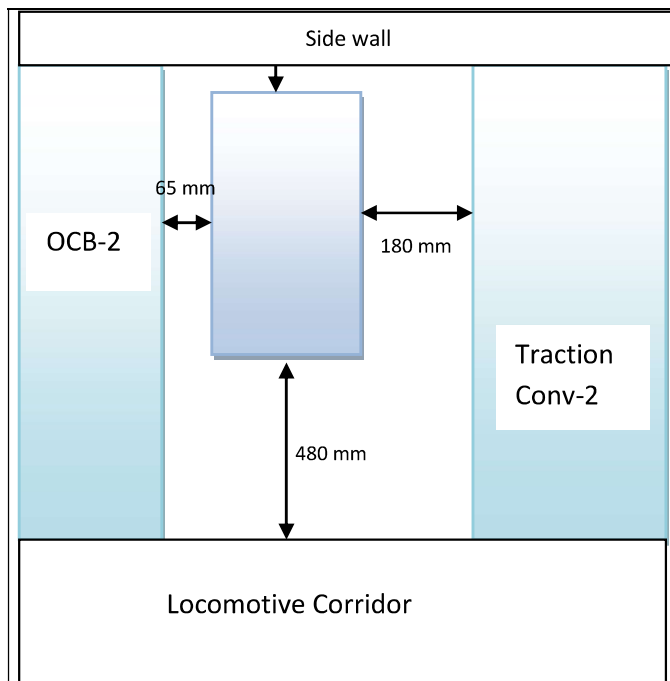
Fig-4: After removal of FB Cubicle

3.3 Shifting of Primary Current Sensors (6.2/1 & 6.2/2) and the Surge Arrestor (6.21):

The Primary current sensors & Surge arrestor shall be mounted on a fixture in new Primary Current Sensor Box, as shown in Fig-6 below. The connection and mounting arrangement of components on the fixture in the new box shall remain same as the existing setup.

- The new Primary Current Sensors Box shall be made of SS-304 sheet with a minimum thickness of 2.0 mm. The detailed drawing of the aforesaid box is enclosed as Annexure-1.
- The surge arrestor shall be mounted on an insulated sheet, similar to the existing arrangement, on the base of the new box.
- The bus-bars shall be secured using insulators, similar to those used for power cable connections in the existing FB Cubicle.

The complete Primary current sensors & Surge arrestor Box shall be mounted on the base of the locomotive, positioned between OCB-2 and Traction Converter-2 in the Machine Room-2. The location of housing has been described in a sketch given in Fig.5. However, it can be slightly adjusted with different make of Propulsion system as per need. A photograph showing the housing and its overall placement is provided in Figure 6 below:

**Fig-5: Existing Connection inside FB cubicle****Fig-6: Modified Box**

Photographs of the existing connection of these components inside the FB cubicle and their arrangement in the new box are shown in Fig-7 and Fig-8 respectively.

