

DSS-E.05.02 | Environmental Exposure / Weathering

Oxidation Darkening of Films

Photo-degradation of films - oxidative crosslinking/soot capture within organic residues; grey→brown dark veil, loss of specular “snap,” wetting anomalies; typically SC-0 for film-only, localized SC-1 where long dwell yields very shallow micro-texture

Diagnosis summary

Oxidation darkening of films is an appearance change on glass caused by oxidative aging of organic surface residues (maintenance detergents/additives, HVAC/kitchen aerosols, traffic-related organics) and/or particulate entrainment (soot/oxyde fines) within those films. It presents as a neutral grey to brown dark veil, often patchy and aligned with wipe paths or airflow cones, with wetting anomalies at boundaries.

Field identification cues

- Surface-catch class (MSRT)
- Generally SC-0 (aged film on top).
- Local SC-1 where long dwell entrained grit or led to incipient substrate micro-texture; SC-2 suggests misclassification-evaluate M.02 abrasion fields or Ch.03.03 mineral etching if matte persists after true film lift.
- Perform one light, non-marring pass on a small revealed test patch (substrate). Use polymer stylus if a functional coating is suspected. MSRT supports classification only.

Classification, severity and scope

- Assign CAT by visibility at acceptance geometry and MSRT after a true film-lift test. Depth values are indicative-field measurement not required.
- CAT-1 (Benign / non-relief): Thin dark veil; SC-0; angle/raking visible; clears fully on reveal patch. Indicative relief: 0-10 µm (optical film only).
- CAT-2 (Light): Persistent dark cast post-reveal with localized SC-1 (incipient substrate change or grit-imprinted micro-texture); limited standard-view impact. Indicative relief: ~10-40 µm.
- CAT-3 (Moderate): Wide-area darkening legible at standard distance, scattered SC-1; indicates long dwell/re-application cycles and oxidative aging. Indicative relief: ~40-120 µm.
- Reclassify when: Amber/yellow hue dominates tied to UV → consider E.05.01 UV-browning; oily neutral film with strong wetting anomalies → R.04.03 HVAC oil / R.04.04 kitchen grease; white/grey crystalline.

Distinguishing criteria

- vs. Soot/particulate film (E.01.03): Soot is dry/transferable and often black; oxidation-darkened films are bound, show wipe geometry, and can be brown/grey.
- vs. UV-browning (E.05.01): UV-browning trends amber/yellow; oxidation darkening trends neutral grey/brown, often pollutant-associated.
- vs. Nicotine/tar (R.04.05): Nicotine is amber/brown with odor and interior airflow mapping; oxidation darkening commonly includes exterior pollutant capture signatures.

Documentation and inspection

- Photo set (VIS): 12 / 36 / 72 in, normal + oblique; raking macros of film edges, color/density variations, and wetting anomalies; context frames of.
- MSRT result (substrate): After a small reveal test patch and true film-lift, perform one light, non-marring pass; record SC-class (SC-0/SC-1/SC-2).
- Forms: Pane ID; product family & surface numbering; worked surface Y/N; functional coating present on worked surface?

Safety / repairability boundary: Complete only the non-invasive reveal and inspection steps authorized by the controlling VIS guidance. Classification does not authorize restoration, establish acceptance, or override stop-work, coating, crack, integrity, access, chemical, fall-protection, or project-specific requirements.

Full DSS publication: use the catalog download. Web specification:

<https://a7df714357.nxcli.io/learning-center/resource-center/damage-specification-standards/dss-e-05-02-oxidation-darkening-of-films/>