

Anti-fog coating SOP: water contact angle on new, washed, abraded and aged coatings

Measure the water contact angle that anti-fog performance depends on, at a fixed early read time, on new coatings and after durability steps, then confirm with your fog test.

How to use this template. Fill in every field marked [] for your coatings. Gates must come from your own fog test results (section 4). Contact angle supports, and does not replace, the fog tests in EN 168, ISO 16321-1 or ANSI/ISEA Z87.1.

1. Scope

- Applies to: substrate [], coating [], product (lens, visor, film, lamp) [].
- Purpose: screen formulations, check lots, and track durability after washing, wiping, abrasion and ageing.
- Out of scope: time to fog, light transmission, haze and optical quality. Use your fog and optical tests.

2. Equipment and materials

- Dropometer with sessile drop setup and fast capture.
- Ultrapure water; flat witness samples coated with each lot.
- Wash, wipe and abrasion equipment per your protocol; humidity chamber for ageing.
- Record sheet (section 6).

3. Method lock (fill in once, then do not change)

Setting	Value	Setting	Value
Drop volume	[] μL	Read time	[] s after landing
Room temperature	[] $^{\circ}\text{C}$	Humidity	[] %
Spots per sample	[]	Cleaning before test	[]
Durability steps	[]	Reference	uncoated []

4. Set your gate (once per product and coating)

1. Measure samples that passed and failed your fog test, new and after durability steps.
2. Find the contact angle that separates them.
3. Set the gate below that value and review it after any formulation change.

Result	Contact angle	After durability	Action
Pass	at or below [] $^{\circ}$	within [] $^{\circ}$ of new	Release or send to fog test
Watch	[] to [] $^{\circ}$	rising	Check cure and cleaning
Fail	above [] $^{\circ}$	any	Hold; investigate the coating

5. Routine check

1. Reference.

Measure an uncoated sample and confirm it reads as before.

2. New.

Measure new coated samples at the locked read time.

3. Durability.

Run wash, wipe, abrasion or ageing steps by your protocol.

4. Remeasure.

Measure after each step on fresh spots.

5. Decide.

Compare with the gate and record the decision.

6. Confirm.

Send shortlisted samples for the fog test.

If readings look wrong: find the cause

What you see	Likely cause	What to do
Angle rises in storage	Organic contamination	Control storage; reclean and remeasure
Angle rises after washing	Coating wear or poor cure	Check cure; compare formulations
Readings vary by timing	Drop spreading	Lock read time
High indoors, low after UV	Photocatalytic surface	Measure under defined light
Low angle but fails fog test	Thickness or water uptake	Check coating thickness

6. Record sheet

Date	Sample	Coating / lot	Step	Angle (°)	Change from new	Decision	Operator

Background and help

Background: Cebeci and colleagues (Langmuir, 2006) reported anti-fog coatings spreading a drop below 5° within 0.5 s. Liu and colleagues (RSC Advances, 2023) saw an anti-fog coating hold near 5° after boiling and abrasion but rise to 13.8° after 50 days of ageing. No eye protection standard we found sets a contact angle limit. Related: EN 168, ISO 16321-1, ANSI/ISEA Z87.1, ISO 27448. Full use case: dropletlab.com/use-cases/anti-fog-anti-condensation-coating-validation/
 Questions about this SOP or the Dropometer: Abhi Bhandankar, abhandankar@dropletlab.com. Book a 15 minute demo at dropletlab.com.