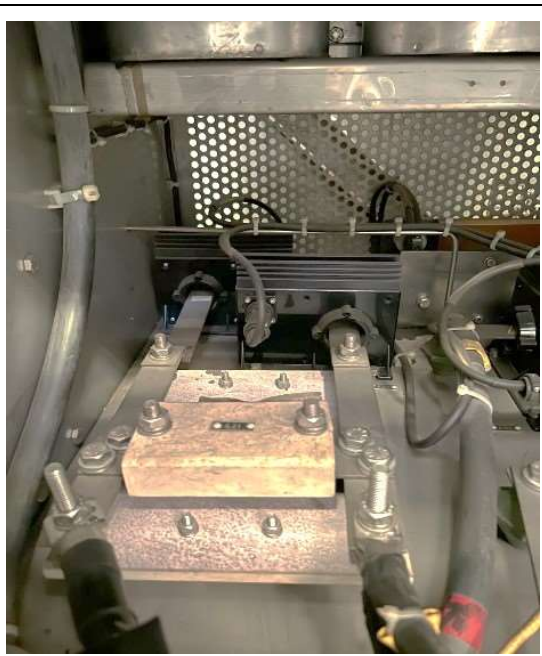


Fig-7: Existing Connection inside FB cubicle



Fig-8: Modified Box internal arrangement

4.0 Software Modification: Following to be ensured:

- (i) Contactors – 8.1, 8.2 & 8.41 have been controlled and monitored by Traction Converter. The control and monitoring signals of these contactor shall be isolated from Traction Converter.
- (ii) Speed restriction of 40 kmph in case of harmonic filter isolation shall be removed.
- (iii) Subsystem SS04 shall be removed from the DDS.
- (iv) Protection actions related to Subsystem-04 (SS04) shall be isolated.

5.0 Material required:

- (i) Housing as per drawing mentioned in Annexure-1.
- (ii) Cables as per Para-3.1 above.

6.0 Material Rendered Surplus:

- (i) Completer Filter Cubicle (FB panel).
- (ii) Harmonic filter resistor grid (on the roof).
- (iii) Cables from Filter Cubicle to Junction box of Harmonic Filter resistance.
- (iv) Control cables from SB to Harmonic Filter.

5.0 Application to the Class of Locomotives:

WAP5, WAP7 and WAG9H class of 3-phase electric locomotives fitted with M/s Alstom, CGPISL and Medha make IGBT based Propulsion Equipment

6.0 Agency of Implementation:

CLW for software modification and Electric Loco Sheds and PUs/Workshops for hardware modification.

7.0 Periodicity of Implementation:

During Production, Minor Schedule Inspections (IA/IB/IC), Overhauling Schedules (TOH, IOH, POH) and any other unscheduled maintenance.

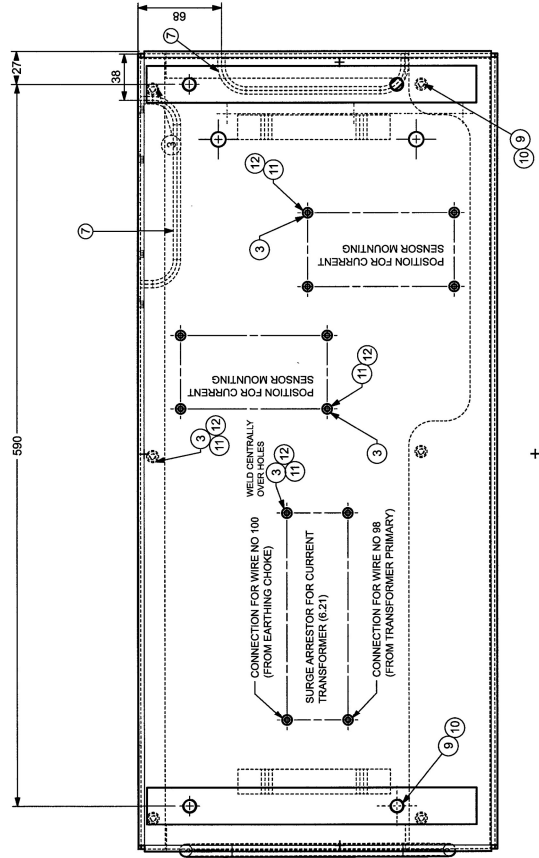
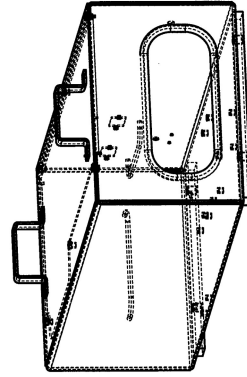
Encl: As above.

