VerdeChrome®

INDUSTRIAL COATINGS · 2026

Chrome Oxide Green for industrial coatings



Colour is the least interesting thing it does

Twenty years without fading. Stable above 800 °C. Inert in acid, alkali and salt spray. Near-infrared reflectance that serves both camouflage and heat management. That is why it ends up in heavy-duty, coil, high-temperature and military coatings.

Tint ramp with increasing TiO_2 addition

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VerdeChrome®

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How this booklet is written

Each chapter follows a formulator's questions: at what temperature does it fail, what does it contribute to a mid-coat, in which media does it stay stable, how much to add and at what PVC, which numbers are checked on acceptance. Every figure carries its test conditions.

Data: our product specifications and published measurements (LAMBDA 1050+, acrylic film, 300–2500 nm @20 nm).

What it is, and what it is not

C.I. Pigment Green 17 — a corundum-type metal oxide. Not an organic dye, not a chromate inhibitor.



α-Cr_2O_3 corundum lattice (schematic)



Pigment-grade powder (product photo)

Formula / index	**Cr_2O_3 · C.I. 77288**
Crystal / RI	**Corundum / 2.551**
Density / Mohs	**5.21 g/cm³ / 8.5–9**
Melting / boiling	**2435 °C / ≈4000 °C**
Oil absorption / heat	**20–25 g/100 g · 982 °C**
Light / weather	**8/8 · 5/5 (full & tint)**
pH (10% slurry)	**6–8**
Cr(VI) (pigment grade)	**≤10 ppm; ND micronized**
Batch colour	**ΔE ≤ 1.0**

Three limits to state up front

Not a corrosion inhibitor
It contains no Cr(VI) and forms no passivating film at the anode. Substituting it 1:1 for a chromate anti-corrosive usually costs a grade in salt spray — not because it is weak, but because the mechanism differs.

Not for whites or pastels
It can only take colour darker. In light systems it acts as a tinting component, normally below 1%; above that the shade turns grey.

Bounded gamut
Lattice chemistry caps chroma, so a high-chroma design green is out of reach. That needs an organic, at 150–200 °C service and 5–8 years outdoors.

One sentence to remember

It is a fired stone, not a dyed colour. That single fact gives every advantage — light-fast, heat-stable, chemically inert, non-migrating — and every drawback: hard, heavy, slow to mill, narrow gamut.

Against organic pigments, point by point

Heat stability	150–200 °C	**982 °C**
Outdoor durability	fades in 5–8 years	**decades**
NIR 780–2500 nm	strong absorber	**43–55%**
Hiding (RI)	moderate	**2.551, close to TiO_2**
Dispersion	easy	**Mohs 8.5–9, longer milling**

Six functions beyond colour

If colour were all you needed, an organic green would be cheaper. As a functional component it brings six more things.

01 Durability

8 / 8

Colour comes from d-d transitions in the lattice; UV photons cannot break it. Light 8, weather 5, full and tint.

Typical use: facades, bridges, wind towers

02 Heat

982 °C

Pigment-grade stable to 982 °C, melting at 2435 °C. Organic chromophores decompose from 200 °C and leave grey char.

Typical use: ducts, boilers, incinerators

03 Inertness

Class 5

Insoluble in water, acids, alkalis and solvents. Migration class 5 — it does not bleed into adjacent coats.

Typical use: chemical, marine, tanks

04 Hiding

n = 2.551

Refractive index second only to TiO_2; single-coat hiding at 20–25 µm.

Typical use: coil, one-coat systems

05 Abrasion

Mohs 8.5–9

At high loading it raises scratch and wear resistance — suited to floors and heavy-duty topcoats.

Typical use: floors, containers, machinery

06 NIR

54.65%

Measured reflectance over 780–2500 nm; solar reflectance 29.5% in the same film.

Typical use: cool roofs, camouflage

Typical ranges for pigment-grade product; every figure must be re-run in your own system at your PVC, binder and cure.

Choosing inside the cure window

Coil PMT 232–249 °C, powder 180–220 °C. Few green pigments survive that window unchanged.

In a PVDF system, resin sets the pigment ceiling

A Kynar® 500 system is built on roughly 70% PVDF resin. Pigment volume is limited by resin crystallinity, so chrome oxide green is typically added at 3–10%; beyond that you lose adhesion and flexibility without gaining weatherability.

The 30% figure belongs to another system

Thermosetting binders tolerate high loading. In mid-coats for severe corrosion, 20–30% is normal and the pigment acts as anti-corrosive filler, not colorant.



Automated coating line

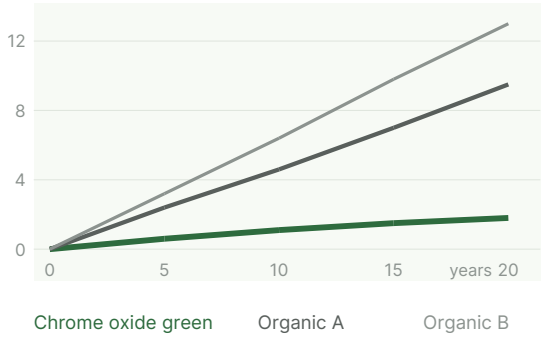
Three screening gates

Cure temperature
Coil PMT 232–249 °C, powder 180–220 °C.

