SPECIFICATION FOR 'HARNESS OF UNDER-FRAME AND SUPERSTRUCTURE ARRANGEMENT' FOR LHB EOG HIGH CAPACITY PARCEL VAN COACHES

1.0 This specification covers manufacturing, assembly and supply of ready made `CABLE HARNESSES for UNDER FRAME AND SUPERSTRUCTURE FOR LHB EOG HIGH CAPACITY PARCEL VAN Coaches'. These harnesses shall comprise of thin walled flexible elastomeric cables with copper conductors duly cut to specified lengths and ferruled for cable identification. The free ends of the cables shall be stripped & taped with FRLT cotton insulation tapes of approved makes.

1.1 The harness manufacturer shall quote separately for supply & commissioning of the harness as under:

a). Budgetary quote of the harness without commissioning.

b). Budgetary quote of the harness with installation & commissioning in the coach at RCF.

1.2 The firm shall maintain date wise in house quality control system and in-house quality control records etc. for in stage process inspection and testing at harness manufacture premises and the same shall be made available to the inspecting official during type testing.

2.0 SCOPE OF SUPPLY:

TYPE	DESCRIPTION
TYPE-1	Harness of 'Under-frame arrangement' for LHB EOG High Capacity Parcel Van Coaches
TYPE-2	Harness of 'Superstructure arrangement' for LHB EOG High Capacity Parcel Van Coaches

Installation and Commissioning requirements:

a) Firm shall be responsible for execution of complete Harness duly ferruled, crimped and connections to all equipments.

b) For manufacturing of LHB EOG High Capacity Parcel Van coaches, Commissioning shall comprise of Electrical activities as under:-

i) **Under-frame** :- Complete furnishing of under-frame comprising:-
   1. Conduiting, Clamping, dressing, tray fixing and Wiring.
   2. Loading and securing of all under-slung equipments.
   3. Connections of all equipments including WSP.
   4. Earthing of all items.

ii) **Super-structure**:- Complete furnishing of super-structure comprising:-
   1. Conduiting, Clamping, dressing, tray fixing and Wiring of side-wall and end-wall.
   2. Fixing/Connections of all types of switch plates, lights etc. in side-wall.
   3. Fixing/Connections of all types of couplers/socket e.g. HOG Socket etc. in end-wall.
   4. Earthing of all items.

iii) **Miscellaneous:-**
   1. Replacement of defective equipment/items.
   2. Shell defect rectification.
   3. Movement of material from PCO/Main Stores to Furnishing Shop-1 & 2 (Necessary assistance shall be given by RCF, free of cost for M&P e.g. Lifters/Cranes/Platforms etc.).
   4. Any other work as per site requirements.

c) Firm shall be fully responsible for complete furnishing of coach electric, item supplied by firms or items to be supplied by RCF. Firm will handed over the coach in NO FAULT condition after Meggering and continuity testing of the coach.
d) Testing on 110V DC, 415V AC, 750V AC & Quality clearance shall be done by RCF.
e) Relevant drawings with latest alterations shall be followed for UNDER-FRAME, ROOF, SIDE-WALL, END-WALL as per Clause-7.0, 7.1 & 7.2
f) Procurement of the items specified in the BOM of the specification shall be from RDSO/RCF/ICF approved vendors mentioned in latest version of the vendor directory issued by RDSO/ RCF/ICF respectively. Wherever some specific makes have been mentioned, procurement is to be done from those sources.
g) SAFETY: All PPE/Safety related gears availability shall be ensured while working in coaches.

2.1 TYPE-1: HARNESS OF UNDER FRAME ARRANGEMENT' FOR LHB EOG HIGH CAPACITY PARCEL VAN COACHES:-

2.1 (a): BILL OF MATERIAL FOR UNDERFRAME WIRING:

A) THIN WALLED FLEXIBLE ELASTOMERIC CABLES WITH COPPER CONDUCTORS & ACCESSORIES:-

S. N.	Description	Working voltage	Cable size (in mm^2)	Cable color	Detail drg./ Spec.	QPC	Remarks
1.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	150	Red	ELRS/SPEC/ELC/0019, Rev.-4	49 Mtrs	Feeder cables
2.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	150	Yellow	ELRS/SPEC/ELC/0019, Rev.-4	49 Mtrs	Feeder cables
3.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	150	Blue	ELRS/SPEC/ELC/0019, Rev.-4	49 Mtrs	Feeder cables
4.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	95	Black	ELRS/SPEC/ELC/0019, Rev.-4	49 Mtrs	Feeder cables
5.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	70	GNYE	ELRS/SPEC/ELC/0019, Rev.-4	3 Mtrs	For feeder earthing
6.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	25	Red	ELRS/SPEC/ELC/0019, Rev.-4	31 Mtrs	Feeder junction boxes to SBC

7.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	25	Yellow	ELRS/SPEC/ELC/0019, Rev.-4	31 Mtrs	Feeder junction boxes to SBC
8.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	25	Blue	ELRS/SPEC/ELC/0019, Rev.-4	31 Mtrs	Feeder junction boxes to SBC
9.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	25	Black	ELRS/SPEC/ELC/0019, Rev.-4	31 Mtrs	Feeder junction boxes to SBC
10.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	16	Red	ELRS/SPEC/ELC/0019, Rev.-4	9 Mtrs	9 KVA TXR input (750V AC side)
11.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	16	Yellow	ELRS/SPEC/ELC/0019, Rev.-4	9 Mtrs	9 KVA TXR input (750V AC side)
12.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	16	Blue	ELRS/SPEC/ELC/0019, Rev.-4	9 Mtrs	9 KVA TXR input (750V AC side)
13.	Thin walled flexible elastomeric cables with copper conductors	above 750 volts upto 1.8KV/ 3.0KV	16	Black	ELRS/SPEC/ELC/0019, Rev.-4	9 Mtrs	9 KVA TXR input (750V AC side)
14.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	16	Red	ELRS/SPEC/ELC/0019, Rev.-4	8 Mtrs	9 KVA TXR output (415V AC side)
15.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	16	Yellow	ELRS/SPEC/ELC/0019, Rev.-4	8 Mtrs	9 KVA TXR output (415V AC side)
16.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	16	Blue	ELRS/SPEC/ELC/0019, Rev.-4	8 Mtrs	9 KVA TXR output (415V AC side)

17.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	16	Black	ELRS/SPEC/ELC/0019, Rev.-4	8 Mtrs	9 KVA TXR output (415V AC side)
18.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	16	GNYE	ELRS/SPEC/ELC/0019, Rev.-4	3 Mtrs	For Earthing
19.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	6	Red	ELRS/SPEC/ELC/0019, Rev.-4	15 Mtrs	9 KVA TXR output (190V AC side)
20.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	6	Yellow	ELRS/SPEC/ELC/0019, Rev.-4	15 Mtrs	9 KVA TXR output (190V AC side)
21.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	6	Blue	ELRS/SPEC/ELC/0019, Rev.-4	15 Mtrs	9 KVA TXR output (190V AC side)
22.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	6	Black	ELRS/SPEC/ELC/0019, Rev.-4	15 Mtrs	9 KVA TXR output (190V AC side)
23.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	6	GNYE	ELRS/SPEC/ELC/0019, Rev.-4	7 Mtrs	HV panel to RBC
24.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	Red	ELRS/SPEC/ELC/0019, Rev.-4	10 Mtrs	BCT-1, BCT-2 to +ve fuse box
25.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	Black	ELRS/SPEC/ELC/0019, Rev.-4	9 Mtrs	BCT-1, BCT-2 to -ve fuse box
26.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	Choco	ELRS/SPEC/ELC/0019, Rev.-4	29 Mtrs	+ve fuse box
27.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	White	ELRS/SPEC/ELC/0019, Rev.-4	39 Mtrs	-ve fuse box