-sd-
DSE/TPS

Copy to:

Secretary (Electrical),
Railway Board, Rail Bhawan,
New Delhi – 110 001

Digitally Signed by Amit
Kumar Saraf
Date: 23-04-2025 13:44:15
Reason: Approved
DSE/TPS



NO. OFF	DESCRIPTION & DIMENSION	ITEM	PART NO.	QUANTITY	MATERIAL	SPECIFICATION
1	BOLT M8 x 50 LONG	16				
1	BOLT M6 x 50 LONG	15				
2	NUT M6	14				
2	NUT M6	13				
16	BOLT M6 x 20 LONG	12				
20	SPRING WASHER M6	11				
4	BOLT M6 x 18 LONG	10				
6	SPRING WASHER M6	9				
1	CIRCULAR TIE ROD	8	ELSK-196			
2	TIE ROD	7	ELSK-198			
4	FLANG WELD NUT M3	6				
2	FILTER TAPPING PAD	5	ELSK-182			
2	HANDLE	4	ELSK-181			
16	FLANG WELD NUT M6	3				
1	FILTER COVER SHEET	2	ELSK-180			
1	FILTER CABLE BOX SHEET	1	ELSK-179			

PRIMARY CURRENT
SENSOR BOX FOR
FB REMOVAL
(ARR REF NO- 3EHP130280)

THIS DRAWING IS A PROPERTY OF BURLINGTON RAILWAYS AND ANY UNAUTHORIZED USE OF THE DRAWING WILL BE CONSIDERED ILLIGAL AND BURLINGTON RAILWAYS WILL HAVE RIGHT TO INITIATE LEGAL PROCEEDINGS AGAINST THE DEFAULTERS.

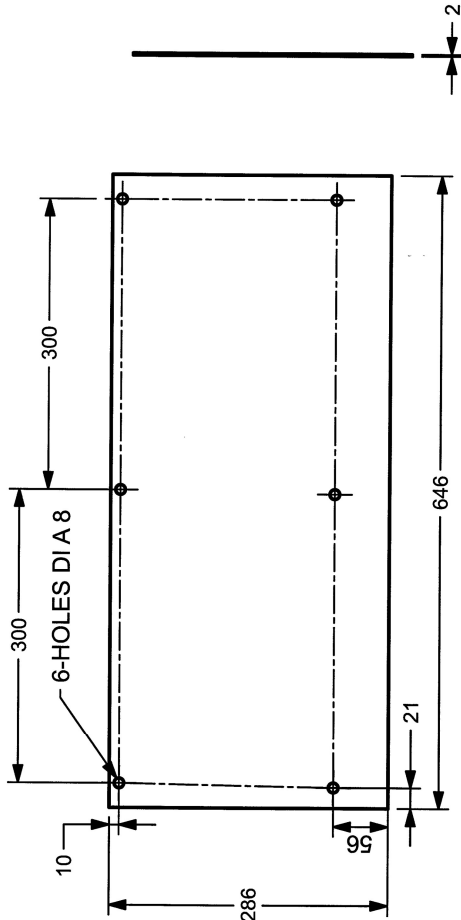
ISSUING AUTHORITY : SSE/RECORDS
ALL DIMS. ARE IN mm.

ब.रे.का. BANARAS LOCOMOTIVE WORKS DRAWING NO- ELSK-178 VARANASI

ASSLY. PART NO.

