Multiple choice:

Why China's new paint rules leave waterborne versus powder to the builders' margins

Container coatings. China's new hazardous-substance limits for industrial coatings took effect on 1 June, owners report early failures of waterborne paint, suppliers read China's new standard two ways, and the builders being asked to pay for powder lines have just reported sharply lower margins on standard boxes.

By Rachael White

GB 30981.2-2025, "Limits of harmful substances in coatings, Part 2: industrial coatings", has applied since 1 June 2026. The State Administration for Market Regulation and the Standardization Administration of China issued it on 30 May 2025. It replaced five earlier standards, among them the 2020 standard on industrial protective coatings and the 2019 standard on marine coatings. The Ministry of Transport approved JT/T 810.2-2026, a standard for waterborne container coatings, on 5 January 2026. It took effect on 1 May. China builds about 95% of the world's containers, by the Container Owners Association's (COA) count, so its coating rules are the specification every owner inherits.

The industrial-coatings standard covers factory and on-site painting of metal, wood, plastic, concrete, composite, glass and ceramic substrates. It adds product classification and hazard marking to the substance limits, according to a summary by the Chinese compliance consultancy CIRS Group. The limits on volatile organic compounds (VOC) for container coatings did not change, as a drafting unit of the standard explains below. The compliance work is the testing and documentation now required for each product.

Failures inside five years

In June-July this year, the COA surveyed the industry on the performance of waterborne coatings. It summarised the results on 12 August. The 38 respondents were owners, lessors, surveyors, manufacturers and coating suppliers. Two-thirds of them, 65%, rate current coatings worse than the solvent-borne systems in use before 2017, when the China Container Industry Association's members moved to waterborne paint under a VOC convention agreed with government in 2016. More than half, 55%, report first failures within five years. Half support "a fundamental industry rethink". Only 22% rate the condition of current coatings good or very good, against 30% poor or very poor.

Peeling, blistering and flash rust are the dominant defects, most often on exterior panels and then on interior panels. Respondents link them to insufficient drying and curing, high line speed, humidity and temperature control, surface preparation, and inconsistent compliance with the paint supplier's requirements. The COA describes the commercial evidence as "directionally serious but incomplete": more repairs, shorter expected life and lower resale value are widely reported, without agreed numbers behind them. The survey finds no agreed replacement technology. Solvent-based high-solids and powder coatings attract the most interest, each with capital, environmental or application constraints of its own.

UNIT45, the Rotterdam company that builds only 45ft palletwide containers to its clients' requirements, specifies through its builders. "Coating selection is essential for container durability, corrosion protection and long-term performance, with requirements depending on operating conditions, intended use and applicable standards," said



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JB Koolen, managing director of UNIT45. "UNIT45 works closely with manufacturing partners to ensure appropriate coating solutions and consistent quality." Repaint intervals "vary according to usage, environmental exposure and container condition". Asked whether anything in 2026 had changed those requirements, Koolen said: "Our priority remains long-term reliability and performance rather than short-term market price fluctuations."

What the suppliers say

Mega P&C, the Shanghai company that describes itself as the world's second-largest container coatings supplier, reads GB 30981.2-2025 as a push. The standard "will drive enterprises to upgrade towards waterborne, powder, high-solids and other environmentally friendly technologies", the company wrote in its half-year report, in translation, and the new standard "covers the whole industry chain". The same report states that the company has developed and tested powder coatings for containers in addition to its waterborne range, and that "the conversion of the powder coating production line is currently being implemented".

"There is no single coating cost per container that makes powder the right choice for every factory."

Jotun Coatings (Zhangjiagang) is listed among the latest standard's drafting units, and reads the text differently because the VOC limits did not move. "As there are no material changes to VOC limits for container coating systems, we do not believe that GB 30981.2-2025 itself will trigger a broad shift from solvent-borne coatings to water-borne, powder or high-solids technologies in the container industry," said Amanda Xu, customer group manager, infra-industrial, at Jotun. The standard's purpose, in Jotun's view, is to "strengthen the control of hazardous substances in industrial coatings and enhance environmental and occupational safety requirements", and its main changes against GB 30981-2020 are "refined testing and compliance requirements for restricted substances" and "enhanced regulatory consistency and product safety management across industrial coating applications". Jotun has completed testing and obtained compliance reports for the products it supplies to the energy-storage container and related industrial markets, Xu said. "The transition toward alternative technologies has been evolving for many years and is influenced by a combination of environmental policies, manufacturing efficiency, performance requirements and total cost considerations."

