Chroma-Chem® FLV Series

A New, Solvent-Free, Bio-Based Colorant Technology for Epoxy, Polyurethane and Polyaspartic Coatings

Chromaflo Technologies

Where Art Meets Technology

May 27, 2020

Presented by: Kip Howard and Belinda Johnson
Key Contributor: Marcel Fleming

Overview

Chromaflo Technologies

Where Art Meets Technology

- Why Did Chromaflo Technologies Develop The Chroma-Chem® FLV Series?
- What Is Chroma-Chem® FLV?
- Chroma-Chem® FLV Product Design Goals.
- Chroma-Chem® FLV Compared To Alternative 100% Solids Colorant Options.
- Next Steps.
- Questions.

Why Develop Chroma-Chem® FLV Series?

Chromaflo Technologies
Where Art Meets Technology

- **Traditional, high performance colorants for 2K epoxy and Urethane coatings**
  - Solvent Borne
    - VOC Containing, Odor, Hazardous
  - 100% Solids
    - Unsaturated Polyester; Reactive Diluent; Plasticizers
      - High impact on Tg
    - Epoxy Based
      - Little to no impact on Tg (Diluents may be present)
      - High Viscosity (especially in cold environments)
      - Increase in viscosity over time
      - Crystallization
      - Settling / Separation
      - Shelf Life – Inventory Management

Chroma-Chem® FLV Series:

Chromaflo Technologies
Where Art Meets Technology

- **Very little or no settling, even at higher temperatures**
- **No solidification or gelling during storage**
- **No crystallization**
- **Much more robust with respect to the viscosity at lower temperatures**
  - Colorants will begin to freeze below 30F. All FLV Colorants have passed freeze-thaw stability testing after four cycles.
- **Cost comparable with our existing products for floor coatings**
- **Sustainable, Green Technology – Contains a high percentage of bio-based components**

Chroma-Chem® FLV Series Design Goals

Chromaflo Technologies

Where Art Meets Technology

- **100% solids**
  - The proprietary liquid vehicle in the FLV line has an Epoxy Equivalent Weight of ~213 and the average product has ~35% vehicle
- **Low Viscosity and Machine Dispensable**
  - FLV colorants are between 60 – 80 KU (*FLV White is 70- 120 KU)
  - FLV Masstone Color Specifications are: Delta L* a* b* = +/- 0.5; Delta E = 0.7; % Strength = +/- 2%
- **Compatible with most 2K Epoxy, Urethane and Polyaspartic floor coatings**
  - Coatings formulations vary in composition and film property requirements. The customer is responsible for evaluating and fully qualifying the FLV colorants for use in their applications.
- **Minimal impact on the film properties of the final coating**
  - May actually enhance adhesion and chemical resistance in some applications
  - Very high pigment concentrations = less colorant needed
- **Stable in viscosity and color for two years**
  - No rise in viscosity over time

Chroma-Chem® FLV Series Cont.

Chromaflo Technologies

Where Art Meets Technology

CHROMA-CHEM® FLV TECHNICAL DATA

chroma-chem

Product Code	Description	CI Name	% Pigment		% Resin		% Other Non-Volatiles		Specific Gravity	VOC[a]	Pigment Lightfastness		Pigment Resistance	
			X Wt.	X Vol.	X Wt.	X Vol.	X Wt.	X Vol.		g/L	Mass	Tint	Acid	Alkali
FLV-020027	Carbon Black	Black 7	20.7	12.3	74.9	83.4	4.4	4.3	1.06	<10	N	N	N	N
FLV-020028	Black Oxide	Black 11	53.0	18.2	43.0	75.6	4.0	6.2	1.68	<10	N	N	N	N
FLV-070089	Red Oxide	Red 101	72.0	33.6	26.6	63.5	1.4	2.9	2.28	<10	N	N	N	N
FLV-070091	Organic Red	Red 170	18.5	14.0	75.0	79.9	6.5	6.1	1.02	<10	N*	S*	N	N
FLV-10886	White	White 6	72.9	39.8	19.8	45.5	7.3	14.7	2.18	<10	N	N	N	N
FLV-30748	Blue	Blue 15:2	21.2	14.0	71.7	79.1	7.1	6.9	1.05	<10	N	N	N	N
FLV-50339	Green	Green 7	18.2	9.3	74.7	83.7	7.1	7.0	1.07	<10	N	N	N	N
FLV-80944	Yellow Oxide	Yellow 42	63.5	29.0	34.8	68.0	1.7	3.0	1.87	<10	N	N	N	N
FLV-80946	Organic Yellow	Yellow 151	13.6	9.8	80.0	84.2	6.4	6.0	1.01	<10	N*	N*	N	A
FLV-80948	Bismuth Vanadate Yellow	Yellow 184	67.5	24.4	30.1	70.5	2.4	5.1	2.24	<10	N	N	N	N