UV dose
Light 8/8, weather 5/5 — no organic chromophore.

Acceptance
AAMA 2605: 10-yr Florida ΔE ≤5; ΔE <2 at 20 years.

ΔE versus exposure years (schematic)



Formulation notes

Loading	3–10% in topcoats, same band for coil and profiles. Charge by PVC, not weight — density 5.21 is 1.6× TiO_2.
Shade	Assess tints at 1:10 in TiO_2. Yellow shade 1061/1062, blue shade 1071–1073.
Settling	In high-load systems use 0.3–0.8% thixotrope and let down immediately after milling.
Gloss	Oil absorption 20–25 g/100 g; a narrow-distribution micronized grade holds full gloss, a broad one scatters.

An easily missed detail

Once a coil or powder shade is locked it cannot be changed — swapping pigment means re-running the customer's approval. What belongs in the specification is ΔE ≤1.0, not a shade number: the shade sets the start, ΔE decides whether it still passes three years later.

Where the pigment is also a filler

The largest outlet. Here it is not simply a colorant — it participates in protection as a filler.



Steel bridge structure (illustrative)

Typical structures and corrosivity

- Steel bridges C5
- Transmission towers C4
- Chemical tanks C5-M
- Port machinery CX
- Offshore wind C5-M
- FGD plant C5-I

Three roles, one pigment

Chemical inertness
No reaction with acid, alkali or salt spray, and no soluble ions released into the film.

Barrier filling
Fills pores and capillaries, lowering porosity; with mica or glass flake it lengthens the diffusion path for water and chloride.

Mechanical reinforcement
Mohs 8.5–9 at density 5.21 raises scratch, impact and wear resistance — visible on offshore and port equipment.

Loading depends on the layer

Topcoat	**5–10%**	colour and gloss retention, some durability
Mid-coat / primer	**15–25%**	anti-corrosive filler + barrier + wear
Severe-service systems	**≈30%**	pickling lines, chemical sumps

Division of labour with zinc-rich primers

Zinc in the primer provides cathodic protection; chrome oxide green takes no part in the electrochemistry. Set the cathodic protection level first, then optimise the barrier with the pigment. Done in the other order, the money goes where it earns nothing.

Three common failures, and where it stands

Blistering comes from osmosis and wants lower porosity — it helps. Rust spots come from insufficient cathodic protection — it cannot help. Delamination is inter-coat adhesion; being inert and non-migrating, it rarely makes things worse.

Colour is fixed in the oven

Powder and profile lines set the shade in the cure cycle, with no second chance.



Electrostatic powder application

Three process windows

Process	Cure	Loading	Key constraint
Coil coating	PMT 232–249 °C	3–10%	20–25 µm, single-coat hiding
Aluminium profiles	200–250 °C	3–10%	batch ΔE ≤2
Powder coatings	180–220 °C	5–12%	extrusion, reclaim reuse

Why powder suits it particularly

Powder coating is solvent-free with an even film, but it cures hot, a shade shift scraps the batch, and reclaim passes through the oven twice. Chrome oxide green does not volatilise, does not migrate, and survives two heat histories at 180–220 °C, so the colour risk in reclaim is far lower than with organics. That is why construction machinery, agricultural equipment, outdoor hardware and guardrails have used it for years.

Three control points on a coil line

Hiding
Film is only 20–25 µm. RI 2.551 gives single-coat hiding; too fine costs hiding, too coarse costs gloss.

Gloss
Oil absorption 20–25 g/100 g allows full gloss at high load; a broad distribution scatters.

Shade
Yellow shades 1061/1062, blue shades 1071–1073. Recalculate TiO_2 whenever you change step.

One note for purchasing

Specify ΔE ≤1.0 rather than a shade number: on this line the real cost is rework, not pigment.

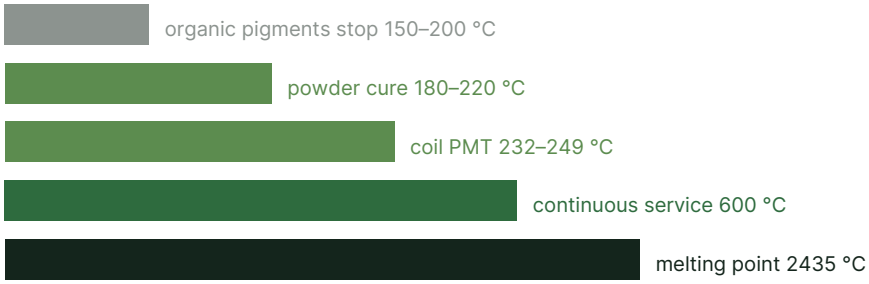
A pigment that melts at 2435 °C

No discolouration and no decomposition below 600 °C — a range where organic pigments have left the field.