The Shanghai supplier describes the direction of the whole industrial coatings market. Jotun describes what a container paint line has to change on 1 June, which for VOC limits is nothing. The choice of waterborne or powder is being made on other grounds.

PPG wrote on 16 October 2025 that the container industry's move to powder "began in the mid-2010s" but that "many manufacturers, especially those in China, are still loyal to waterborne systems". The company puts powder's transfer efficiency at up to 95%, against about 60% for liquid systems, and says powder needs up to 40% less material to coat a part. It gives cure times of about 30 minutes for standard powder and 15 to 20 minutes for low-bake formulations.

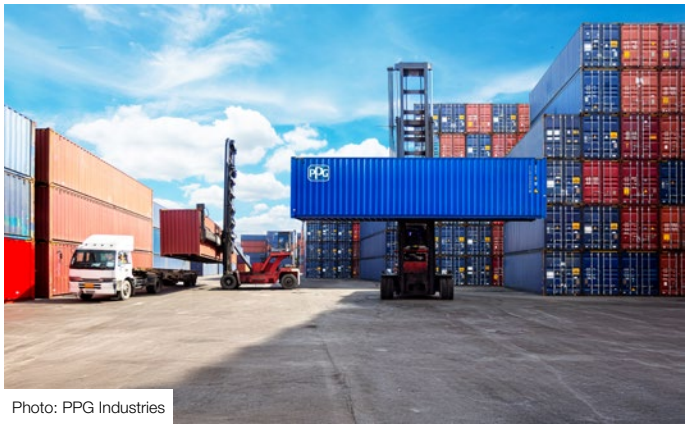

Photo: PPG Industries

In China the reference line is at CIMC's Xinhui plant. In August 2022 the China Container Industry Association and CIMC's container division held a promotion event there for what the association called the industry's first fully automatic whole-container powder coating trial line, which it said had passed repeated trial and batch production. The association put the line's labour saving at more than 90% against a conventional paint line and said the process produced no wastewater, waste gas or solid waste.

PPG does not disclose customer-specific production or trial figures, said Tom McAfee, global segment manager, transportation, at PPG. The case for conversion, he said, starts with quality and consistency. "Waterborne coatings rely on controlled water evaporation during film formation. Environmental conditions, such as ambient heat and humidity will impact that control. If application and drying conditions are not properly managed, coating quality can be affected." Powder "requires a precisely designed line and tightly controlled application and curing conditions. When these conditions are maintained, the process can deliver consistent coating quality and predictable performance, giving owners greater confidence to support a change."

The margin on a box

"For manufacturers, however, moving to powder remains a significant investment decision, particularly when an established waterborne line is already in place," McAfee said. "It involves changes to application equipment and ovens, integration into production, and customer qualification. These requirements can influence the timing of a conversion, even where the quality benefits are recognised."

The conversion McAfee describes is paid for out of what a builder earns on a standard container, and between January and June that earning shrank. Singamas sold a standard 20ft dry freight container for an average of US$1,613 in the six months to June, against US$1,845 a year earlier, a fall of 12.6% (*CM* calculation). Volume fell harder, to about 43,000 teu of dry freight and ISO specialised containers from 84,000 teu. The dry container industry "continued to face challenges from production overcapacity, which kept dry freight container prices under pressure", Singamas said in its results of 25 August.

CIMC, the largest builder, sold more boxes and made far less on each. Dry container sales reached 1,138,500 teu, up 1.1%, and container manufacturing revenue of US$3.3bn was up 0.9%. Net profit from the segment was US$41m, down 81.2%, which CIMC attributed in its interim report to lower prices for standard boxes and to exchange rates. COSCO SHIPPING Development, the second-largest builder, sold 958,600 teu, 13.4% more than a year earlier, for revenue from container manufacturing of US$1.7bn, up 2.3%. Revenue per teu therefore fell by about 9.7% (*CM* calculation).

