SPECIFICATION

FOR

SET OF CABLE DISCONNECTION TM-1 to TM-6

FOR WAG-9 AND WAP-7

THREE PHASE ELECTRIC LOCOMOTIVES

Specification No : CLW/ES/3/0128

Issue Date :- 09.06.1997

Final Draft

ISSUED BY
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ALTERATION RECORD SHEET

S. No.	Date of Amendment	Page No.	Alteration	Reason	Authority
1.	28.02.2003	5	A	Fire Retardant/ Self-extinguishing clause included in Page No.5	Sd/-
2.	09.04.2009	5	B	In Sheet No. 05, the Hole center will be 15 mm from the Bus Bar in fig. no.5 as per instruction of Dy. CEE/ EL	Sd/-
3.	23.02.2018	4	C	Material of compression plate and spacer has been changed from Bakelite to Glass reinforced Polyester dough moulding compounds Gr-D3 as per IS 13411 with approval of Dy. CEE/D-I on dtd:- 23.02.2018	Sd/-
4.	--.07.2024		D	(i) Sketch for Threaded Rod replaced with modified Sketch in fig. 4 of sheet no. 7 (ii) Grade of Material & Standard for following items added/modified in material column in para 5 of sheet no. 4. a. Bracket : SST 6XCrNiTi to SST 6XCrNiTi1810 Cold rolled as per AISI-321. b. Insulation Plate: Polyester Resin to Polyester Resin as per IS: 10192-1982,Gr. UP-2. c. Threaded Rod: Glass reinforced plastic/ Fibre reinforced plastic to SST Rod as per AISI-**321** covered with Fibre reinforced plastic as per IS: 10192-1982,Gr. EP-3. d. Terminal Bar: Electrolytic tough pitch Cu. Medium cold rolled as per DIN 1787(Silver Plated 2-3 micron) to Electrolytic tough pitch Cu. Medium cold rolled as per IS: 191:2007 Pt. (V) (Silver Plated 2-3 micron)**.** (iii) M/s. APL for standard fasteners added in sheet no. 3 (iv) Unspecified Tolerance: IS:2102 added in note, sheet no. 7. (v) Type, routine and acceptance test schedule incorporated in para 6 of Sheet No. 4-6 as per test schedule of spec. no. CLW/ES/3/0424 for spec. of Set of Cable Disconnection of WAP-5. (vi) Number of copies of technical documents revised under para 7 of Sheet No. 6. (vii) Major schedules for overhauling of locos has been incorporated in new para No. 8	

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1. SCOPE

This specification covers the manufacture and supply of Set of Cable Disconnection TM- 1 to TM-6 for WAG-9 (Co-Co),6000 HP, 3-phase, 25 KV, 50 Hz AC Locomotive.

2. SERVICE CONDITIONS

- **CLIMATIC & ENVIRONMENTAL CONDITION:-**

Maximum atmospheric temperatures	+70°C (in Sun) & 50°C (in shade)
Normal Humidity	60%.
Maximum Humidity	100% saturation during rainy season
Altitude	160 m above mean sea level
Rainfall	Very heavy in certain areas. The equipment should be designed in such a way as to withstand its running at 10 Km/hr. in flood water level of 102 mm 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 correspondence unless otherwise prescribed

3. STANDARDS

The relevant IEC, BS, DIN, Standard & Indian standard specification shall apply with respect to all materials used in the manufacture of Cable Disconnection TM-1 to TM-6.

4. SCOPE OF SUPPLY

Sl.No.	Description	ABB ID	Quantity per Loco	CLW Drg. No.
1.	Cable Disconnection TM-1	3EHP130282R0001	1	CLW/ES/3/SK-1/0128
2.	Cable Disconnection TM-2	3EHP130282R0002	1	CLW/ES/3/SK-1/0128
3.	Cable Disconnection TM-3	3EHP130282R0003	1	CLW/ES/3/SK-1/0128
4.	Cable Disconnection TM-4	3EHP130282R0004	1	CLW/ES/3/SK-1/0128
5.	Cable Disconnection TM-5	3EHP130282R0005	1	CLW/ES/3/SK-1/0128
6.	Cable Disconnection TM-6	3EHP130282R0006	1	CLW/ES/3/SK-1/0128

- Standard fasteners of M/s TVS, M/s LPS, M/s Un-Brako, M/s. APL and Spring Washers of M/s FORBES make only to be used.
- Manufacturer shall fix a Name Plate on the equipment indicating (i) Manufacturer's Name (ii) Electrical rating (iii) Month and year of manufacture (iv) Sl. No. of the equipment.

