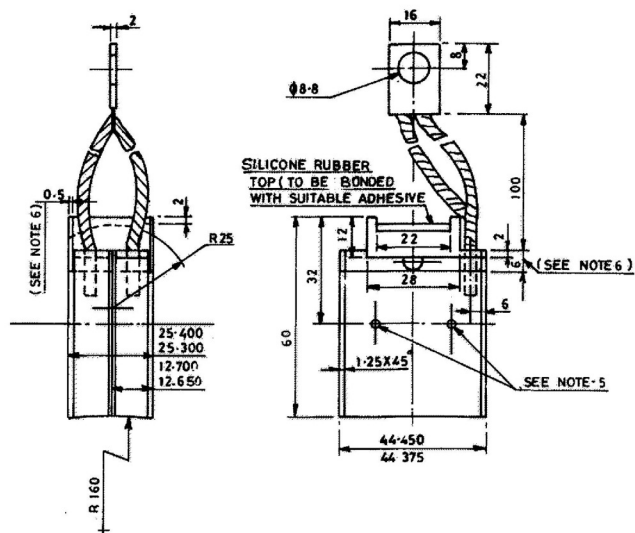


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3-439-20-41-005 DRG. NO.



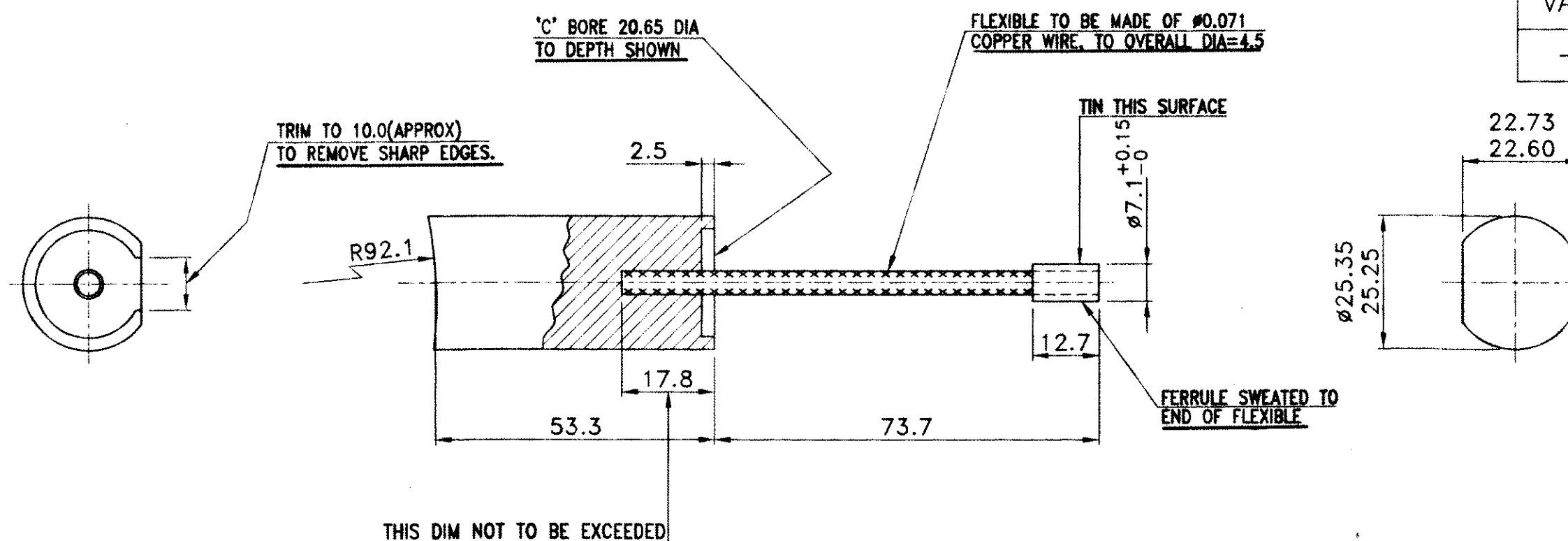
- NOTES:-
1. ~~CARBON BRUSH GRADE - EG14D(1) OR EG 7097 (TC) OR E88X (ELCA)~~
 2. TECHNICAL DATA OF BRUSH GRADE VIZ. APPARENT DENSITY, SHORE HARDNESS, TRANSVERSE STRENGTH, SPECIFIC RESISTANCE, CONTACT VOLTAGE DROP, CO-EFFICIENT OF FRICTION AND MATERIAL DETAILS OF RUBBER TOP ARE TO BE SUPPLIED ALONG WITH QUOTATION TO ENABLE CONSIDERATION OF THE OFFER.
 3. CARBON BRUSH SHALL CONFORM TO (I.S. 3003) UNLESS OTHERWISE STATED.
 4. BRUSH GRADE AND MANUFACTURER'S NAME / TRADE MARK SHALL BE ENGRAVED ON BOTH THE WIDER FACES ABOVE THE CONDEMNING MARK
 5. CONDEMNING MARK SHALL BE MADE ON TWO WIDER FACES.
 6. A GROOVE OF 0.5 X 6 PROVIDED TO AVOID GLUE / RUBBER STICKING IN BRUSH HOLDER IS ALSO ACCEPTABLE.
 7. TOLERANCE ON UNTOLERATED DIMN. TO BE ± 0.25 MM.
 8. REFER TM 98262 FOR ACCEPTANCE OF CARBON BRUSH.
 9. APPROVED CARBON BRUSH GRADES
 1. EG14D(1) 6F ASSAM CARBON PRODUCTS LTD.
 2. E88X(1) OF MERSEN INDIA PVT. LTD.
 3. EG-7097 OF MERSEN/FRANCE