[a] Expected values based on formulation

Comparison To Alterative Colorant Options

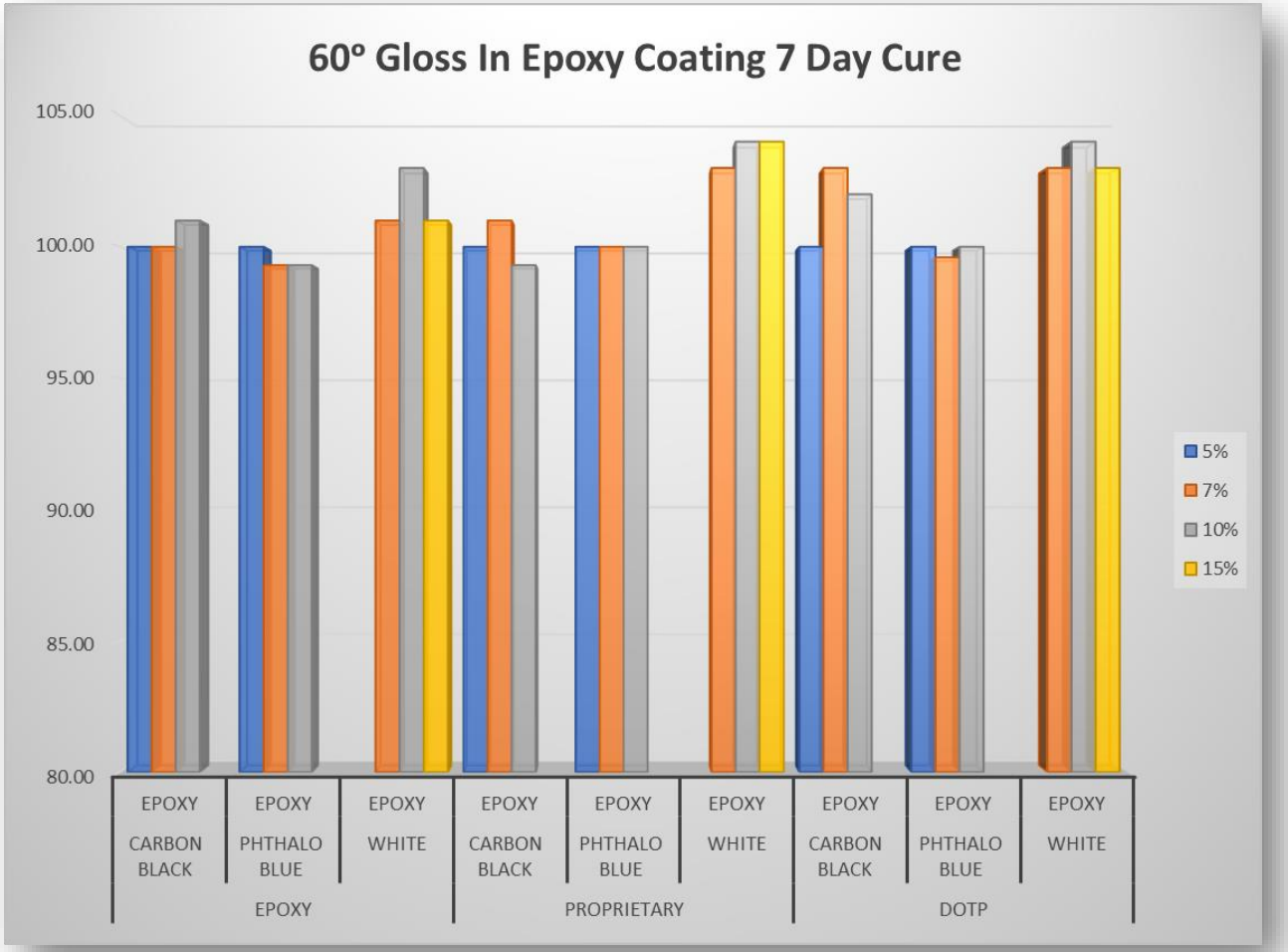
Chromaflo Technologies
Where Art Meets Technology

- Three 100% Colorant Technologies Were Evaluated
  - Chroma-Chem® FLV (Proprietary Vehicle)
  - Chroma-Chem® EDC (BisA Epoxy Vehicle)
  - Chroma-Chem® DTP (DOPT Vehicle)
- Three Colorants From Each Line Were Evaluated
  - White (TiO_2)
  - Carbon Black
  - Phthalocyanine Blue
- Three Coatings Systems Were Used
  - 2K Amine Cured Epoxy
  - 2K Polyurethane
  - 2K Polyaspartic

