

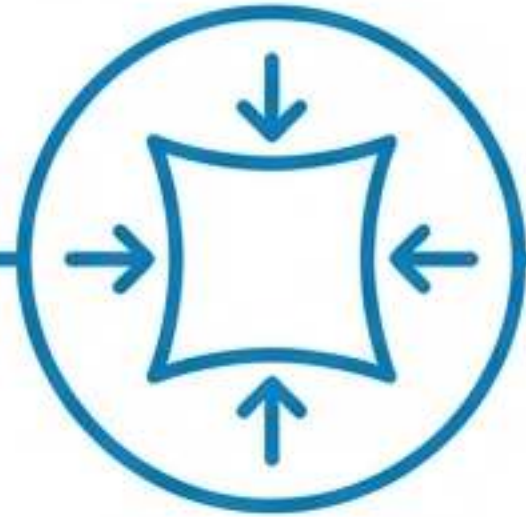


Screen Printing on Lycra – [Synthetic Fiber]



Precision Protocols for High-Stretch Elastane Blends

SUBSTRATE ANALYSIS: PROCESSING CONSTRAINTS



THERMAL SHRINKAGE

Elastane (polyether-polyurea copolymer) undergoes irreversible deformation.

Failure Point:
> 160°C (320°F)



DYE SUBLIMATION

Disperse dyes transition from solid to gas phase. Gas molecules diffuse into ink (Migration).

Transition Point:
> 145°C (293°F)

