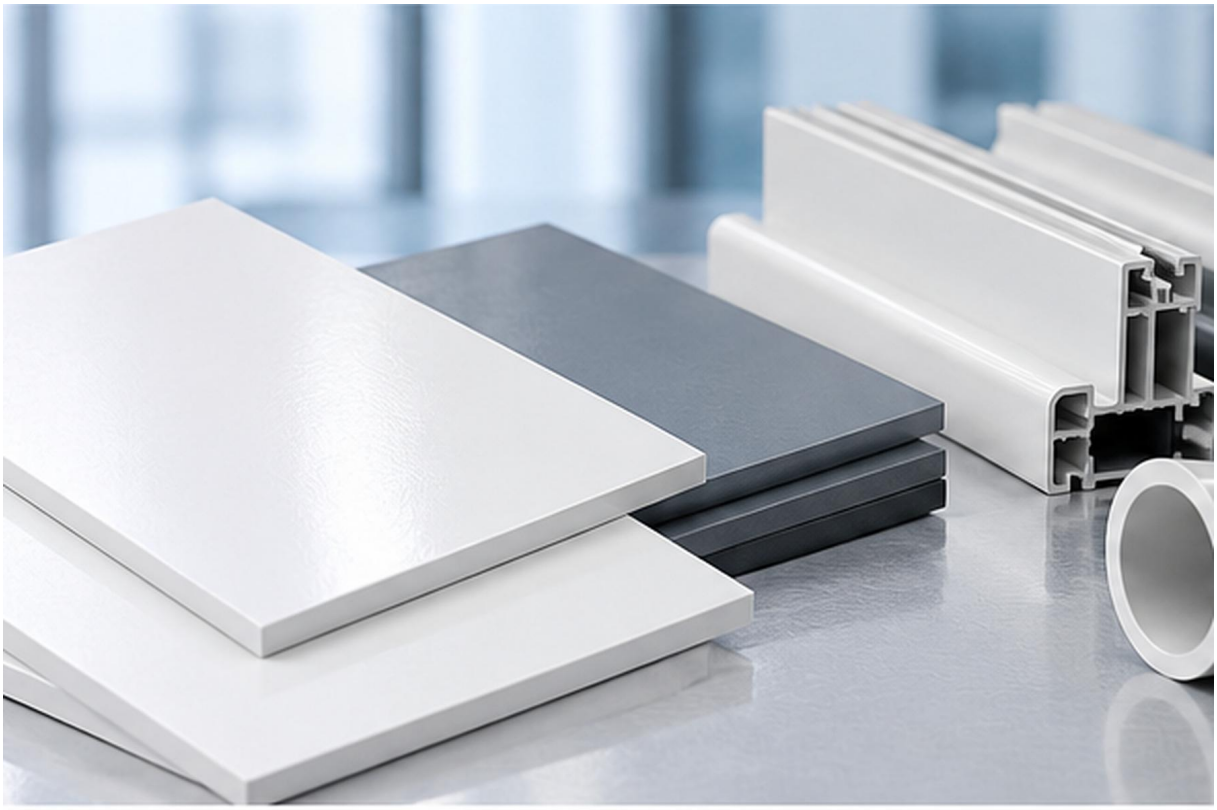
泛华化学 INTER-CHINA CHEMICAL

TITANIUM DIOXIDE FOR PLASTICS | TECHNICAL REPORT

R-F9156 PVC Color and Tinting Application Performance Report

White PVC color · CIE whiteness · Grey PVC tinting strength & undertone



PVC application image (illustrative; not original test specimens)

WHITE PVC	GREY PVC	CUSTOMER TEST
Whiteness · L*a*b*	Tinting · undertone	Matched formulation · choice

Application test data: 2014, 2019 and 2020

Version 1 | 2021

00 R-F9156 TECHNICAL REPORT

Performance Summary and Test Conditions

Independent PVC comparison campaigns; data interpreted within each tested formulation

R-F9156 was evaluated in white and grey plasticized PVC systems. The 2019 and 2020 tests measure color, CIE whiteness and grey-sheet relative tinting strength. R-F9156 delivered a CIE whiteness of 84.84 in the 2019 A series and relative tinting strength of 106%; other series used different lots or formulations and are reported separately.