Comparison To Alternatives - Gloss

Chromaflo Technologies

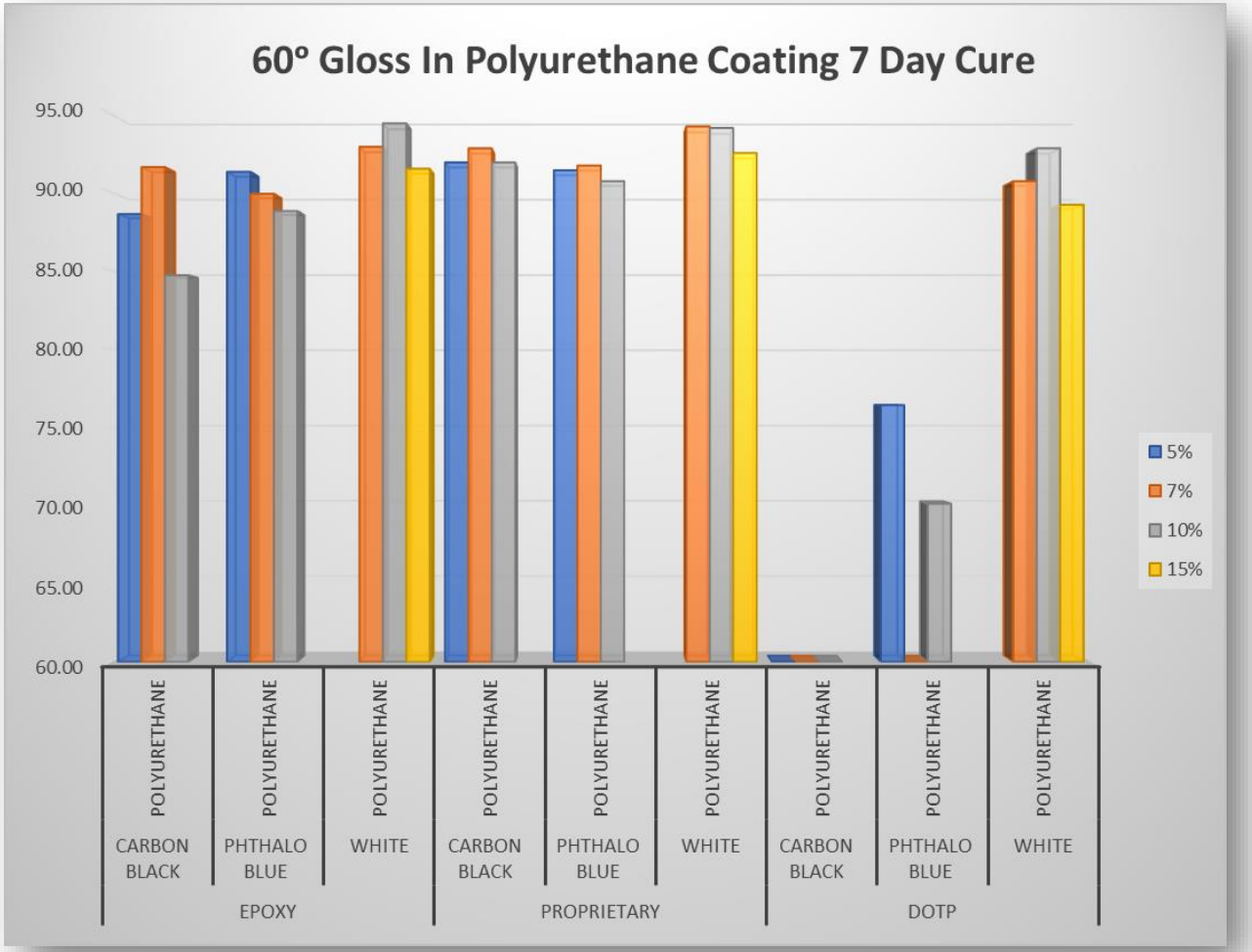
Where Art Meets Technology



Comparison To Alternatives - Gloss

Chromaflo Technologies

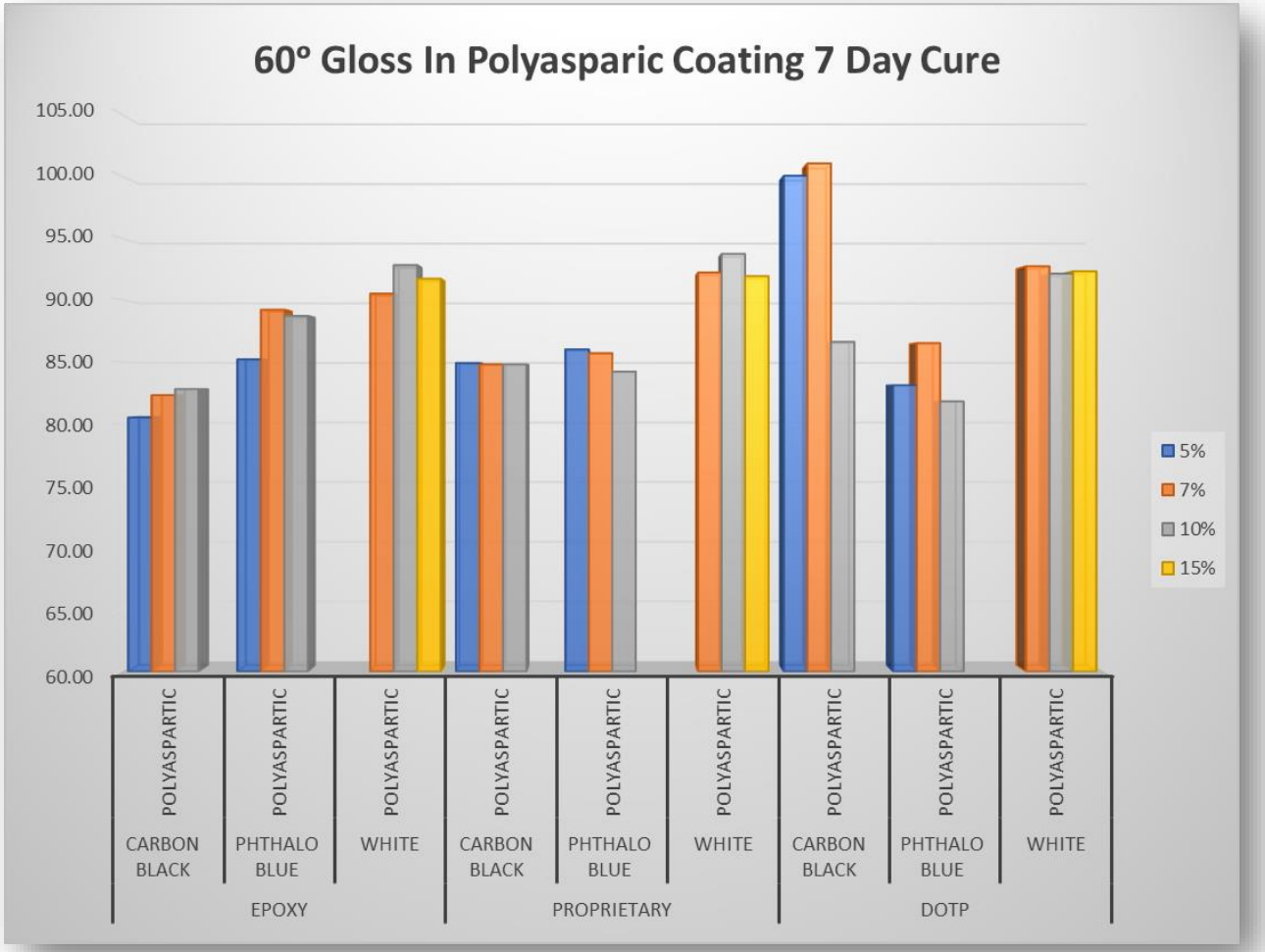
Where Art Meets Technology