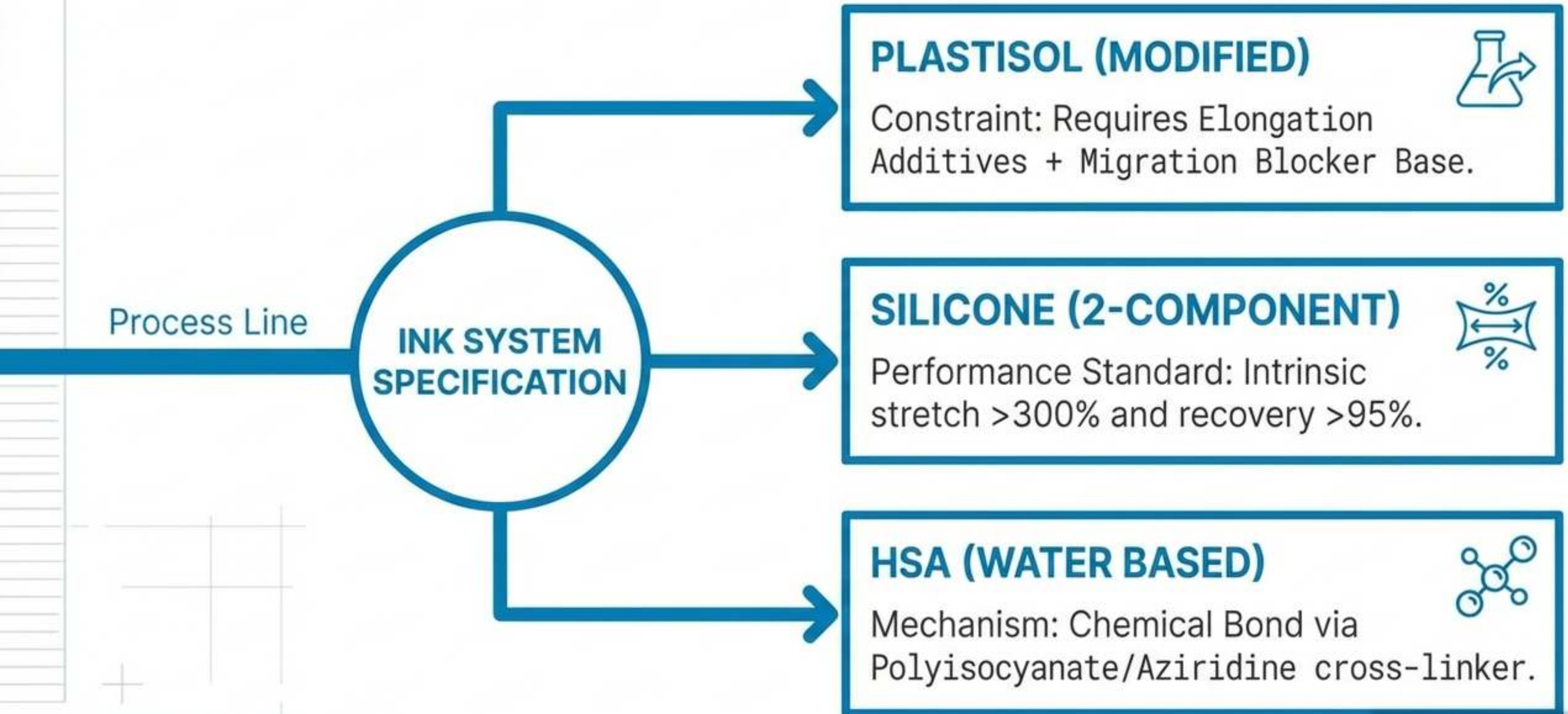


MODULUS MISMATCH

Standard ink rigidity causes cohesion failure (cracking) during extension.

Substrate: > 300% Stretch
Std Ink: < 50% Stretch

CHEMICAL SELECTION STRATEGY



PROTOCOL A: PLASTISOL MODIFICATION

LAYER 3: TOP COLORS

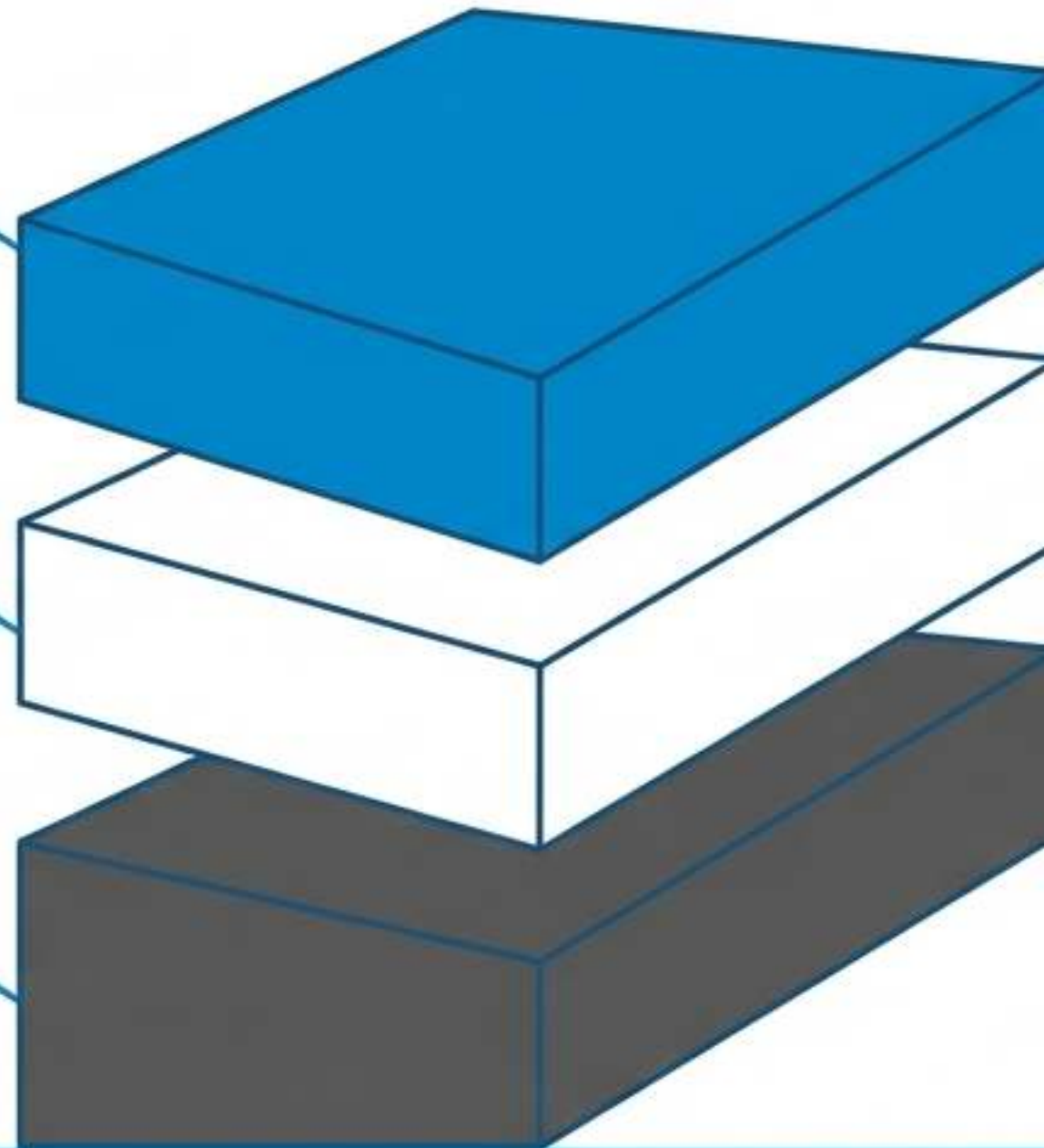
Formula: 10-20% Elongation
Additive by weight.

