



A High-Performance Waterborne Coating System to Protect Steel Valves for an Egyptian Oil Storage Facility

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The PetrolValves Group has chosen a coating system consisting of waterborne paints produced by the Italian company Ti.Pi.Ci. Technology in Protective Coatings for the anti-corrosion treatment of 140 valves for an Egyptian oil storage facility.

In this article, we would like to highlight the strategic initiatives undertaken by the PetrolValves Group, a leading provider of flow control solutions for the energy industry, specialising in the engineering of valves, actuators, and control systems. For some time now, the PetrolValves Group has been placing particular emphasis and interest in investing in the continuous improvement of its business through the adoption of innovative technologies and environmentally

friendly protection systems that protect the health of people and the environment and meet the highest safety standards.

A very effective choice in the field of anti-corrosion treatments for the flow control sector are waterborne, high-build, long-lasting, and overcoatable coatings that, in addition to the corrosion protection of steel substrates exposed to marine environments, are characterised by non-flammability, which is crucial for the operational aspects of

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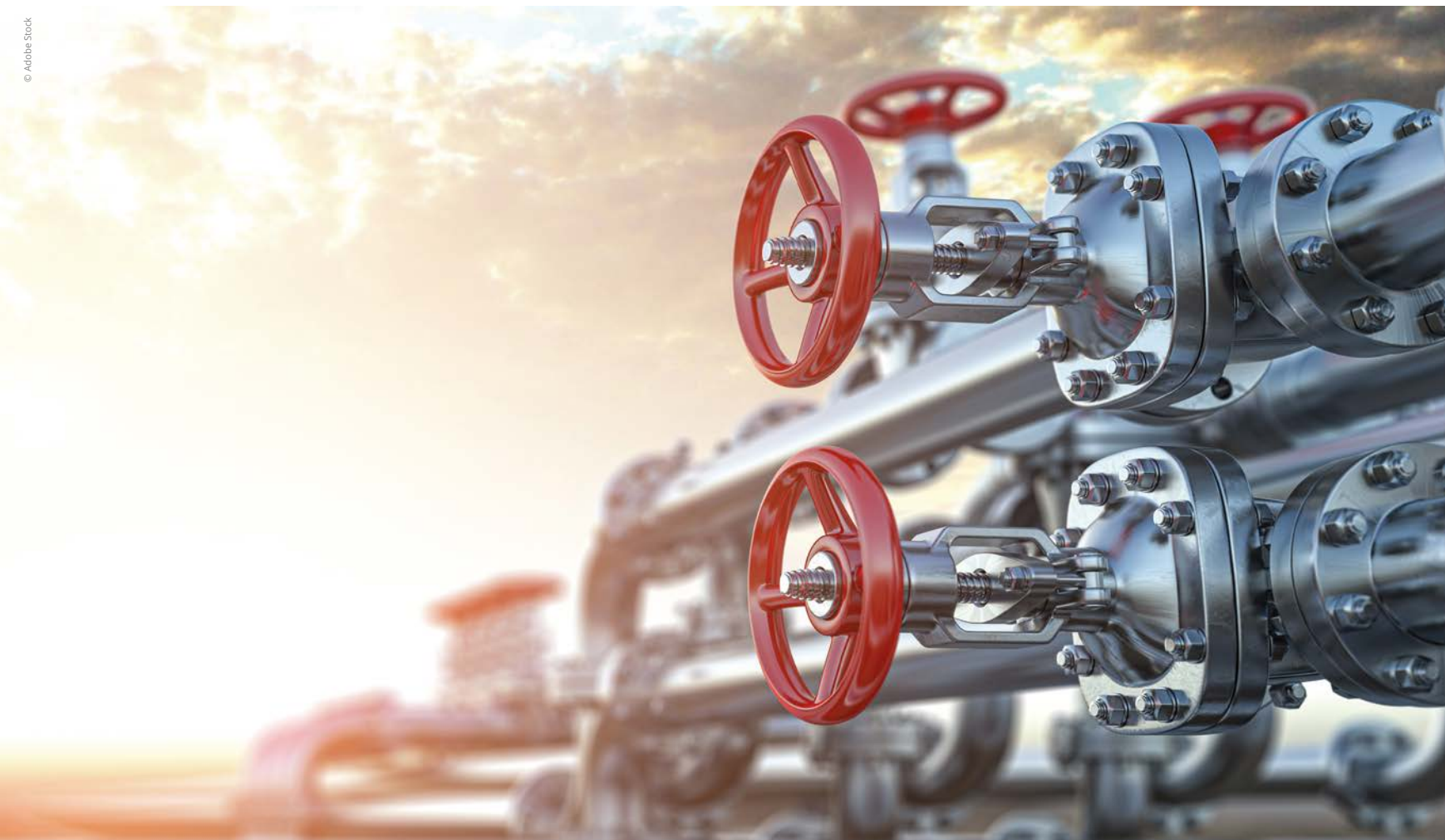


Table 1: System 1 required in the specifications.