Pigment-grade powder: no decomposition, no shift at 982 °C

Temperature ladder



Typical duties

Boiler shells	300–500 °C
High-temperature piping	300–600 °C
Metallurgical plant	400–600 °C
Engine exhausts	400–700 °C
Incinerator walls	500–900 °C

Two routes

Conventional: silicone or inorganic silicate binder + chrome oxide green + heat-resistant fillers, service 300–600 °C, oxidation and media resistance together.

For higher temperatures

Plasma-sprayed chromium oxide ceramic, good beyond 1000 °C — at that point it is no longer a pigment but the coating itself.

Set the binder before the pigment

High-temperature failures start in the binder: silicone resin decomposes and chalks above its limit, and no pigment rescues that. Read the binder's ceiling and the actual heating curve first, then choose the pigment. Once the two match, chrome oxide green is usually the part of the formula you stop worrying about.

Two field details

First, heating rate — a cold furnace brought up too fast lets the expansion mismatch tear the interface, regardless of pigment. Second, shutdown: thermal shock on cooling is often more destructive than the operating temperature itself.

07 · MARINE AND OFFSHORE

Seawater forgives no organic colour

Alkaline salt spray, wet–dry cycling, hard UV: the combination organic pigments handle worst.



Hull coating: green topcoat above the waterline, antifouling below

Zones and exposure

Atmospheric	decks, superstructure	UV + salt spray	topcoat 5–10%
Splash	platform legs, piles	wet–dry + hard UV	5–10% + flake mid-coat
Tidal	hull near waterline	immersion / drying	water-resistant system
Immersion	submerged structure	seawater + fouling	antifouling system
Port equipment	cranes, gantries	salt spray + industry	mid-coat 15–20%

How an organic green fails here

Marine atmosphere is an alkaline salt-spray environment. Organic chromophores hydrolyse slowly under alkaline conditions: the colour fades, chalks and turns grey. The failure advances from the surface inward and no amount of cleaning brings it back, whereas an inorganic oxide offers almost no reactive site. Paired with a glass-flake mid-coat, colour retention moves from 5–8 years to beyond 15.

The arithmetic of maintenance

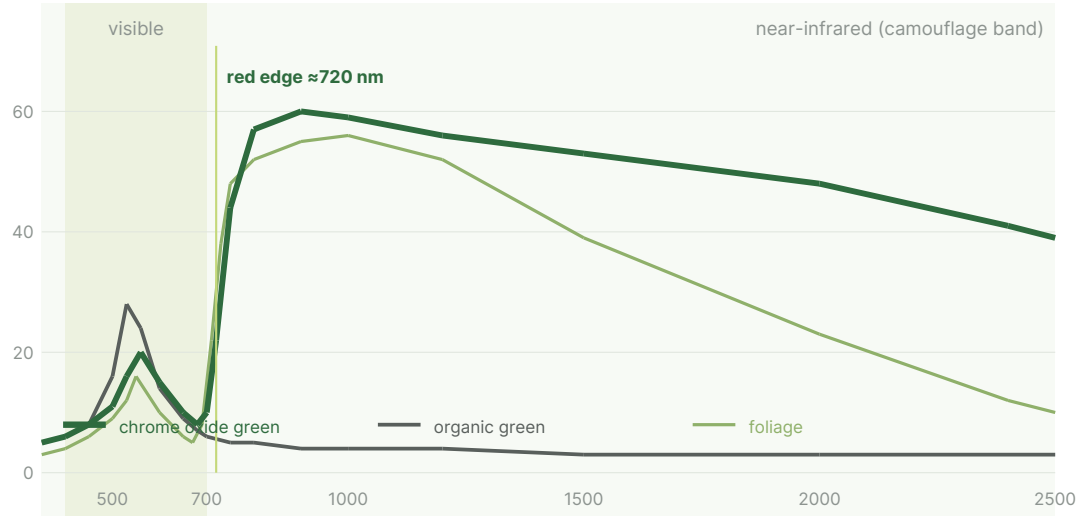
One offshore maintenance campaign typically costs more than twenty times the paint: dock or crane time, scaffolding, surface preparation, lost production. Economics therefore hinge on how many years you avoid touching it, not on the price per kilogram — which is why marine specifications write the colour-retention period as a hard number.

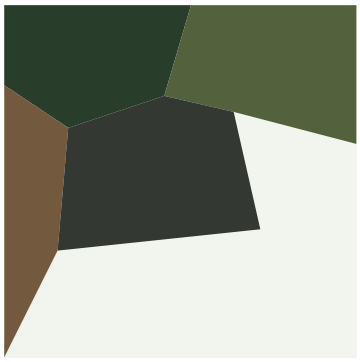
Recommended build

Zinc-rich epoxy primer + glass-flake epoxy mid-coat + chrome oxide green polyurethane topcoat. Each layer has one job: cathodic protection, barrier, colour retention.

Visible light fools the eye; NIR fools the sensor

Camouflage is accepted at 780–2500 nm, not in the visible — that is where night vision and seekers work.





