Colour Acceptance Protocol

Grading material colour with a grey scale — because ΔE alone is not a pass/fail answer

Version 1.0 · September 2026 · Print freely. No email required.

Why this document exists

Two people can look at the same two panels and disagree. One measures ΔE 1.4 and signs it off. The other says the colours are clearly different.

Both can be right. A spectrophotometer reads reflected light, and on a textured surface — PC film, woven polyester, brushed hardware — that reflection changes with angle, graining and surface sheen. The instrument reports a small number. The eye reports a real difference.

This is the protocol we use instead. It puts a standardised scale under the visual judgement, so the result is defensible without a contract dispute.

1 · The instrument problem, stated precisely

Method	What it measures	Where it fails
Visual assessment only	The human eye, under whatever light is in the room	Two inspectors, two answers. No record of *how much* difference. Cannot be defended to a customer or pushed back on with a supplier.
Spectrophotometer only	Reflected light across the spectrum, converted to ΔE	**Textured surfaces scatter and reflect unpredictably.** Reading shifts with angle and grain direction. Result: ΔE well under 2 on a pair the eye rejects without hesitation.
Grey scale grading (this protocol)	The magnitude of a visible colour difference, judged against a certified reference	Requires a proper viewing setup and a calibrated grey scale. Slower per sample than pressing a button — and it is the only one of the three that answers the question that actually matters.

The number that started all of this

ΔE < 2 is widely treated as "imperceptible" or "acceptable". On smooth, uniform panels, that is often fair.

On textured luggage materials it is not reliable. We have measured pairs well inside that threshold that any experienced inspector would reject on sight. The number said pass. The eye said no. The eye was right.

2 · The scale

Assessment uses a certified grey scale for evaluating change in colour, to the following standards:

Standard	Scope
`GB/T 250`	National standard (China) — grey scale for assessing change in colour
`ISO 105 A02`	International equivalent
`AATCC EP1`	US equivalent

The scale is a 5-step / 9-grade system. Grade 5 is no visible difference; grade 1 is a large difference. Half grades sit between the whole ones.

left = no visible difference → right = large difference

Acceptance criterion for material colour

Grade 4 or better. Anything below grade 4 is rejected.

In CIELAB terms, this grade broadly corresponds to a ΔE of roughly 1.7 — but treat that as an indicative reference, not an equivalence. The grey scale grades the *perceived* size of a difference; ΔE computes a distance in colour space. They are related, not identical, and the scale is the one that matches what a customer ultimately sees.

3 · Procedure

1. **Viewing conditions.** North-facing daylight or a D65 light booth. No coloured walls or surfaces within the viewing area. No direct sunlight.
2. **Sample preparation.** Material at least 50 × 50 mm, flat and free of creases. Where grain or directionality exists, **orient both the sample and the reference the same way**.
3. **Background.** Place both on a neutral mid-grey backing — not white, not the packing material.
4. **Grade the pair.** Place sample and approved reference side by side, edge touching, and compare against the grey scale pairs. Record the grade that the difference most closely matches.
5. **Confirm with instrumentation.** Take the spectrophotometer reading as a **secondary** record. Use it to track consistency between batches, not as the deciding vote.
6. **Judge.** Grade ≥ 4 → accept. Grade < 4 → reject, raise with the supplier, and quote the grade in the correspondence.
7. **Record and retain.** Log every result. Retain retained samples per batch — a colour dispute six months later is settled by the physical retained sample, not by a photograph.

Order matters

Grade first, then instrument. If you measure first, the number anchors the judgement — you see what the instrument told you to see. That is how ΔE 1.4 gets signed off on a pair that should have been rejected.

4 · Records

Suggested fields. Adjust to your own system, but keep the grade and the retained sample — those two are what settle a dispute.

Field	Example	Note
Batch / lot no.	PO-2418-LOT3	Tie to purchase order
Material	1680D polyester, black	Include colour name
Supplier	—	—
Approved reference	Ref. #A-118, signed 2026-03-04	Must be a signed physical sample
Grey scale grade	4	Primary criterion
ΔE (secondary)	1.4	Recorded for trend tracking only
Light source	D65 / north daylight	Record conditions
Inspector	—	Accountability
Result	Accepted / Rejected	—
Retained sample	Bin 12, drawer 4	Physical location

5 · Where this fits in production

Colour acceptance is not a final-inspection activity. By then the material is already cut and sewn.

Stage	Action
Pre-production	Signed colour reference agreed and retained by both parties. This is the document everything else is judged against.
Material in	Grade every incoming lot against the reference. Reject at the door.
In-process	Grade on a sampling basis, particularly after any change of supplier, lot or dye run.
Final	Verify against the retained reference under the same viewing conditions. Do not use photographs.

A note on photographs

A photograph cannot settle a colour dispute. Camera white balance, screen calibration and compression all shift colour, and both parties will see a different image. Use photographs to *document that a check happened*. Use the physical retained sample and the recorded grade to *settle the question*.

6 · Pre-shipment checklist

☐ Signed colour reference on file, dated, from both parties

☐ Grey scale current and undamaged

☐ Viewing area free of coloured surfaces; D65 or north daylight confirmed

☐ Every incoming lot graded and logged

☐ Grade recorded as the primary criterion; ΔE as secondary

☐ Retained samples labelled and stored per lot

☐ Rejections communicated in writing, quoting the grade

☐ Rejected lots physically segregated — not returned to the line

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The method described is our own working practice, developed over 30 years in luggage manufacturing. Standards referenced — GB/T 250, ISO 105 A02, AATCC EP1 — are published industry standards and are not our property. Grade-to-ΔE relationships are indicative references, not equivalences; always defer to the certified scale.