Comparison To Alternatives - Gloss

Chromaflo Technologies

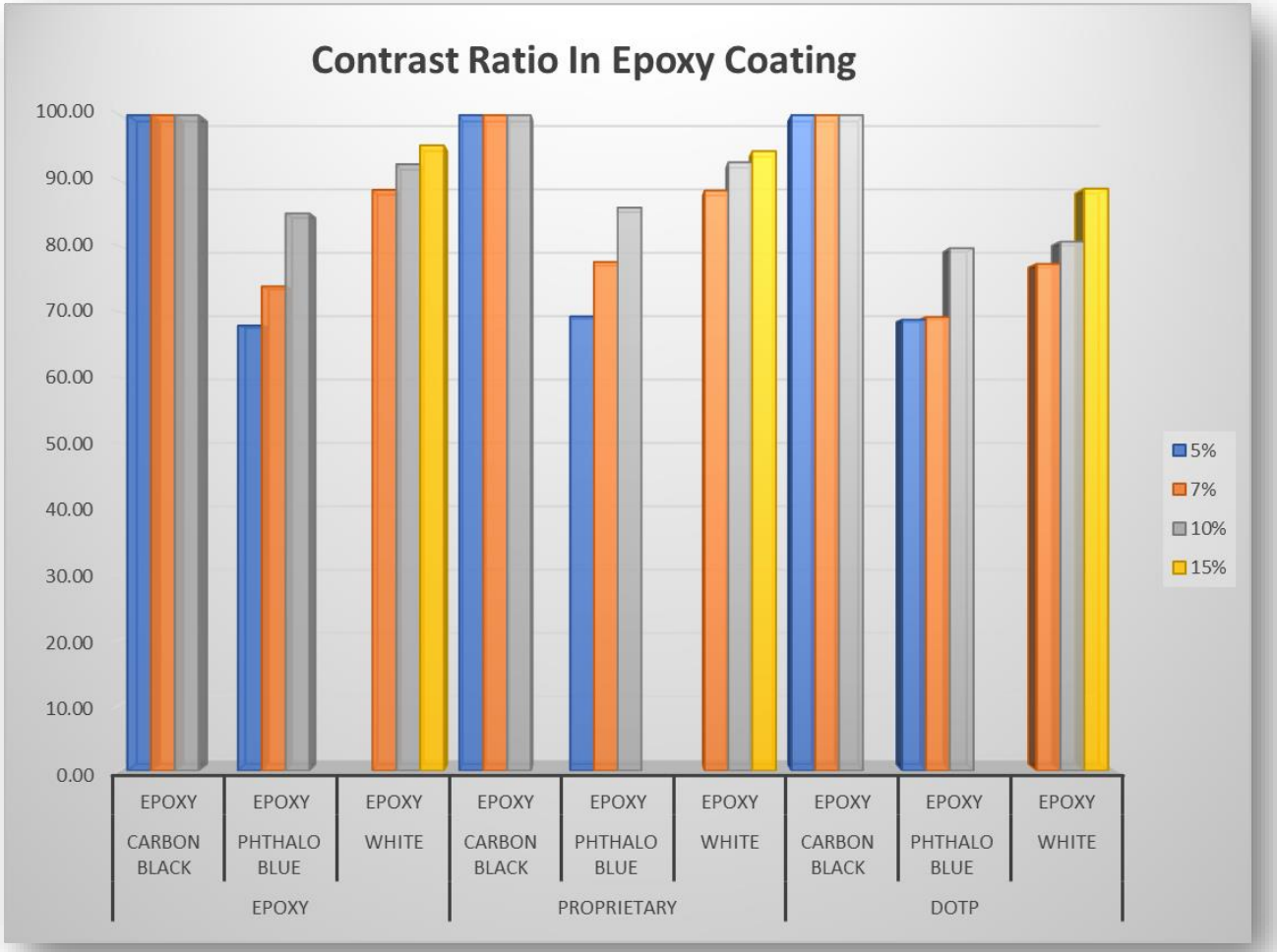
Where Art Meets Technology



Comparison To Alternatives - Opacity

Chromaflo Technologies

Where Art Meets Technology

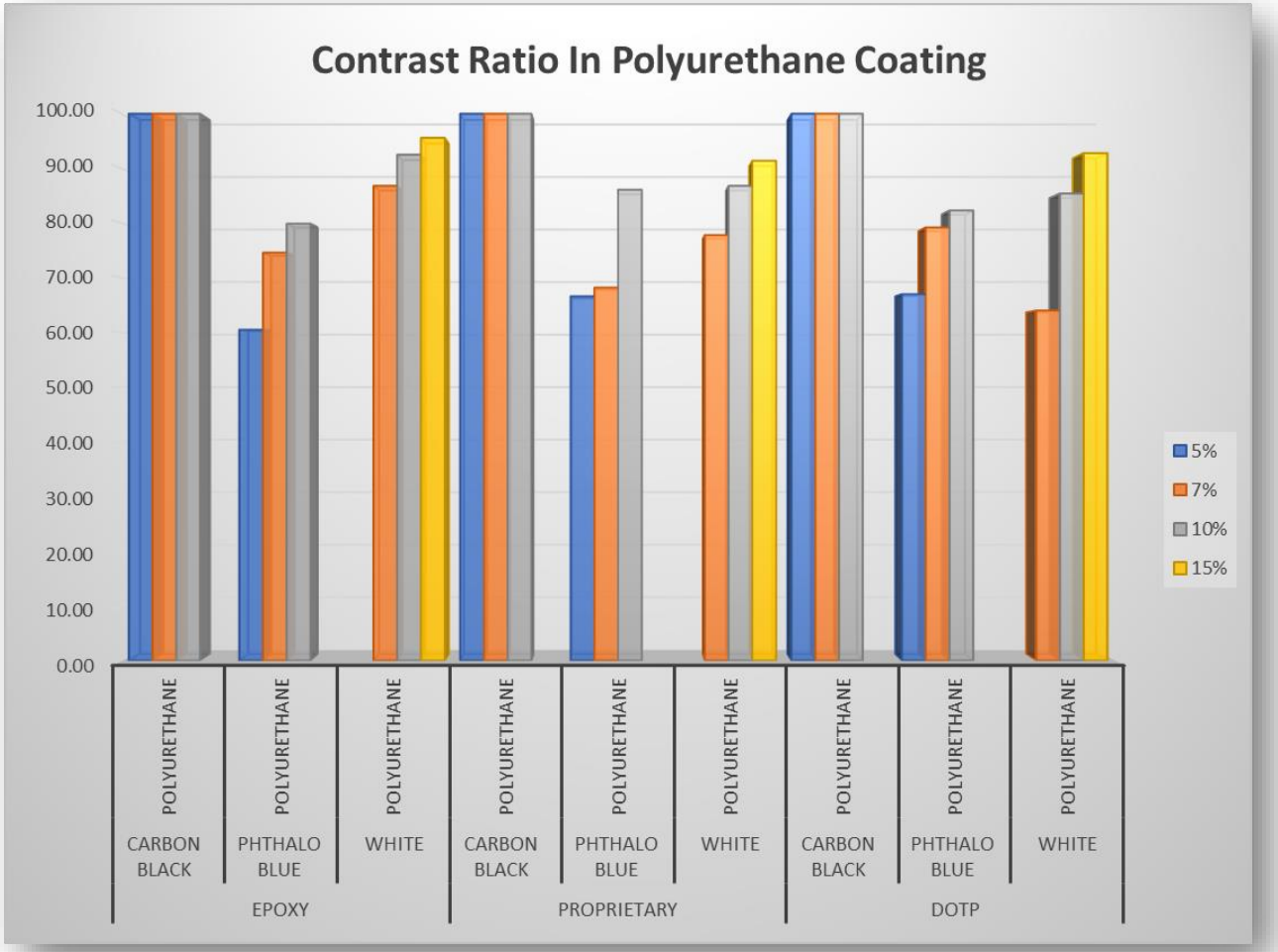