INVENTORY NO.	REV. 05	DATE 8-1-99	ALTD. CKD. <i>mk</i>	NOTE-8 WAS NOT ON.	REV. 04	DATE 24.8.94	ALTD. CKD. <i>mk</i>	NOTE-7 WAS NOT ON.	REV. 03	DATE 3.11.92	ALTERED CHECKED <i>mk</i>	DRG. REVISED & RETRACED.	DEPT. TME	GRADE OF UN.TOL. DIM. <i>mm</i>	SCALE N.T.S.	WEIGHT (Kg) 0.15	REF. TO ASSY. DRG. 0 439 20 41 005	ITEM NO. 013	DRAWING NO. 3 439 20 41 005	SHEET NO. 01	NO. OF SHEETS 01			
	REV. 07	DATE 27-2-08	ALTD. CKD. <i>mk</i>	NOTE 9 WAS NOT ON.	REV. 06	DATE 27-01-03	ALTD. CKD. <i>mk</i>	IN NOTE 1 E88 X (EL+A) WAS ON. IN TITLE M/C REF. TM-4601 BX WAS NOT ON.	REV. 05	DATE 16.11.24	ALTD. CKD. BKT	NOTE 9 MODIFIED.	REV. 04	DATE 14-2-09	ALTD. CKD. <i>mk</i>	NOTE 9 MODIFIED.								
SIGN. & DATE									STATUS OF DRAWING				TYPE OF PRODUCT OR NAME OF CUSTOMER / PROJECT				MG DE LOCO ACEMU							
REF. DRG. NO.					DISTRIBUTION OF PRINTS				Bharat Heavy Electricals Ltd. Bhopal				NAME				SIGN				DATE			
					TME-1, TXM-4, TNX-1				BHU				DRN. CKSB				-sd-				10-2-88			
												CHD. SGD.				-sd-				26-2-88				
												APPD. SKB				-sd-				20-5-88				
												CARD CODE												
												TITLE				DRAWING NO.				REV.				
												CARBON BRUSH (SPLIT)				3 439 20 41 005				09				
												WITH FLEXIBLES & TERMINAL												

(ALL DIMENSIONS ARE IN mm)

STYLE LIST

VAR	IT.NO.	ST NO.
—	001	BP9044760149



NOTE:

1. THE GRADES OF CARBON BRUSHES SHALL BE AS PER LATEST RDSO APPROVED LIST. CURRENT RDSO APPROVED LIST TO BE ESSENTIALLY REFERRED BEFORE PI/ENQUIRY.

-	SEE NOTE-1		001	EARTH RETURN BRUSH (COMPLETE WITH FLEX AND FERRULE)					Kg.	0.25		
							TM 98257					
VAR 00	REMARKS	VAR. NO.	ITEM NO	DESCRIPTION	STD.	DRAWING NO.	IT.NO	MATL. CODE	A/C	UNIT	UNIT WT.	U.S. ZONE
							VAR	MATL. SPECN.			QTY.	