Four-colour camouflage

Measured reflectance (acrylic film, LAMBDA 1050+, 300–2500 nm @20 nm)

Grade	Solar %	NIR %	Visible %
GREEN 1030	29.5	**54.65**	8.51
GREEN 1031	27.2	**51.69**	6.98
GREEN 1001	24.7	**42.96**	9.62

Cool-pigment family (NIR %)

TiNi yellow PY53	≥80
TiCr brown PBr24	70–85
FeCr black PBr29	60–70
Cr_2O_3 green	**43–55**

Only green with the right red edge.

Three conditions that must hold together

Red edge
Chlorophyll rises sharply at 700–730 nm; chrome oxide green has its edge in the same place — the physical reason it enters camouflage formulas.

NIR level
51.69% measured over 780–2500 nm, on the order of foliage. An organic green absorbs almost completely there and reads as a black hole to night vision.

Batch consistency
Military acceptance controls colour and reflectance per batch; inorganic pigments are far more stable batch to batch.

Formulation and acceptance

Camouflage green is rarely a single pigment: chrome oxide green sets the base, iron yellow or TiO_2 adjust lightness and the steepness of the red edge. Submit the spectral curve with the panel at sampling; accept against the curve, not the colour chip.

Five mainstream systems (1)

It rarely appears alone — always in a layer with a role. Each system below marks where it sits and how much.

1 Long-life heavy duty (steelwork / bridges / tanks)

20–25 yr / coastal 15–20

Topcoat	**3–8%**	Fluorocarbon or aliphatic PU: colour and gloss retention
Mid-coat	**10–20%**	Chrome-green modified epoxy MIO: labyrinth + barrier
Primer	—	Zinc-rich epoxy, Zn ≥80%: cathodic protection

One pigment, two roles: in the mid-coat it is a filler (coarse, high load), in the topcoat a colour component (micronized, low load).

2 Severe media (chemical, pickling, plating)

by media & temperature

Barrier layer	**20–30%**	High-filled vinyl ester / novolac epoxy + glass flake
Primer	—	Epoxy primer: adhesion and sealing

High loading belongs here — the binder is thermosetting and can carry it. Used on pickling hooks, sump linings.

3 Powder coatings (machinery / hardware)

cured at 180–220 °C

Topcoat	**5–12%**	Chrome-green polyester powder: no shift on cure, stable on reclaim
Primer	—	Epoxy powder: adhesion and corrosion
Pre-treatment	—	phosphating / passivation

One electrostatic pass. Used on excavators, loaders and outdoor guardrails.

Five mainstream systems (2)

High temperature and splash zone, plus a summary table of all five.

4 High-temperature (boilers / hot piping)

300–600 °C service

Topcoat	**15–25%**	Chrome-green ceramic topcoat (silicone / silicate)
Primer	—	Heat-resistant silicone primer

Beyond that, plasma-sprayed chromium oxide ceramic takes it past 1000 °C — no longer a pigment but the coating.

5 Splash zone (offshore platforms / ports)

15+ years maintenance-free

Topcoat	**5–10%**	Chrome-green polyurethane: no fade, no chalking
Mid-coat	—	Glass-flake epoxy: strong barrier
Primer	—	Zinc-rich epoxy: cathodic protection

Wet–dry cycling, hard UV and heavy salt spray at once — where colour retention earns its keep.

Five systems at a glance

System	Typical use	Chrome oxide green	Life / condition
Long-life heavy duty	bridges, tanks	**mid 10–20% / top 3–8%**	20–25 yr / 15–20 coastal
Severe media	chemical, pickling	**20–30%**	assessed by media
Powder coatings	machinery, hardware	**5–12%**	200 °C cure, 10–15 yr
High temperature	boilers, piping	**15–25%**	300–600 °C service
Splash zone	platforms, ports	**topcoat 5–10%**	15+ years

All five in one sentence

The topcoat relies on it for colour, the mid-coat for barrier, the primer for nothing at all — putting it in the right layer matters more than how much you add.

PVC, dispersion and substitution

Heavy, hard, slow to mill. Formulate with those facts, not against them.

Suggested loading (% of total formula)

System	Loading	Note
Weathering topcoat (FC / PU)	3–10%	charge by PVC, not weight
Heavy-duty mid-coat / primer	15–25%	shared with mica or glass flake
Severe-service systems	≈30%	vinyl ester / novolac epoxy
Coil and profiles	3–10%	film 20–25 µm
Powder coatings	5–12%	extrusion, reclaim reuse
High-temperature coatings	15–25%	silicone or silicate binder

Dispersion: four practical points

Milling
Mohs 8.5–9, so it mills slower than organics. Standard grades need 2–4 passes with 0.8–1.2 mm zirconia; micronized reaches full strength in one.

Wetting
Oil absorption 20–25 g/100 g. Wet in slowly before applying shear to avoid dry pockets.

Stability
Density 5.21 settles on standing. 0.3–0.8% thixotrope and immediate let-down after milling.