Chromaflo Technologies

Comparison To Alternatives - Opacity

Chromaflo Technologies

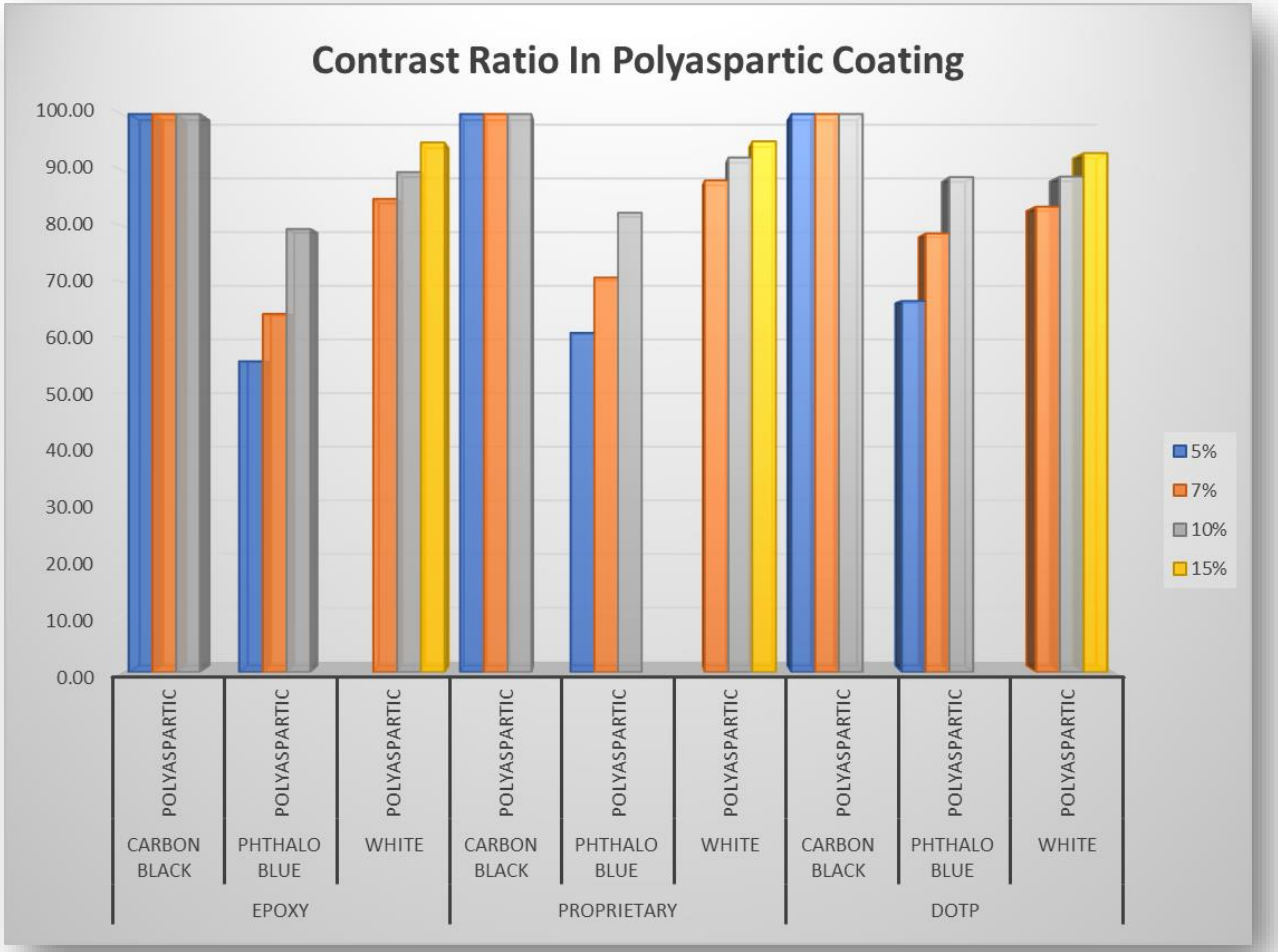
Where Art Meets Technology



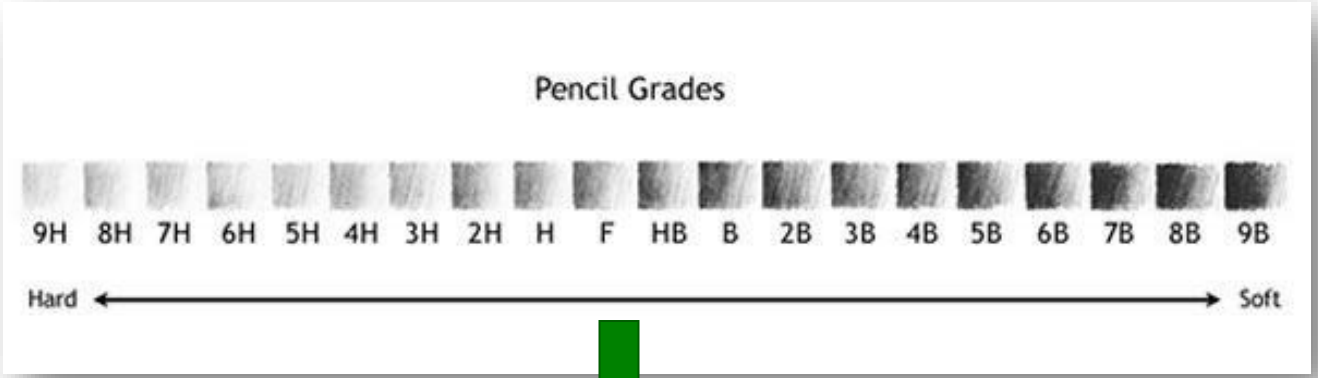
Chromaflo Technologies

Comparison To Alternatives - Opacity

Chromaflo Technologies