SURFACE PREPARATION	Sandblasting to grade Sa 2.5
ROUGHNESS PROFILE	50 – 75 μ
PRIMER	Zinc-rich epoxy coating
DFT	75 μ
INTERMEDIATE COAT	High-build residue, epoxy coating with micaceous iron oxide
DFT	200 μ
TOP COAT	Polyurethane coating
DFT	50 μ
TOTAL DFT	325 μ

Table 2: System 1 composed by selecting qualified products.

SURFACE PREPARATION	Sandblasting to grade Sa 2.5
ROUGHNESS PROFILE	50 – 75 μ
PRIMER	HYDROGUARD Zinc 78
DFT	75 μ
INTERMEDIATE COAT	HYDROGUARD HB MIO
DFT	200 μ
TOP COAT	HYDROTHANE
DFT	50 μ
TOTAL DFT	325 μ

paintshops. Waterborne coatings developed specifically for use in the protective sector are now well established in both new construction and maintenance projects. Ti.Pi.Ci.'s technology for this specific purpose has been perfected over the last few decades and it has already achieved considerable successes, among which the experience of the PetrolValves Group stands out.

The specifications of the international order

This international order concerned the supply of 140 carbon steel valves intended for an oil storage facility in Egypt.

The specifications for the selection of the protective system was drawn up by a well-known Egyptian engineering company and the protective system required was System 1 (Table 1).

The 140 valves produced by the PetrolValves Group were intended for exposure in a C5 environment, as defined in the standard ISO 12944-2:2017. Consequently, the protective system was designed by selecting high-performance waterborne products that belong to coating systems qualified according to the strictest international standards, such as ISO 12944:2017 and NORSOK M-501 Rev. 6 (Table 2).

Surface preparation and coating were carried out by System Car Srl (Carpaneto Piacentino, Piacenza, Italy), a company established in 1987 that extends over an area of about 100,000 m² (of which about 50,000 m² are covered) and currently employs more than 200 people. The work was carried out on two types of parts: the primary component, composed of the valve and the bracket, whose function is to connect the valve to the secondary component, that is, the actuator. The



Valves awaiting surface treatment.



The detail of an assembled bracket.

function of the actuator (supplied already coated with an unknown protective system) is to “actuate” the valve, thus enabling the flow of fluid in the storage system to advance or stop.

Surface preparation

The surface preparation started by visually examining each valve, checking for any surface defects such as sharp edges, non-optimal bending radius, and so on. Then, the surfaces were cleaned to remove any oils and greases remaining after the testing and assembly operations carried out in the production departments of the PetrolValves plant in Gerbido (Piacenza).

This crucial preliminary phase was then concluded by checking for the presence of soluble salts using the Bresle test. The subsequent sandblasting operations were performed using garnet abrasive, thus obtaining a medium (grit) roughness profile. The coating phase was then started.

Coating of the 140 valves

First layer

As mentioned, these valves were intended for a structure exposed in a C5 environment, as defined in the standard ISO 12944-2017. It is