Shading
Cooler and greyer than phthalo — rebuild base colours before matching tints.

Substituting lead chrome green

Colour substitution, not anti-corrosion substitution. An approximate 1:1 swap works, but change three things: recalculate PVC at the higher density, re-check the undertone (cooler, greyer), and re-run salt spray.

Common problems and what to do

Settling / caking	charge by PVC + thixotrope; let down immediately after milling.
Low gloss	a broad distribution scatters light — switch to narrow micronized or mill longer.
Shade drift	select by hue angle: yellow 1061/1062, blue 1071–1073; recalculate TiO_2 on a step change.
Long milling	a pre-dispersed or micronized grade saves a pass for a slightly higher price.
Brittle film	PVC above CPVC — reduce PVC or add lamellar filler.

Which grade to specify

DELIKECOLORS pigment series — selected by particle size, shade and NIR performance.

Grade	D50	Typical use	Notes
GREEN 1000	1–2 μm	vivid emerald, industrial reference	balanced durability and cost
GREEN 1001	1.2–2 μm	water-borne architectural, facades	general workhorse
GREEN 1020	1–2 μm	powder coatings	economical, good durability
GREEN 1025	≤0.5 μm	solvent-borne industrial, high gloss	micronized, strong tinting
GREEN 1030 / 1031	1–2 μm	cool roofs / camouflage	NIR 54.65% / 51.69%
GREEN 1061–1073	≤0.5 μm	yellow to blue shade range	select by hue angle

Documents and compliance

Cr(VI)	≤10 ppm pigment grade, not detected (ND) micronized; measured value on every CoA.
Regulations	REACH, RoHS, GB 18666; the Jirong® suppression process limits Cr(VI) formation.
Colour	batch ΔE ≤1.0 against the registered standard, L* a* b* shipped with each lot.
Test methods	laser diffraction for D50, 45 μm residue, soluble salts, pH of 10% slurry, specified Cr(VI) extraction.
Food and toys	non-migrating, Cr(III) stable; confirm the specific end-use rule case by case.

Suggested validation sequence

200 g sample → check fineness, viscosity, hiding → spray panels for QUV and salt spray → compare ΔE side by side with the incumbent. Three steps before talking price beats comparing colour chips.

Three systems and their acceptance data

Industry-standard conditions and parameter ranges, shown to explain the selection logic — not project data.

System A

Steelwork of a sea-crossing bridge

ISO 12944 C5-M, 25-year target

- Build: zinc-rich epoxy primer + chrome-green modified epoxy MIO mid-coat (15–20%) + fluorocarbon topcoat (5–8%)
- Acceptance: 1440 h salt spray without blistering; QUV 2000 h ΔE <3; pull-off adhesion ≥5 MPa
- Logic: the mid-coat uses it for barrier and wear, the topcoat for colour — one pigment, two positions, two loadings

System B

Aluminium curtain wall, high-rise

AAMA 2605, PVDF system

- Build: chromate-free pre-treatment + PVDF topcoat (~70% resin + 3–10% chrome oxide green, 25±2 µm)
- Acceptance: 10-year Florida exposure ΔE ≤5; ΔE <2 after 20 years outdoors; chalk ≤8
- Logic: PMT 232–249 °C and twenty years of UV screen out everything but an inorganic green

System C

Three-colour military vehicle camouflage

GJB camouflage paints, visible + NIR

- Build: epoxy primer + polyurethane camouflage topcoat (GREEN 1031 + iron yellow + TiO_2)
- Acceptance: 51.69% reflectance over 780–2500 nm; batch ΔE ≤1.0; NIR deviation from foliage <5%
- Logic: red-edge position and NIR level matched at the same time, with batch colour locked to ΔE ≤1.0

The same three systems with an organic green

Sea-crossing bridge	visible fading within 5 years, early maintenance Cost: one repaint costs ≥20× the topcoat material
Curtain wall	yellowing at 250 °C — cannot leave the plant Cost: whole batch reworked, delay and claim
Military vehicle	NIR almost fully absorbed, thermal signature exposed Cost: fails acceptance

For a formulation review or a panel trial, send the binder, film build, cure schedule and acceptance criteria.

Matching film build, cure and pigment position

The same pigment in primer, mid-coat or topcoat calls for different loading, particle size and acceptance.

Typical parameters by layer

Layer	Dry film	Cure	Chrome oxide green	Main role
Topcoat	25–50 µm	ambient / 200–250 °C	3–10%	colour, weather, media
Mid-coat	60–120 µm	ambient / 80 °C stoved	10–25%	barrier, wear, filling
Primer	60–80 µm	ambient	usually 0	cathodic protection or adhesion
Single coat	80–150 µm	ambient	15–25%	corrosion plus colour

Wet film from dry film

WFT = DFT ÷ volume solids. At 45% VS and a 40 µm target, apply 89 µm wet. High-filled mid-coats run lower in solids, so a single pass tends to go on too thick — build in two. Topcoats applied too thick lose durability, because the resin fraction at the surface drops.