28.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	2.5	White	ELRS/SPEC/ELC/0019, Rev.-4	6 Mtrs	RBC to HV Panel
29.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	2.5	Choco-late	ELRS/SPEC/ELC/0019, Rev.-4	107 Mtrs	Feeder control cables & HV Panel to RBC
30.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	2.5	GNYE	ELRS/SPEC/ELC/0019, Rev.-4	2 Mtrs	For Earthing
31.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	1.5	White	ELRS/SPEC/ELC/0019, Rev.-4	10 Mtrs	VK1 to HV Panel
32.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	1.5	Choco-late	ELRS/SPEC/ELC/0019, Rev.-4	10 Mtrs	VK1 to HV Panel
33.	3x1.0 sqmm multicore cables 600/1000V colour Wh,Br,Blk	-	3x1.0	Wh, Br, Blk	EDTS-132, Rev-' C ' AM-3, Corr-1 (DS-4)	90 Mtrs	Feeder control cable
34.	Cable marking system	-	-	-	EDML-60, Col-VI (Latest Revision)	1 no.	Heat shrinkable sleeves of M/S TYCO/ Phoenix/ Panduit make
35.	Copper crimping socket for 70 sq.mm cable	-	-	-	EDTS-200 (Latest Revision)	12 nos.	ITEM-7
36.	Copper crimping socket for 25 sq.mm cable	-	-	-	EDTS-200 (Latest Revision)	4 nos.	ITEM-14
37.	Copper crimping socket for 25 sq.mm cable	-	-	-	EDTS-200 (Latest Revision)	8 nos.	Suitable for feeder connection
38.	Copper crimping socket for 16 sq.mm cable	-	-	-	EDTS-200 (Latest Revision)	27 nos.	ITEM-15
39.	Copper crimping socket for 16	-	-	-	EDTS-200 (Latest Revision)	1 no.	ITEM-16

	sq.mm cable						
40.	Copper crimping socket for 16 sq.mm cable	-	-	-	EDTS-200 (Latest Revision)	2 nos.	ITEM-17
41.	Copper crimping socket for 10 sq.mm cable	-	-	-	EDTS-201 (Latest Revision)	28 nos.	ITEM-2
42.	Copper crimping socket for 6 sq.mm cable	-	-	-	EDTS-201 (Latest Revision)	8 nos.	ITEM-6
43.	Copper crimping socket for 6 sq.mm cable	-	-	-	EDTS-201 (Latest Revision)	10 nos.	ITEM-5
44.	Copper crimping socket for 2.5 sq.mm cable	-	-	-	EDTS-201 (Latest Revision)	8 nos.	ITEM-10

Note:-

1. 3x1.0 sq.mm shield multi-core cables of speed sensors have been deleted from BOM as these are being supplied by WSP system suppliers.

B) CONDUIT SYSTEM FOR CABLE MANAGEMENT & ACCESSORIES FOR UNDER FRAME WIRING:-

Firms supplying these items shall get these tested as per RDSO specification no. RDSO/PE/SPEC/AC/0138-2009 (Latest)

S. N.	DESCRIPTION	SPEC. NO.	TABLE	ITEM	QPC
1.	Polyamide flexible corrugated conduit, NW-12	RDSO/PE/SPEC/AC/0138-2009, (Latest)	A-1	2	34 mtrs.
2.	Polyamide flexible corrugated conduit, NW-17		A-1	3	156 mtrs.
3.	Polyamide flexible corrugated conduit, NW-23		A-1	4	60 mtrs.
4.	Polyamide flexible corrugated conduit, NW-29		A-1	5	16 mtrs.
5.	Polyamide flexible corrugated conduit, NW-36		A-1	6	6 mtrs.
6.*	Polyamide flexible corrugated conduit, NW-48		A-1	7	27 mtrs.
7.	Straight PG metal thread End fitting PG-11	RDSO/PE/SPEC/AC/0138-2009,(Latest)	A-2	2	26 nos.
8.	Straight PG metal thread End fitting PG-16		A-2	3	15 nos.
9.	Straight PG metal thread End fitting PG-21		A-2	5	20 nos.

10.	Straight PG metal thread End fitting PG-29		A-2	6	4 nos.
11.	Straight PG metal thread End fitting PG-36		A-2	7	2 nos.
12.*	Straight PG metal thread End fitting PG-48		A-2	8	2 nos.
13.	Hex.lock nut with PG thread brass PG-11	RDSO/PE/SPEC/AC/0138-2009,(Latest)	A-10	2	26 nos.
14.	Hex.lock nut with PG thread brass PG-16		A-10	4	15 nos.
15.	Hex.lock nut with PG thread brass PG-21		A-10	5	20 nos.
16.	Hex. lock nut with PG thread brass PG-29		A-10	6	4 nos.
17.	Hex. lock nut with PG thread brass PG-36		A-10	7	2 nos.
18.*	Hex. lock nut with PG thread brass PG-48		A-10	8	2 nos.
19.	Tube clamp NW-12	RDSO/PE/SPEC/AC/0138-2009,(Latest)	A-8	2	10 nos.
20.	Tube clamp NW-17		A-8	3	74 nos.
21.	Tube clamp NW-23		A-8	4	30 nos.
22.	Tube clamp NW-29		A-8	6	20 nos.
23.	Tube clamp NW-36		A-8	7	25 nos.
24.*	Tube clamp NW-48		A-8	8	10 nos.
25.	PG thread plug screws PG-16	RDSO/PE/SPEC/AC/0138-2009,(Latest)	A-18	4	4 nos.
26.	PG thread plug screws PG-21		A-18	5	4 nos.

Note:-

1. * marked items shall not be procured as these items are available in RCF depots.

2.1 (b) <u>PREPARATION / BUNCHING OF HARNESS:-</u>

The preparation / bunching of harness shall be done as per under given for Under Frame wiring.

Har No.	Nos. & size of cable	Spec. no.	Working voltage	Color code	Length in mm	Ferrules marking	Route	Remarks & Flex. conduit size and length	Group name
1	3 nos., 150 mm^2	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	R,Y,B	24500	12 01 15 02, 12 01 18 02, 12 01 21 02	21	From feeder junction box A16X1 to A19X1 (To be	FEEDER CABLES

	1 no., 95 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	Blk	24500	12 01 24 02	21	supplied loose)	
1A	2 nos., 2.5 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Ch,Ch	25000	46 01 03, 46 01 04	25	Control cables **(NW-17,L=24 Mtrs)**	
1B	3 nos., 150 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	R,Y,B	24500	12 01 01 02, 12 01 04 02, 12 01 07 02	10	From feeder junction box A17X1 to A18X1 (To be supplied loose)	FEEDER CABLES (Feeder-2)
	1 no., 95 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	Blk	24500	12 01 10 02	10		
1C	2 nos. 2.5 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Ch,Ch	25500	46 01 01, 46 01 02	14	Control cables **(NW-17, L=24 Mtrs)**	
2	4 nos., 25 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	R,Y,B, Blk	15000	12 01 01 01, 12 01 04 01, 12 01 07 01, 12 01 10 01	13	HOG Compliant Switch Board Cabinet to under-slung HV Panel(**NW-48, L=13 Mtrs)**	FEEDER LOOP CABLES
2A	4 nos., 25 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	R,Y,B, Blk	16000	12 01 15 01, 12 01 18 01, 12 01 21 01, 12 01 24 01	23	HOG Compliant Switch Board Cabinet to under-slung HV Panel(**NW-48, L=14 Mtrs)**	FEEDER LOOP CABLES
3	4 nos., 16 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	R,Y,B, Blk	9000	12 01 12.02, 12 01 13.02, 12 01 14.02, 12 01 11.02	30	Input cables S1 (750V side) to S7 **(NW-29, L=7 Mtrs)**	9 KVA Trans-former Input/Output Cables
3A	4 nos., 16 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	R,Y,B, Blk	8000	12 02 06.01, 12 02 07.01, 12 02 08.01, 12 02 09.01	31	Out put cables S7 (415V side) to S1 **(NW-36, L=6 Mtrs)**	
3B	4 nos., 6 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	R,Y,B, Blk	8000	12 02 16.01, 12 02 17.01, 12 02 18.01, 12 02 19.01	31A	Out put cables S7 (190V side) to S1 **(To be laid with harness no.3A)**	

4	1 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Ch	2500	35	35	Battery fuse box +ve (S4) to Battery box (S3) **(NW-17, L=2 Mtr)**	DC circuit cables
4A	1 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W	2500	39	39	Battery fuse box -ve (S5) to Battery (S3) **(NW-17, L=2 Mtr)**	
4B	1 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Ch	15000	36	36	RBC (S1B) to EFT-III **(NW-17, L=14 Mtrs)**	
4C	1 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W	20500	40	40	Battery fuse -ve (S5) to EFT-III **(NW-17, L=19 Mtrs)**	
4D	1 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Ch	5000	42	42	Battery fuse box +ve (S4) to RBC (S1B) **(NW-23, L=4 Mtrs)**	
4E	1 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W	10000	43	43	Battery fuse box -ve (S5) to RBC (S1B) **(NW-23, L=6 Mtrs)**	
5	3x1.0 mm² + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	12000	23 03 10.02, 23 03 11.02, 23 03 12.02	81	HV Panel (S1) to connection box VK4 **(NW-17, L=10 Mtrs)**	Speed sensor cables
5A	3x1.0 mm² + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	9000	23 03 07.02, 23 03 08.02, 23 03 09.02	82	HV Panel (S1) to connection box VK3 **(NW-17, L=7 Mtrs)**	