LAYER 2: HIGH-STRETCH WHITE UNDERBASE

Formula: 40-50% Elongation
Additive by weight.

LAYER 1: MIGRATION BLOCKER BASE

Gray/Black with Activated
Carbon. Absorbs sublimated dye.



PROCESS LINE

STRATEGY: MECHANICAL ELASTICITY VIA PLASTICIZERS

Achieves stretch through
plasticizer addition to plastisol
resin, reducing viscosity and
increasing flexibility.

Requires multi-layer
application for performance.

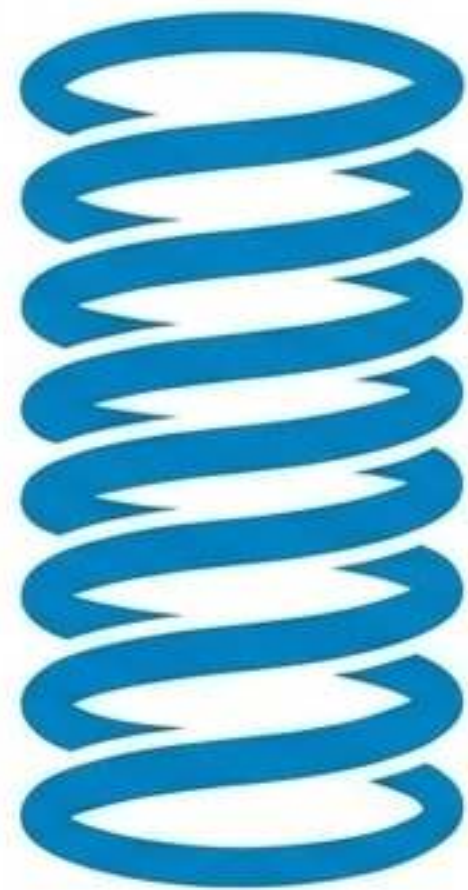
PROTOCOL B: TWO-COMPONENT SILICONE

MECHANICAL PERFORMANCE

Elasticity

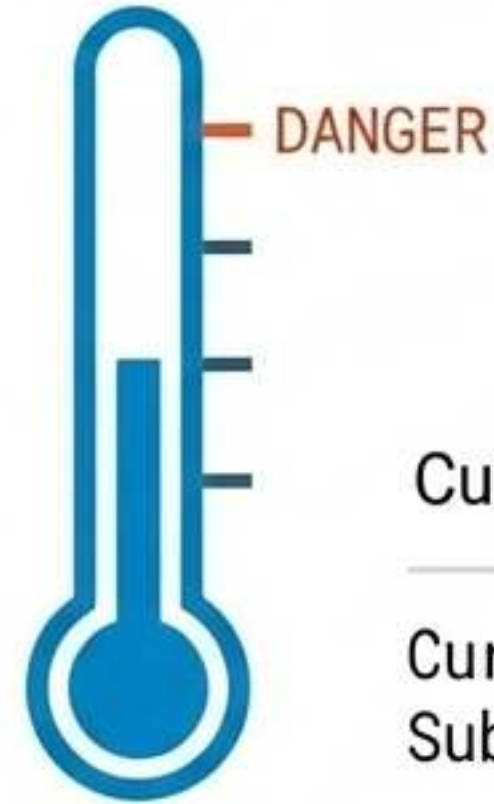
Performance wear standard.

