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 SHAKAMBHARI GROUP #SteelWithin		SHAKAMBHARI ISPAT & POWER LTD. (Formerly known as Ess Dee Aluminium Ltd.)	
STANDARD OPERATING PROCEDURE			
Title: Operation for Coating Machine			Page No. 1 of 5
SOP No.	Version No.	Effective Date	Next review date
SIPL/PDI/006	00	06.07.2026	05.07.2028

1.0 PURPOSE

- 1.1 The coating system is a three-roller application system for VMCH and a gravure coating system (for Shellac). The drying tunnel consists of individual air jets which are heated by a boiler. The coating solution (VMCH), which is the coating material, and the solvent are mixed in an appropriate ratio to obtain the required viscosity. The coating GSM can be controlled by adjusting the gap between the application roller and the bath. The rubber roller gap is kept fixed, so only viscosity is verified to get the required coating GSM.

2.0 SCOPE

- 2.1 This SOP applies to all HSL coating operations for aluminium foil carried out at Shakambhari Ispat & Power Ltd. It is applicable to the Production Conversion Department.

3.0 REFERENCE(S) & ATTACHMENTS**3.1 References**

- 3.1.1 In-house

3.2 Attachments

- 3.2.1 Attachment I: Coating Machine Output Log Book - SIPL/PDI/006/F01/00
 3.2.2 Attachment II: Shellac & VMCH Mixing Log Book - SIPL/PDI/006/F02/00
 3.2.3 Attachment III: Machine Cleaning Record - SIPL/PDI/006/F03/00

4.0 RESPONSIBILITY**4.1 Production Department Person**

- 4.1.1 To prepare the SOP.

4.2 Production Head

- 4.2.1 To ensure the training of the SOP to all concerned personnel involved in implementation of the SOP.
 4.2.2 To ensure the implementation of the SOP after training.

4.3 Quality Assurance Person

- 4.3.1 To check the SOP and to maintain the original copy of the SOP.
 4.3.2 To issue the controlled copy of the SOP and maintain its issuance record.
 To retrieve the controlled copy of the SOP when it is superseded/obsolete and maintain its record.

4.4 QA Head / Plant Head

- 4.4.1 To approve new or revised SOP.
 4.4.2 To ensure the implementation of the defined system.

5.0 DISTRIBUTION

- 5.1 Quality Control
 5.2 Production

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Samrat Banerjee 04.07.2026	[Signature] 04.07.2026	[Signature] 04.07.2026

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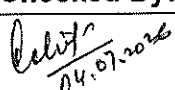
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STANDARD OPERATING PROCEDURE			
Title: Operation for Coating Machine			Page No. 2 of 5
SOP No.	Version No.	Effective Date	Next review date
SIPL/PDI/006	00	06.07.2026	05.07.2028

6.0 DEFINITION(S) & ABBREVIATION(S)**6.1 Definitions**

- 6.1.1 **Shellac Wash:** Shellac wash coating is a thin, uniform coating of shellac resin applied to aluminium foil to improve the adhesion test. It also provides surface bonding between ink and foil.
- 6.1.2 **Heat Seal Lacquer:** Heat Seal Lacquer (HSL) coating is a specially formulated coating applied to aluminium foil that forms a strong seal with compatible packaging materials when heat and pressure are applied during the sealing process.

6.2 Abbreviations

- 6.2.1 QC: Quality Control
- 6.2.2 M/C: Machine
- 6.2.3 MPM: Meters Per Minute
- 6.2.4 HMI: Human Machine Interface
- 6.2.5 PSI: Pound per square inch (1 lb/in²; one pound-force applied to an area of one square inch).

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STANDARD OPERATING PROCEDURE			
Title: Operation for Coating Machine			Page No. 3 of 5
SOP No.	Version No.	Effective Date	Next review date
SIPL/PDI/006	00	06.07.2026	05.07.2028

7.0 PROCEDURE

7.1 General

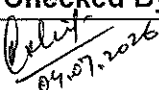
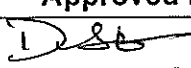
- 7.1.1 A drying tunnel with air blower is provided for hot air heating, with exhaust blower and driven guide rollers.
- 7.1.2 All the process parameters are mentioned in the Process Monitoring section.

7.2 Roles During Operation

- 7.2.1 **Production Head:** To ensure adherence to the SOP and batch manufacturing record. Review and approve the in-process sample before QC submission.
- 7.2.2 **Production Operator:** Responsible for placing a flag in the rewinding roll in case of any defect or joint, so that the inspection operator in the subsequent operation will remove the defective portion. The operator is also responsible for the control of the viscosity of the heat seal coating (VMCH solution) and the use of the correct ratio of shellac and retarder.
- 7.2.3 **Production Helper:** The helper on the rewind end of the machine handles the changing of the rolls when one core is full and a new one is started. He prepares the plain spool for receiving the web and to start a new roll on it, using BOPP adhesive tape / ½" cello tape to paste one end of the foil. The loose end of the completed roll is taped down, the roll is removed from the unwinder and a new spool is inserted.