Property	R-F9156	Test group
CIE whiteness	84.84	2019 A, white 4.0 PHR
CIE whiteness	85.53	2019 B, white 4.0 PHR
CIE whiteness	84.67	2020 D, white 4.0 PHR
Rel. tint strength	106%	2019 A, grey 2.0 PHR
Rel. tint strength	100%	2020 D, grey 4.0 PHR

Formulation and method conditions

Test series	White / grey TiO_2	Method / record
2019 A and C	4.0 / 2.0 PHR	160°C two-roll, 5 min; press
2019 B	4.0 / 2.0 PHR	160°C two-roll; 20 Jun 2019
2020 D	4.0 / 4.0 PHR	Two-roll and press; 23 Mar 2020
2014 instrument	Full formulation not stated	D65/A/F02; 10° observer

PVC means polyvinyl chloride in this report; PHR means parts per hundred parts of resin. For grey PVC, TiO_2-to-carbon-black ratio was 20:1 where reported.

Comparison samples and evidence rules

Third-party grades are anonymized as Benchmark A–E, with a fixed identity only within the original group. DR-2588 is an ICC grade. Series A and C share the R-F9156 lot reference, but use different commercial controls. Tinting strength is a within-series index; 2020 and 2019 values must not be ranked against one another.

White PVC: Color and CIE Whiteness

2019 A/B/C and 2020 D test groups; TiO_2 loading 4.0 PHR for all white-sheet results

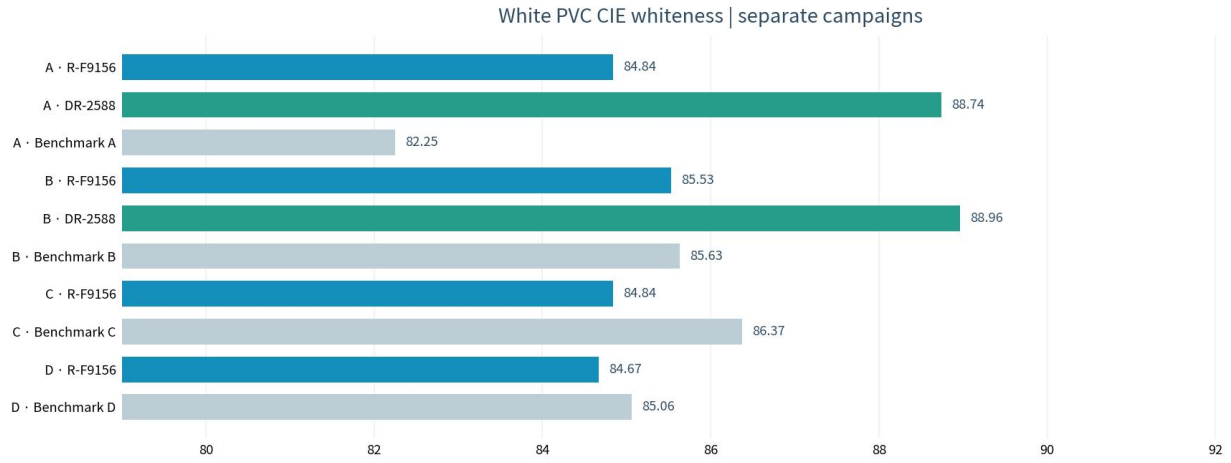


Figure 1. White PVC whiteness by original comparison series; results from different test campaigns are not pooled.