5B	3x1.0 mm^2 + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	18000	23 03 01.02, 23 03 02.02, 23 03 03.02	76 (89)	HV Panel (S1) to connection box VK1 **(NW-23, L=13 Mtrs)** (NW-17, L=5 Mtrs to be supplied loose) Route no. 75 & 76 are to be laid in one flexible conduit, NW-23 and to be marked route no. 89.	
5C	3x1.0 mm^2 + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	15000	23 03 04.02, 23 03 05.02, 23 03 06.02	75 (89)	HV Panel (S1) to connection box VK2 **(To be laid with harness no. 5B)**	
6	3x1.0 mm^2 + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	12000	23 02 06.01, 23 02 07.01, 23 02 05.06	86	HV PANEL (S1) to through box VK5 (EVS2/EVR2) **(NW-29, L=9 Mtrs)**	Disc brake cables
6A	3x1.0 mm^2 + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	12000	23 02 01.01, 23 02 02.01, 23 02 05.04		HV Panel (S1) to through box VK5 (EVS1/EVR1) **(To be laid with harness no. 6)**	
6B	3x1.0 mm^2 + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	10000	23 02 14.01, 23 02 15.01, 23 02 05.10	87	HV Panel (S1) to through box VK7 (EVS4/EVR4) **(NW-23, L=8 Mtrs)**	
6C	3x1.0 mm^2 + Shielded multi-core	EDTS-132, Rev.C,Am-3, Corr-1 (DS-4)	-	W,Br, Blk,	10000	23 02 10.01, 23 02 11.01, 23 02 05.08		HV Panel (S1) to through box VK7 (EVS3/EVR3) **(To be laid with har. no. 6B)**	

7	2 nos., 1.5 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W,Ch	10000	-	41	Air Brake Cable (Mech.) **(NW-17, L=8 Mtrs)**	Air Brake cable (Mech.)
8	1 no., 2.5 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Ch	6000	52	52	HV Panel (S1) to RBC (S1B) **(NW-17, L=5 Mtrs)**	RBC
8A	1 no., 2.5 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W	6000	52A	52A	HV Panel (S1) to RBC (S1B) **(NW-17, L=5 Mtrs)**	
9	5 nos., 6 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	R,Y,B, BLK, GNYE	7000	53	53	HV Panel (S1) to RBC (S1B) **(NW-23, L=6 Mtrs)**	
10	6 nos., 70 mm²	ELRS/SPEC /ELC/0019, Rev.-4	above 750 volts upto 1.8KV/ 3.0KV	GNYE	500	PE	-	Earthing	Earthing cables
	3 nos., 16 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	GNYE	500	PE	-	Earthing	
	2 nos., 16 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	GNYE	300	PE	-	Earthing	
	2 nos., 16 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	GNYE	200	PE	-	Earthing	
	4 nos., 2.5 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	GNYE	450	PE	-	Earthing	
11	3 X1.0 mm² (2 nos.)	EDTS-132, Rev.-C,Am-3,Corr-1 (DS-4)	Upto 750 volts	W,Br, Blk	15000	NET	-	HV Panel to RSW NET-1/NET-2 **(NW-17, L=13 Mtrs)**	-
11A	3 X1.0 mm² (2 nos.)	EDTS-132, Rev.-C,Am-3,Corr-1 (DS-4)	Upto 750 volts	W,Br, Blk	30000	NET	-	RSW NET-1/NET-2 TO RSW NET-1/NET-2 EFT PLATE-IV TO EFT Plate-I cable loop **(NW-17, L=28 Mtrs)**	-
12	01 nos., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Red	3500	BCT-1 to BCT-2	-	BCT-1 to BCT-2 **(NW-23, L=3 Mtrs)**	BCT Cables

12A	01 nos., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Blk	3500	BCT-1 to BCT-2	-	BCT-1 to BCT-2 **(NW-23, L=3 Mtrs)**	
12B	01 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Red	6000	BCT-1 to Battery Fuse Box (+ve)	-	BCT-1 to Battery Fuse Box (+ve) **(NW-23, L=5 Mtrs)**	
12C	01 no., 10 mm²	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Blk	5000	BCT-1 to Battery Fuse Box (-ve)	-	BCT-1 to Battery Fuse Box (-ve) **(NW-23, L=4 Mtrs)**	

Notes:

1. Reference for Wiring on under frame & superstructure shall be taken as per clause no. 7.1 & 7.2 respectively.
2. Bunching for under frame shall be done as per clause 2.1(b) duly ferruled, legibly marked and laid in polyamide flexible conduits as per requirements in the coaches at shop floor.
3. Harnesses shall be prepared from multi-color cables only as specified for under frame and superstructure wiring. Zero halogen, fire retardant heat shrinkable sleeves of M/S Tyco/Phoenix/Panduit/Brady makes of appropriate color to be used. The standard length of ferrules should only be used.
4. Multi-core cables shall be as per specification no. EDTS-132, (Latest Revision) to respective data sheets.
5. The marking ferrules for feeder cables shall not be heat shrinked at the time of supply by the harness manufacturer, however to be suitably provided at 750 mm from both ends of the cables such that these ferrules shall not disengage from the cables during laying in the feeder pipes. After laying of the harness in the coach these ferrules shall be heat shrinked in place according to shop requirements.

2.2 TYPE-2: Harness of 'Superstructure arrangement' for LHB EOG High Capacity Parcel Van Coaches

2.2 a) BILL OF MATERIAL FOR SUPERSTRUCTURE ARRANGEMENT:-

A) THIN WALLED FLEXIBLE ELASTOMERIC CABLES WITH COPPER CONDUCTORS & ACCESSORIES:-

Sr. No.	Description	Working voltage	Cable size (in mm²)	Cable color	Detail drg./ Spec.	QPC	Remarks/ Location
1.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	1.5	Yellow	ELRS/SPEC/ELC/ 0019,Rev.-4	72 mtrs.	Inside coach
2.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	1.5	Blue	ELRS/SPEC/ELC/ 0019,Rev.-4	43 mtrs.	Inside coach

3.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	4	Red	ELRS/SPEC/ELC/ 0019,Rev.-4	94 mtrs.	Inside coach
4.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	4	Black	ELRS/SPEC/ELC/ 0019,Rev.-4	94 mtrs.	Inside coach
5.*	UIC Control cable	-	16-Core	-	RDSO/PE/MS/A C/0051-2011, Am-1, RCF Anx.-D	58 mtrs.	Inside Coach
6.	Copper Crimping Socket for 4 sq. mm. cable (for EFT circuit and termination at EFT)	-	-	-	EDTS-201 (Latest), Table-1	12 nos.	Item-8 (M6)
7.	Copper Crimping Socket for 4 sq. mm. cable (for EFT circuit and termination at RSW panel)	-	-	-	EDTS-201 (Latest), Table-1	04 nos.	Item-12 (M8)
8.	Cable jacket system	-	-	-	EDTS-138 (Latest Revision)	20 Mtrs.	ITEM-5
9.	FRLT cotton insulation tape, RED	-	-	-	ICF/ELEC/921, Rev.00	2 nos.	-
10.	FRLT cotton insulation tape, YELLOW	-	-	-	ICF/ELEC/921, Rev.00	2 nos.	-
11.	FRLT cotton insulation tape, BLUE	-	-	-	ICF/ELEC/921, Rev.00	2 nos.	-
12.	FRLT cotton insulation tape, BLACK	-	-	-	ICF/ELEC/921, Rev.00	2 nos.	-
13.	FRLT cotton insulation tape, GREEN	-	-	-	ICF/ELEC/921, Rev.00	2 nos.	-
14.	Cable Binder 2.5x104	-	-	-	-	100 nos.	M/s EVEREST, NOVAFLEX, Panduit & M V Electro – Systems

NOTE:

* UIC Control Cable 16-core is in the scope of RCF, however installation of the cable shall be done by the firm.

B) CONDUIT SYSTEM FOR CABLE MANAGEMENT & ACCESSORIES SUPERSTRUCTURE ARRANGEMENT:-

Firms supplying these items shall get these tested as per RDSO specification no. RDSO/PE/SPEC/AC/0138-2009, (Latest).

Sr. No.	DESCRIPTION	SPEC. NO.	TABLE	ITEM	QPC
1.	Polyamide flexible corrugated conduit, NW-12	RDSO/PE/SPEC/ AC/0138-2009, (Latest)	A-1	2	190 mtrs.
2.	Polyamide flexible corrugated conduit, NW-17		A-1	3	70 mtrs.
3.	Tube clamp NW-12		A-8	2	24 nos.
4.	Tube clamp NW-17		A-8	3	10 nos.
5.	Straight PG metal thread End fitting PG-11		A-2	2	8 nos.
6.	Straight PG metal thread End fitting PG-16		A-2	3	8 nos.
7.	Hex. lock nut with PG thread brass PG-11		A-10	2	8 nos.
8.	Hex .lock nut with PG thread brass PG-16		A-10	4	8 nos.