Elongation: > 300%
Recovery: > 95%



THERMAL SAFETY

Thermal Advantage



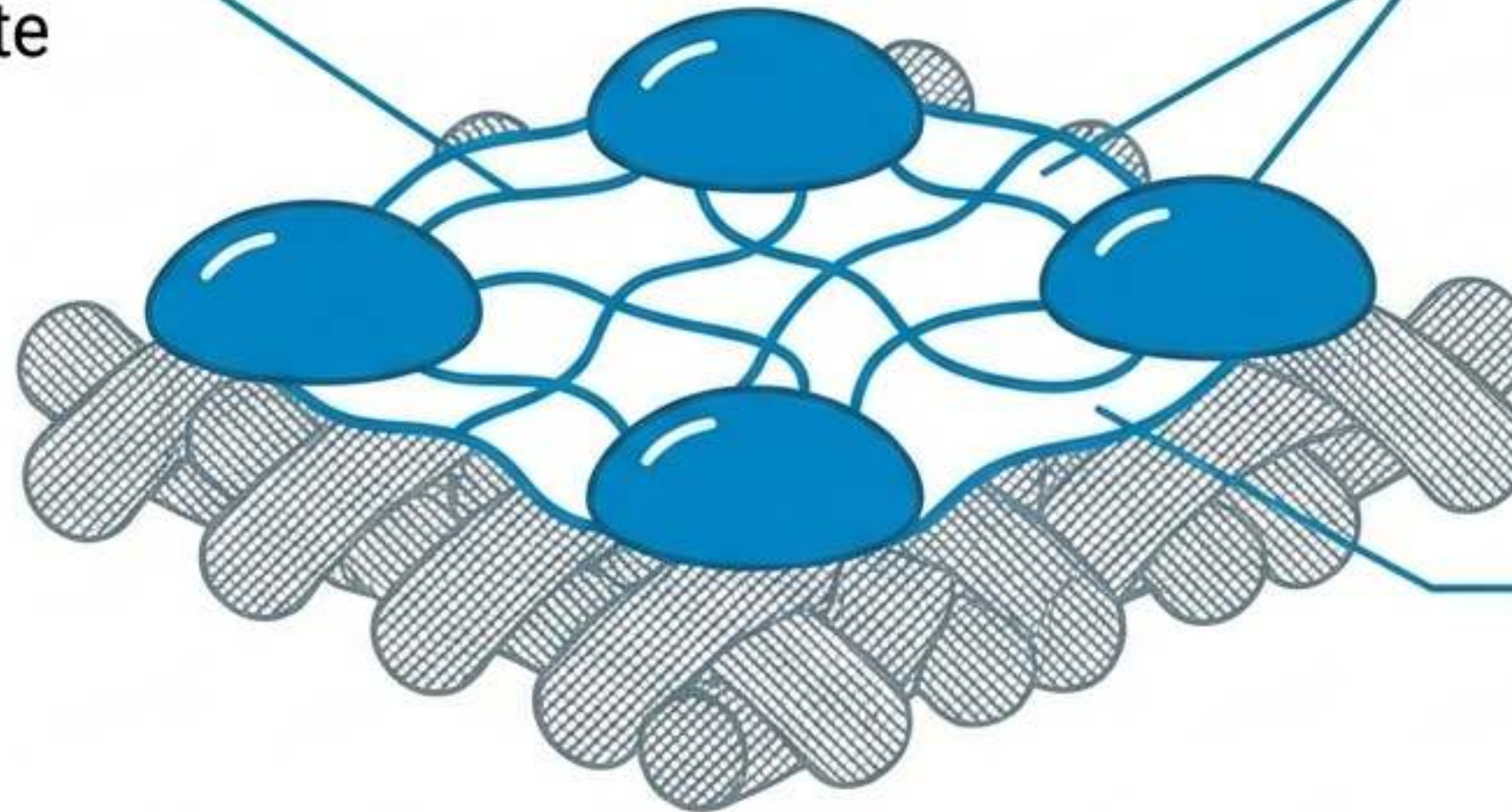
Cures below sublimation threshold.