REF. D.	ADDITIONAL INFORMATION										TM 4601AZ/BZ/BX																																																													
	STATUS OF DRAWING										TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT AC EMU																																																													
	DISTRIBUTION OF PRINTS										<div><div><div>DRN</div><div>CRD</div><div>APPD</div></div><div><div>BHADAURIA</div><div>SGD</div><div>SKB</div></div><div><div>Sd</div><div>Sd</div><div>Sd</div></div><div><div>5.1.89</div><div>5.1.89</div><div>6.1.89</div></div><div><div>NO. OF VAR</div><div>—</div></div></div>																																																													
	TME-1 TXM-3 TNX-1																																																																							
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INVENTORY NO.	<table><tr><td>REV.</td><td>DATE</td><td>ALTERED</td><td>BY</td></tr><tr><td>07</td><td>27/09</td><td>CHECKED</td><td>DM</td></tr><tr><td></td><td></td><td>APPROVED</td><td></td></tr></table>										REV.	DATE	ALTERED	BY	07	27/09	CHECKED	DM			APPROVED		<table><tr><td>REV.</td><td>DATE</td><td>ALTERED</td><td>KANSARA</td></tr><tr><td>06</td><td>20.03.09</td><td>CHECKED</td><td>DM</td></tr><tr><td></td><td></td><td>APPROVED</td><td></td></tr></table>										REV.	DATE	ALTERED	KANSARA	06	20.03.09	CHECKED	DM			APPROVED		<table><tr><td>DEPT</td><td>TME</td><td>GRADE OF UNITS IN E/N/F</td><td></td><td>SCALE</td><td>WEIGHT (K.G.)</td><td>REF. TO ASSY. DRG.</td><td>ITEM NO.</td><td>NO. OF ITEM</td></tr><tr><td>CODE</td><td>405</td><td></td><td></td><td>NTS</td><td>0.25</td><td>3 439 13 37 002</td><td>003</td><td>001</td></tr></table>										DEPT	TME	GRADE OF UNITS IN E/N/F		SCALE	WEIGHT (K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEM	CODE	405			NTS	0.25	3 439 13 37 002	003	001
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	IN REMARKS COL - GRADE CMIS - MORGAN WAS ON.										DRAWING UPDATED & DIGITIZED.																																																													
											<table><tr><td colspan="6">TITLE</td><td colspan="2">DRAWING NO.</td><td>REV.</td></tr><tr><td colspan="6">EARTH RETURN BRUSH</td><td colspan="2">3 439 13 37 006</td><td>07</td></tr><tr><td colspan="6">SHT. No.</td><td colspan="2">01</td><td>NO. OF SHT.</td><td>01</td></tr></table>										TITLE						DRAWING NO.		REV.	EARTH RETURN BRUSH						3 439 13 37 006		07	SHT. No.						01		NO. OF SHT.	01																								
TITLE						DRAWING NO.		REV.																																																																
EARTH RETURN BRUSH						3 439 13 37 006		07																																																																
SHT. No.						01		NO. OF SHT.	01																																																															



TME/2010

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

TRACTION MACHINES ENGINEERING DIVISION

PRODUCT STANDARD CONCURRENT SHEET





GENERAL INFORMATION

DATE: 01.08.2009

PRODUCT STANDARD NO.: **TM98262**

DESCRIPTION

: CARBON BRUSHES FOR TRACTION MACHINES

REVISION NO.	DETAILS OF REVISION		
02	Table-A updated with new grades of carbon brushes which are presently used in Traction machines.		
	NAME	SIGNATURE	DATE
PREPARED BY:	K. K. DAS		01.08.2009
AGREED BY	REMARK	DEPTT./SEC	SIGNATURE
S.K. Yadav	OK.	TME	
B.K. Tammareddy	OK.	TME	
SHISHU PAL	OK	TME	
			05/08/09 06.08.09 06/08/09



TME 2011

PRODUCT STANDARD

TME DIVISION, BHOPAL

TM 98262

Rev. No. 02

PAGE 01 OF 03

CARBON BRUSHES FOR TRACTION MACHINES**1.0 General:**

This specification covers the properties required for carbon brushes and relevant test methods to be followed for accepting the carbon brushes for Traction machines.

2.0 Application:

To be used as either commutator or slip ring carbon brush for Traction machines.

3.0 Approved grades:

Shall be stated on the relevant carbon brush drawings.

4.0 Compliance with national standard:

This shall be carried out generally in line with IS13466 , IS13584 & IS 13586.