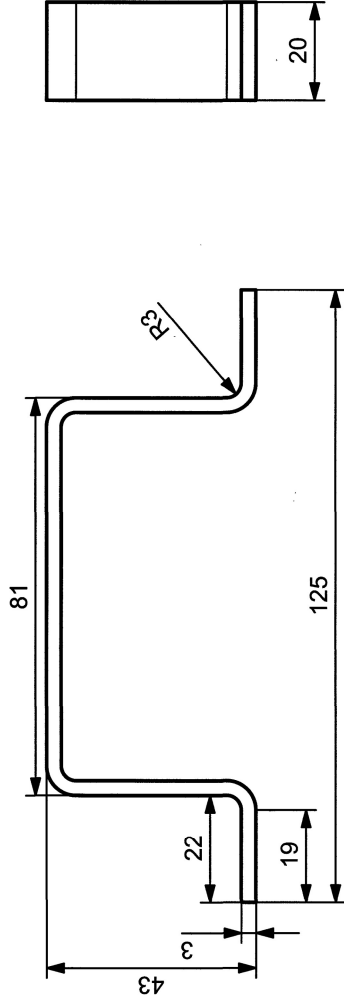
WT./ASSEMBLY		R-1 FINISH ROUGH	① R-1 FINISH ROUGH	② R-1 FINISH ROUGH	③ R-1 FINISH ROUGH	④ R-1 FINISH ROUGH	⑤ R-1 FINISH ROUGH	⑥ R-1 FINISH ROUGH	⑦ R-1 FINISH ROUGH	⑧ R-1 FINISH ROUGH	⑨ R-1 FINISH ROUGH	⑩ R-1 FINISH ROUGH	⑪ R-1 FINISH ROUGH	⑫ R-1 FINISH ROUGH	⑬ R-1 FINISH ROUGH	⑭ R-1 FINISH ROUGH	⑮ R-1 FINISH ROUGH	⑯ R-1 FINISH ROUGH	⑰ R-1 FINISH ROUGH	⑱ R-1 FINISH ROUGH	⑲ R-1 FINISH ROUGH	⑳ R-1 FINISH ROUGH	㉑ R-1 FINISH ROUGH	㉒ R-1 FINISH ROUGH	㉓ R-1 FINISH ROUGH	㉔ R-1 FINISH ROUGH	㉕ R-1 FINISH ROUGH	㉖ R-1 FINISH ROUGH	㉗ R-1 FINISH ROUGH	㉘ R-1 FINISH ROUGH	㉙ R-1 FINISH ROUGH	㉚ R-1 FINISH ROUGH	㉛ R-1 FINISH ROUGH	㉜ R-1 FINISH ROUGH	㉝ R-1 FINISH ROUGH	㉞ R-1 FINISH ROUGH	㉟ R-1 FINISH ROUGH	㊱ R-1 FINISH ROUGH	㊲ R-1 FINISH ROUGH	㊳ R-1 FINISH ROUGH	㊴ R-1 FINISH ROUGH	㊵ R-1 FINISH ROUGH	㊶ R-1 FINISH ROUGH	㊷ R-1 FINISH ROUGH	㊸ R-1 FINISH ROUGH	㊹ R-1 FINISH ROUGH	㊺ R-1 FINISH ROUGH	㊻ R-1 FINISH ROUGH	㊼ R-1 FINISH ROUGH	㊽ R-1 FINISH ROUGH	㊾ R-1 FINISH ROUGH	㊿ R-1 FINISH 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C-1 FINISH ROUGH	C1 ROUGH CLEANING	SURFACE ROUGHNESS VALUE TO IS: 3073	GRADE NO	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	ALT. NO.	A L T E R A T I O N	REASON	CHECKED BY SSE/VEH	VERIFIED BY ADE	APPROVED BY DUCE/MECH
C-10 FLAME CUT	C10 CHAMFERED		Ro ym	0.025	0.050	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50						
C13 BURRS REMOVED			SYMBOL	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽	▽▽▽▽						



NO. OFF		DESCRIPTION & DIMENSION		ITEM	PART NO.	SS SHEET	ASTM A240 GR 321
GROUP : SUPERSTRUCTURE		SUPERSEDED BY		Wt./UNIT	MATERIAL	SPECIFICATION	
FILT ER COVER SHEET		SCALE 1:5		SIZE A3	CHECKED BY	DRAWN BY	
PROJECTION		ALT.		WAP 7		WAP 7	
BANARAS LOCOMOTIVE WORKS VARANASI		DRG NO. ELSK - 180		Wt./ASSLY. =		K9	
TOLERANCES ON UNTOLERANCED DIMENSION TO		ISSUING AUTHORITY : SSE/RECORDS		ALL DIMENSION ARE IN mm.		THIS DRAWING IS A PROPERTY OF BLM/INDIAN RAILWAYS AND ANY UNAUTHORIZED USE OF THE DRAWING WILL BE CONSIDERED ILLIGAL AND BLM/INDIAN RAILWAYS WILL HAVE RIGHT TO INITIATE LEGAL PROCEEDINGS AGAINST THE DEFAULTERS.	
Dj.CDE/1		ADE/ELE-2		2/ELSK-178		ASSLY. PART NO.	
WAP 7		WAP 7		WAP 7		WAP 7	