Cure Temp: 120–130°C
Sublimation Risk: None (Inert)

Chemistry: Naturally migration-resistant. No heavy blocker required.

PROTOCOL C: HSA WATER-BASED

Cross-Linker:
1–3% Polyisocyanate
or Aziridine



Structure:
Polyurethane-like
film formation

Positioning:
Top-sitting film
(Preserves opacity
on dark synthetics)

PROCESS LINE

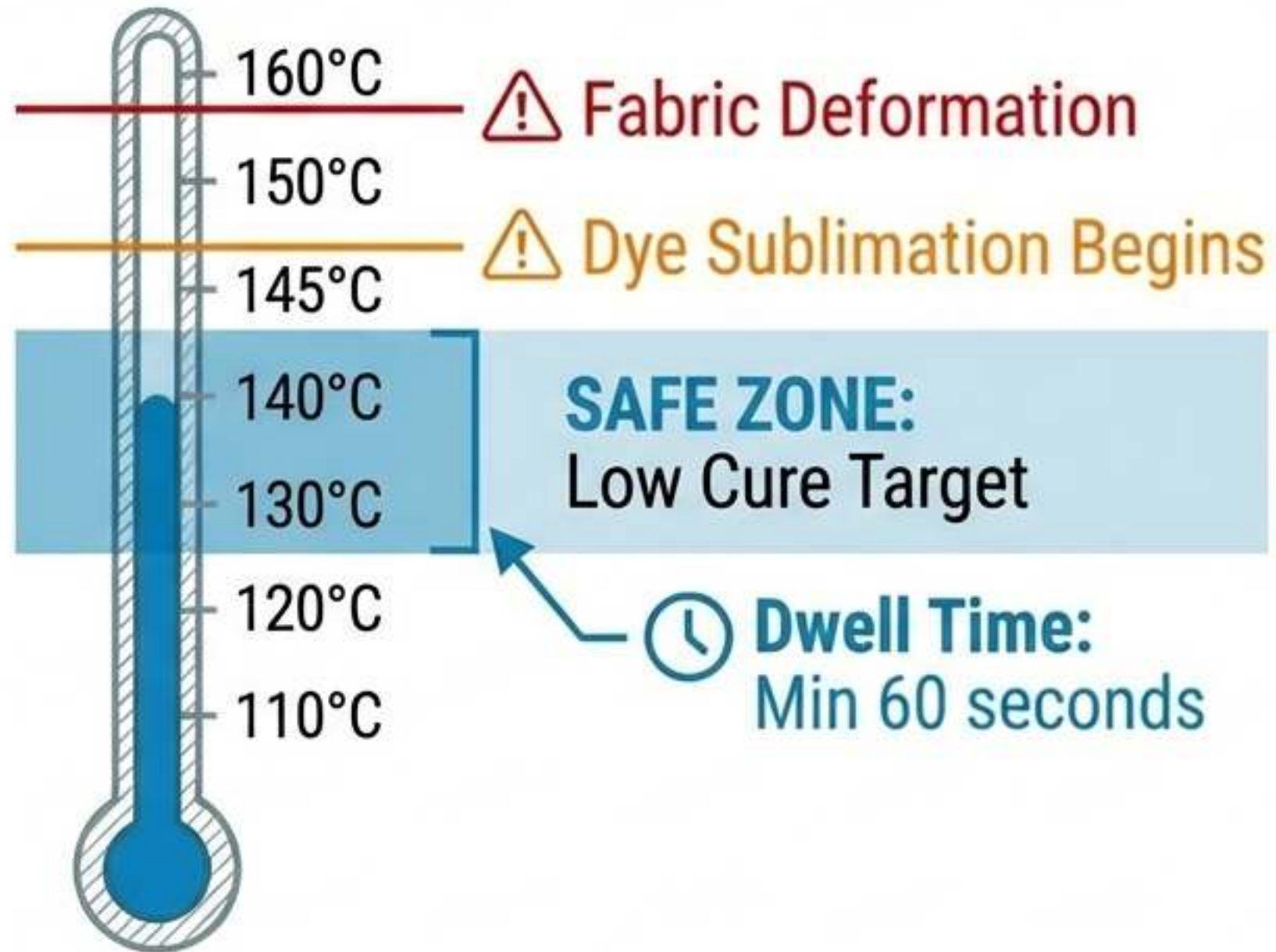
MECHANICAL SETUP: MESH GEOMETRY & RHEOLOGY