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5. DRAWINGS

The following drawings are attached with the specification:-
Drg. No. CLW/ES/3/SK-1/0128

Fig. No.	Description	ABB ID	Material
1.	Bracket	3EHP431227	SST 6XCrNiTi 1810 Cold rolled as per AISI-321
2.	Compression Plate	HBTB416302	Glass reinforced polyester dough moulding compound Gr.D3 as per IS:13411
3.	Insulation Plate	3EHP431587	Polyester Resin as per IS: 10192-1982,Gr. UP-2
4.	Threaded rod	HBTB416304	SST Rod as per AISI-321 covered with Fibre reinforced plastic as per IS: 10192-1982,Gr. EP-3
5.	Terminal Bar	3EHP431586	Electrolytic tough pitch Cu. Medium cold rolled as per IS: 191:2007 Pt. (V) (Silver Plated 2-3 micron)
6.	Spacer	HBTB416301	Polyester dough compounds Gr.D3 as per IS:13411
7.	Washer	7500	A13/24 SST, A2-70 or A4-70 as per DIN 125, DIN 17440
8.	Con Washer	7602	13/19 SPR ST M2.5-M8 Spr St C60 >M10, 50CrV4
9.	Hex. Nut	7701	0.8 D M10 SST A2-70/A4-70 (ISO 3506) as per DIN 934/ DIN 267 T.4

6. TESTS:-

6.1 Type tests, routine tests and acceptance tests:

A. TYPE TEST:

Type test to be carried out on prototype samples of Cable Disconnection. Complete type tests shall be organized and conducted by the manufacturer in presence of the authorized representative of vendor controlling authority. The type test once approved by vendor controlling agency may be repeated whenever required by vendor controlling agency.

B. ROUTINE TEST:

To be carried out by the manufacturer on each lot. The manufacturer shall maintain record of test results to be produced as and when required by the authorized inspecting agency.

C. ACCEPTANCE TEST:

Acceptance test will be done by the inspection agency as per terms and conditions mentioned in the placed purchase orders. Sampling plan will be followed as tabulated below:

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Sl No.	Lot or Batch Size	Sample Size	Accept Lot if Non Conformity is Equal or Less than Mentioned No.
1.	2-8	2	0
2.	9-15	3	0
3.	16-25	5	0
4.	26-50	8	0
5.	51-90	13	0
6.	91-150	20	1
7.	151-280	32	2
8.	281-500	50	3
9.	501-1200	80	5
10.	1201-3200	125	7
11.	3201-10000	200	10

6.2 Description of test:

Sl.No.	Test description	Type Test	Routine Test	Acceptance Test
6.2.1	Raw material testing of Bracket, Compression Plate, Insulation Plate, Threaded rod, Terminal Bar, Spacer etc	✓	✓	✓
6.2.2	Dimensional details with respect to drawing	✓	✓	✓
6.2.3	Quality of workmanship and their conformity with the standard specification	✓	✓	✓
6.2.4	Plating & thickness of Terminal Bar (Silver Plated 2-3 micron)	✓	✓ *	✓ *
6.2.5	High voltage test **Procedure:** Voltage of 3kv for 1 minute to be applied (a) Between Terminal bars (i.e. 1&2, 2&3 and 1&3). (b) Between Terminal bars and threaded rod and should be withstand.	✓	-	-
6.2.6	Milli volt drop test **Procedure:** Free end cable (CAB 9 GKW-AX 120 4000 V BK) to be connected with Terminal Bar in which current of 300 Amps to be injected by current injector and milli volt drop to be measured between terminal bar & connecting cable. Milli volt drop should not exceed more than 3 mV.	✓	-	-

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* Test shall be conducted on 05 (Five) random samples selected by inspecting officials during inspection from the offered lot.

7. TECHNICAL DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER:-

i. Type test reports : In soft & Hard copy (One set)
ii. Routine test report along with each set : In soft copy + hard copy (One set)
iii. Maintenance Manual : In Soft copy
iv. Detailed drawings : Soft copy (CAD /NX (Unigraphics) + 1 hard copy in readable size

8. Major schedules for WAG9/ WAG-9H/ WAG-9HC are as follows:
1. TOH(3 years)
2. IOH (6 years)
3. POH (18 years)

8.1 Major schedules for other variant of locos will be as per RB Letter No. 2022/M(L)/165/5, dtd: 07.12.2022 or latest issued by Indian Railways.