Note: -

1. Reference for Wiring on under frame & superstructure shall be taken as per clause no. 7.1 & 7.2 respectively.
2. Bunching for superstructure shall be done as per drgs. mentioned in clause 7.2, duly ferruled, legibly marked and laid in polyamide flexible conduits as per wiring requirements in the coaches at shop floor. Cable protection system shall be supplied as per BOM of clause 2.2 (B).
3. Identification shall be made with colored, zero halogen fire retardant heat shrinkable sleeves of **M/S TYCO/Phoenix/Panduit /MV make.**

3.0 TECHNICAL REQUIREMENTS:

3.1 While manufacturing of cable harnesses essential safety requirements for voltage grade segregation, crimping etc. shall be strictly followed as per instructions laid down in under given documents:

a) General requirements shall be as per RDSO Spec. no. EL/TL/56-92 (Code of practice for train Lighting maintenance on Prevention of Fires on 110V DC).
b) Instructions laid down in Code of practice for wiring End On Generation Train Lighting system working at 750VAC,ELPS/ SPEC/EOG-01(MARCH-94) shall be followed.
c) Work instructions for preparation of Harness to RCF document no. EDW0003 Ver.-02 or Latest version.
d) Work instructions for crimping of cable ends and cable terminations to RCF document no. EDW0006 Ver.-01 or Latest version.
e) Schedule of Technical Requirements **(STR) no. RCF/EL/0015-2011 (Rev.-B)** shall be strictly followed for preparation of ready-made harness.

3.2 Stripping of the cables at the ends shall be done where crimping sockets are not provided for ease of wiring.

3.3 The complete superstructure wiring harness shall be made according to the drg. no. mentioned in clause 7.2.

3.4 Technical Staff :

a) The staff with minimum qualification `ITI' with **02** years experience or minimum **05** to **06** years experience for non ITI's in manufacturing harness of power-wiring/ control wiring in panels or other similar works having intricate design.

b) The Supervisor staff for the skilled worker should be minimum graduate in electrical with 02 years experience in the same field or should be diploma holder in electrical discipline with at least five years experience in manufacturing of harness of power wiring control wiring in panels or other similar works. The firm shall deploy supervisors/staff in adequate nos. so as to match the delivery schedules as accepted by them against the contract".

c) Firm shall ensure that technical staff as stipulated above shall be available in actual working conditions at shop floor. Representative of RCF may check any time the availability of these staff with qualifications. In case of non-compliance, Railway shall be free to terminate the contract in case of violation.

d) Similarly, firm shall ensure technical staff with the above qualifications is deployed at the time of commissioning at RCF with at-least one supervisor to coordinate with Electrical Production and day-to-day monitoring.

3.5 Proper cutting/crimping tools for various sizes of cables shall be provided to the staff for ease of crimping & cutting of cables **(to be provided by the contractor**).

3.6 Marking ferrules shall be of computer generated type for easy identification of the cables with the help of shrinking sleeves (self-extinguishing) of suitable size horizontally printed cable markers of Tyco/Phoenix/Panduit make only.

3.7 Test for thin walled flexible elastomeric cables with copper conductors for its basic properties may be conducted on any sample picked up from the supply. The cost for the testing will be borne by the firm. The specific tests to be done are covered in clause 4.9.

3.8 The firm shall take prompt action or act promptly within a reasonable time upon a short notice to rectify the defects/deficiency/deficiency noticed/reported by RCF in the cable harness supplied by the firm. Failure to do the needful up to the satisfaction of the RCF, Firm's contract may be rescinded immediately or terminated without any further notice or may be levied penalty corresponding to the delay caused in the coach turn out for which the decision of the nominated **`Competent Authority' shall be Final and Binding on the firm".**

3.9 The firm's premises may be inspected by representative of PCEE/RCF on any day on a short notice to ensure compliance to the various stipulations of the specifications, laid down standards including work instructions for the cable harness manufacturing practices. If anything is not laid or specified therein this specification, the work shall be completed as per the best-established Engineering Practices/Procedures being followed in the Industry. "The firm shall extend all the necessary help to allow visiting all the infrastructure facilities, M&P, Tools, Testing facilities, examination of related quality records/documents etc. during his visit"

3.10 In case of commissioning work by supplier, firm shall be fully responsible for scope of work mentioned at clause 2.0 of the specification and shall hand-over the coach after testing as per clause 4.10(b) of the specification and complete in all respects.

3.11 All the rigid conduits, Flexible Conduits, end fittings shall be in firm scope of supply. However clamps & it's hardware's etc. will be in RCF scope of supply.

3.12 Only those firms shall be considered which have adequate infrastructure to make similar nature wiring/ harness at its manufacturing unit and conforming to STR.

3.13 Firm shall fill-up performa for guaranteed performance as per **Annexure-`A'** and furnish details along with tender. It is perquisite without which offer shall be considered technically disqualified.

3.14 The firm will furnish the credentials in their support for having completed similar or identical works of its working in any Central/State government or Central/State Govt. undertaking, reputed/established private organization such as Railways, Defense, L&T, Siemens etc. The firm to submit requisite proofs like completion certificates, contract details including contract value, Latest Income tax clearance certificate, balance sheet duly vetted by the CA for the last three years, registration with the government organization, copies of permission from regulatory authorities like environmental & pollution control boards etc. "The firm should have completed successfully at least a similar cable harness work of one third or more value of the tendered cost value against an earlier contract."

3.15 The cable & conduit manufacturer shall submit a certificate along with each lot of supply that the same raw material has been used in manufacturing of the present supply as was used on which the type tests were conducted.

3.16 Every letter from the firm shall have name and designation of the official signing the letter with the signature.

3.17 Procurement of the items specified in the BOM of the specification shall be from RDSO/RCF/ICF approved vendors mentioned in latest version of the vendor directory issued by RDSO/RCF/ICF respectively, however the procurement of cables shall be done from RDSO 'approved vendors' for minimum 80% quantity of NPQ and balance 20% quantity from 'developmental vendors' as mentioned in the latest version of vendor directory issued by RDSO.

Based on the procurement of various sizes of cables from either approved or developmental sources, the cable harness shall be categorized as under:

Category-A: Cable Harness with approved sources of cables (80% min.)
Category-B: Cable Harness with developmental sources of cables (up to 20%)

Category-B type of cable harnesses may be supplied with cables procured from developmental sources however in no case Category-A type shall be supplied with cables procured from developmental sources.

Firm shall maintain a record according to the above classification and offer to M/s RITES/inspecting official for inspection in format EDF 0001 with the specification.

4.0 TESTS:

4.1 Inspecting agency /RITES shall carry out the tests in harness manufacturer's premises as per acceptance and routine tests specified in the tender specification. Check list Proforma consisting of testing details, observations/measurements and acceptability of the measurements should be prepared and testing to be done as per Proforma jointly with the firm's engineer .This should be submitted along with the inspection certificate to RCF.

4.2 Cables prescribed in RDSO/RCF specification of cables received by the harness manufacturer shall be inspected by RITES for acceptance and routine tests at cable manufacturer premises and certificate to this effect should be submitted by cable harness manufacturer to RCF.

4.3 Cable management system prescribed in RDSO specification RDSO/PE/SPEC/AC/0138-2009, (Latest) shall be inspected by RITES (RA Berlin- in case of imported manufacturer) for acceptance and routine tests and certificate to this effect should be submitted by cable harness manufacturer to RCF.

4.4 The format for inspection based upon the tests stipulated in specification shall be as per clause no.-4.10.

4.5 Firm's internal testing to be done by qualified person as per para 3.4 (b) of this specification and submitted to RCF.

4.6 TYPE TEST:

All the type tests mentioned in Clause 4.9 & 4.10 shall be carried out on a prototype unit. The firm manufacturing for the first time shall get the prototype approved from PCEE/RCF.

4.7 ROUTINE TEST:

Routine tests mentioned in clause 4.9 shall be carried out on each unit by the manufacturer at his works to ensure compliance with the specification and the drawings.

4.8 ACCEPTANCE TEST:

a) Acceptance tests for cables will be done at cable manufacturer's premises as per RDSO specification no. ELRS/SPEC/ELC/0019 (Latest Revision).

b) Acceptance tests for conduits etc. for cable management system will be done as per RDSO specification no. RDSO/PE/SPEC/AC/0138-2009, (Latest) for supply for Non-RDSO approved sources but RCF approved sources, clause 7.0 is to be followed.

c) Acceptance test mentioned in clause 4.9 cable harness manufacturer to be witnessed by inspecting agency nominated by the purchaser at the works of the cable harness manufacturer, on the samples picked up by the inspecting authority. All the acceptance tests shall be carried out at firm's premises at the manufacturer's cost. Inspecting officer will witness the tests.
A copy of the internal tests conducted by the firm shall be supplied to inspecting/purchasing authority. Inspecting agency shall maintain record of all the tests conducted for future reference and will check the authenticity and the originality of the bill of material for each item by seeing the invoices invariably to avoid spurious material being safety involved.