Theoretical Ink Volume (Vth) Target: $> 23 \text{ cm}^3/\text{m}^2$

LAYER FUNCTION	MESH COUNT (METRIC)		TENSION	TECHNICAL PURPOSE	
Migration Blocker		32–43 T/cm		> 25 N/cm	Max deposit for absorption
Stretch Underbase		43–54 T/cm		> 25 N/cm	Opacity & Elasticity foundation
Detail / Top Colors		61–79 T/cm		> 20 N/cm	Definition & reduced tack

PROCESS LINE

CCP: THERMAL CURING CONTROL



MEASUREMENT PROTOCOL



IR Thermometers fail due to low emissivity ($\epsilon < 0.95$).



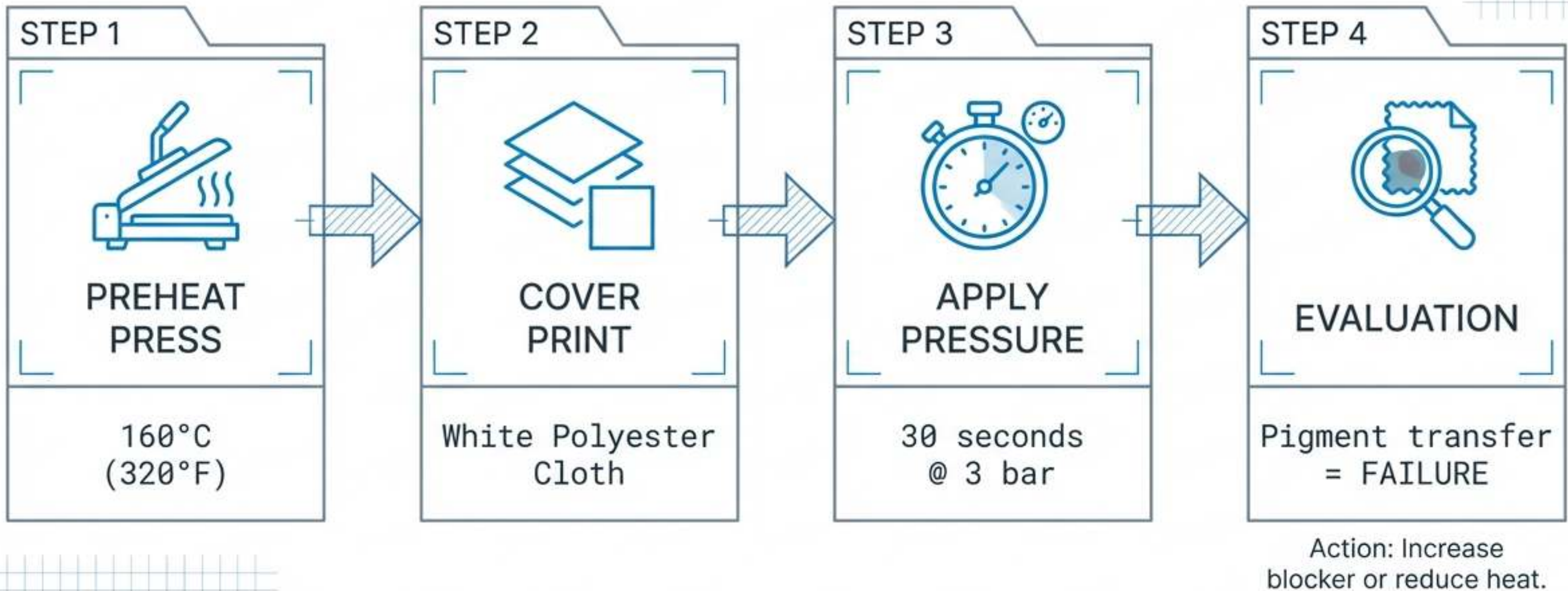
MANDATORY: Use Donut Probe (Thermocouple) embedded in wet ink.