8.2 Quality of equipment shall be such that no unscheduled maintenance of the equipment is required.

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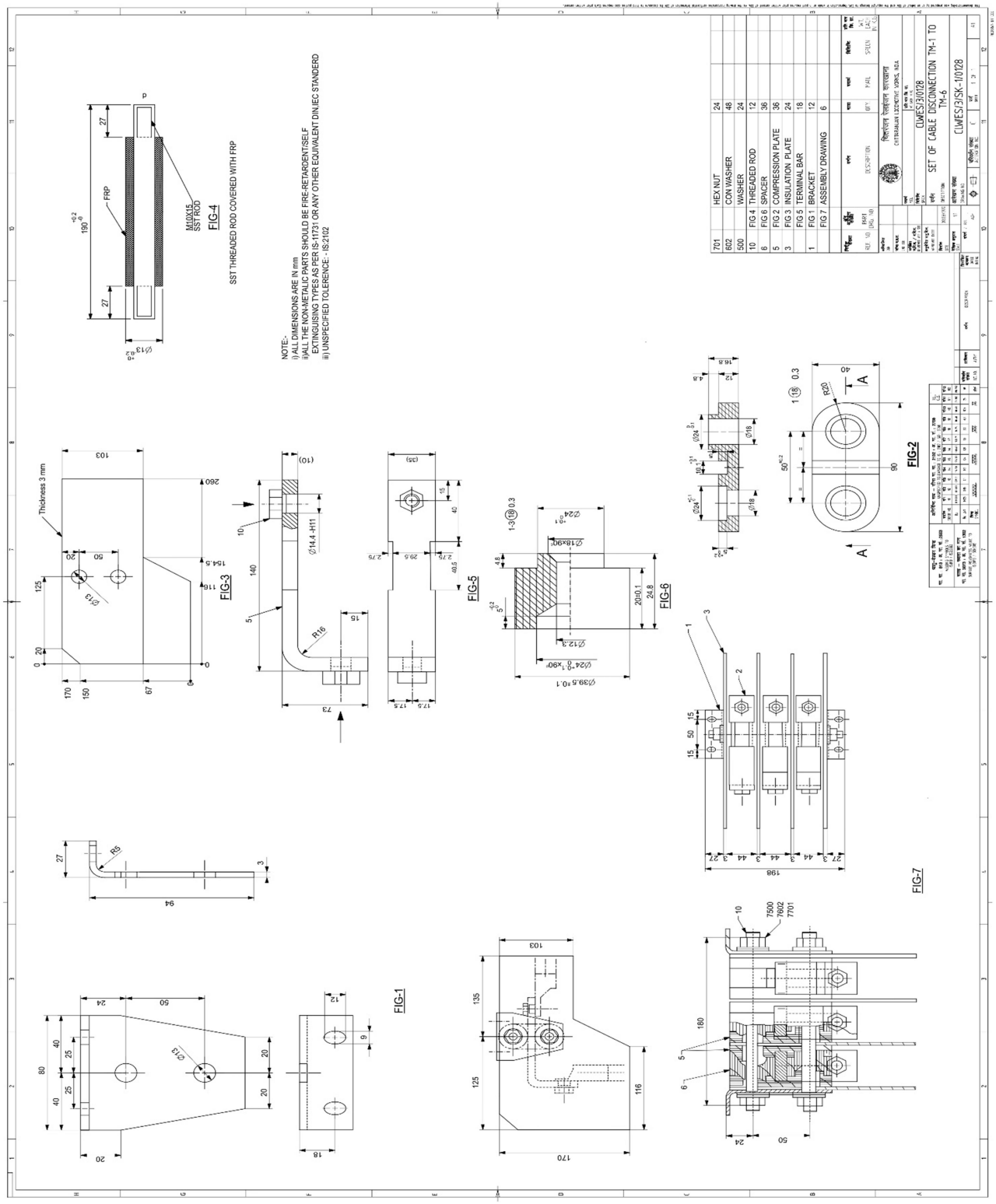