Series · grade	L*	a*	b*	CIE whiteness
A · R-F9156	97.34	-0.68	1.89	84.84
A · DR-2588	97.69	-0.71	1.22	88.74
A · Benchmark A	97.29	-0.65	2.44	82.25
B · R-F9156	97.29	-0.71	1.71	85.53
B · DR-2588	97.72	-0.70	1.18	88.96
B · Benchmark B	97.40	-0.66	1.75	85.63
C · R-F9156	97.34	-0.68	1.89	84.84
C · Benchmark C	97.62	-0.65	1.71	86.37
D · R-F9156	97.38	-0.72	1.95	84.67
D · Benchmark D	98.13	-0.30	1.54	85.06

Within the 2019 A group, R-F9156 shows CIE whiteness 84.84 versus 82.25 for Benchmark A, with a lower b* (1.89 versus 2.44). The 2019 C and 2020 D comparisons show higher whiteness for their respective benchmarks. Overall grade selection should account for the requested shade and customer formulation.

Grey PVC: Tinting Strength and Undertone

Grey-sheet tests: 2019 A/B/C at 2.0 PHR; 2020 D at 4.0 PHR (as recorded)

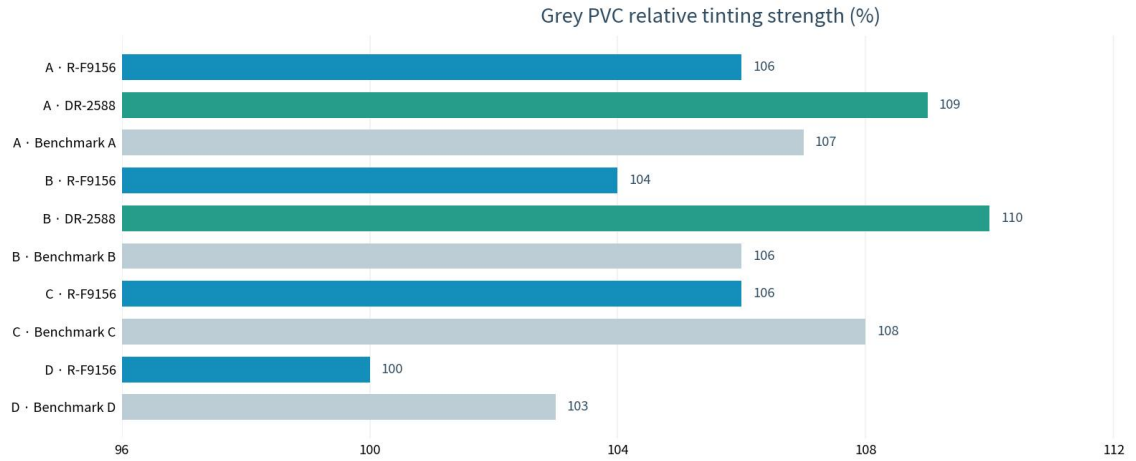


Figure 2. Within-series relative tinting strength (%); series D has a separate reference and formulation.

Series · grade	b*	Rel. tint strength (%)
A · R-F9156	-0.80	106
A · DR-2588	-2.18	109
A · Benchmark A	-0.45	107
B · R-F9156	-1.59	104
B · DR-2588	-2.55	110
B · Benchmark B	-0.60	106
C · R-F9156	-0.80	106
C · Benchmark C	-0.78	108
D · R-F9156	-1.12	100
D · Benchmark D	-0.77	103

Grey-sheet b* for R-F9156 ranges from −0.80 to −1.59 in the 2019 sets, and is −1.12 in 2020. More-negative b* indicates a bluer direction in the stated system; it does not by itself establish better visual color. Tinting strength is 104–106% in 2019 sets, compared with 100% in the separate 2020 reference system.

2014 Instrument Color-Difference Checks

D65, A and F02 illuminants / 10° observer; instrument color-difference output, not fresh PVC production trials