PROCESS LINE



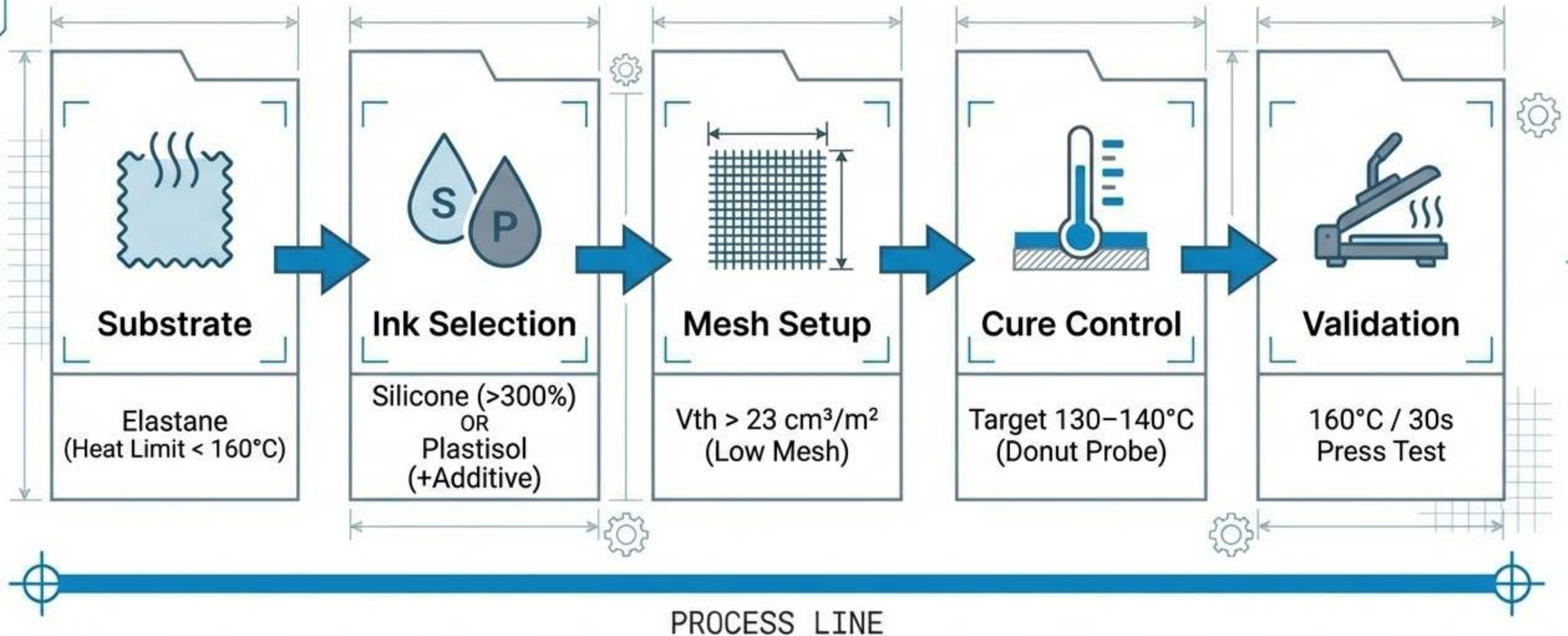
SreenPrintingNow
by Stefan Mertes

VALIDATION: ACCELERATED MIGRATION TEST



PROCESS LINE

The Precision Protocol Summary



Process control mitigates chemical instability.