4.9 TABLE FOR TESTS:-

Tests for harnesses at firm`s premises:

S.No	Tests	Type Test	Routine Test	Acceptance Test
1	Visual inspection, including inspection of wiring and electrical operational test. (Visual inspection for proper assembly, compatibility of sub-components & wiring etc.)	YES	YES	YES
2	Checking of electrical continuity	YES	YES	YES
3	Checking of cable routing & alignment as per requirements	YES	YES	YES
4	Test for verification of dielectric properties. (shall withstand (2.0 KV for 1 minute)	YES	YES	-
5	Test for verification of insulation resistance. (>100 MΩ with 500 V Megger).	YES	YES	-

6	Compliance to safety related codes of practice as per para 4.0 of this specification.	YES	YES	YES
7	Originality of the bill of the material with proof of the invoices	YES	YES	YES
8	Check of crimping joints a) mV drop Test. b) Pull out Test.	YES	YES	-
9.	Test for thin walled flexible elastomeric cables with copper conductors	YES	YES	YES
10.	Test for rigid PVC conduits to IS:9537 (Part-3)	YES	YES	YES
11.	Test for cable protection system	YES	YES	YES
12.	Test for marking ferrules	YES	YES	YES
13.	Test for copper crimping sockets	YES	YES	YES
14.	Test for FRLT tape	YES	YES	YES
15.	Test for cable alley/ duct	YES	YES	YES

4.10 a): Details of testing:

S. No.	Details of testing	Remarks of Rites Inspecting official
1	Tests for thin walled flexible elastomeric cables with copper conductors to RDSO Specification no. ELRS/SPEC/ELC/0019(Latest)	
a	Test for thickness of insulation and sheath as per applicable clause of RDSO spec (5% of each cable size to be checked.)	
b	High voltage test (water immersion test) as per applicable clause of RDSO spec. (on two cable size of cable used)	
c	Insulation resistance test as per applicable clause of RDSO spec. (on one cable size different from HV test)	
d	Tracking resistance as per applicable clause of RDSO spec.(on two size not covered in HV test & IR test)	
e	Strippability as per applicable clause of RDSO spec. (10 samples in prototype testing and five samples in acceptance/routine test of different size 1mm to 6mm)	
f	Wind ability of the finished cable as per applicable clause of RDSO spec. (One sample 1-6 sq. mm & one sample more than 6 sq. mm)	
g	Slippage test as per applicable clause of the RDSO spec. (two samples for size less than 25mm dia and two samples for dia more than 25mm)	
2	**Acceptance Test for PVC conduit to IS:9537**	
a	Checking of dimensions as clause 7 of IS	
b	Bending test (at room temperature) as per clause 9.2 of IS spec	
c	Compression test as per cl. 9.3 of IS spec (5 samples in prototype and 2 samples in acceptance/routine)	
d	Collapse test as per cl. 9.5 of IS spec (one sample)	
e	Resistance to burning as per cl. 11 of IS spec. (2 samples)	
f	Electrical Characteristics as per cl 12 of IS spec	

3	**Cable Protection System- Testing as per RDSO Spec. No. RDSO/PE/SPEC/AC/0138(latest)**	
a	Make	
b	Type / Series used for	
i	Conduit	
	Checking of dimensions	
	Compression test (two sample of each size)	
	Impact test (one sample of each sizes)	
	Flexing test (2 samples of each type of fitting.)	
	di-electric strength (one sample of each size)	
ii	End fitting – Tensile test (of different five sizes)	
iii	Tube clamps – Dimensional check as per – two sample of each size	
iv	Lock nuts – Dimensional check as per – two sample of each size.	
4	**Marking ferrules**	
	Computer generated (verification of make/brand)	Tyco / Phoenix / Panduit /MV/____
5	**Copper crimping sockets**	
	Visual inspection and checking of dimensions as per cl 5.6 of EDTS200 (five sample of each)	
	Crimping test as per cl 5.7 of EDTS200 (Two sample of size less than 6mm^2 and two sample of 6mm^2)	
	Flattening test as per cl 5.8 of EDTS200	
6	**FRLT tape**	
	Resistance to flame propagation as per clause 6.0 of IS:7809 for 2 samples	
	Electrical strength as per clause 7.1 of IS:7809 for 5 samples IR value	
7	**Cable alley / duct**	
	Make/catalogue number used verify make of _____ test certificates.	

4.10 (b) : Tests after commissioning of the coach at RCF:

S.No	Tests	Type Test	Routine Test	Acceptance Test	Clause of IS:8623(P-I)-93
1	Verification of insulation resistance	YES	YES	YES	8.3.4
2	Checking of electrical continuity of all the circuits.	YES	YES	YES	8.3.3
3.	Verification of die electric properties	YES	YES	YES	8.2.2

The accuracy of measuring instruments used for both type and routine tests shall be of class 1.5.

5.0 APPROVALS:

5.1 Before making regular supplies, **firm shall take prior clearance from Dy.CEE/P** regarding minor changes in size of cut length of wire under same, overall bill of material. If the minor changes in the length of cables, as advised by DY.CEE/P/RCF result in variation in the overall quantity of bill of material for particular type of coaches then the excess quantity should be supplied separately by the supplier and if quantity falls short then the same shall be supplied by RCF at RCF as per direction of DY.CEE/P. It is essential in order to ensure proper usage of cable harness in other coaches with minor

modifications to avoid hold of coaches and to avoid the cable harness being surplus for a particular type of coach.

5.2 Firms manufacturing for the first time, Prototype Inspection shall be done by office of the PCEE/RCF.

5.3 Firm shall be fully responsible for commissioning of harness system in prototype coach at RCF to avoid any teething troubles or modification required if any, before commencement of bulk supply and commissioning at RCF. Firm shall supply one coach harness set only for validation on coach and after its trial conducted/prototype approval, the bulk supply shall be dispatched and commissioned on the coaches at RCF. Final clearance shall be accorded by Dy.CEE/P coach-wise after successful commissioning in coaches and Quality clearance by Quality.

6.0 PACKING AND TRACEABILITY:-

1. Packing of harnesses shall be done as per Packing Instructions PI005 to RCF document no. PLM0010E, version-8.0. Harnesses shall be bunched together and shall be supplied as single unit per coach. Each harness shall be duly bunched individually and legibly marked as per details specified in the specification on it for under frame and superstructure arrangement.
2. Packing per coach set shall be done as per packing conditions. However either card board packing in single unit or plastic containers (returnable basis) shall be used for supplying the material. The packing shall be legibly marked for the type of coach applicable for.
3. All the loose wiring for lavatory area & other locations shall be segregated and bunched separately before packing.
4. Performa invoice of all the major items like cable, crimping sockets etc. shall be supplied along with each supply of material.
5. Every unit of supply item shall be numbered / marked for identification, traceability and analysis. The following details shall be imprinted on the number plate of each unit
   a) Serial Number
   b) Year and month of manufacture
   c) Name of the item

7.0 ENCLOSURES:

S.No	Drawing/Spec. no.	Description
1.	RDSO Spec. no. EL/TL/56-92	Code of practice for Train Lighting maintenance on Prevention of Fires on 110V D.C
2.	RDSO Spec. no. EL/TL/001	Code of practice for End On Generation for Train Lighting system working at 750VAC
3.	RCF/EL/0015-2011 (Rev. 'B')	Schedule of technical requirements (STR) for ready-made harness.
4.	EDW0003 Ver. – 02.	Work instructions for preparation of Harness
5.	EDW0006 Ver. – 01	Work instructions for crimping of cable ends and cable terminations
6.	Annexure-A	Performa for Performance Guaranty
7.	Drg. No.-VP70018 (Latest)	Harness details for Roof Wiring. **(TYPE-2)**

7.1 ENCLOSURES for TYPE-1 (For Under-frame arrangement)

S.N.	Drawing no.	Description
1.	VP70019 (Latest)	Block diagram & Harness chart for under-frame (for LHB EOG VPH coaches)
2.	VP71002 (Latest)	Arrangement of under-frame wiring (for LHB EOG VPH coaches)

7.2 ENCLOSURES for TYPE-2 (For Superstructure arrangement)

S.N.	Drawing no.	Description
1.	VP74002 (Latest)	Light installation for sidewall (for LHB EOG VPH coaches)
2.	VP75006 (Latest)	Arrangement of End-wall wiring on PP-End (for LHB EOG VPH coaches)
3.	VP75007 (Latest)	Arrangement of End-wall wiring on NPP-End (for LHB EOG VPH coaches)
4	VP70018 (Latest)	Harness Chart for Roof Wiring (for LHB EOG VPH coaches)

ANNEXURE `A' TO SPEC. NO. EDTS-406, REV-NIL

PERFORMA FOR PERFORMANCE GUARANTEE

S. No.	ITEMS DESCRIPTION	COMPLIANCE (YES/NO)
1.	Compliance of **STR** (if Yes, enclose clause by clause comments)	
2.	Compliance of qualified technical staff (if Yes, enclose the details)	
3.	Compliance of adequate space and condition for manufacturing, assembly (if yes, enclose the details)	
4.	Compliance of in-house testing facilities (if Yes, enclose the details)	
5.	Compliance of other details to improve the quality (if Yes, enclose the details)	

Corrigendum-1 to RCF Specification no. EDTS-406, Rev.-Nil, Am-1 for LHB EOG High Capacity Parcel Van Coaches.