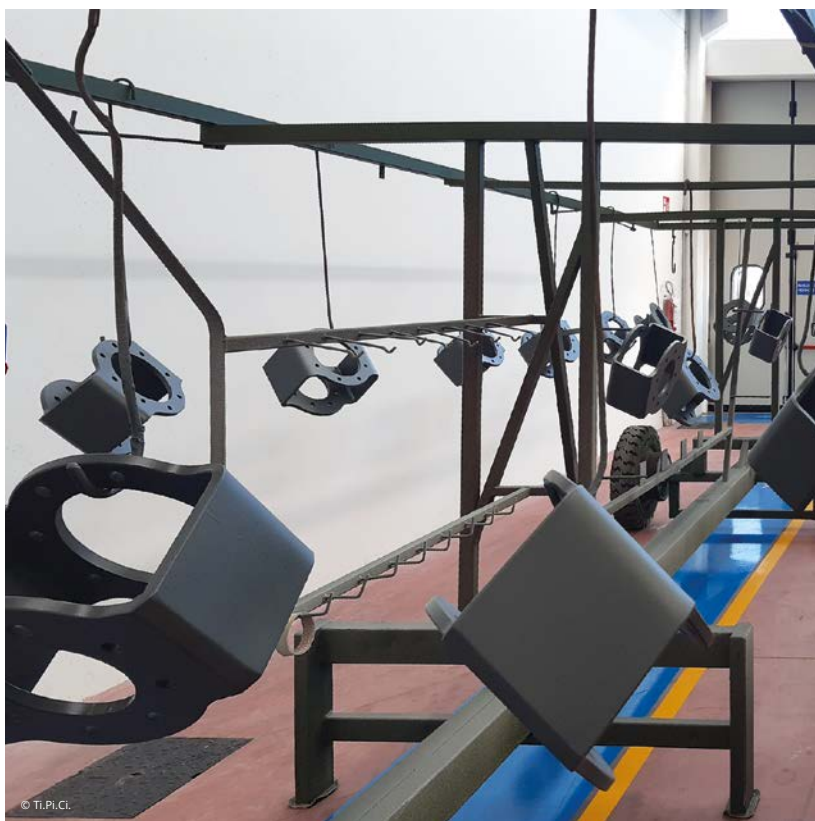
therefore understandable that the Egyptian company owning the plant asked for a zinc-rich epoxy primer to be applied. The product chosen by Ti.Pi.Ci. to meet this need was HYDROGUARD Zinc 78.

This is a fast-drying, two-components, waterborne, zinc-rich epoxy primer with 78 (±2)% zinc on dry film in accordance with the SSPC Paint 20 Level II regulation, supplied with ASTM D520 Type III zinc dust. It was chosen among all zinc-rich epoxy products offered by Ti.Pi.Ci. because it can be used as a primer in a variety of systems qualified according to ISO 12944:2017 for exposure in C5 environments, as well as in NORSOK M-501 qualified systems and for structures immersed in salt water (System 7B).

Second layer

The second layer required by the specifications was a high-build epoxy intermediate coat formulated with micaceous iron oxide (MIO). Since a thickness of 200 microns in a single layer was required, the choice fell on a product from the HB (High Build) range.

This unique waterborne product line is currently one of the highest technological expressions of the know-how of Ti.Pi.Ci. HYDROGUARD HB MIO is a waterborne epoxy primer-intermediate coat with a dry residue by volume of 74%, which can be applied in a single layer up to 250 dry



Components treated with the waterborne, zinc-rich epoxy primer HYDROGUARD Zinc 78.




The detail of some brackets following the application of the first layer.

microns. Another distinguishing feature is its high percentage of MIO on dry film, around 30%.

Third layer

The third and final layer required by the specifications was a polyurethane topcoat in the RAL 7035 (Light Grey) colour. In this case, the HYDROTHANE finish was selected, a waterborne polyurethane coating with a glossy appearance. The range of finishes formulated by Ti.Pi.Ci. is very wide-ranging and it offers to customers and international engineering companies many different solutions, in terms of both gloss (and therefore aesthetics) and chemical and physical characteristics (as in the case of fluorinated finishes). HYDROTHANE represented the beginning of the entire range and it was selected for this project not only to enhance the final aesthetics of the valves, but also and above all for its excellent chemical, physical, and mechanical characteristics. This topcoat is in fact used in numerous systems qualified according to the ISO 12944:2017 standard for exposures in CX environments, as well as in NORSOK M-501 qualified systems, both in the System 1 and for structures immersed in salt water (System 7B).

A new environmental vision for the oil industry

For over twenty-five years, Ti.Pi.Ci. (Technology in Protective Coatings) has been striving to open the way to possible applications of sustainable protective systems in the Oil&Gas and Offshore industry, where it is still mistakenly believed that the only way to protect structures is the use of solvent-based products – with the consequent worsening of environmental pollution, which, unfortunately, has been going on for too long. The PetrolValves Group has long since decided to join this philosophy, as have other major multinational groups using Ti.Pi.Ci.'s technology not only in Italy but also abroad, including in the USA, the Middle East, and Northern and Eastern Europe. The PetrolValves Group's choice to market itself as a promoter of green solutions, actively pursued by its technical, production, and quality departments, proves that a vision focused on protecting people and the environment can be readily accepted by international engineering firms. At the same time, such environmental choice made by contracting entities enables applicators (better technically prepared than others and ready to comply with the increasingly binding European regulations) to achieve a higher safety degree in their plants, significantly reduce their emissions (which is no mean feat), and save money. 



Some valves painted with the waterborne protective system developed by Ti.Pi.Ci.



The detail of a finished valve.