Where Art Meets Technology



Comparison To Alternatives – Film Hardness

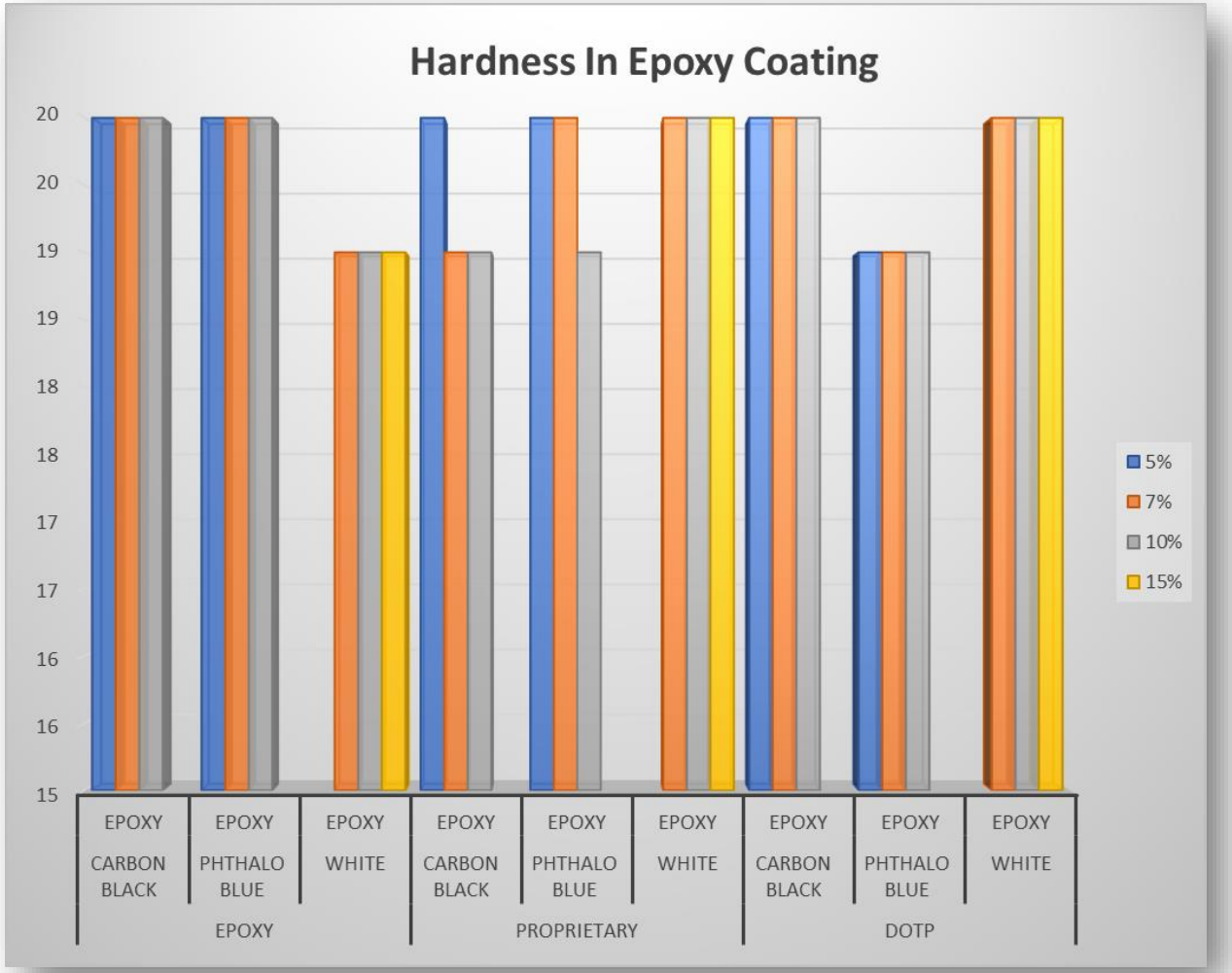


9H	8H	7H	6H	5H	4H	3H	2H	H	F	HB	B	2B	3B	4B	5B	6B	7B	8B	9B
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comparison To Alternatives - Hardness