This corrigendum is issued to specification no. EDTS-406, Rev.-Nil, Am.-1 for Ready-made Harness for LHB EOG High Capacity Parcel Van coaches in order to incorporate following changes:-

Clause No. 2.1:- BILL OF MATERIAL FOR UNDERFRAME WIRING:-

THIN WALLED FLEXIBLE ELASTOMERIC CABLES WITH COPPER CONDUCTORS & ACCESSORIES:-

Cable Color for Sr. No.-32 for 1.5 sq. mm. cable may be read as **Choco**. instead of **White**.

Clause No. 2.1 (b):- Preparation/Bunching of Harness:- (May be Read as)

H. No.	Nos. of size of cable	Spec. No.	Working Voltage	Color Code	Length in mm		Ferrules Marking	Route	Remarks & Flex. Conduit Size & Length	Group Name
					Existing	Revised				
11A	3 X 1.0 mm^2 (2 nos.)	EDTS-132, Rev-C, Am-3, Corr-1 (DS-4)	Upto 750 Volts	W, Br, Blk	30000	30000	NET	-	RSW NET-1/NET-2 to RSW NET-1/NET-2 EFT Plate-IV to EFT Plate-I cable loop **(NW-17, L=28 Mtrs)**	-
	02 nos., 1.5 mm^2	ELRS/SPEC /ELC/0019 , Rev.-4	Upto 750 Volts	W, Ch.	30000	30000	EFT Plate-IV to EFT Plate-I			

2.2 A) Thin Walled Flexible Elastomeric Cables with Copper Conductors & Accessories:-

Item added:

S. N.	Description	Cable Size	Detail Drg./Spec.	QPC	Remarks
15.	Flexible Flame-retardant high performance polyolefin heat shrinkable tubing	-	EDML-176, Rev-0	1	Loose Supply

Clause No. 2.2 B) Note:- (May be read as)

3. Identification shall be made with colored, zero halogen fire retardant heat shrinkable sleeves of M/s TYCO/Phoenix/Panduit/MV up-to 100 mm length.

Corrigendum-1

Clause No. 3.1 :- (May be read as)

Schedule of Technical Requirements for preparation of ready-made harness may be read as **(STR) No. RCF/EL/0015-2020 (Rev.-C)**.

Clause No. 4.9 :- Table for Tests:-

Sr. No.	Tests	Remarks
10	Test for Rigid PVC Conduits to IS:9537 (Part-3)	Stands Deleted for Type, Routine & Acceptance tests

Clause No. 4.10 :- Details of Testing:-

S. No.-2 i.e. Acceptance Test for PVC Conduit to IS:9537 stands Deleted.

Clause No.- 5.0 :- Approvals:- (May be read as)

5.1 Firms manufacturing for the first time, shall get the Prototype Inspection done by the Office of the PCEE/RCF.

5.2 Firm supplying the Coach Harness for first time shall supply one set of coach harness for validation on coach before bulk supply.

5.3 **Deleted.**

Clause No.- 6.0 :- Packing and Traceability:- (May be read as)

6.1 Packing of harnesses shall be done as per Packing Instructions mentioned in the relevant PO's placed on the firm. Harnesses shall be bunched together and shall be supplied as single unit per coach. Each harness shall be duly bunched individually and legibly marked as per details specified in the specification on it for under frame and Roof arrangement.

EMERGENCY FEED TERMINAL (EFT)

HARNESS NO.	NO. OF HARNESS	FROM	TO	CODE FOR CABLE MARKER FROM	CODE FOR CABLE MARKER TO	CABLE COLOUR	QTY. PER HARNESS	CABLE SIZE (SQ.MM)	APPROX. LENGTH (IN MM)	CONDUIT NW-12 APPROX.LENGTH (IN MM)
1	1	EFT-III	EFT-IV	+VE EFT II	EFT I +VE	R	1	4	7500	7000
2	1	EFT-III	EFT-IV	-VE EFT II	EFT I -VE	BLK	1	4	7500	7000
3	1	EFT-IV	EFT-II	+VE EFT IV	EFT III +VE	R	1	4	28000	28500
4	1	EFT-IV	EFT-II	-VE EFT IV	EFT III -VE	BLK	1	4	28000	28500
5	1	EFT-I	EFT-II	+VE EFT-III	EFT-I +VE	R	1	4	7500	7000
6	1	EFT-I	EFT-II	-VE EFT-IV	EFT-II -VE	BLK	1	4	7500	7000

RSW-1 FOR LIGHT CKT WIRING

HARNESS NO.	NO. OF HARNESS	FROM	TO	FERRULE NO.	CABLE COLOUR	QTY. PER HARNESS	CABLE SIZE (SQ.MM)	APPROX. LENGTH (IN MM)	CONDUIT NW-12 APPROX.LENGTH (IN MM)
7	1	EFT-IV	RSW-1(WAGO TERMINAL)	L1+	Y	1	1.5	500	500
8	1	RSW-1 WAGO TER. (EFT-IV SIDE)	RSW-1, WAGO TER. (EFT-I SIDE)	L1+	Y	1	1.5	28500	+IN U/FRAME
9	1	RSW-1 (WAGO TERMINAL)	FDB-1,IN U/F	L1+	Y	1	1.5	5000	4500
10	1	EFT-1	FDB-1,IN U/F	L-	BLUE	1	1.5	5000	4500

FDB TO FDB WIRING IN UNDERFRAME AREA

HARNESS NO.	NO. OF HARNESS	FROM	TO	FERRULE NO.	CABLE COLOUR	QTY. PER HARNESS	CABLE SIZE (SQ.MM)	APPROX. LENGTH (IN MM)	REMARKS	CONDUIT NW-12 APPROX.LENGTH (IN MM)
11	1	EFT-I(RSW-1)	FDB-1	L1+	R	1	4.0	4000		3500
12	1	EFT-1	FDB-1	L1-	BLK	1	4.0	4000		3500
13	1	FDB-1	L-1	L+	Y	1	1.5	4500	IN SIDEWALL	4000
14	1	FDB-1	L-1	L-	BLUE	1	1.5	4500	IN SIDEWALL	4000
15	1	FDB-1	FDB-2	L1+	R	1	4.0	17000		16500
16	1	FDB-1	FDB-2	L1-	BLK	1	4.0	17000		16500
17	1	FDB-2	L-3	L+	Y	1	1.5	5500	IN SIDEWALL	5000
18	1	FDB-2	L-3	L-	BLUE	1	1.5	5500	IN SIDEWALL	5000
19	1	FDB-2	L-5	L+	Y	1	1.5	9000	IN SIDEWALL	8500
20	1	FDB-2	L-5	L-	BLUE	1	1.5	9000	IN SIDEWALL	8500
21	1	FDB-2	FDB-3	L1+	R	1	4.0	12000		11500
22	1	FDB-2	FDB-3	L1-	BLK	1	4.0	12000		11500
23	1	FDB-3	L-4	L+	Y	1	1.5	4500	IN SIDEWALL	4000
24	1	FDB-3	L-4	L-	BLUE	1	1.5	4500	IN SIDEWALL	4000
25	1	FDB-3	FDB-4	L1+	R	1	4.0	17000		16500
26	1	FDB-3	FDB-4	L1-	BLK	1	4.0	17000		16500
27	1	FDB-4	L-2	L+	Y	1	1.5	9000	IN SIDEWALL	8500
28	1	FDB-4	L-2	L-	BLUE	1	1.5	9000	IN SIDEWALL	8500
29	1	FDB-4	L-6	L+	Y	1	1.5	5500	IN SIDEWALL	5000
30	1	FDB-4	L-6	L-	BLUE	1	1.5	5500	IN SIDEWALL	5000

ALT.NO	ALT.DATE	ZONE	ALTERATIONS	AUTHORITY
C	23/02/2021	ALL	1. NO. OF HARNESS FOR HARNESS NO.-8 MODIFIED.	ED/CR/2021-0001