Choosing the application method

Air spray	general topcoats	fine atomisation, good appearance; 30–50% transfer
Airless	high-build mid-coats	thick single pass; suits high loading
Electrostatic	powder and profiles	high deposition; reclaim needs colour control
Roll / coil	pre-coated steel	line speed sets film; single-pass hiding
Brush / roller	touch-up and site	small areas; watch film uniformity

Defects and what to change

Sagging	film applied too thick or over-thinned	two passes, control wet film
Pinholes / craters	contaminated substrate or poor deaeration	pre-treatment and defoamer
Orange peel	poor atomisation or high viscosity	adjust pressure and thinning
Poor adhesion	PVC too high or weak pre-treatment	lower PVC, re-phosphating

A common misconception

Adding mid-coat thickness for corrosion resistance can backfire: internal stress and trapped solvent drive cracking and blistering. Fix the film band first, then adjust pigment loading inside it.

Every property has a test method

Naming the method in a specification beats naming a number — a figure without conditions is another person's figure.

Properties and standards

Colour / ΔE	spectrophotometer, D65/10°	GB/T 11186 / ISO 7724	ΔE ≤1.0 batch
Hiding power	contrast ratio	GB/T 23981 / ISO 6504-1	≥0.90 (white)
Salt spray	neutral NSS	GB/T 1771 / ISO 9227	1000–1440 h no blister
Accelerated ageing	QUV / UVA-340	GB/T 14522 / ASTM G154	2000 h ΔE <3
Adhesion (pull-off)	hydraulic pull-off	GB/T 5210 / ISO 4624	≥5 MPa or cohesive
Chemical resistance	immersion / wipe	GB/T 1763 / ISO 2812	per media class
NIR and TSR	spectrophotometer 300–2500 nm	ASTM E1980 / GB/T 25261	curve + 3-band values
Cr(VI)	specified extraction	EN 15205 / GB/T 23994	≤10 ppm; ND micronized

What we can send

CoA, every batch
Cr_2O_3 content, D50, residue, soluble salts, pH, moisture, Cr(VI), colour

Spectral curve
measured 300–2500 nm with solar, NIR and visible fractions

Sample and panel
200 g sample; laboratory spray panels on request

Compliance statements
REACH / RoHS / GB 18666 declarations

Why test conditions must be stated

Substrate cold-rolled steel / aluminium / galvanised — adhesion and salt spray differ markedly

Film build 20 µm versus 45 µm of the same formula can double salt-spray life

Cure 7 days ambient versus 30 min at 80 °C changes crosslink density and media resistance

Surface gloss and roughness affect reflectance measurement; NIR data especially

Acceptance advice

Confirm fineness, viscosity and hiding on a small sample, then spray panels for ageing and salt spray, and finally compare ΔE side by side with the incumbent. Keep that order: a colour-chip comparison only rules out obvious mistakes, not three-year differences.

Traceable from raw material to pallet

Batch consistency is an inorganic pigment's advantage — provided every batch is tested and retained.

Batch numbering and retention

Each batch carries one number: production year-month + line + sequence (e.g. 2611-A-07). That number maps to one CoA, one retained sample and one release record. Samples are kept for two years, so any dispute can be re-tested against the original.

Release testing

Chemistry
Cr_2O_3 ≥99% (micronized ≥98.5%), Fe_2O_3, SiO_2, soluble salts ≤0.70%

Physical
D50 and distribution, 45 µm residue ≤0.30%, moisture ≤0.30%, pH 6–8

Colour
L* a* b* against the registered standard, ΔE ≤1.0

Compliance
Cr(VI) migration by solvent extraction — ≤10 ppm pigment grade, ND micronized

Packaging and logistics

Standard	25 kg paper-plastic composite bag with PE liner
Bulk	500 / 1000 kg FIBC with discharge spout
Pallet	40 bags per pallet, stretch-wrapped with corner boards
Storage	dry, out of direct light, not with acids or alkalis; 2 years unopened
Export	FOB / CIF, with MSDS and transport assessment

Controlling hexavalent chromium

Local high temperatures during sintering and milling generate traces of Cr(VI). A suppression process limits its formation, migration is measured on every batch, and third-party testing can be arranged to your nominated laboratory.

What a buyer should ask for

A CoA per lot (not an estimate), the Cr(VI) method used, the registered colour standard, and a retained sample period — those four answers separate a pigment supplier from a trader.

Twelve questions we are asked most

Ordered by frequency. Answers give numbers and methods rather than adjectives.

01 **Can it replace lead chrome green?**
Colour and barrier, yes; inhibition, no. Cathodic protection has to come from zinc-rich or a dedicated inhibitor — start with 500 h salt spray and a cross-cut adhesion comparison.

02 **Does it interfere with organic greens?**
No reaction, but blending pulls down durability and NIR. In tints where the organic fraction dominates, the organic still sets the fade.

03 **Why is tinting strength lower?**
Inorganic hiding comes from refractive index and particle size, not absorption. Dark systems barely notice; in light systems it is a tinting component.

