CONBYTH Quality Inspection Procedure for PPGL and PPGI

1. Purpose and Scope

This procedure applies to the full-process quality inspection and control of color-coated steel sheet and strip produced by the coil coating process using hot-dip galvanized or Galvalume substrates. It ensures that product appearance, dimensional accuracy, coating performance and durability meet the requirements of standards such as GB/T 12754 and customer specifications.

2. Applicable Standards

Standard No.	Title	Description
GB/T 12754-2019	Color-coated steel sheets and strips	Product standard – technical requirements, inspection rules, packaging and marking
GB/T 13448-2019	Test methods for color-coated steel sheets and strips	Coating performance test methods
YB/T 4456-2022	Color-coated steel sheets and strips for building	Industry standard for construction use
GB/T 9286	Paints and varnishes – Cross-cut test	Adhesion test method
GB/T 1732	Determination of impact resistance of film	Impact test method

3. Quality Inspection Procedure (Five-Stage Control)

Stage 1 – Incoming Raw Material Inspection

- **Substrate inspection**: Check surface quality of hot-dip galvanized / Galvalume substrate (no severe rust, scratches, oil stains, uneven spangle). Measure thickness and width.

- **Paint inspection**: Verify type, colour and batch number against production order; check appearance (uniform, no sedimentation, no skinning).
- **Batch sampling**: Random sampling per specified ratio; non-conforming materials shall be rejected.

Stage 2 – Pre-production Process Check

- **Cleaning section**: Verify bath temperature, concentration and pH value meet process requirements.
- **Pretreatment (chromate / Cr-free)**: Check uniform application, continuous and defect-free conversion layer.
- **Coating parameters**: Confirm viscosity of primer and topcoat, roll pressure, line speed, etc.
- **Curing oven calibration**: Check that set temperature profile matches actual readings in each zone.

Stage 3 – In-process Inspection (Online)

Inspection Item	Frequency	Method
Coating thickness	At least 3–5 points per coil	Magnetic thickness gauge
Gloss	Once every 2 hours	Glossmeter (60°)
Colour difference	At start & end of each coil	Colorimeter
Surface appearance	Continuous visual inspection	Visual + auxiliary light
T-bend	At least twice per shift	T-bend tester
Pencil hardness	At least once per shift	Pencil hardness tester
MEK rub resistance	At least once per shift	MEK rub tester

Any non-conformity found during online inspection shall be immediately marked, recorded and fed back; stop production if necessary.

Stage 4 – Finished Product (Off-line) Inspection

- **Appearance**: Colour uniformity, gloss consistency, surface defects (scratches, pinholes, blisters, misses, craters, etc.)
- **Dimensional accuracy**: Width tolerance, crescent (sickle) shape, flatness
- **Coating thickness**: Total and individual coat thickness on both sides
- **Adhesion**: Cross-cut test or pull-off test

- **Flexibility**: T-bend test, reverse impact test, cupping test
- **Hardness**: Pencil hardness test
- **Solvent resistance**: MEK rub test
- **Corrosion resistance**: Neutral salt spray test (NSS) as per grade
- **Weathering resistance**: UV accelerated ageing or natural exposure (as required)

Stage 5 – Packaging, Marking and Warehouse Inspection

- **Packaging check**: Inner wrapping (moisture-proof paper/film) intact; outer steel strapping tight; edge protectors correctly installed, no loosening.
- **Marking verification**: Label information (product name, grade, dimensions, colour, batch number, net weight, production date) matches physical coil and quality certificate.
- **Warehouse re-inspection**: Random re-inspection per batch; non-conforming product handled according to non-conformance procedure.