ITEM	DESCRIPTION & DIMENSIONS	QPASSLY	DETAIL DRG	MATL. & SPEC.	REMARKS
16	POLYAMIDE FLEXIBLE CONDUIT(NW-17), DETAIL AT ANNEX-A,TABLE-1,ITEM NO.3	70	NIL	RDSO/PE/SPEC/AC/0138-2009,	REV-1,
15	POLYAMIDE FLEXIBLE CONDUIT(NW-12), DETAIL AT ANNEX-A,TABLE-1,ITEM NO.2	230	NIL	RDSO/PE/SPEC/AC/0138-2009,	REV-1,
14	FRLT COTTON INSULATION TAPE,WHITE	2	NIL	ICF/ELEC/921, REV-0	NIL
13	FRLT COTTON INSULATION TAPE,CHOCOLATE	2	NIL	ICF/ELEC/921, REV-0	NIL
12	FRLT COTTON INSULATION TAPE,GREEN	2	NIL	ICF/ELEC/921, REV-0	REFERRED IN
11	FRLT COTTON INSULATION TAPE,BLACK	2	NIL	ICF/ELEC/921, REV-0	REFERRED IN
10	FRLT COTTON INSULATION TAPE,BLUE	2	NIL	ICF/ELEC/921, REV-0	REFERRED IN
9	FRLT COTTON INSULATION TAPE,YELLOW	2	NIL	ICF/ELEC/921, REV-0	NIL
8	FRLT COTTON INSULATION TAPE,RED	2	NIL	ICF/ELEC/921, REV-0	REFERRED IN
7	UIC CONTROL CABLE 16 SINGLE CORE/16 CORE 1/1.55MM	98	NIL	RDSO/PE/MS/AC/0051-2011,REV-2	ITEM
6	4 SQ.MM BLACK THIN WALLED FLEX.BLAST.CABLE WITH CU.COND.UPTO 75DV (IN NTRS) COND.	94	NIL	ELRS/RDSO/ELC/0019,REV-4	REFERRED IN
5	4 SQ.MM (RED) THIN WALLED FLEX.BLAST.CABLE WITH CU.COND.UPTO 75DV (IN NTRS) COND.	94	NIL	ELRS/RDSO/ELC/0019,REV-4	REFERRED IN
4	1.5 SQ.MM BLUE THIN WALLED FLEX.BLAST.CABLE WITH CU.COND.UPTO 75DV (IN NTRS) COND.	43	NIL	ELRS/RDSO/ELC/0019,REV-4	REFERRED IN
3	1.5 SQ.MM YELLOW THIN WALLED FLEX.BLAST.CABLE WITH CU.COND.UPTO 75DV (IN NTRS) COND.	72	NIL	ELRS/RDSO/ELC/0019,REV-4	REFERRED IN
2	10 SQ.MM BLACK THIN WALLED FLEX.BLAST.CABLE WITH CU.COND.UPTO 75DV (IN NTRS) COND.	12	NIL	ELRS/RDSO/ELC/0019,REV-4	NIL
1	10 SQ.MM (RED) THIN WALLED FLEX.BLAST.CABLE WITH CU.COND.UPTO 75DV (IN NTRS) COND.	10	NIL	ELRS/RDSO/ELC/0019,REV-4	NIL

WELD LENGTH NIL M
WEIGHT NIL KG
S.AREA NIL M²
LENGTH/DIA. NIL M
WIDTH/THICK. NIL M
HEIGHT NIL M

GROUP: ELECTRICAL
FILE: \\ibmx3800\elect\pond\VP70018c.prt(2D)
SUPERSEDES: VP70018 ALT 6

HARNESS CHART FOR ROOF WIRING

(FOR LHB EOG VPH COACH)

RAIL COACH FACTORY, KAPURTHALA

रेलकोच फैक्टरी कपूरथला | IRS

SCALE NTS | SSE/ED | CHD | DRN

REF.DRG.No. NIL

PL NO. 00000000

DRG.NO. VP70018 ALT. C SIZE A4 SHEET 1/1

SEE/D&D | DY.CEE/D&D

NOTE:

1. CABLE LENGTH GIVEN AGAINST EACH HARNESS ARE ONLY APPROXIMATE AND CORRECT LENGTH SHALL BE ADVISED BY SHOP TO DESIGN OFFICE, IN CASE OF ANY CHANGE.

ANY MANUAL ALTERATION SHALL AUTOMATICALLY RENDER THIS DRAWING INVALID.

FOR UNTOLERANCED DIMENSIONS REFER MDG0008

DETAIL DRGS STARTING WITH "LI" ARE INTERNAL REFERENCE LISTS ONLY AND ARE NOT FOR ISSUE.

DATE OF FIRST ISSUE 06/12/2019

Amendment No. -1 to Specification for 'Harness of Under-Frame and Superstructure arrangement' for LHB EOG High Capacity Parcel Van Coaches.

This Amendment is issued to specification for 'Harness of Under-Frame and Superstructure Arrangement' for LHB EOG High Capacity Parcel Van Coaches to spec. no. EDTS-406, Rev 'Nil' in order to delete the provision of installation and commissioning of harness by the firm and accordingly the relevant clauses where ever mentioned in the specification shall not be applicable.

1. **Clause No.-1.1:**
   1.1 b) deleted

2. **Clause No.-2.0**
   2.0 (a), (b), (c) & (d) deleted.

3. **Clause No.-2.1**
   QPC Modified

BILL OF MATERIAL FOR UNDERFRAME WIRING:

A) THIN WALLED FLEXIBLE ELASTOMERIC CABLES WITH COPPER CONDUCTORS & ACCESSORIES:-

S. N.	Description	Working voltage	Cable size (in mm^2)	Cable color	Detail drg./ Spec.	QPC		Remarks
						Existing	Revised	
24.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	Red	ELRS/SPEC/ELC/ 0019, Rev.-4	10 Mtrs	**12.5 Mtrs.**	BCT-1, BCT-2 to +ve fuse box
25.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	Black	ELRS/SPEC/ELC/ 0019, Rev.-4	9 Mtrs	**11.5 Mtrs.**	BCT-1, BCT-2 to -ve fuse box
26.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	Choco	ELRS/SPEC/ELC/ 0019, Rev.-4	29 Mtrs	**22.5 Mtrs.**	+ve fuse box
27.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	10	White	ELRS/SPEC/ELC/ 0019, Rev.-4	39 Mtrs	**29 Mtrs.**	-ve fuse box
31.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	1.5	White	ELRS/SPEC/ELC/ 0019, Rev.-4	10 Mtrs	**40 Mtrs.**	VK-1 to HV Panel & RSW-1 Light Control
32.	Thin walled flexible elastomeric cables with copper conductors	Upto 750 volts	1.5	White	ELRS/SPEC/ELC/ 0019, Rev.-4	10 Mtrs	**40 Mtrs.**	

B) CONDUIT SYSTEM FOR CABLE MANAGEMENT & ACCESSORIES FOR UNDER FRAME WIRING:-

QPC Modified

Firms supplying these items shall get these tested as per RDSO specification no. RDSO/PE/SPEC/AC/0138-2009 (Latest)

S. N.	DESCRIPTION	SPEC. NO.	TABLE	ITEM	QPC	
					Existing	Revised
3.	Polyamide flexible corrugated conduit, NW-23	RDSO/PE/SPEC/AC/ 0138-2009 (Latest)	A-1	4	60 mtrs.	**66 mtrs.**
8.	Straight PG metal thread End fitting PG-16	RDSO/PE/SPEC/AC/ 0138-2009 (Latest)	A-2	3	15 nos.	**24 nos.**
9.	Straight PG metal thread End fitting PG-21		A-2	5	20 nos.	**18 nos.**
12.*	Straight PG metal thread End fitting PG-48		A-2	8	2 nos.	**4 nos.**
14.	Hex.lock nut with PG thread brass PG-16	RDSO/PE/SPEC/AC/ 0138-2009 (Latest)	A-10	4	15 nos.	**24 nos.**
15.	Hex.lock nut with PG thread brass PG-21		A-10	5	20 nos.	**18 nos.**
18.*	Hex. lock nut with PG thread brass PG-48		A-10	8	2 nos.	**4 nos.**

4. Clause No. 2.1 (b) PREPARATION / BUNCHING OF HARNESS:-

QPC Modified

The preparation / bunching of harness shall be done as per under given for Under Frame wiring.