Chromaflo Technologies

Where Art Meets Technology

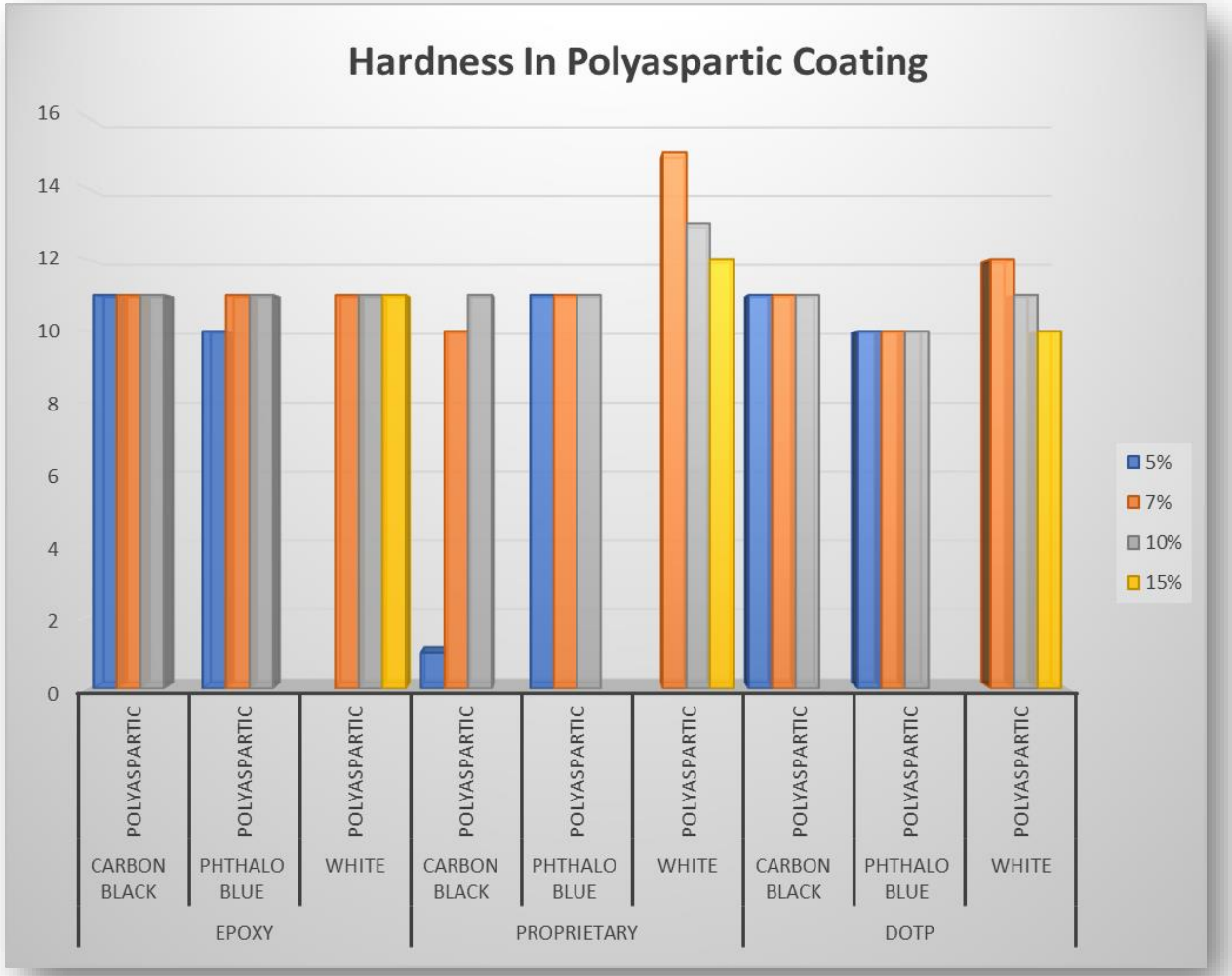


Chromaflo Technologies

Comparison To Alternatives - Hardness

Chromaflo Technologies

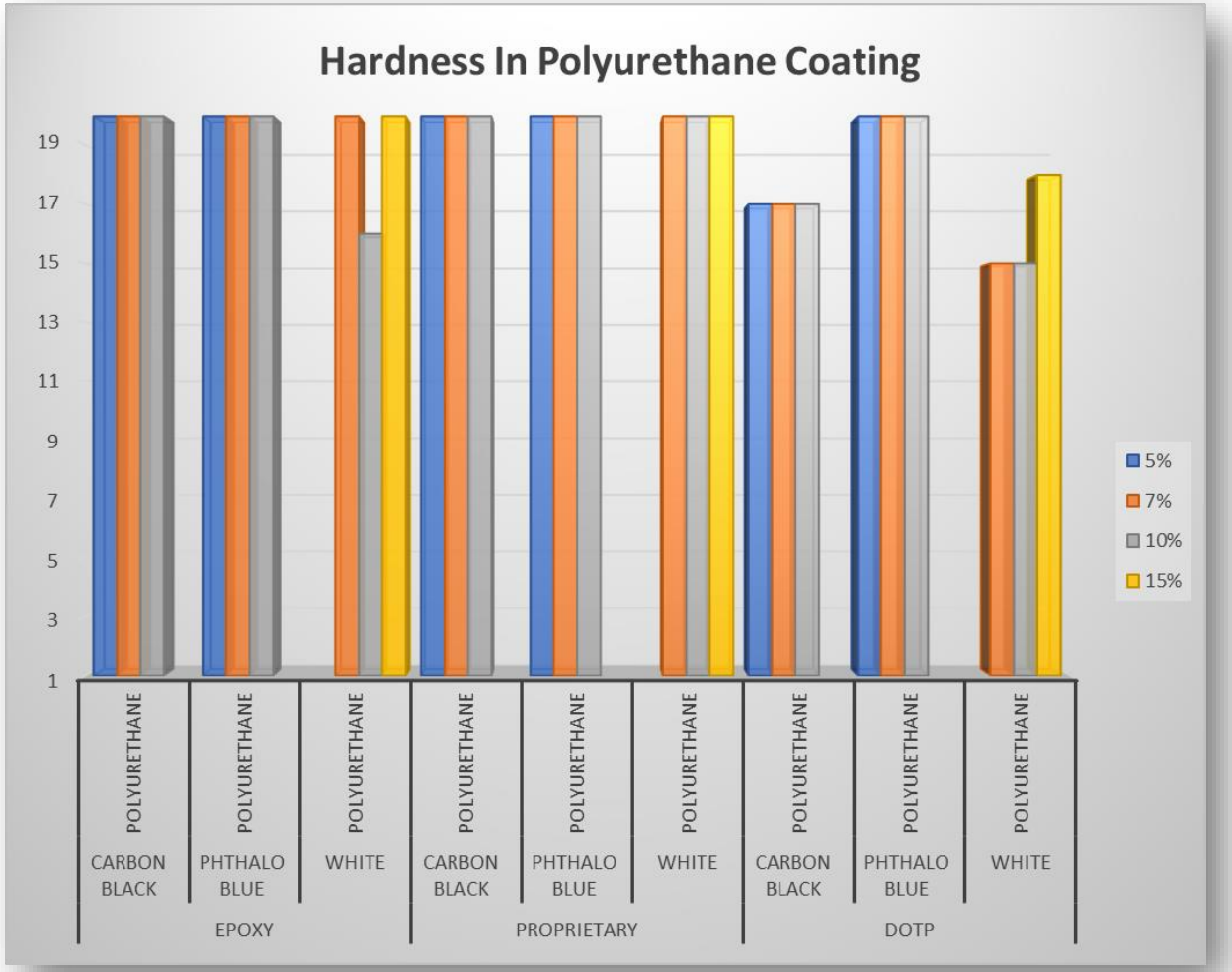
Where Art Meets Technology



Comparison To Alternatives - Hardness

Chromaflo Technologies

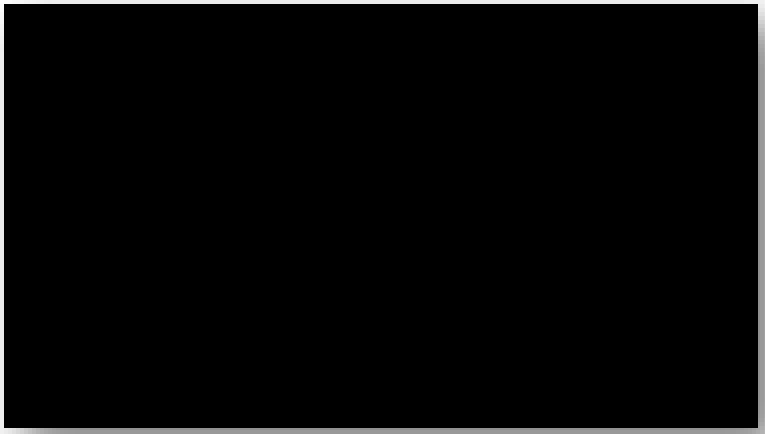
Where Art Meets Technology

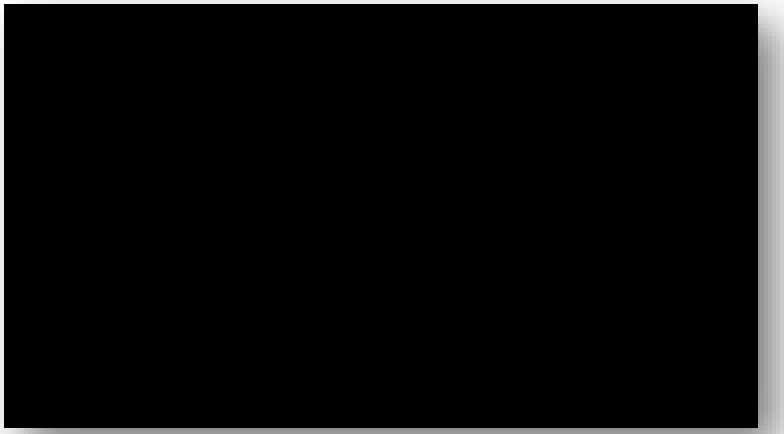


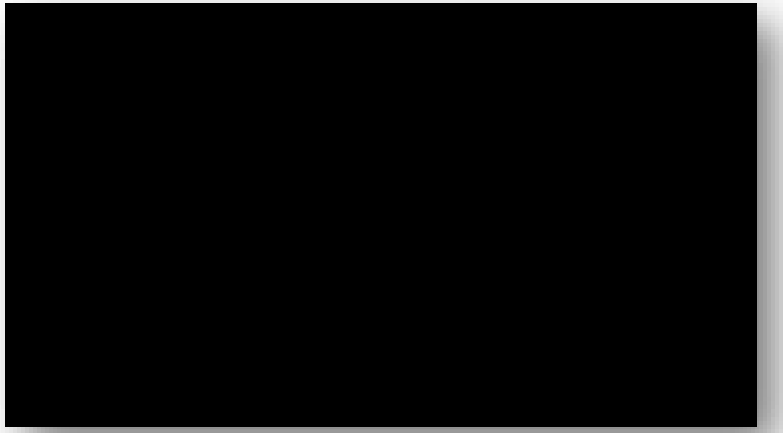
Comparison To Alternatives – 4 Week Oven Viscosity

