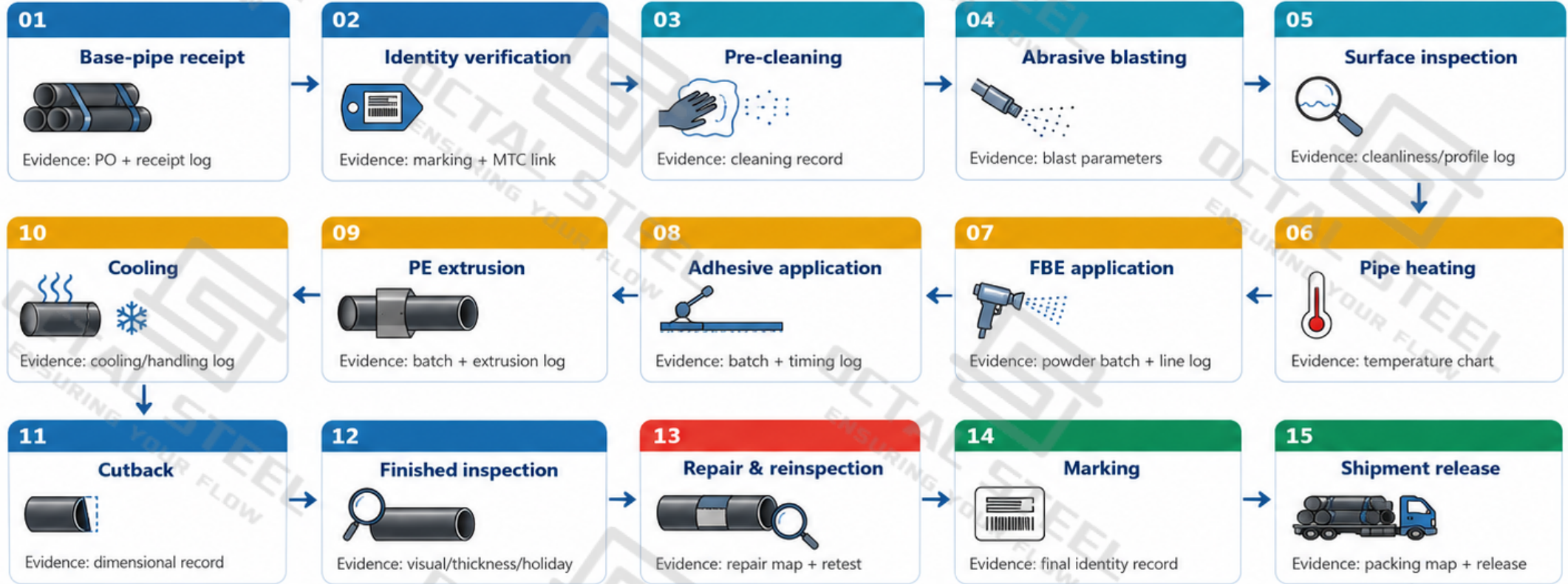


Inspection and Release Flow

A record-led sequence from incoming pipe identity to shipment release

RELEASE PRINCIPLE The coating is released through linked process evidence, finished-pipe inspection and approved repair closure — not by external appearance alone.



ITP GATES AND RECORD STATUS
















- R Review point**
Documents/results reviewed before release.
- W Witness point**
Activity may proceed when the notified witness is absent only if the approved ITP permits.
- H Hold point**
Activity does not proceed until the defined release is recorded.
- PR Production record**
Process evidence retained and linked to pipe number, lot, shift or batch.

R/W/H allocation, notification periods and responsible parties shall be defined only by the approved project ITP.

This generic checklist does not assign responsibility.

Surface Preparation and Process Control

Inspection evidence required before and during coating application

Inspection Point	Inspection Method	Controlled Variable	Acceptance Source	Required Record	Risk Controlled
 pipe identity	Visual check + marking	Pipe ID, heat/lot, spec	Approved PO, coating specification	PO + receipt log	Wrong material / traceability loss
 oil and grease removal	Solvent wipe or equivalent	Oil/grease absence	Coating specification, ISO 8501-1	Cleaning record	Poor adhesion / holidays
 visual cleanliness	Visual comparison	Cleanliness grade (Sa 2½ commonly specified)*	ISO 8501-1, coating specification, approved APS/PQT/ITP	Blast record / visual log	Contamination / coating failure
 surface profile	Profile comparator or replica tape	Profile depth range (µm)	ISO 8503 series, coating specification, approved APS/PQT/ITP	Profile measurement log	Inadequate adhesion
 dust contamination	ISO 8502-3 (tape test)	Dust level	ISO 8502-3, coating specification	Dust test record	Holidays / inclusions
 soluble salts where specified	ISO 8502-6 (Bresle method)	Soluble salt level	ISO 8502-6, coating specification (when required)	Bresle test record	Blistering / underfilm corrosion
 steel-surface defects	Visual inspection	Defects, gouges, weld repair	Coating specification, approved APS/PQT/ITP	Repair & inspection log	Coating damage / reject
 pipe surface temperature	Contact thermometer or IR	Surface temperature, humidity	ISO 8502-4, coating specification	Temperature/humidity log	Condensation / poor adhesion
 FBE batch	Visual check + label	Batch number, expiry	Material supplier data, ISO 21809-1:2018	FBE batch record	Non-conforming material
 adhesive batch	Visual check + label	Batch number, expiry	Material supplier data, DIN 30670-1:2024-01	Adhesive batch record	Non-conforming material
 PE batch	Visual check + label	Batch number, grade	Material supplier data, CSA Z245.21:22	PE batch record	Non-conforming material
 application timing	Process log / timer	Max time to coating application	Coating specification, approved ITP	Timing log	Flash rust / adhesion loss
 extrusion temperature	Machine readout	Melt temperature (°C)	Coating specification, approved APS/PQT/ITP	Extrusion log	Poor fusion / weak bond
 line speed	Machine readout	Line speed (m/min)	Coating specification, approved APS/PQT/ITP	Line speed log	Inadequate coating build
 cooling condition	Visual check + log	Watch bump, flow, spray coverage	Coating specification, approved APS/PQT/ITP	Cooling log	Overheating / deformation