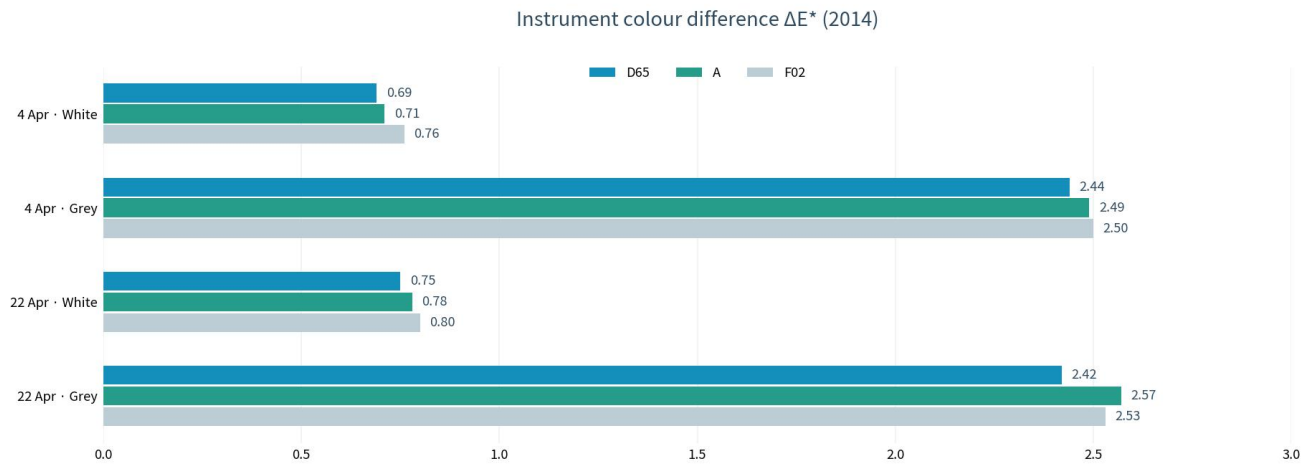


Figure 3. Reported ΔE* under three illuminants, compared with coded Benchmark E.

Specimen · source	9156 b*	Control b*	Δb*	ΔE*
4 Apr · White · D65	1.61	2.19	0.57	0.69
4 Apr · White · A	1.29	1.88	0.59	0.71
4 Apr · White · F02	1.65	2.31	0.67	0.76
4 Apr · Grey · D65	-1.09	0.36	1.45	2.44
4 Apr · Grey · A	-1.37	0.21	1.58	2.49
4 Apr · Grey · F02	-1.29	0.39	1.67	2.50
22 Apr · White · D65	1.60	2.25	0.65	0.75
22 Apr · White · A	1.23	1.91	0.68	0.78
22 Apr · White · F02	1.64	2.37	0.73	0.80
22 Apr · Grey · D65	-0.65	1.10	1.76	2.42
22 Apr · Grey · A	-0.90	1.04	1.94	2.57
22 Apr · Grey · F02	-0.78	1.23	2.01	2.53

In both 2014 white-sheet checks, R-F9156 had a lower b* than Benchmark E under D65/10°. The recorded ΔE* values were 0.69 and 0.75 for white sheets, and 2.44 and 2.42 for grey sheets. Δb* follows the source control-minus-standard convention. These checks do not establish durability, opacity or extrusion stability.

Application Conclusions and Customer Evaluation

Use matched PVC formulation testing to select the most suitable pigment for the final article

Key findings

Selection criterion	Evidence-based interpretation
White PVC color	2019 A whiteness 84.84, b* 1.89; whiteness +2.59 versus Benchmark A.
Grey PVC tinting	2019 A/B/C strength 106 / 104 / 106%; compare only within each reference group.
Qualification	Verify color, whiteness, tinting and processing in an identical customer recipe.

Interpreting the historical comparisons

R-F9156 offers a measurable blue-shade direction against Benchmark A in the 2019 white PVC test, but does not lead every whiteness or tinting comparison. Results refer to specific lots and reference systems, not universal grade rankings. The 2020 test is the latest application campaign represented in this report.

Recommended customer qualification

For a meaningful PVC evaluation, use the incumbent pigment as the control. Fix resin, plasticizer and stabilizer package, dosage, carbon-black ratio, mixing and pressing conditions, then compare L*, a*, b*, CIE whiteness and grey tinting. For extrusion profiles and films, add heat stability, dispersion, surface-defect and lot-to-lot checks; those properties are not established by the color data in this report.

Technical note: Historical laboratory results are application references, not current batch guarantees. Additional performance and supply conditions depend on the customer formulation and agreed specification. Request the current TDS and suitable test sample before final selection.

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