4. Key Inspection Items and Acceptance Criteria

4.1 Appearance

Item	Acceptance Criteria	Method
Colour	Matches reference panel, ΔE ≤ 1.5–2.0 (as agreed)	Colorimeter (D65)
Gloss	Within agreed tolerance of reference value	60° glossmeter
Surface defects	No misses, scratches, blisters, pinholes, craters, orange peel, peeling, embedded foreign matter	Visual inspection

4.2 Dimensions and Shape

Item	Acceptance Criteria	Method
Width	Nominal width ± tolerance (typically 0 / +3 mm or ±2 mm)	Steel tape / width gauge
Thickness	Substrate + coating; tolerance per standard	Micrometer / thickness gauge
Crescent (sickle)	≤ 4 mm per 2 m (or as per standard)	Straight edge + feeler gauge
Flatness	≤ specified value	Feeler gauge

4.3 Coating Performance

Item	Acceptance Criteria	Method	Standard
Coating thickness	Topcoat 10–30 µm, primer 4–22 µm, uniform	Magnetic gauge (5 point average)	GB/T 13448
Adhesion (cross-cut)	Rating 0 or 1	Cross-cut tool + tape	GB/T 9286
Pencil hardness	≥ F–HB (architectural) or ≥ H (appliance); no scratch	Pencil hardness (45°, 7.5 N)	GB/T 13448
T-bend	≤ 3T for architectural grade; no cracking / peeling	T-bend tester + magnifier	GB/T 13448
Reverse impact	9 J or 12 J; no cracking / peeling	Impact tester	GB/T 1732
Cupping	No cracking / peeling as per grade	Cupping tester	GB/T 13448
MEK rub	No paint removal / exposure of substrate after 50–100 rubs	MEK rub tester	GB/T 13448

4.4 Corrosion and Weathering Resistance

Item	Acceptance Criteria	Method	Standard
Neutral salt spray (NSS)	Conventional polyester ≥240–500 h; high-durability / PVDF ≥1000 h; no blistering / creep ≤2 mm from scribe	Salt spray chamber	GB/T 13448
Humidity resistance	≥500 h, no blistering	Constant climate chamber	GB/T 13448
UV ageing	ΔE ≤ 3 after 1000 h; chalking rating ≤1	QUV weatherometer	GB/T 13448

5. Common Defects – Identification and Disposition

Defect	Description	Probable Cause	Disposition
Miss / skip	Local area without coating	Low roll pressure, poor strip shape, water or dirt on strip	Rework or scrap
Scratch	Continuous or intermittent line mark	Foreign matter or damage on line roller	Light: repair; severe: scrap
Pinhole / blister	Small raised dots or cavities	Contaminated paint, poor rinsing, improper oven temperature	Scrap or downgrade
Colour	Mismatch with	Uneven coating thickness, batch	Adjust and

Defect	Description	Probable Cause	Disposition
difference	reference panel	variation, oven temperature fluctuation	re-produce
Poor adhesion	Coating peels easily	Poor pretreatment, incorrect curing	Re-inspect batch; adjust process
Low pencil hardness	Coating easily scratched	Low oven temperature, under-cured, excessive thickness	Adjust oven and coating parameters
MEK failure	Paint removal after rub	Insufficient curing, poor cleaning before coating	Adjust curing process
Delamination	Local coating detachment	Improper / uneven pretreatment	Reject; adjust pretreatment

6. Quality Records and Reports

The quality inspector shall maintain the following records:

1. **Raw material inspection records**: Substrate batch No., thickness, surface quality; paint batch No., viscosity, colour.
2. **In-process inspection records**: Coating thickness, gloss, colour difference, T-bend, hardness, MEK rub per coil / per shift.
3. **Finished product test report**: Final inspection data per batch, including quality certificate.
4. **Non-conformance handling records**: Non-conforming item, quantity, disposition, corrective action and verification.
5. **Instrument calibration records**: Regular calibration and maintenance of all testing equipment.

Special note: GB/T 12754 and GB/T 13448 are under revision (plan numbers 20260884-T-605 and 20161849-T-605). Quality inspectors shall monitor the release of new editions and update the inspection basis accordingly.