KEY SURFACE CONDITIONS

- ✔ **Cleanliness:** Sa 2½ is a commonly specified preparation grade for visual cleanliness. Note: **The approved project specification governs.**
- ✔ **Profile:** Uniform profile within specified range for effective mechanical key.
- ✔ **Dust:** Acceptable per ISO 8502-3 (tape test) to prevent holidays and inclusions.
- ✔ **Salts:** Meet specified limits where required (ISO 8502-6) to reduce blistering risk.
- ✔ **Flash Rust Control:** Apply coating within the specified time window.



RELEASE REMINDER

Process control and traceable records are stronger acceptance evidence than appearance alone.



Identity



Cleaning



Blasting / Profile



Temperature



Powder Batch



Adhesive Batch



PE Batch












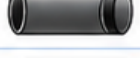


Line Speed



Cooling

Finished Coating Inspection

Pipe-by-pipe release checks after coating, cutback and handling

Inspection	Method	Frequency Source	Confirmation	Release Record
 visual examination	Visual under adequate light. Inspect full circumference.	ISO 21809-1:2018, Clause 10.2 Project specification	Coating integrity and surface condition acceptable.	Visual record
 individual layer thickness where measurable	Destructive micrometer or magnetic gauge.	ISO 21809-1:2018, 10.3.2 Approved ITP	Each layer meets minimum specified thickness.	Thickness report
 total coating thickness	Non-destructive electronic thickness gauge.	ISO 21809-1:2018, 10.3.3 Approved ITP	Total coating meets the required coating class.	Thickness report
 thickness over longitudinal or spiral weld areas	Non-destructive thickness measurement across weld.	ISO 21809-1:2018, 10.3.4 Project specification	Weld-area thickness meets minimum requirements.	Thickness report
 coating continuity	Visual inspection (holidays, pinholes, voids).	ISO 21809-1:2018, 10.2 Approved ITP	Coating is continuous and free from visible defects.	Visual record
 holiday detection	Low voltage spark test with wet sponge.	ISO 21809-1:2018, 10.4 Approved ITP	No holidays; electrical continuity of coating.	Holiday report
 cutback length	Measure from pipe end to coating edge.	ISO 21809-1:2018, 10.5.2 Project specification	Cutback length as per requirement.	Cutback record
 cutback tolerance	Measure cutback tolerance.	ISO 21809-1:2018, 10.5.2 Project specification	Cutback tolerance within specified limit.	Cutback record
 coating edge condition	Visual inspection of coating edge and taper.	ISO 21809-1:2018, 10.5.3 Approved ITP	Coating edge clean and smooth; no lifting.	Visual record
 exposed steel condition	Visual inspection of exposed steel in cutback.	ISO 21809-1:2018, 10.5.3 Approved ITP	Exposed steel clean, dry, and free from damage.	Visual record
 final marking	Verify marking content and legibility.	ISO 21809-1:2018, 7.1 Project specification	Identity and traceability confirmed.	Marking check
 handling damage	Visual inspection after cutback and handling/transport.	ISO 21809-1:2018, 10.2 Approved ITP	No damage from handling or transport.	Handling-release log



Do not use a universal holiday-test voltage.





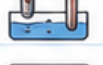







Voltage selection shall follow the applicable standard, coating thickness and approved procedure.



Weld-area thickness checks are particularly important for HFW/ERW, LSAW and SSAW base pipes.

