泛华化学 INTER-CHINA CHEMICAL

TITANIUM DIOXIDE FOR PLASTICS | TECHNICAL REPORT

R-F 9156 RUTILE TITANIUM DIOXIDE APPLICATION PERFORMANCE IN PLASTICS

PVC color and tinting strength · PE masterbatch processing · PP injection · PE film opacity

MASTERBATCH & FILM | OUTDOOR PLASTICS | ENGINEERING PLASTICS

PVC	PE MASTERBATCH	PE FILM
Color · Tinting	MFR · FPV	Opacity · Color

Historical laboratory application data (2012–2014); not a current production-batch certificate.

Version 1.0 | 2017

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Executive Summary

Application-oriented interpretation of traceable historical laboratory data

This report consolidates Inter-China Chemical application testing from 2012 and 2014 for R-F 9156 in white/gray PVC, high-loading PE masterbatch, PP injection plaques and blown PE film. Original measured values and test conditions are preserved; third-party commercial comparison grades are anonymized.

Indicator	R-F 9156	Test configuration
PVC CIE whiteness	83.74	2014; 6.0 PHR
Relative tinting strength	105.5	2014; 3.0 PHR; R-F 9158 = 100
Melt flow rate	21.0 g/10 min	2014; 70% PE masterbatch
Filter pressure value	0.168 bar/g	2014; 10 µm screen
PP plaque whiteness	86.02	2014; 2.0 PHR
PE film opacity	61.97%	2014; 30 µm; 5% TiO_2

Application principle Do not pool numeric rankings across different resin systems, film thicknesses or pigment concentrations.

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Report Scope and Source Data

Separate historical test results from specifications and commercial guarantees

Year	Test scope	Treatment
2012	PVC L*a*b*; tinting; PE masterbatch MFR / FPV	Historical reference
2014	PVC L*a*b*; tinting; masterbatch MFR / FPV; PP injection; PE film	Main dataset
2014	PVC white/gray color-difference instrument printouts	Instrument cross-check

Benchmark anonymization: within each independent test set, commercial comparisons are labeled Benchmark A, B, C, etc. Identical benchmark letters in separate tests do not imply the same physical grade. R-F 9158 is an ICC grade and may be named.

Original instrument screenshots contain commercial grade identities and therefore are not reproduced in this external version. Charts are redrawn using anonymized labels.

Note These historical data do not establish 2026 production-lot characteristics or lot-to-lot consistency.

PVC: Whiteness and Color Performance

Read L*, b* and CIE whiteness together at fixed dosage

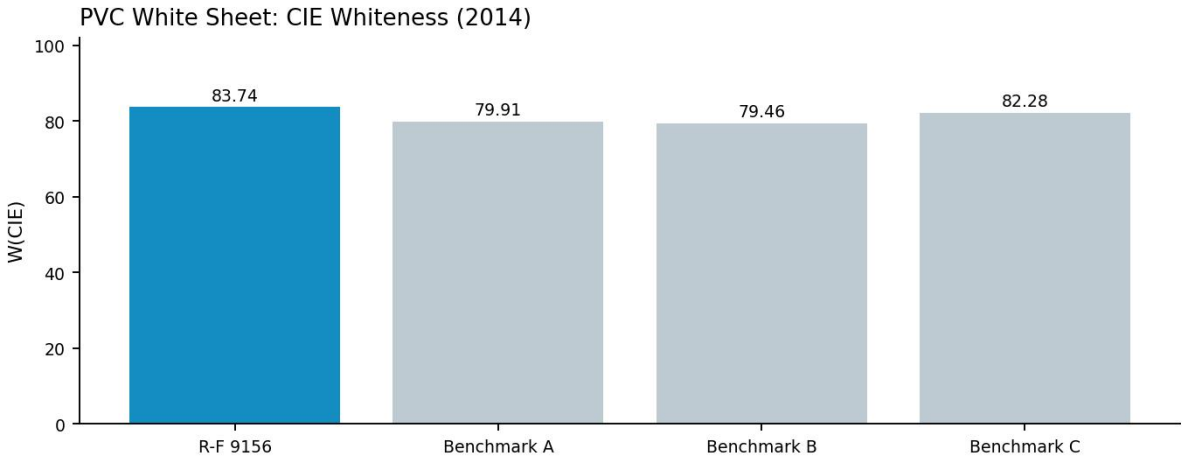

Figure 2-1. PVC white-sheet results (2014). Plasticized PVC compound; TiO_2 dosage = 6.0 PHR.

Sample	L*	b*	W(CIE)
R-F 9156	96.38	1.60	83.74
Benchmark A	96.02	2.25	79.91
Benchmark B	95.88	2.27	79.46
Benchmark C	96.17	1.80	82.28

Interpretation R-F 9156 shows high whiteness and low b* relative to these selected benchmarks under the stated conditions; this is not a universal cross-formulation ranking.