Chromaflo Technologies

Where Art Meets Technology



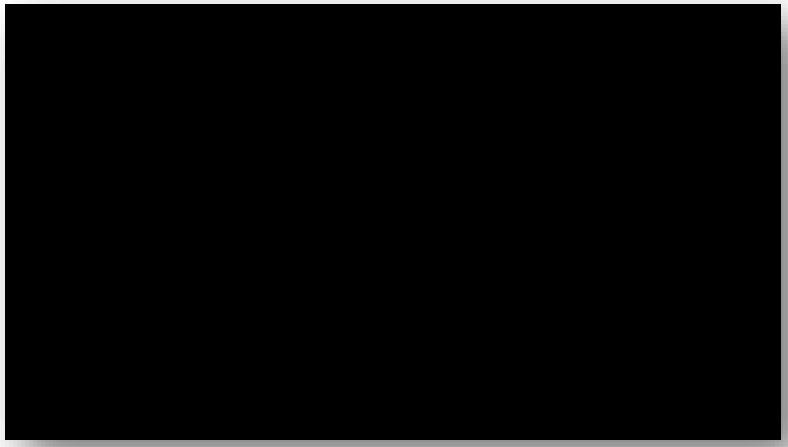


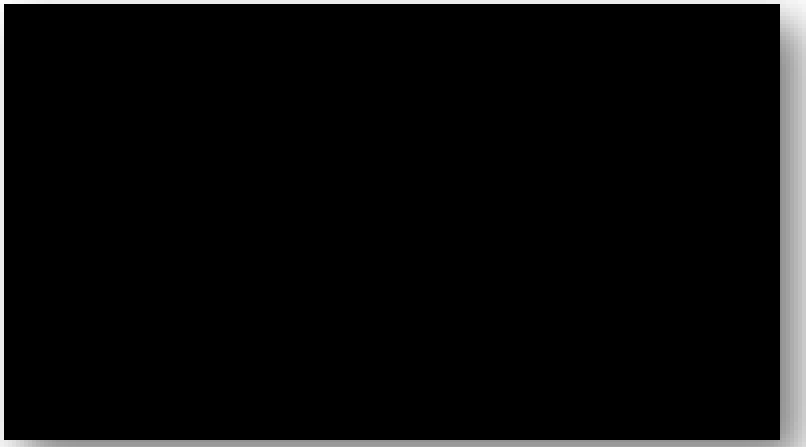


Comparison To Alternatives – 4 Week Oven Viscosity

Chromaflo Technologies

Where Art Meets Technology

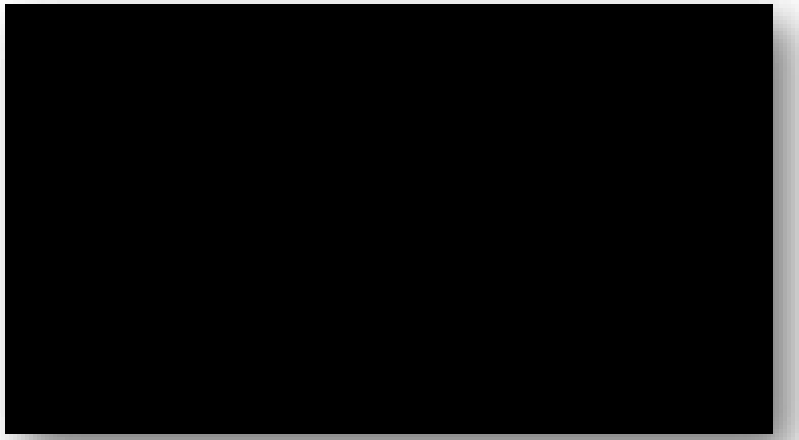


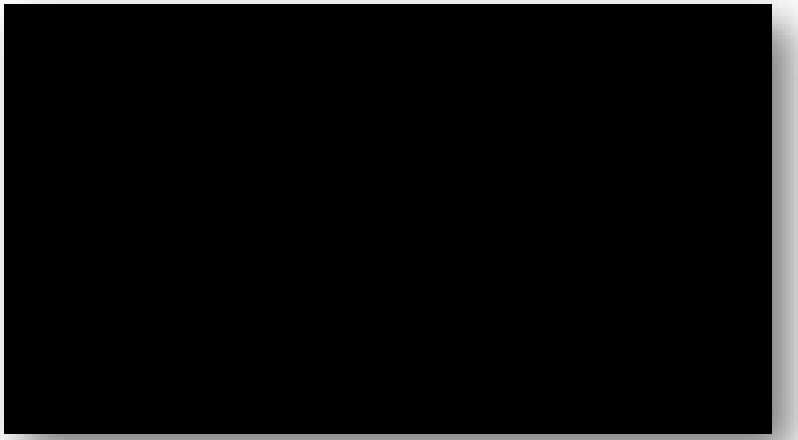


Comparison To Alternatives – 4 Week Oven Viscosity

Chromaflo Technologies

Where Art Meets Technology





Comparison Overview

Chromaflo Technologies

Where Art Meets Technology

	Viscosity	Compatibility	Film Properties	Stability	Dispensability	Settling
FLV Line	✓	✓	✓	✓	✓	✓
Epoxy Line	X	X	✓	X	X	X
DOTP Line	✓	X	X	✓	✓	✓

In The Works

Chromaflo Technologies

Where Art Meets Technology

- Expanding the FLV color pallet.
  - There are currently 13 masstones, but more in process.
- Creating a 735 line with 23 colors (Based of 754 line)
- Custom Color Matching
- Color Database

Questions

Chromaflo Technologies

Where Art Meets Technology

- Questions?