

CMP System Acceptance Procedure

The following acceptance procedure shall be applied to verify the installation and performance of the CMP system delivered in accordance with the technical specification.

1. Document and Documentation Verification

The following documents shall be provided by the manufacturer/supplier:

- 1.1. Operational manual
- 1.2. Maintenance manual
- 1.3. Electrical diagrams and system infrastructure requirements
- 1.4. Software manual
- 1.5. Calibration certificates (if applicable)
- 1.6. Warranty certificate
- 1.7. CE or equivalent safety compliance declarations
- 1.8. List of all delivered accessories

2. Physical Installation Verification

- 2.1. The system shall be connected to an electrical infrastructure compliant with the technical specification (220–240 V single phase or 380–400 V three phase, 50 Hz).
- 2.2. All mechanical components (platen, head, carriers, slurry lines, conditioning unit) shall be undamaged and correctly assembled.
- 2.3. The platen surface, head surface, and carriers shall be free of scratches or defects.
- 2.4. DI water connection shall be tested.
- 2.5. Slurry lines shall be checked for leakage.
- 2.6. The safety enclosure/protective system shall be verified for proper operation.

3. Software and Recipe Verification

- 3.1. Access to the system interface (PC-based or integrated panel) shall be confirmed.
- 3.2. User account creation/access functions shall be tested.
- 3.3. The ability to create recipes with a minimum of 10 steps shall be verified.
- 3.4. It shall be demonstrated that the following parameters can be independently adjusted for each step:
 - i. Platen speed
 - ii. Head speed
 - iii. Pressure/downforce
 - iv. Slurry flow rate
 - v. Conditioning parameters (speed, duration, and oscillation if available)
- 3.5. Proper operation of the data logging/recording function shall be verified.

4. Axial Motion and Mechanical Function Tests

- 4.1. **Platen:**
 - i. CW and CCW rotation shall be tested.
 - ii. The operational range of 30–100 rpm shall be verified.
- 4.2. **Head:**
 - i. Operation within the 20–100 rpm range shall be verified.
 - ii. Up/down motion of the head shall be tested.
- 4.3. **Sweeping/Oscillation:**
 - i. The lateral oscillation/sweeping motion shall be activated and checked for proper operation.
- 4.4. The conditioning system shall be tested.

5. Slurry Delivery and DI Rinse Tests

- 5.1. Start/stop operation of slurry flow and flow rate adjustment shall be tested.
- 5.2. Slurry lines shall be checked for leaks.

5.3. Proper function of the DI water rinse system shall be verified.

5.4. Stable slurry flow shall be tested at a minimum of two different flow-rate settings.

6. Safety Tests

6.1. System shutdown upon opening the cover/protective enclosure (interlock function) shall be verified.

6.2. Emergency stop operation shall be tested.

6.3. Overload protection shall be tested according to the manufacturer's procedure.

6.4. Chemical resistance of internal surfaces shall be verified based on manufacturer documentation.

7. Performance Test (Polishing Test)

(This step verifies system capability; Ra values are not enforced as absolute performance guarantees.)

7.1. A short CMP process shall be performed on a copper or silicon sample.

7.2. During the process, the system shall demonstrate:

- i. Stable rpm
- ii. Stable slurry flow
- iii. Stable pressure
- iv. Proper sweeping motion

7.3. Surface roughness (Ra) shall be measured using AFM, profilometer, or optical interferometer.

i. Achieving values close to the target Ra specifications shall be considered sufficient (≤ 5 nm for Cu, ≤ 2 nm for Si/SiO₂, ≤ 20 nm for polymers).

(This test verifies system capability; process optimization is not required for acceptance.)

8. Training Verification

Training provided by the manufacturer shall cover the following topics:

- 8.1. System startup and shutdown
- 8.2. Recipe creation
- 8.3. Pad replacement
- 8.4. Carrier installation and removal
- 8.5. Conditioning procedures
- 8.6. Slurry system operation
- 8.7. Cleaning and daily maintenance
- 8.8. Safety procedures

9. Acceptance Criteria and Reporting

The system shall be considered accepted when the following conditions are met:

- 9.1. Conformity with the technical specification is verified.
- 9.2. All mechanical and electronic function tests are successfully completed.
- 9.3. Software and recipe management functions operate correctly.
- 9.4. Safety tests are successfully completed.
- 9.5. Slurry and DI rinse systems function properly.
- 9.6. Performance test results are satisfactory.
- 9.7. Operator training is successfully completed.
- 9.8. All documentation has been delivered.

A signed Acceptance Test Report (ATR) shall be provided by the supplier.

10. Rejection Criteria

Acceptance shall not be granted if any of the following conditions occur:

- i. Presence of technical defects in the system
- ii. Non-functioning system features
- iii. Failure of safety tests
- iv. Missing documentation or missing accessories
- v. Major control or stability issues during the performance test

(The supplier shall resolve deficiencies, after which the acceptance test will be repeated.)