7.3 In-Process Quality Control

- 7.3.1 At defined intervals, cut samples of coated foil for testing.
- 7.3.2 There must be adequate availability of coating like VMCH / wash (shellac wash), etc., with formulated viscosity.
- 7.3.3 Use only material tested and okayed by Q.C.
- 7.3.4 After completion of every output roll, Q.C. checks and records and gives feedback (verbal or in writing) for correction.
- 7.3.5 Other duties that require close attention are the constant checking of coating thickness, coating quality and web tension, and any type of visual defect.
- 7.3.6 Each roll taken from the machine is subjected to the quality control tests, and prompt feedback from this result may require considerable adjustment by the operator.

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STANDARD OPERATING PROCEDURE	
Title: Operation for Coating Machine	
Page No. 4 of 5	
SOP No.	Version No.
Effective Date	Next review date
SIPL/PDI/006	00
06.07.2026	05.07.2028

7.4 Process Monitoring

Sr. No	Description	Range	Responsibility
1	Viscosity (by B6 cup)	Secs.	Operator
2	VMCH (Heat Seal Lacquer)	7-10 (4.0 - 6.0 gsm)	
		10-14 (6.0 - 8.0 gsm)	
3	Shellac coating	1.5 to 2 %	

7.5 Product Specification

Product	Foil Gauge (Micron)	Width (mm)
Blister Foil (Hard/Soft)	20 / 25 / 30	600 to 1000

7.6 Machine Tension & Pressure Control Details

Unwind Tension	Nip (chiller) Tension	Rewind Tension	Shellac Nip Pressure	Doctor Blade Pressure	Nip Pressure (Application Roll)	Nip Pressure (Rubber Roll)
45 to 60	2.0 to 5.0 kg	45 to 60 Kg	3.0 to 7.0 kg	1.0 to 4.0 kg	2.0 to 6.0 kg	2.0 to 7.0 kg

7.7 Drying Zone Temperature (°C):

Boiler Temp.	HSL Zone-1	HSL Zone-2	HSL Zone-3	HSL Zone-4	HSL Zone-5	HSL Zone-6	HSL Zone-7
260 to 350	90 to 150	110 to 150	110 to 170	110 to 170	110 to 170	110 to 170	90 to 130

7.8 Machine Speed:

Sr. No	Product	Speed (Meter/Minute)
1	0.020 / 0.025 / 0.030 Blister VMCH (4.0 - 6.0 gsm)	90 - 100
2	0.020 / 0.025 / 0.030 Blister VMCH (6.0 - 8.0 gsm)	90 - 100

7.9 Chiller Temperature (°C):

Summer Season	Rainy Season	Winter Season
20 to 25	26 to 29	28 to 30

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STANDARD OPERATING PROCEDURE			
Title: Operation for Coating Machine			Page No. 5 of 5
SOP No.	Version No.	Effective Date	Next review date
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7.10 Area Line Clearance

- 7.10.1 Once the job is finished, stop the machine from run mode and switch to idling mode at the speed of 10 mpm.
- 7.10.2 Take the HSL tray down by rotating the screw.
- 7.10.3 Pour solvent on the cylinder from the doctor blade side.
- 7.10.4 Take the doctor blade up. Clean all the cylinders properly by cotton cloth until no HSL traces remain in the cells. Apply petroleum jelly on the cylinder surface evenly.
- 7.10.5 Stop the machine from idling mode. Disengage all the cylinders.
- 7.10.6 Cover the cylinder with PET or poly film, then cover the cylinder with corrugated sheet.
- 7.10.7 Remove HSL from the HSL tank and pour it into the HSL can.
- 7.10.8 Remove the cylinder from the unit using the cylinder trolley and return it to the cylinder store.
- 7.10.9 Remove all the rubber rollers.
- 7.10.10 Remove all the HSL / solvent-soaked cotton cloths from the machine.
- 7.10.11 Remove all the materials as mentioned in the line clearance.
- 7.10.12 Once line-clearance operations are complete, take approval from QC personnel for the next run.

8.0 REVISION HISTORY:

Revision No.	00	Effective Date	06.07.2026	CC No.	~ A
Details of revision: New SOP					

Prepared By:	Checked By:	Approved By:
Samrat Banerjee 04.07.2026	Debi 04.07.2026	DSB 04.07.2026