Qualification and Destructive Tests

How to distinguish qualification, routine production and release-related testing

Test Item	Main Purpose	Typical Category	Governing Basis	Evidence / Record	
 <p>MATERIAL QUALIFICATION TESTS</p>	 <p>Peel or bond-strength test</p>	Confirms adhesion between coating layers and to steel.	Material Qualification	Governing standard (e.g., ISO 21809-1/-2)	Qg report, test results, material qualification file
	 <p>Impact resistance</p>	Verifies coating toughness and ability to resist mechanical impact.	Material Qualification	Governing standard	Qg report, test results
	 <p>Indentation resistance</p>	Assesses resistance to deformation and stress concentration.	Material Qualification	Governing standard	Qg report, test results
	 <p>Cathodic disbondment</p>	Confirms resistance to disbondment under cathodic protection.	Material Qualification	Governing standard	Qg report, test results
	 <p>Elongation</p>	Confirms coating flexibility and ductility.	Material Qualification	Governing standard	Qg report, test results
	 <p>Thermal ageing (where required)</p>	Evaluates performance after exposure to elevated temperature.	Material Qualification	Governing standard / project specification	Qg report, test results, exposure conditions
	 <p>Hot-water immersion (where required)</p>	Evaluates water absorption and interface stability.	Material Qualification	Governing standard / project specification	Qg report, test results, exposure conditions
	 <p>Material compatibility</p>	Confirms compatibility between coating, adhesive and substrate.	Material Qualification	Governing standard / project specification	Qg report, test results, compatibility matrix
 <p>PROCEDURE QUALIFICATION TESTS</p>	 <p>Procedure Qualification Test (PQT)</p>	Verifies that the application procedure consistently produces conforming coating performance.	Procedure Qualification	ISO 21809-2 Clause 13 / Annex D (or governing standard)	PQT report, parameters, operator/equipment qualifications
 <p>ROUTINE PRODUCTION TESTS</p>	 <p>Routine production tests (in-line QC)</p>	Monitors key process parameters and in-process coating quality.	Routine Production	Governing standard / approved PQT / project ITP	QC records, control charts, process parameter logs
 <p>LOT OR SHIFT TESTS</p>	 <p>Lot or shift tests</p>	Confirms coating performance for each lot or shift of production.	Lot / Shift Tests	Governing standard / approved PQT / project ITP	Batch/shift test records, acceptance logs
 <p>FINAL PIPE-BY-PIPE INSPECTION</p>	 <p>Final pipe-by-pipe inspection</p>	Verifies each finished pipe meets release condition.	Final Inspection	Governing standard / approved PQT / project ITP	Inspection records, release decision

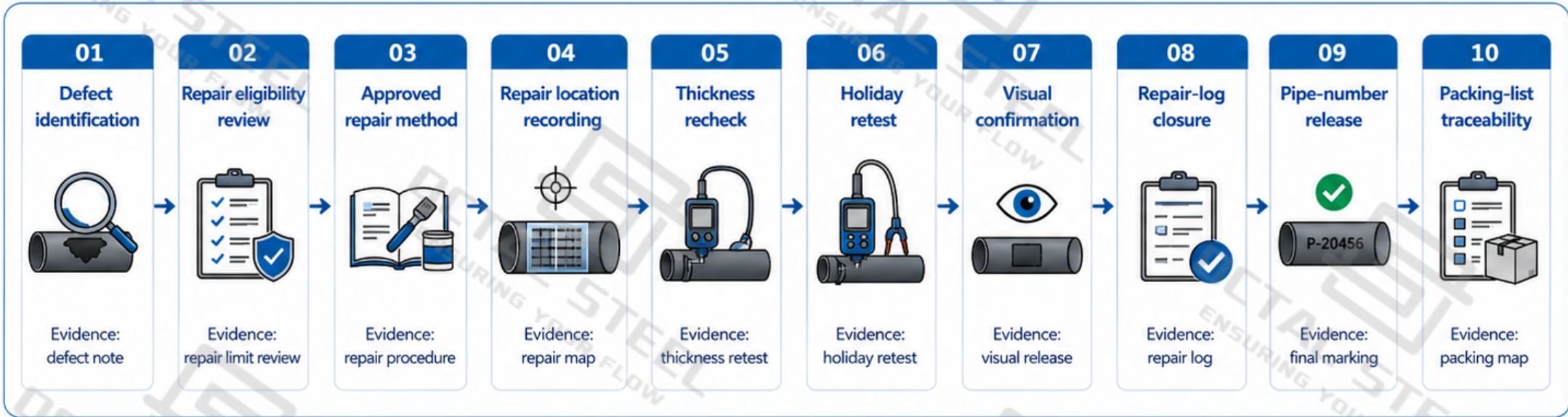
IMPORTANT NOTE: Destructive or laboratory tests are not automatically performed on every finished pipe. | **Frequency and acceptance criteria:** To be defined by the governing standard, approved PQT and project ITP.

HOW THE CATEGORIES DIFFER



Repair, Reinspection and Final Release

Closing coating defects through traceable repair evidence and linked shipment records



Record	Linked Identity	Reviewed By	Release Status
repair log	pipe number + repair location	manufacturer QC	closed
retest results	pipe number + repair location	coating inspector	accepted
final visual inspection	pipe number + repair location	coating inspector	accepted
final marking record	pipe number + marking details	manufacturer QC	closed
packing-list pipe map	pipe number + bundle/pack ID	project review per ITP	accepted
shipment release dossier	pipe number + all records	project review per ITP	released
third-party release when specified	pipe number + all records	third-party inspector when specified	project-defined approval

Only approved repairs that are rechecked and traceably linked to the pipe number may proceed to shipment release.

Maximum repair size, repair material system and acceptance limits shall follow the governing standard, approved procedure and project specification.