5.0 Information to be provided by brush manufactures:

In accordance with IS 13466 Clause 1.3.

6.0 BHEL acceptance tests on carbon brushes:

Shall be carried out at the time of accepting supplies of carbon brushes in line with IS 13466 Clause 16.2 and also hardness test in line with IS 13584 Clause 7.1.


6.1 Workmanship:

In accordance with IS13466 Clause 16.5.

6.2 Dimensional accuracy:

Shall be stated on the drawing or in the purchase order. Dimensions shall be measured in accordance with IS 13466 Clause 16.5.

Revision Details: As per revision sheet			Distribution	Qty.	Approved		Dt. of 1 st Issue
Rev. No.	Date of Rev	Reaffirmed Year			Sr.DGM/TME		
02	1.8.09	Feb 2022	TME TXM QMX	1 1 1	Prepared B. Tamrakar Mgr./TME	Checked V.Rawtiya DGM/TME	-

 TME 2012	PRODUCT STANDARD TME DIVISION, BHOPAL	TM 98262 Rev. No. 02 PAGE 02 OF 03
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6.3 Hardness (Rebound method):

Test to be conducted in accordance with IS 13584 Cl. 7.2 .
Refer TABLE A , of this specification for hardness values against each brush grade.

For grades not covered contact TME department for the nominal value of hardness.

6.4 Connection drop test across flexible to carbon joint:

In accordance with IS 13466 Cl. 16.6.

Acceptance criteria as per Table 2 of IS 13466 .

For pig tail overall diameter sizes not specifically covered in the above IS 13466 , limits / reference values of next higher sizes pig tail diameter shall form the basis of acceptance.

6.5 Pigtail pull out strength test:

In accordance with IS13466 Cl. 16.7.

Acceptance criteria as per Table 3 of IS 13466.

For pig tail overall diameter sizes not specifically covered in the above IS 13466 , limits / reference values of next higher sizes pig tail diameter shall form the basis of acceptance.

7.0 Test certificate:

Unless otherwise stated, the supplier shall submit three copies each of Type and BHEL acceptance test results in accordance with IS13466 Clause 16.1 and 16.2 for each individual consignment.



TME 2012

PRODUCT STANDARD**TME DIVISION, BHOPAL****TM 98262****Rev. No. 02****PAGE 03 OF 03****TABLE-A**

Shore hardness value for various grades of carbon brushes are given below:
Tolerance on nominal value of hardness is as per clause 4 Table 1 of IS 13584.

A. Brush grades supplied by M/s Assam Carbon Products Ltd. (Morgans):

Grade Group	Brush grade	Shore hardness limits (Nominal)
Electro Graphite	EGO	37.0
Electro Graphite	EG-14D(I)	66.0
Electro Graphite	EG-105S	70.0
Electro Graphite	EG-225	43.0
Electro Graphite	EG-251	60.0
Electro Graphite	EG-284	68.0
Natural Graphite	HM-6	16.0
Metal Graphite	BM-51	11.0

B. Imported brush grades of M/s Carbone Lorraine - France, manufactured by M/s Carbone Lorraine India Pvt. Ltd.:

Grade Group	Brush grade	Shore hardness limits (Nominal)
Electro Graphite	E-49X(I)	55.0
Electro Graphite	E-55(I)	52.5
Electro Graphite	E-88X(I)	65.0
Electro Graphite	EG-326	42.5
Electro Graphite	EG-353D	60.0
Electro Graphite	EG-353T	57.5
Electro Graphite	EG-6754	87.0
Electro Graphite	EG-8220	90.0
-	BE-14Z1	17.5

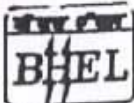
C. Brush grades supplied by M/s Carbone Lorraine India Pvt. Ltd.:

Grade Group	Brush grade	Shore hardness limits (Nominal)
Electro Graphite	EG-98B	65.5
Electro Graphite	EG-389	25.0
Electro Graphite	EG-6754	87.0
Electro Graphite	EG-7097	76.0
Electro Graphite	EG-9049	74.0

(Ref: Letter "Grade Hardness Details", dated 28/02/09 from SCI Carbon brushes Pvt. Ltd. and Email "Carbon brush grade properties", dated 22/07/09 from Carbone Lorraine India Pvt. Ltd.)

NOTE: 1. The above mentioned brush grades are only to check the hardness test results not to ensure the approved grade for any machine.
2. For approved brush grade, please check the drawing of a particular machine.

