

Appearance Defect Inspection Standard

For PDLC / PNLC Smart Film Products

1. Scope

This standard defines the classification, dimensional limits, and acceptance criteria for appearance defects of CX SMART FILM PDLC/PNLC smart film products. It applies to outgoing quality inspection, incoming material inspection, and customer quality acceptance as the unified basis for appearance quality judgment.

2. Inspection Conditions

- Environment: Natural light or 40W fluorescent lamp, minimum illuminance 800 Lux
- Viewing distance: 1 meter between inspector and film surface
- Viewing angle: Perpendicular to the film surface (within $\pm 30^\circ$)
- Inspector requirement: Naked or corrected visual acuity of 1.0 or above

3. Defect Acceptance Criteria

Defect Type	Size & Description	Acceptance Criterion
Spots, Bubbles, Point Inclusions	Diameter ≤ 0.5 mm	Acceptable
	$0.5\text{ mm} < \text{Diameter} \leq 1.0$ mm	Dense clustering not allowed
	$1.0\text{ mm} < \text{Diameter} \leq 3.0$ mm	$S \leq 1\text{ m}^2$: max. 1.0 defect $S > 1\text{ m}^2$: max. $(1.0 \times S)$ defects
	Diameter > 3.0 mm	Not allowed
Scratches, Linear Inclusions	Length ≤ 30 mm AND Width ≤ 0.2 mm	Acceptable
	Length > 30 mm AND Width > 0.2 mm	Max. $(2.0 \times S)$ defects
Color Variation	Visible color difference at 1m distance (normal view)	Not allowed
	Slight color variation at oblique angles ($<30^\circ$ or $>150^\circ$)	Acceptable
Cloudy / Fibrous Patterns	Patterns invisible at 1m distance	Not counted
	Patterns visible at 1m distance	Max. $(1.0 \times S)$ defects
	Densely clustered visible patterns at 1m	Not allowed

4. Definitions & Notes

- (1) S represents the area of the smart film panel, measured in square meters (m²).
- (2) "Dense clustering" is defined as more than 5 defects within a circular area of 200mm diameter.
- (3) "Breakdown spot" refers to a point-type burn defect caused by unpredictable local short-circuit overcurrent in the dielectric layer (PDLC material) under applied electric field.
- (4) The allowable defect count is calculated by multiplying the coefficient by S, and rounded to the nearest integer per GB/T 8170 standard.