04 **It settles badly at high loading — what now?**
Density 5.21 is 1.6× TiO_2. Use 0.3–0.8% thixotrope, charge by PVC, and let down immediately after milling.

05 **Milling takes too long. A finer grade?**
Yes. Micronized (D50 ≤0.5 µm) reaches full strength in one pass; the cost is price and a re-check of hiding and gloss.

06 **How tight can batch colour be?**
ΔE ≤1.0 against the registered standard, with L* a* b* shipped. Tighter is possible if you register your own colour standard.

07 **Can it run continuously at 800 °C?**
The pigment is stable to 982 °C, but system life is set by the binder. Silicone systems run 300–600 °C; beyond that, inorganic binders or sprayed ceramic.

08 **Is the NIR data measured or calculated?**
Measured: acrylic film, defined substrate, 300–2500 nm at 20 nm intervals, full curve and three-band values in the report.

09 **A touch of green in a light formula?**
Possible, usually below 1%. It pulls the shade grey-green and forces a TiO_2 recalculation; dark formulas are unaffected.

10 **Can reclaim powder be re-used?**
Yes, though it carries a second heat history. Chrome oxide green tolerates two passes at 220 °C, so colour risk stays below that of organics.

11 **Why does D50 vary slightly between batches?**
Milling and classification are statistical. Holding D50 inside the declared band is the spec; residue and distribution are the real controls.

12 **Can you match our colour standard?**
Yes — send the chip or L* a* b*, we register it and measure each batch against it.

Not on the list? **sales@chromeoxidegreen.com**

Send the formula, substrate, film build and acceptance criteria — the answer comes back as data and method.

A dark surface is not necessarily a hot one

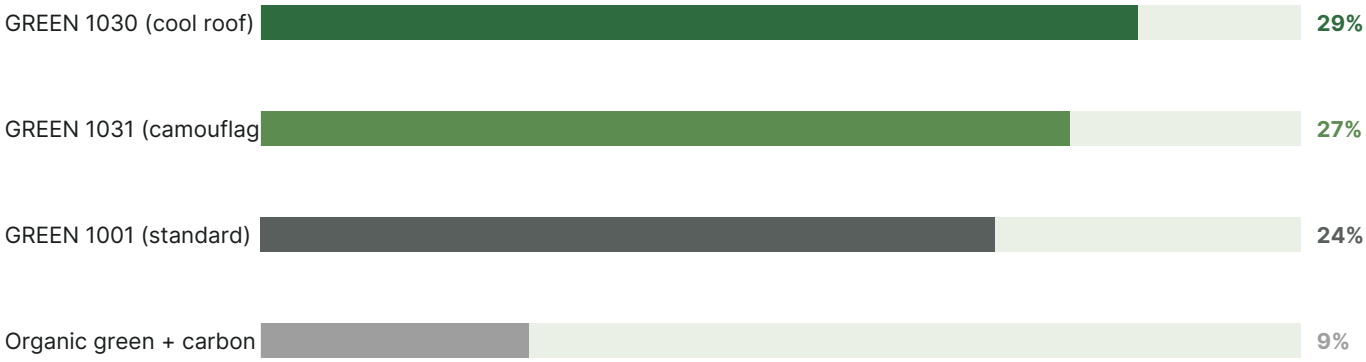
About half of solar energy arrives as near-infrared. A surface can look dark and still reflect it.

Solar spectrum



UV 3% Visible 44% Near-infrared 53%

Measured solar reflectance, TSR (%)



Translated to a roof

At SR 0.27–0.30 the peak surface temperature runs 10–25 °C below a conventional dark roof, top-floor cooling load drops 10–20%, and membrane life extends by 5–10 years. Every 10 °C off the surface cuts the heat flow inward by roughly a third.

How to make it work

NIR reflectance belongs to the whole system: primer colour, film build and the other pigments all take part. Measure finished TSR to ASTM E1980 or GB/T 25261 rather than adding up pigment data sheets.

The edge of the claim

The CICP family contains pigments that reflect more: titanium nickel yellow ≥80%, titanium chrome brown 70–85%, iron chrome black 60–70%. The case for chrome oxide green is cost, top-tier durability, a natural shade, and meeting camouflage and longevity requirements at once.

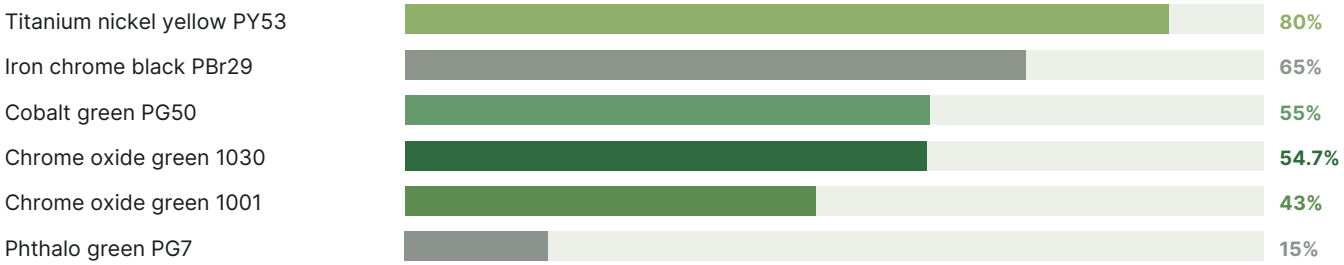
All called "green", none at the same price

Six common green pigments in one table, compared on heat, durability, NIR, hiding and cost.