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TME/2010

TRACTION MACHINES ENGINEERING DIVISION, BHEL, BHOPAL			
PRODUCT STANDARD		CONCURRENCE SHEET	
GENERAL INFORMATION		DATE: 17.06.98	
PRODUCT STANDARD NO.		TM 98 257	
DESCRIPTION		Specification for Metal graphite Brushes	
REVISION NO.	DETAILS OF REVISION		
00	NIL		
	NAME	SIGNATURE	DATE
PREPARED BY:	A. KATDARE	<i>A. Katdare</i>	17.06.98
AGREED BY:	REMARKS DEPTT./SEC.	SIGN.	DATE
R. N. PAUL	<i>Agreed</i> TME/Elect	<i>R. N. Paul</i>	17.6.98
A. T. RANDEEN	<i>Agreed</i> TME/Elect	<i>A. T. Rande</i>	17.6.98



TME 2011

PRODUCT STANDARD TME DIVN. BHOPAL

TM

98257

PAGE 1 OF 2

METAL GRAPHITE BRUSHES

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1.0 GENERAL :-

This specification covers properties required and its methods to be followed for accepting the Metal graphite brushes.

2.0 APPLICATION :-

To be used as Earthing brush for traction motors.

3.0 APPROVED GRADES :-

- (i) CM1S - Morgan
- (ii) BM51 - Assam Carbon
- (iii) EM1S
(MG1X) - Luna Carbon

4.0 COMPLIANCE WITH NATIONAL STANDARDS :-


Generally in line with IS13466, IS13584 & IS13586.

5.0 INFORMATION TO BE PROVIDED BY BRUSH MANUFACTURER :-

In accordance with IS13466 clause 1.3.

6.0 ACCEPTANCE TEST :-

Shall be carried out at the time of acceptance of supplies in line with IS13466 clause 16.2 and hardness test in line with IS13584 clause 7.1.

Revision Details: As per revision sheet			Distribution	Qty.	Approved		
Rev. No.	Date of Rev	Reaffirmed Year	TME TXM QMX 10	1 1 1	Sr.DGM/TME	 Checked V.Rawtiya DGM/TME	Dt. of 1 st Issue
00	17.6.98	Feb 2022			Prepared B. Tamrakar Mgr/TME		
					17.6.98		

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TME, 2011

PRODUCT STANDARD TME DIVN. BHOPAL

TM

98257

PAGE 2 OF 2

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6.1 WORKMANSHIP :-

In accordance with IS13466 clause 16.4.

6.2 DIMENSIONAL ACCURACY :-

Shall be stated on the dra. or on the order. Dimensions shall be measured in accordance with IS13466 clause 16.5.

6.3 CONNECTION DROP TEST :-

In accordance with IS13466 clause 16.6.

Required maximum value of connection drop - 10 millivolts.

6.4 PIG TAIL PULL OUT STRENGTH :-

In accordance with IS13466 clause 16.7.

6.5 HARDNESS (REBOUND METHOD) :-

In accordance with IS13584 clause 7.1. Required hardness value 10 ± 2 (shore).

7.0 TEST CERTIFICATES :-

Unless otherwise stated, the supplier shall submit three copies each of Type and Acceptance test results in accordance with IS13466 clause 16.1 and 16.2 for each individual consignment.

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BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

QUALITY ASSURANCE PLAN FOR CARBON BRUSH TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QTM/TXM/VENDOR/QAP/2020-21/CARBON BRUSH REV 00
DATED: 08.01.2021

Page : 1 of 3

SL. NO	COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTA OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
--------	-----------	-----------------	---------------	-----------------	--------------------	------------------	------------------	-------------------	---------

1.0	RAW MATERIALS & BOUGHT OUT ITEMS								
1)	Carbon Block	Chemical & Mechanical	TC verified & Measurement	Sample	As per IS 13466/ TM 98262	As per drawing & Specification	MTC	BHEL/TP/A	Record Review
2)	Terminal	Dimensions	TC verified & Measurement	Random Sample	As per IS 13466/ TM 98262		MTC	BHEL/TP/A	
3)	Flexible	Dimensions	TC verified & Measurement	Random Sample	As per IS 13466/ TM 98262		MTC	BHEL/TP/A	