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SPECIFICATION

FOR

SET OF CABLE DISCONNECTION TM-1 to TM-4 FOR WAP-5

THREE PHASE ELECTRIC LOCOMOTIVES

Specification No : CLW/ES/3/0424

Issued on 25.11.1999

ISSUED BY
DY.CHIEF ELECTRICAL ENGINEER/D-I
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ALTERATION RECORD SHEET

SL. No.	Date of Amendment	Page No.	Alteration	Reason	Authority
1.	20.02.2003	4	A	Fire Retardant/ Self-extinguishing clause included in Page No.4, Sl.No.4.1	Sd/-
2.	23.02.2018	5	B	Material of compression plate and spacer has been changed from Bakelite to Glass reinforced Polyester dough moulding compounds Gr-D3 as per IS 13411 with approval of Dy.CEE/D-I on dtd:- 23.02.2018	Sd/-
3.	--.07.2024	5,6,7	C	(i) Sketch for Threaded Rod added in REF.-7 of sheet no. 9 (ii) Standard & Grade of Material for following items added/modified in material column in para 4 of sheet no. 5. a) Bracket : SST 6XCrNiTi to SST 6XCrNiTi1810 Cold rolled as per AISI-321 b) Insulating Plate: Polyester Resin to Polyester Resin as per IS: 10192-1982,Gr. UP-2. c) Threaded Rod: Glass reinforced plastic/ Fibre reinforced plastic to SST Rod as per AISI-321 covered with Fibre reinforced plastic as per IS: 10192-1982,Gr. EP-3. d) Terminal Bar: Electrolytic tough pitch Cu. Medium cold rolled as per DIN 1787(Silver Plated 2-3 micron) to Electrolytic tough pitch Cu. Medium cold rolled as per IS: 191:2007 Pt. (V) (Silver Plated 2-3 micron). (iii) Material details for following items incorporated as per Spec. no. CLW/ES/3/0128 for Spec. of WAG-9 & WAP-7 under para 4 of sheet no. 5. a) Washer: SST to A13/24 SST, A2-70 or A4-70 as per DIN 125, DIN 17440. b) Con Washer : SPR STEEL to 13/19 SPR ST M2.5-M8 Spr St C60 >M10, 50CrV4. c) Hex Nut : SST to 0.8 D M12 SST A2-70/A4-70 (ISO 3506) as per DIN 934/ DIN 267 T.4. iv) M/s. APL for standard fasteners added in para 4 (1.10) of sheet no. 5. v) Unspecified Tolerance: IS:2102 added in note para of sheet no. 9. vi) Number of copies of technical documents revised under para 5 of Sheet No. 6. vii) Major schedules for overhauling of locos has been incorporated in new para No. 8	

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SPECIFICATION FOR TRACTION MOTOR CABLE DISCONNECTION

1. SCOPE

This specification applies to TRACTION MOTOR CABLE DISCONNECTION TM- 1 to TM-4 for 3-Phase, 5000 HP WAP-5 class locomotive for 25 kV AC 50 Hz system.

2. CLIMATIC & ENVIRONMENTAL CONDITION:-

Maximum atmospheric temperatures	Under Sun: 70°C ,In shade.: 50°C
Humidity	100% saturation during rainy season
Reference site condition:	
i) Ambient Temp.	Max. 55°C Min. 0°C
ii) Humidity	60%
iii) Altitude	160 m above mean sea level
iv) Rainfall	Very heavy in certain areas. The locomotive will be designed to permit its running at 10 Km/hr. in flood water level of 102 mm 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 standard otherwise prescribed

3. STANDARDS

The relevant IEC, BS, DIN, Standard & Indian standard specification shall apply with respect to all materials used in the manufacture of the item .

3.1 All the non-metallic parts should be Fire retardant/ self-extinguishing type as per IS-11731 or any other equipment DIN, IEC standard.

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4. SCOPE OF SUPPLY & TECHNICAL DATA