PVC: Gray Plaque Tinting Strength and Undertone

The carbon-black reference and normalization basis matter

Sample	L*	b*	Rel. tint strength	Undertone
R-F 9156	65.26	−0.65	105.5	−14.5
Benchmark A	64.48	0.23	101.7	−12.1
R-F 9158	63.82	−0.60	100	−14.4
Benchmark B	64.69	−1.01	103.3	−15.3

2014 configuration: plasticized PVC, TiO_2 = 3.0 PHR, TiO_2:carbon black = 20:1; relative tinting strength is normalized to R-F 9158 = 100. These values cannot be ranked directly against the 2012 experiment using a 40:1 ratio.

Cross-check An April 22, 2014 instrument printout reported 103.48% strength for R-F 9156 versus one anonymized gray-sheet comparison. It uses a different reference basis from the composite-table value of 105.5.

PE Masterbatch: Melt Flow and Filter Pressure

Processing screening in 70% TiO_2 concentrate

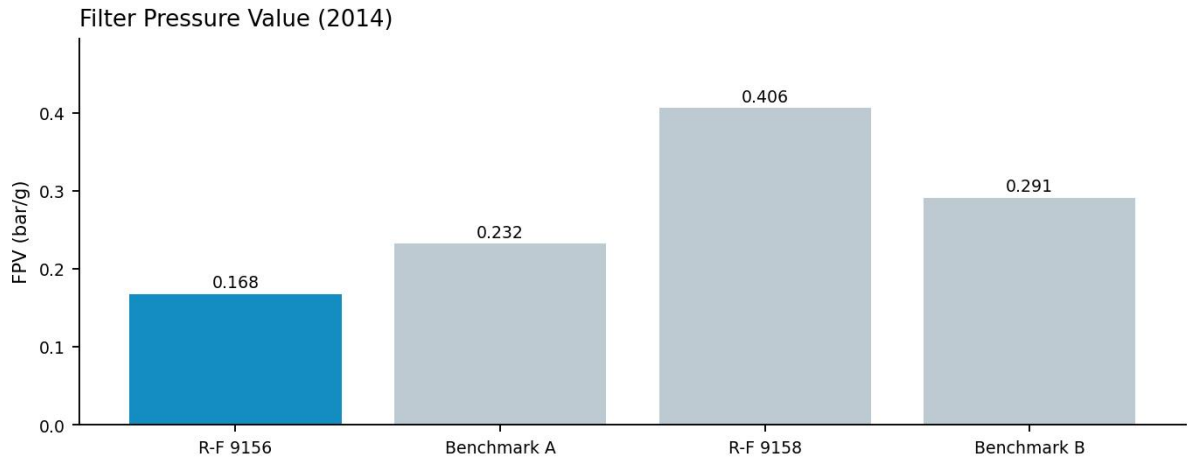

Figure 4-1. Historical FPV comparison; lower values indicate lower filtration loading in this setup.

Sample	MFR (g/10 min)	FPV (bar/g)
R-F 9156	21.0	0.168
Benchmark A	20.0	0.232
R-F 9158	18.0	0.406
Benchmark B	19.4	0.291

Conditions: masterbatch = PE 25%, PE wax 5%, TiO_2 70%. MFR per ISO 1133:1997 at 190°C / 2.160 kg. FPV per EN 13900-5:2005: LDPE 885.7 g plus masterbatch 114.3 g, final TiO_2 8%, 10 µm screen, 190°C.

PP Injection: Color Characteristics

Lightness, yellow–blue chromaticity and whiteness in PP

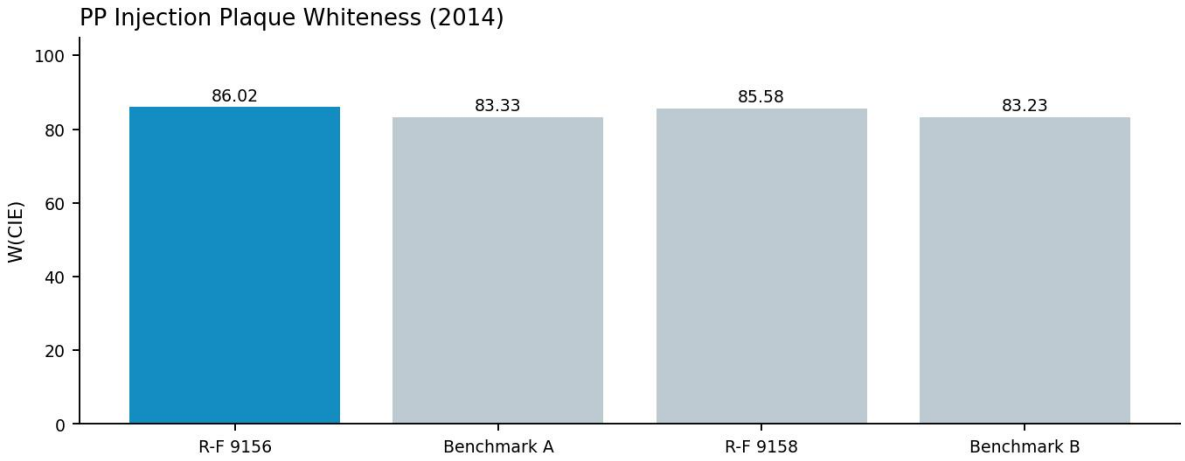

Figure 5-1. CIE whiteness in PP injection plaques (2014).