गजेंद्र सिंह राठौर / Gajendra Singh Rathour
वरिष्ठ अभियंता (सहायक) / Sr. Engineer (AFD)
गुणता नियंत्रण विभाग / Quality Control-CIM
बी.एस.ई. प्लान्ट / BHEL, BHOPAL



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

QUALITY ASSURANCE PLAN FOR CARBON BRUSH TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QTM/TXM/VENDOR/QAP/2020-21/CARBON BRUSH REV 00
DATED: 08.01.2021

Page : 2 of 3

2.0	INPROCESS INSPECTION						
1)	a)Workmanship b)Dimensional c)accuracy test d)Connection drop test e)Pullout Strength Test f)Hardness	Visual, Dimensions, Mechanical & Electrical	Measurement & Visual	Sample	As per IS 13466/ TM 98262/ IS13584	As per drawing & specification	Internal Records BHEL/TPJA Record Review

15

गजेंद्र सिंह शर्मा / Gajendra Singh Rathour
वरिष्ठ अभियंता (गुणवत्ता) / Sr. Engineer (QFD)
गुणवत्ता नियंत्रण / Quality Control-CIM
बी.एस.ई.एस., बhopal / BHEL, BHOPAL



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

QUALITY ASSURANCE PLAN FOR CARBON BRUSH TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. – QTM/TXM/VENDOR/QAP/2020-21/CARBON BRUSH REV 00
DATED: 08.01.2021

Page : 3 of 3

3.0 FINAL INSPECTION & TESTING

	a) Workmanship b) Dimensional accuracy test c) Connection drop test d) Pullout Test e) Hardness	Visual, Dimensions, Mechanical & Electrical	Measurement & Visual	Sample	As per IS 13466/ TM 98262/ IS13584	As per drawing & specification	Internal Records	BHEL/TPJA	Witness
1)									
2)	Identification marking (grade, vendor name, PO)	Visual	Visual	Sample	100%				Witness
3)	Packing to avoid transit damage	Visual	Visual	Sample	100%				----- 16

16

Prepared By

Approved By

गजेन्द्र सिंह राठौर / Gajendra Singh Rathour
वरिष्ठ अभियंता (व्यवस्थापक) / Sr. Engineer (O/P)
गुणता नियंत्रण विभाग / Quality Control-CQM
बी.एस.ई.एल., भोपाल / BHEL, BHOPAL

एच.ए. टोपपो / H.A. TOPPO
अवर प्रबंधक / Asst. General Manager
कृष्ण टी.एम. / QTM
बी.एस.ई.एल., भोपाल / BHEL, BHOPAL

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY CONTROL TRANSPORTATION
QUALITY ASSURANCE PLAN(QAP)

QA PLAN NO : QTM/TXM/VENDOR/QAP/2016-17/TM4601/EARTH RETURN BRUSH DT. 21.03.2017 REV 00
 REFERENCE- drg no. 34391337006

SL. NO.	CHARACTERISTIC	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK (No. of jobs)		REF. DOCUMENT	FORMAT OF RECORD	REMARKS
				TP	TP/A			
1.0	Raw Material Test Certificate	A	VR	100%	100%	As per drg and relevant spec.	SR	TEST LAB NABL / EQUIVALENT ACCREDITED/ SOURCE MILL.
2.0	Dimensions as per drg.	A	I	100%	20%	As per drg.	SR	All dimensions marked in drawing, TC to be Submitted
3.0	Testing	A	T	100%	1%	TM 98257	SR	Report to be submitted
4.0	Brush grade and manufacturer's identification mark	A	V	100%	20%	As per drg and spec.	SR	Brush grade and manufacturer's identification mark should be marked
5.0	Grade of carbon Brush	A	V	100%	20%	As per drg and spec.	SR	As per RDSO approved list/PO
6.0	Packaging suitability for transit & storage	B	VR	100%		--	SR	Packaging shall be such that during transit job is not damaged. Certificate of compliance is to be submitted
PREPARED BY		APPROVED BY						

1) All TTR, SR checked by T R, TP, VR, TC (duly signed & sealed) as per above QAP requirement shall be submitted along with log sheet.

Abbreviation: A - Critical, B - Major, VR - Verification, I-Instrument/ Gauges,

T R - Test Record, S R- Shop Record, T - test witness

AGENCIES: QC-BHEL Quality control

TP/A - BHEL appointed third Party Inspecting Agency

TP - Task Performer

S. M. K. J. GUN
 Quality Control
 BHEL, BHOPAL