Har No.	Nos. & size of cable	Spec. no.	Working voltage	Color code	Length in mm		Ferrules marking	Route	Remarks & Flex. conduit size and length	Group name
					Existing	Revised				
4C	1 no., 10 mm^2	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W	20500	**16500**	40	40	Battery fuse - ve (S5) to EFT-III **(NW-17, L=16 Mtrs**	
11A	3 X1.0 mm^2 (2 nos.)	EDTS-132, Rev.-C,Am-3,Corr-1 (DS-4)	Upto 750 volts	W,Br, Blk	30000	-	NET	-	RSW NET-1/NET-2 TO RSW NET-1/NET-2 EFT PLATE-IV TO EFT Plate-I cable loop **(NW-17, L=28 Mtrs)**	-
	02 nos., 1.5 mm^2	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	W,CH	-	30000	EFT PLATE-IV TO EFT Plate-I			
12B	01 no., 10 mm^2	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Red	6000	**9000**	BCT-1 to Battery Fuse Box (+ve)	-	BCT-1 to Battery Fuse Box (+ve) **(NW-23, L=8Mtrs)**	BCT Cables

12C	01 no., 10 mm^2	ELRS/SPEC /ELC/0019, Rev.-4	Upto 750 volts	Blk	5000	**8000**	BCT-1 to Battery Fuse Box (-ve)	-	BCT-1 to Battery Fuse Box (-ve) **(NW-23, L=7 Mtrs)**	

5. **Clause No.-2.2 a)**
Note Modified as under:-
* UIC Control Cable 16-core is in the scope of RCF.

6. **Clause No.- 2.2 B) <u>CONDUIT SYSTEM FOR CABLE MANAGEMENT & ACCESSORIES SUPERSTRUCTURE ARRANGEMENT</u>:-**

QPC Modified

Firms supplying these items shall get these tested as per RDSO specification no. RDSO/PE/SPEC/AC/ 0138-2009, (Latest).

S.N.	DESCRIPTION	SPEC. NO.	TABLE	ITEM	Existing QPC	Revised QPC
1	Polyamide flexible corrugated conduit, NW-12	RDSO/PE/SPEC/AC/0138-2009, (Latest)	A-1	2	190 Mtrs.	**230 Mtrs.**

7. **Clause No.-3.4: Technical Staff**
3.4 (c) & (d) deleted

8. **Clause No. 3.10**
Deleted

9. **Clause No. 3.14**
Deleted

10. **Clause No. 5.3**
Modified as under:-

Cl. No.	Existing Clause	Modified Clause
5.3	Firm shall be fully responsible for commissioning of harness system in prototype coach at RCF to avoid any teething troubles or modification required if any, before commencement of bulk supply and commissioning at RCF. Firm shall supply one coach harness set only for validation on coach and after its trial conducted/prototype approval, the bulk supply shall be dispatched and commissioned on the coaches at RCF. Final clearance shall be accorded by Dy.CEE/P coach-wise after successful commissioning in coaches and Quality clearance by Quality.	Firm shall be fully responsible for commissioning of harness system in prototype coach at RCF to avoid any teething troubles or modification required if any, before commencement of bulk supply and commissioning at RCF. Firm shall supply one coach harness set only for validation on coach and after its trial conducted/prototype approval, the bulk supply shall be dispatched and commissioned on the coaches at RCF.

Corr.-2

Corrigendum – 2 to Specification no. - EDTS 406, Rev- Nil, Am-1, Corr-1

This corrigendum is issued to Specification no. EDTS 406, Rev.-Nil, Am-1, Corr-1 for 'Harness of Under frame and Roof arrangement for LHB EOG Non AC Parcel Van Coaches' to change the Scope of Supply as follows:

Clause 2.0 (f) shall be read as:

2.0 Scope of supply:

f) Procurement of the item specified in BOM of the specification shall be from RDSO/RCF/ICF approved vendors mentioned in the latest version of the vendor directory issued by RCF/ICF/RDSO respectively, however the procurement of **e-beam Cables & Cable Management System** shall be done from RDSO 'Approved Vendors' for minimum **80%** quantity of total quantity and balance quantity up-to **20%** from 'Developmental Vendors' as mentioned in latest version of the vendor directory issued by RDSO.

Based on the procurement of various sizes of **e-beam Cables & Cable Management System** from either Approved or Developmental Sources, the cable harness shall be categorized as under:

- **Category-A**: Cable Harness with Approved Source of e-beam Cables & Cable Management System (80% min.)
- **Category-B**: Cables Harness with Developmental source of e-beam Cables & Cable Management System (20% min.)

Category-B type of cable harness may be supplied with e-beam cables & cable management system procured from Developmental Sources, however in no case Category-A type shall be supplied with e-beam cables & cable management system procured from Developmental Sources.

Firm shall maintain a record according to the above classification and offer to RITES/Inspecting Official for inspection in format **EDF 0001, Ver. 2.0 (or Latest)** annexed with the specification.

Note:-

The above mentioned criteria is not applicable to Cable Management System of size NW10 & NW70 as the Approved Sources are less than three or only Developmental Sources are there. Therefore, the procurement of size NW10 & NW70 (if applicable) may be done for such sources subject to past performance, capacity, delivery requirements, quality under procurement, nature of item, outstanding order etc. to be treated as Bulk Orders.

EDTS-406, Rev-Nil, Am-1, Corr-1	2	2.7.21				1 of 1
Spec. No.	**Corr.**	**Date**	**SSE/CAD**	**SEE/D&D**	**Dy.CEE/D&D**	**Page No.**

	RAIL COACH FACTORY, KAPURTHALA INDIAN RAILWAY	Document No.	EDF 0001
		Version.	2.0
		Issue Date.	02.07.2021
		Page No.	1 of 1

INSPECTION FORMAT FOR SUPPLY OF CABLE HARNESS

To be maintained by the cables harness manufacturer at his premises and to be signed by the Inspecting official during inspection against each Purchase Order

Name of Firm : .....

P.O. No. : .....

Description : .....

Specification : .....

e-beam Cables

Sr. No.	Date of Inspection	Total ordered quantity	Lot offered	Category-A Qty. (With Cables from Approved sources 80% Min	Category-B Qty. (With Cables from developmental sources (Up to 20%)	Sign of Inspecting Engineer

Cable Management System

Sr. No.	Date of Inspection	Total ordered quantity	Lot offered	Category-A Qty. (With Cables from Approved sources 80% Min	Category-B Qty. (With Cables from developmental sources (Up to 20%)	Sign of Inspecting Engineer

	रेल कोच फैक्टरी, कपूरथला Rail Coach Factory, Kapurthala	दस्तावेज़ सं.: *सुधार सं.-2* Document no.: *Amendment-2*

Amendment No.-2 to Specification No. EDTS-406, Rev-Nil, AM-1, Corr-1 & 2

This Amendment is issued to specification for 'Harness of Under-Frame and Superstructure Arrangement' for LHB EOG High Capacity Parcel Van Coaches to spec. no. EDTS-406, Rev 'Nil', AM-1, Corr-1 & 2 in order to modify "Bill of Material" of under-frame to modify clause regarding PG-48 cable management system in the specification.

1. **Clause No. 2.1 (a):-**

B) CONDUIT SYSTEM FOR CABLE MANAGEMENT & ACCESSORIES FOR UNDER FRAME WIRING:-

Following Items are **REVISED** as under:

S.N.	DESCRIPTION	SPEC. NO.	TABLE	ITEM	QPC	
					Existing	Revised
6.	Polyamide flexible corrugated conduit, NW-48	RDSO/PE/SPEC/ AC/0138-2009, Rev-1 (Annexure-A)	A-1	7	27 Mtr **	27 Mtr **
12.	Straight PG metal thread End fitting PG-48		A-2	8	04 nos. **	04 nos.
18.	Hex. lock nut with PG thread brass PG-48		A-10	8	04 nos. **	04 nos.
24.	Tube clamp NW-48		A-8	8	10 nos.**	10 nos.

Note "** Marked items shall not be procured as these items are available in RCF depots"

2. **Clause No. 4.9, Table for Tests:**

Test for PVC Rigid Conduits to IS:9537 (Part-3) which was deleted in Corr-1 of this specification is hereby again added and is reproduced as follows:-

Test for Harnesses at firm's premises:

S.No.	Tests	Type Test	Routine Test	Acceptance Test
10.	Test for Rigid PVC Conduits to IS:9537 (Part-3)	YES	YES	YES

3. **Clause No. 4.10 (a) Details of Testing:**

Acceptance Test for PVC Rigid Conduits to IS:9537 (Part-3) which was deleted in Corr-1 of this specification is hereby again added and is reproduced as follows:-

7.	Acceptance test for PVC conduit to IS:9537	
S.No.	Details of Testing	Remarks of Rites Inspecting official
a.	Checking of dimensions as clause 7 of IS.	
b.	Bending test (at room temperature) as per clause 9.2 of IS spec.	
c.	Compression test as per cl. 9.3 of IS spec (5 sample in prototype and 2 samples in acceptance /routine)	
d.	Collapse test as per cl. 9.5 of IS spec (One sample)	
e.	Resistance to burning as per cl. 11 of IS spec. (2 samples)	
f.	Electrical characteristics as per cl. 12 of IS spec.	

4. Clause No. 6.0: Packing and Traceability

Reference Clause No. 6.0 (i) for Packing Instructions stands deleted.