Sl.No.	DESCRIPTION OF MATERIALS	IDENT. NO.	DRG. NO.	QTY/ LOC O	MATERIAL
1.	T.M. cable Disconnection	3EHP230120P0001	CLW/ES/3/SK-1/0424	4	
One T.M. Cable Disconnection consists of:-					
1.1	Compression Plate	HBTB416302P0001	CLW/ES/3/SK-1/0424	6	Glass reinforced polyester dough moulding compound Gr.D3 as per IS:13411
1.2	Bracket	3EHP431227 P0001	CLW/ES/3/SK-1/0424	2	SST 6XCrNiTi 1810 Cold rolled as per AISI-321
1.3	Insulating Plate	3EHP431229P0001	CLW/ES/3/SK-1/0424	4	Polyester Resin as per IS: 10192-1982,Gr. UP-2
1.4	Threaded rod	3EHP230120P0001	CLW/ES/3/SK-1/0424	2	SST Rod as per AISI-321 covered with Fibre reinforced plastic as per IS: 10192-1982,Gr. EP-3
1.5	Terminal Bar	3EHP431228R0001	CLW/ES/3/SK-1/0424	3	Electrolytic tough pitch Cu. Medium cold rolled as per IS: 191:2007 Pt. (V) (Silver Plated 2-3 micron)
1.6	Spacer	HBTB416301P0002	CLW/ES/3/SK-1/0424		Glass reinforced polyester dough moulding compound Gr.D3 as per IS:13411
1.7	Washer A13/24	NB335050P0610	CLW/ES/3/SK-1/0424	4	A13/24 SST, A2-70 or A4-70 as per DIN 125, DIN 17440
1.8	Con Washer 13/29	3EHW470066P1120	CLW/ES/3/SK-1/0424	8	13/19 SPR ST M2.5-M8 Spr St C60 >M10, 50CrV4
1.9	Hex. Nut 0.8D/M10	NB332600P0514	CLW/ES/3/SK-1/0424	4	0.8 D M10 SST A2-70/A4-70 (ISO 3506) as per DIN 934/ DIN 267 T.4

1.10 Standard fasteners of M/s TVS, M/s LPS, M/s Un-Brako**,** M/s. APL and Spring Washers of M/s FORBES make only to be used.

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4.1 NAME PLATE

The manufacturer shall fix Name Plate on the equipment indicating (i) Manufacturer's Name and monogram (ii) Range of electrical rating (iii) Month and year of manufacture (iv) Sl. No. of the equipment.

5. TECHNICAL DOCUMENTS TO BE SUPPLIED BY THE SUPPLIER:-

The following documents shall be supplied by the supplier as a part of the contract

i. Type test reports : In soft & Hard copy (One set)
ii. Routine test report along with each set : In soft copy + hard copy (One set)
iii. Maintenance Manual : In Soft copy
iv. Detailed drawings : Soft copy (CAD /NX (Unigraphics) + 1 hard copy in readable size

6. TESTS

6.1 Type tests, routine tests and acceptance tests:

A. TYPE TEST:

Type test to be carried out on prototype samples of Cable Disconnection. Complete type tests shall be organized and conducted by the manufacturer in presence of the authorized representative of vendor controlling authority. The type test once approved by vendor controlling agency may be repeated whenever required by vendor controlling agency.

B. ROUTINE TEST:

To be carried out by the manufacturer on each lot. The manufacturer shall maintain record of test results to be produced as and when required by the authorized inspecting agency.

C. ACCEPTANCE TEST:

Acceptance test will be done by the inspection agency as per terms and conditions mentioned in the placed purchase orders. Sampling plan will be followed as tabulated below:

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Sl No.	Lot or Batch Size	Sample Size	Accept Lot if Non Conformity is Equal or Less than Mentioned No.
1.	2-8	2	0
2.	9-15	3	0
3.	16-25	5	0
4.	26-50	8	0
5.	51-90	13	0
6.	91-150	20	1
7.	151-280	32	2
8.	281-500	50	3
9.	501-1200	80	5
10.	1201-3200	125	7
11.	3201-10000	200	10

6.2 Description of test:

Sl.No.	Test description	Type Test	Routine Test	Acceptance Test
6.2.1	Raw material testing of Bracket, Compression Plate, Insulation Plate, Threaded rod, Terminal Bar, Spacer etc	✓	✓	✓
6.2.2	Dimensional details with respect to drawing	✓	✓	✓
6.2.3	Quality of workmanship and their conformity with the standard specification	✓	✓	✓
6.2.4	Plating & thickness of Terminal Bar (Silver Plated 2-3 micron)	✓	✓ *	✓ *
6.2.5	High voltage test **Procedure:** Voltage of 3kv for 1 minute to be applied (a) Between Terminal bars (i.e. 1&2, 2&3 and 1&3). (b) Between Terminal bars and threaded rod And should be withstand.	✓	-	-
6.2.6	Milli volt drop test **Procedure:** Free end cable (CAB 9 GKW-AX 120 4000 V BK) to be connected with Terminal Bar in which current of 300 Amps to be injected by current injector and milli volt drop to be measured between terminal bar & connecting cable.	✓	-	-

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	Milli volt drop should not exceed more than 3 mV.			

***** Test shall be conducted on 05 (Five) random samples selected by inspecting officials during inspection from the offered lot.

