

**1. Scope:**

This specification specifies abrasible coating on steam gland areas of steam turbine components.

2. Coating Requirements:

- i) **Bond coat** (Primary coat): Metco 450NS (Ni 5Al) or equivalent.

Particle size: 90 +45 microns

Thickness of coating: 100 – 150 microns

- ii) **Top coat** (final coat): Metco 301NS (Ni 13Cr 8Fe 3.5Al 6.5BN) or equivalent.

Particle size: 120 +45 microns.

Technical requirements for Coating:

Manufacturing method: Thermal spray coating (flame spraying)

Type of bond: Mechanical

- a) Thickness of coating: as specified in drawing.

- b) Coating shall manifest good lubricity shall get easily abraded in case of contact with rotor material 30CrMoNiV59, 28CrMoNiV511 & Sealing fin which are made of high alloyed Chromium steel & Austenitic stainless steel.

- c) Coating shall manifest good Machinability, oxidation resistant and corrosion-resistance.

- d) Coating shall be suitable for withstanding Service temperature up to 610 °C.

3. Process Qualification:

Successful process qualification is mandatory requirement for coating on actual components.

During Process Qualification, vendor must establish coating process on test piece. The Process qualification as applicable for first test piece includes following requirement:

- a) Minimum three coated sample pieces complying order specific coating thickness (0.6mm) shall be tested at NABL approved lab jointly with BHEL / TPI for checking of bond strength, porosity. Sample of raw material on which coating is to be done shall be provided by BHEL for process qualification.
- b) One additional sample piece with total coating thickness of 2 mm shall also be provided to BHEL / TPI for checking of the hardness of coating.

The number of test pieces and testing process is liable to iterate until desirable mechanical properties as given below are achieved:

Hardness: HR15Y hardness (Avg.) 45 to 65

Porosity: > 50 %

Peel-off strength(psi) as per ASTM C 633: >1100 mean value

(with Std. deviation less than 10% of mean value)

Process qualification test results satisfying above parameters with manufacturing plan covering complete manufacture sequence are to be submitted to BHEL

Based on process qualification test results, BHEL will provide the approval of process qualification test results and coating on actual component will be allowed.

Manufacturing plan should cover minimum following details:

- i. Sequence of operation
- ii. List of equipment used
- iii. Details of filler materials- chemical composition and grain size distribution,
- iv. coating parameters: gases and gas flow rates, distances, spraying equipment, covering, etc.

- v. List of all other materials used for masking, grit blast media, etc.
- vi. Quality Control Plan describing the methods and frequencies of inspections and tests used to ensure that coated parts meet the requirements of the BHEL drawing.

Any changes of the production and/or test sequence require an update of the MQCP by the manufacturer and a release of the MQCP by the purchaser. The supplier shall have the MQCP reviewed and approved and released by BHEL. The supplier to assumes full responsibility for the correctness and completeness of the MQCP.

4. Coating on Actual Components:

- i. Segments for coating shall be delivered ready machined, marked, and assembled with seal strips for coating. A certificate of dimension inspection shall be added only if actual dimensions are not within the tolerances. Upon receipt, the manufacturer shall inspect the supply for part count, identification, free of defect and suitability for coating. Documents delivered must be considered. Discrepancies and defects must be immediately reported to the BHEL before taking any further step on coating.
- ii. The coating is to be applied as per approved Manufacturing Plan established during process qualification.
- iii. Location of abrasable coating is shown in the applicable ordering drawing.
- iv. Before starting the coating process, the surfaces to be coated shall be cleaned thoroughly and suitable grit type and size shall be selected to achieve required surface roughness to ensure excellent bonding of primary coat as per approved manufacturing plan. During grit blasting care shall be exercised to protect sealing fins from damage and bending. The surface shall be degreased with suitable solvent
- v. Before commencing the thermal spaying process, supplier shall ensure masking of sealing fins with heat resistant tape to prevent damages and inadvertent application of coating on sealing fins.
- vi. Abradable coating to be applied between the seal strips as shown in figure below:

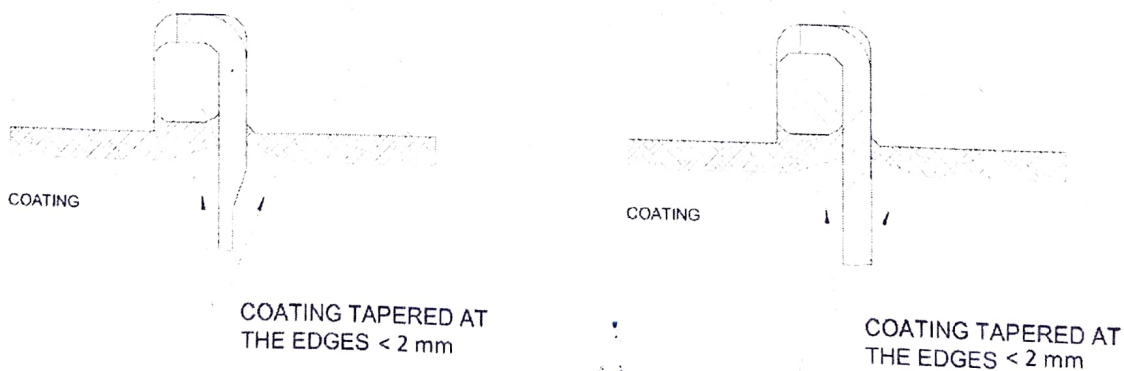


Fig.1



HARIDWAR

TECHNICAL REQUIREMENTS / SPECIFICATIONS FOR
 ABRADABLE COATING FOR SEAL SEGMENTS UP TO TEMPERATURE OF 620°C

TS No.
 4-10528-56901
 Rev.00

5. Testing:

5.1 Visual inspection: Upon completion, the surfaces are to be inspected visually. The following criteria must be fulfilled:

The coating must be homogeneous and must cover all surfaces as specified in the specification drawing.

5.2 Dimension check:

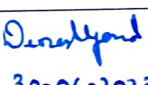
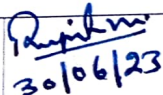
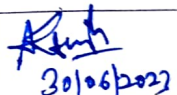
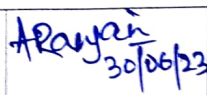
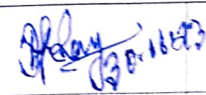
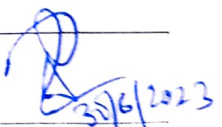
The coated surface thickness shall be within tolerance of + 0.1mm of specification drawing.

6. Packing & Despatch:

The supplier is responsible for packing and transport of finished goods. Special attention shall be paid to the protection of the seal strips and coating in order to prevent damage during transport.

7. References:

TC41002

Signature & Date	 30-06-2023	 30/06/23	 30/06/2023	 30/06/23	 30/06/2023	 30/6/2023
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