Six properties side by side

Pigment	Heat	Durability	NIR	Hiding	Cost
Chrome oxide green PG17	**982 °C**	**8/8 · 5/5**	**43–55%**	**high**	**medium**
Phthalo green PG7	≤200 °C	7–8	≈15%	medium	low
Azo / lead chrome green	≤180 °C	4–5	low	medium	low
Cobalt green PG50	≈1000 °C	excellent	50–55%	medium	high
Titanium nickel yellow PY53	≈1000 °C	excellent	≥80%	medium	very high
Iron chrome black PBr29	≈1000 °C	excellent	60–70%	high	high

Near-infrared reflectance (780–2500 nm)



Three questions decide it

Heat ceiling coil and powder 200–260 °C, high-temperature systems 300–600 °C. Anything below the window is out.

NIR target whether TSR or spectral matching is required. Above 60%, chrome oxide green cannot carry it alone.

Gamut a high-chroma design green needs an organic; the price is durability and heat resistance.

In one line

If all three greens qualify, take the cheapest. If one property fails, only the inorganic is left — that is the reason it exists.

Four sites

From a bridge to a hull, from a powder line to a coil line — one pigment, four working lives.



Steelwork of a sea-crossing bridge

Primer for cathodic protection, mid-coat for barrier and wear, topcoat for colour — chrome oxide green appears twice, in two roles.



Hull and marine structures

Green topcoat above the waterline faces salt spray and UV; an inorganic pigment does not hydrolyse, so the colour does not grey out with service.



Electrostatic powder coating

Two heat histories at 180–220 °C including reclaim, with no volatiles and no shift — the default for outdoor green powder topcoats.



Automated coating line

Coil and profiles are fixed at PMT 232–249 °C; there is one shading window, and film build sets hiding and gloss.

Illustrative scenes; each system must be designed against its own exposure, film build and acceptance criteria.

Terminology and design shortcuts

The terms most often confused in technical meetings, and three calculations used daily.

Terms

Pigment volume concentration	**PVC**	pigment volume ÷ total volume; sets gloss and protection
Critical PVC	**CPVC**	above it the film turns porous and protection collapses
Dry / wet film thickness	**DFT / WFT**	WFT = DFT ÷ volume solids
Volume solids	**VS**	volume fraction of film-former in the wet paint
Near-infrared reflectance	**NIR**	reflectance 780–2500 nm; the core metric for cool pigments
Total solar reflectance	**TSR**	weighted reflectance 300–2500 nm; used for cool-roof acceptance
Colour difference	**ΔE**	combined difference in L* a* b*; ≤1.0 is hard to see
Hexavalent chromium	**Cr(VI)**	the regulated valence; ≤10 ppm at pigment grade
Migration	**—**	tendency of a pigment to bleed from the film; class 5 is best

Three calculations

Wet film — **WFT = DFT ÷ VS × 100**
40 µm DFT at 45% VS → 89 µm wet

PVC — **PVC = V(pigment) ÷ (V(pigment) + V(binder))**
by volume, never by weight

Pigment mass — **W = PVC × ρ(pigment) × V(film)**
density 5.21 g/cm³, 1.6× TiO_2

Selecting in three steps

1. **Set the temperature window** — coil 230–260 °C / powder 180–220 °C / high temperature 300–600 °C
2. **Name the weak link** — durability, media, abrasion or NIR — which one is the hard requirement
3. **Fix grade and loading** — pick the band by D50 (0.5–2 µm), set the load by PVC

Reference standards

ISO 1247 (pigments) · ISO 7724 (colour) · ISO 9227 (salt spray) · ISO 4892-3 (QUV) · ISO 4624 (adhesion) · ASTM E1980 (TSR) · GB/T 25261 (reflective roof coatings)



VerdeChrome®

Colour fades.
Structure doesn't.

So we do one thing: keep the ΔE a single digit twenty years from now.

Products

DELIKECOLORS pigment series
GREEN 1000 – 1073, D50 0.5–2 µm
NIR grades 1030 / 1031

Technical support

formulation review and panels
spectral curves and measured TSR
batch ΔE ≤1.0 with L* a* b*

Contact

sales@chromeoxidegreen.com
www.chromeoxidegreen.com

Figures are product values or industry norms; every formula, loading and acceptance criterion must be re-verified in your own system.

Photography: VerdeChrome product shots; hull, powder and coil scenes are licensed samples; bridge image public licence (Pexels).