Sample	L*	b*	W(CIE)
R-F 9156	97.40	1.66	86.02
Benchmark A	97.25	2.18	83.33
R-F 9158	97.57	1.86	85.58
Benchmark B	96.87	1.99	83.23

Conditions: twin-screw masterbatch preparation, dilution into PP, injection molding at 220°C, TiO_2 = 2.0 PHR. Color measured using Datacolor 600. Results describe initial color only—not long-term thermal or UV durability.

Blown PE Film: Color and Opacity

Film thickness and pigment loading are both critical controls

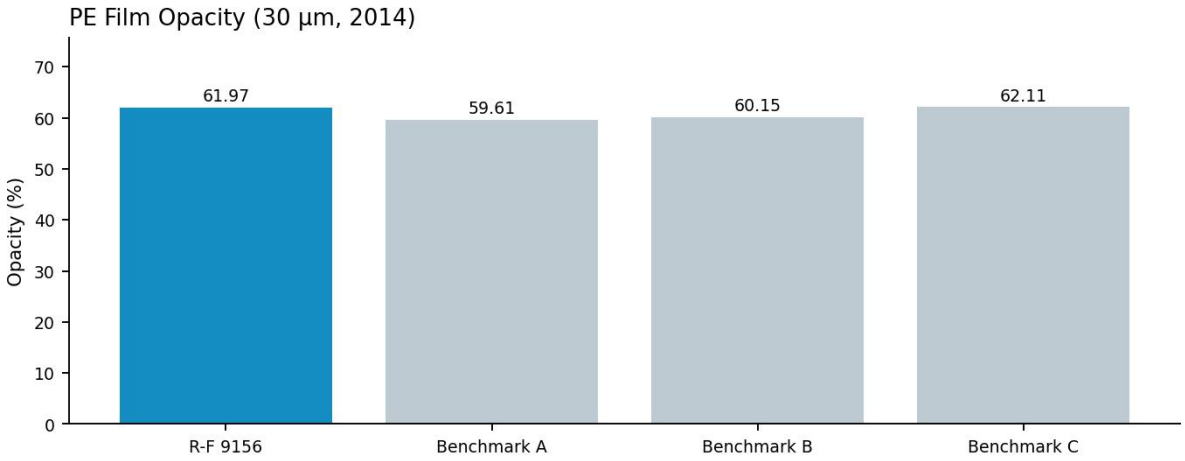

Figure 6-1. Opacity of 30 µm PE film with 5% TiO_2 (2014).

Sample	L*	W(CIE)	Opacity (%)
R-F 9156	94.62	74.24	61.97
Benchmark A	94.39	72.01	59.61
Benchmark B	94.26	71.48	60.15
Benchmark C	94.73	75.21	62.11

The pigment was first compounded into 70% TiO_2 masterbatch and then processed into 30 µm blown PE film with 5% final TiO_2. R-F 9156 performed favorably versus some benchmarks; Benchmark C was slightly higher. Conclusions are limited to this film formulation.

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Methods, Interpretation and Qualification

Translate historical screening into reproducible customer qualification

Property	Method / configuration	Interpretation
PVC color	Datacolor 600; PVC white/gray plaque	6.0 vs 3.0 PHR; white/gray are separate
Tinting	TiO_2 / carbon black = 20:1 (2014)	Reference R-F 9158 = 100
MFR	ISO 1133:1997; 190°C, 2.160 kg	70% PE masterbatch
FPV	EN 13900-5:2005; 10 µm screen	8% final TiO_2 in LDPE
PP color	220°C injection; 2.0 PHR	Initial color only
PE film	30 µm blown film; 5% TiO_2	Opacity is formulation-specific

For qualification, compare against the customer's incumbent pigment using the same resin, carrier, loading, equipment, specimen preparation and measurement settings. Production trials should additionally capture screen-pressure rise, torque, particle spots, batch consistency and final-product properties.

Technical statement Application data are provided for technical screening, not as a guaranteed commercial specification. Delivery and acceptance depend on mutually confirmed specifications and contract terms.

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Closing Summary

Choose pigments on application performance, not a single powder metric

Across PVC color and tinting, PE masterbatch processing, PP injection and PE film opacity, historical R-F 9156 tests provide a traceable application-oriented reference. Final selection requires validation in the customer's own formulation using current commercial material.

COLOR	PROCESSING	END USE
L*a*b* / whiteness	MFR / FPV	PP plaque / PE film

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Product delivery and quality acceptance are governed by the mutually confirmed technical specification, inspection documents and contractual terms.