P-1 FINISH ROUGH	ROUGH CLEANING	SURFACE ROUGHNESS VALUE TO 15: 3073	GRADE, NO.	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	ALT. NO.	A L T E R A T I O N	REASON	CHECKED BY SSE/VEH	VERIFIED BY ADE	APPROVED BY DJ, COE/ MECH
P-10 FLAME CUT	(B) CHAMFERED		Ra μ m	.025	.050	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50						
	(C) BURRS REMOVED		SYMBOL																		



THIS DRAWING IS A PROPERTY OF BLM/INDIAN RAILWAYS AND ANY UNAUTHORISED USE OF THE DRAWING WILL BE CONSIDERED ILLEGAL AND BLM/INDIAN RAILWAYS WILL HAVE RIGHT TO INITIATE LEGAL PROCEEDINGS AGAINST THE DEFAULTERS.

THIS DRAWING IS A PROPERTY OF BLM/INDIAN RAILWAYS AND ANY UNAUTHORISED USE OF THE DRAWING WILL BE CONSIDERED ILLIGAL AND BLM/INDIAN RAILWAYS WILL HAVE RIGHT TO INITIATE LEGAL PROCEEDINGS AGAINST THE DEFAULTERS.		Wt./ASSLY. = Kg		21/11/15 A/K/15/15		4/ELSK-178 ASSLY. PART NO.	
TOLERANCES ON UNTOLERANCED DIMENSION TO ISSUING AUTHORITY : SSE/RECORDS ALL DIMENSION ARE IN mm.		21/11/15 A/K/15/15		4/ELSK-178 ASSLY. PART NO.		4/ELSK-178 ASSLY. PART NO.	
Wt./ASSLY. = Kg		21/11/15 A/K/15/15		4/ELSK-178 ASSLY. PART NO.		4/ELSK-178 ASSLY. PART NO.	
TOLERANCES ON UNTOLERANCED DIMENSION TO ISSUING AUTHORITY : SSE/RECORDS ALL DIMENSION ARE IN mm.		21/11/15 A/K/15/15		4/ELSK-178 ASSLY. PART NO.		4/ELSK-178 ASSLY. PART NO.	

P-1 FINISH ROUGH		(0) ROUGH CLEANING		SURFACE ROUGHNESS VALUE TO IS: 3073		GRADE NO		N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	ALT. NO.		AL T E R A T I O N		REASON		CHECKED BY SSE/VEH	VERIFIED BY ADE	APPROVED BY Dy.CDE/ MECH	
P-10 FLAME CUT		(B) CHAMFERED				Ra μm	.025	.050	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50											
		(019) BURRS REMOVED		SYMBOL		▽▽▽▽		▽▽▽		▽▽		▽		□															

M 8 TAPPED HOLE

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15
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170
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THIS DRAWING IS A PROPERTY OF BLM/INDIAN RAILWAYS AND ANY UNAUTHORISED USE OF THE DRAWING WILL BE CONSIDERED ILLIGAL AND BLM/INDIAN RAILWAYS WILL HAVE RIGHT TO INITIATE LEGAL PROCEEDINGS AGAINST THE DEFAULTERS.

Wg./ASPLY. =
TOLERANCES ON UNTOLERANCED DIMENSION TO
ISSUING AUTHORITY : SSE/RECORDS
ALL DIMENSION ARE IN mm.

Kg

Dy.CDE/1

5/ELSK - 178

ASSLY. PART NO.

ADE/ELSK-178

BANARAS LOCOMOTIVE WORKS
VARANASI

DRG NO. ELSK - 182

[illegible]