7. QUALITY ASSURANCE

Quality assurance should be as per ISO 9000

8. Major schedules for WAG9/ WAG-9H/ WAG-9HC are as follows:
1. TOH(3 years)
2. IOH (6 years)
3. POH (18 years)

8.1 Major schedules for other variant of locos will be as per RB Letter No. 2022/M(L)/165/5, dtd: 07.12.2022 or latest issued by Indian Railways.

8.2 Quality of equipment shall be such that no unscheduled maintenance of the equipment is required.

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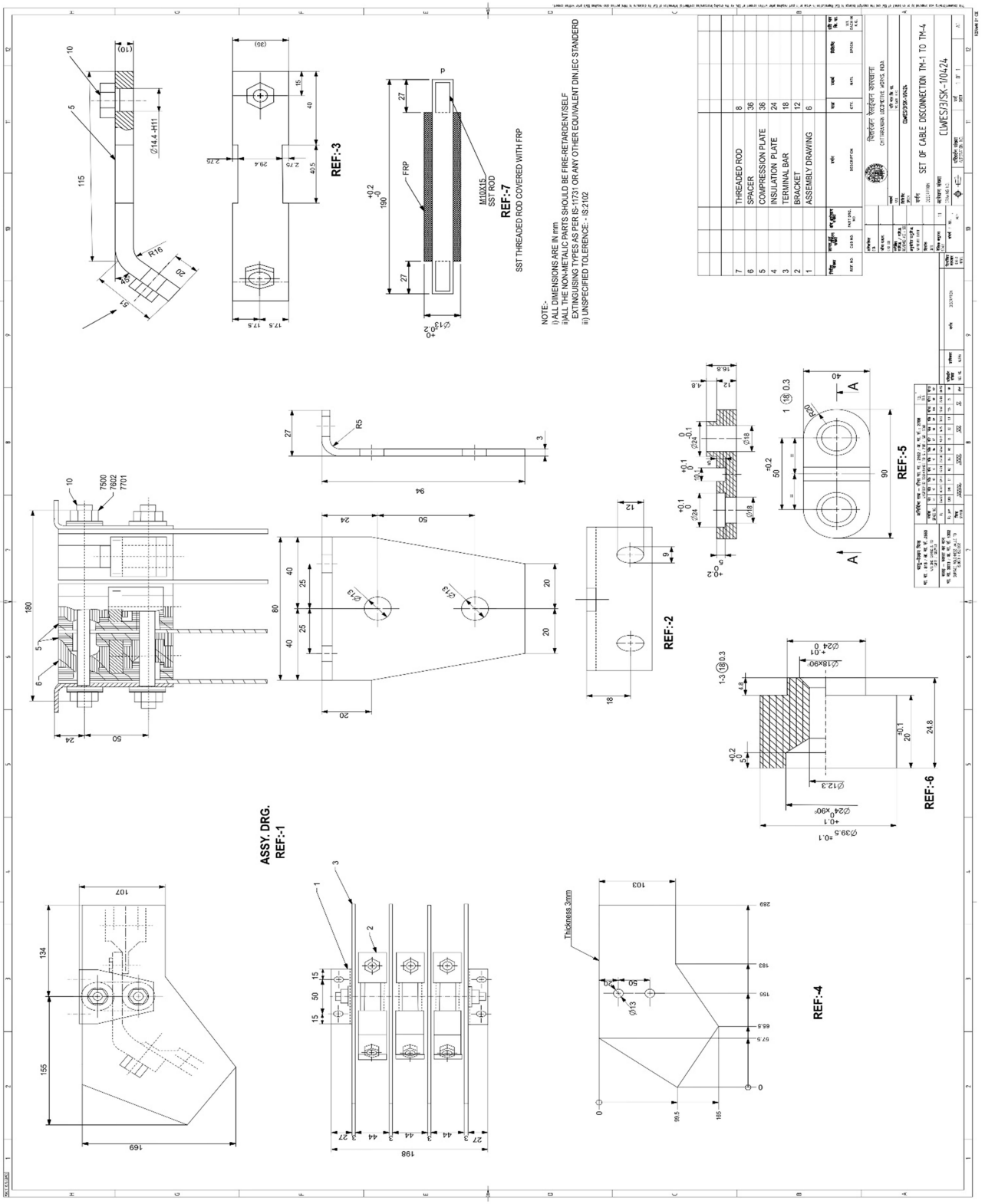

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