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The supplier converting its line reported the same squeeze. Mega P&C's average selling price for marine-equipment coatings fell 12.4% year-on-year, to RMB13,881 (US$2,080) a tonne.

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Volume in the segment fell 6.9% and revenue fell 18.5%, to US$74m. The company named the container business as the reason its group profit fell, and its purchase price for curing agents rose 18.6% between the first and second quarters, according to its operating data announcement of 22 August.

The builders' own capital is going to the containers that still pay. Specialised and customised containers produced 63.6% of Singamas's manufacturing revenue over the half, against 40.2% twelve months before, and more than 76.1% of that came from containers for energy storage systems (ESS). Teo Siong Seng, chairman, said the dry freight focus would be "on cost control and operational efficiency", while "capacity expansion for customised containers will remain a key enabler of Singamas's transformation". COSCO SHIPPING Development's special container sales rose 117.3% by volume, and its half-year report names energy storage containers, modular housing units, ro-ro frames and planting containers as the growth products. A builder whose capital goes to ESS lines has less for a powder oven on the dry freight line.

Whether the squeeze lasts is the question the third-quarter reports will answer. CIMC told a meeting of 16 institutions on 30 September, in an investor-relations record dated 9 October, that order scheduling for the second half was full and that prices had improved quarter-on-quarter. The full-year result would stay under pressure against last year's high base and rising material prices, it said in a translated statement. Christian Roeloffs, co-founder and CEO of Container xChange, the Hamburg trading and leasing platform, said factory prices in China "did start to increase again towards the end of the first half of 2026", so "the half-year averages may mask some of that more recent movement". Mega P&C's marine-equipment coatings revenue has risen for two quarters from a low of US$28m in the fourth quarter of 2025, reaching US$42m by the second quarter with average selling prices 2.6% above the first quarter's. The third-quarter reports from CIMC, COSCO SHIPPING Development and the coatings supplier are due before 31 October.

On the price at which powder pays, McAfee said: "There is no single coating cost per container that makes powder the right choice for every factory.

The operating costs of the powder line and the initial investment required to convert the line are two separate considerations, and both affect the business case." Material savings from transfer efficiency and reclaimed overspray "alone do not establish the payback period for a conversion".

Curing "is an important consideration, but oven time alone does not determine its impact on production", and whether curing capacity or another factor becomes the main constraint "will depend on the factory".

Under the conditions PPG assessed, powder cut the carbon footprint of coating materials by 50%, of transport by 71% and of process waste by 99% per teu compared with waterborne coatings, McAfee said. Application energy and its footprint were 52% higher "because of greater application energy requirements and a higher curing temperature". The modelled net result was a 64% reduction across the assessed stages. "That is an environmental result, rather than a financial payback calculation."

Jotun supplies "the specialized container market, including energy storage system (ESS) applications, which represent one of our key strategic growth segments", Xu said, and has "achieved strong and consistent sales growth in this market" over the past three years. Customers for ESS and other specialised containers "typically prioritize corrosion protection performance, operational reliability and lifecycle economics", and Jotun's systems "can meet corrosion protection design requirements exceeding 25 years when specified appropriately".

No single winner

The regulations do not specify the type of coating a container should carry, only the limits on hazardous substance content. And the builders who would pay for a new line earned much less per standard box between January and June. McAfee advises a factory weighing the switch to run its own numbers. "For manufacturers considering powder, the next step is a facility-specific assessment of investment, operating requirements, and expected production performance."

Xu expects no single technology to win. "We believe water-borne, high-solids and powder coating technologies will continue to develop alongside conventional technologies. However, market adoption will ultimately depend on a balance of performance, application practicality, sustainability objectives and total lifecycle cost rather than regulatory compliance alone. Therefore, we expect multiple coating technologies to coexist, with customers selecting the solution that best fits their operational and economic requirements."

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