A Division of Transnet SOC Limited

TECHNOLOGY MANAGEMENT

SPECIFICATION

300 VOLT GAS ARRESTER SPARK GAP FOR TRACTION POWER SUPPLIES

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LIST OF AMENDMENTS TO THE SPECIFICATION

Version No.	Date Issued	Clause No.	Page No.	Remarks
4	May 2021			Updated to new specification document format.
		2	4	Definition and background sections merged to form new background section.
		4.1	4	Lightning conditions updated and pollution conditions added.
		5	4&5	Technical requirements are divided into electrical and mechanical requirement subsections.
		5.1.1	5	Inserted gas arrester measurement.
		7	5	Section added
		8	5	Section updated
		9	6	Section added
		10	6	Method of tendering has been updated.

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1.0 SCOPE

1.1 This specification details Transnet's requirements for the manufacturing and supply of the 300 Volt (V) gas arrestor spark gap for use in traction power supply system.

1.2 This specification contains technical datasheet (Annexure A) which must be completed by the tenderer and must be submitted as part of the tender documents.

2.0 BACKGROUND

The spark gaps assemblies are used to limit voltages between the earthing system and the traction negative return system i.e., to limit contact voltages for the protection and safety of the staff and the public.

Spark gaps are used at substations, bridges, station platforms sidings, switching structures, H-masts, etc. The spark gap assembly is a voltage limiting device which consists of a gas arrestor and is contained in a housing according to Transnet drawing BBB 0906.

3.0 NORMATIVE REFERENCES

Unless otherwise specified all materials used, equipment developed and supplied shall comply with the latest edition of the relevant South African National Standards (SANS) or Transnet publications.

3.1 SANS STANDARDS:

3.1.1 SANS 9001 : Quality management systems — Requirements.

3.1.2 SANS 60479-1 : Effects of current on human beings and livestock

3.2 TRANSNET PUBLICATION:

3.2.1 BBB 0906 : Spark Gap Assembly Gas Filled Arrester.

3.3 IEEE PUBLICATION:

3.3.1 Std 80 : IEEE Guide for Safety in AC Substation Grounding

4.0 SERVICE CONDITIONS

4.1 ENVIRONMENTAL CONDITIONS

Altitude:	0 - 1800 m above sea level
Relative humidity:	10% to 90%
Ambient temperature:	-10° C to +55° C
Wind pressure:	750 Pa
Lightning conditions:	20 ground flashes/km2 per annum
Pollution:	Heavily salt laden with industrial pollutants including diesel- electric locomotive emissions.

5.0 TECHNICAL REQUIREMENTS

The technical requirements stated in this document are for the completely assembled spark gap unit, which includes each of the components listed in BBB 0906.

5.1 Electrical Requirements

5.1.1 The spark gap shall be fitted with a gas arrester with a diameter of below 25 mm and length of 16 mm.

5.1.2 The gas arrester device shall be of the type that returns to its initial state after discharging the impulse current in case of over voltages due to lightning effects.

5.1.3 The gas arrester shall comply with the following parameters:

5.1.3.1. U_{ac} – Rating of the gas arrestor: 300 V. (Refer to BBH6355 for the calculation)

5.1.3.2. AC-spark over voltage – 50 Hz voltage ramp: 255 V ≤ U_{ac} ≤ 345 V. (15% tolerance)

5.1.3.3. Impulse spark over voltage 1.2/50 µs Impulse voltage: ≤ 1000 V.

5.1.3.4. Impulse current without welding: 0.5 to 5 kA (10/350 µs).

5.1.3.5. Impulse current without mechanical failure: 20 kA (10/350 µs).

5.1.3.6. Short circuit current: 14 kA to 28 kA (peak) 50 Hz: t > 30 ms.

5.1.4 In the event of failure, the gas arrestor shall fail to short circuit mode.

5.2 Mechanical Requirements

5.2.1 The spark gap housing shall be manufactured in accordance to drawing No. BBB 0906 and its associated drawings.

5.2.2 The spark gap shall be assembled with the gas arrester installed according to the drawing BBB 0906.

5.2.3 The complete assembled spark gap shall be torqued to a value of 60 Nm to ensure sufficient surface contact between the gas arrester and spark gap housing.

6.0 TESTING AND INSPECTIONS

6.1 Transnet reserves the right to be present at all tests and inspections as called for in this specification. The gas arrester shall be subjected to tests as per the standards specified, to verify that its performance is in accordance with the specifications.

6.2 A pre-production sample shall be tested in accordance with this specification at the manufacturer's facility.

6.3 The responsibility of arranging the tests called for in this clause rests with the successful tenderer.

6.4 A Transnet Freight Rail, Technology Management (Electrical Technology) department representative may request any additional test deemed necessary to ensure compliance.

6.5 The issuing of acceptance certificates will be authorised by the Quality Assurance section of Transnet.

6.6 Tests shall be carried out on the gas arresters to verify the spark over voltage rating. (All gas arresters in the complete unit must be tested to ensure the breakover voltage is correct)

7.0 DOCUMENTATION REQUIREMENTS

7.1 The following technical documentation shall be submitted with tender:

7.1.1 One hard copy of the technical specification/detailed drawing.

7.1.2 One hard copy of detailed drawing.

7.1.3 One hard copy of method of installation.

7.1.4 One hard copy of the maintenance manual.

7.1.5 One hard copy of design and type test certificates shall be provided for the spark gab assembly to show compliance to clause 5.1.2, 5.1.3 and 5.1.4 of this specification.

7.2 Supplier shall advise how to proceed with the equipment at the end of its operating life, taking into consideration environmental requirements and regulations.

8.0 QUALITY ASSURANCE

8.1 The successful tenderer shall maintain a Quality Management System (QMS) based on or certified to SANS 9001.

9.0 GUARANTEE AND DEFECTS

9.1 The appointed tenderer shall guarantee that the supplied spark gap conforms to Transnet's requirements.

9.2 The appointed tenderer shall accept liability for makers' defects, which may appear in design, material and workmanship.

9.3 The appointed tenderer shall provide all information regarding guarantees and warranties in writing.

END

10.0 ANNEXURE A: TECHNICAL DATA SHEET

(To be completed by the tenderers and submitted as part of their tender)

10.1	**TENDER INFORMATION**	
10.1.1	Tenderer	
10.1.2	Tender No.	
10.1.3	Date	
10.2	**ELECTRICAL INFORMATION**	
10.2.1	Gas arrester diameter	
10.2.2		
10.2.3	Uac – Rating of the gas arrestor	
10.2.4	AC-spark over voltage	
10.2.5	Impulse spark over voltage	
10.2.6	Impulse current without welding	
10.2.7	Impulse current without mechanical failure	
10.2.8	Short circuit current	