

UPDATE

Maintaining crude oil storage tanks

SIOT-TAL, the largest oil terminal in the Mediterranean Sea, has been operating for over 50 years, transporting oil from Trieste to Central Europe, serving countries such as Austria, the Czech Republic and Germany. The company has always looked after its investments and has been dedicated to constantly improving the plants with the adoption of innovative technologies and environmentally-friendly maintenance systems. This approach safeguards the health of its workers, the environment and is in line with the highest safety standards, explains Dr Marco Trentini Trentini – FROSIO-Inspector Level III – TIPCi (Technology in Protective Coatings).

Water-based, high-build, long-lasting and recoatable products have proved to be a very important and effective choice when it comes to the anticorrosive treatment and maintenance of the numerous tanks that make up the tank farm. The paint system was adopted because it can easily be over-coated over time. In addition, the paint system offers corrosion protection to the steel supports which are exposed to the marine environment, and non-flammability, which is an important property for the safe operation of the terminal. TiPICI has developed and perfected, over the course of a few decades, water-based paint products that have been developed specifically for use in the protective coating sector. They are now seeing regular adoption both in the field of new construction and maintenance and this is supported by notable successes, among which the SIOT project is one.

The Transalpine Pipeline (TAL) is an oil pipeline that connects the port of Trieste to the central European refineries. It is managed by the TAL Group, which in turn manages the various companies in Italy (Italian Company for the Transalpine Oil Company S.p.A. - SIOT), Austria (Transalpine Ölleitung in Österreich GmbH) and Germany (Deutsche Transalpine Ölleitung GmbH).

The oil transported in the pipeline covers 40% of Germany's oil needs (100% in Bavaria and Baden-Württemberg), 90% of Austria's requirements and over 50% of the Czech Republic's.

The SIOT marine terminal is located in the Bay of Muggia and is the starting point of the pipeline. With an average of 35 million tons of crude oil discharged each year, it represents 75% of the traffic of the port of Trieste, making it the main Italian and Mediterranean port of call for the oil industry.

From the piers of the marine terminal the crude oil is unloaded and transferred to the tank farm located in San Dorligo della Valle in southeastern Trieste.

The tanks

TK-65 is a carbon steel storage tank with a height of 17.4m, a diameter of 78m and a capacity of 80,000m³. It was built and painted with solvent-based paints in 1995.

SIOT decided to carry out maintenance on the external tank surface in 2018. As the work was being carried out inside the farm, the safety of the plant had to be safeguarded, particularly with respect to the risks of fire. This meant it was only possible to use a high-performance surface tolerant water-based paint system.

The water-based system chosen (Table I) by SIOT had the following on-site requirements:

- low VOC to safeguard the environment and the health of the applicators;
- non-flammability to avoid fire risk;
- surface tolerant properties;
- extremely high level of protection and adhesion;
- ability to apply on external surface at low temperatures;
- ability to be applied by roller and/or brush.

Application

The general conditions of the structures were very good, the surface was opaque due to chalking, and the percentage of rust was estimated to be less than 1%.

The first step was surface cleaning and removing oil and grease according to standard SSPC PA 1.

Subsequently, the surface was hydroblast-cleaned, not only to clean the surface but also to create a low roughness profile on the painted surface (Pictures 1 and 2).

The last surface control before the environment condition check was to test for the presence of soluble salt. This control was made according to standards ISO 8502 Part 6 and Part 9 (Bresle test).

Application began in December 2018, with all the water-based paint being applied by brush and roller (see opposite). The environmental

→ Table I: Water-based protective system applied on TK-65 tank.

Type of coating	Solids	DFT	VOC Level	Product
Water-based 'surface tolerant' high-build epoxy mastic	74%	150µ	<65 g/l	Hydroguard HB off-white
Water-based polyurethane matt topcoat	45%	2x50µ	<120 g/l	Hydrothane matt Ral 9010



conditions were not very favourable, with strong winds repeatedly interrupting the application. The safety of the operators working at height had to be safeguarded at all costs. Moreover, the air and surface temperature was only 6°C. Despite these low temperatures, the paint was applied equally and without any drying or film hardening problems.

The final tank colour was Ral 9010 (with matt appearance), as stipulated by SIOT, with the stair and handrail surfaces being painted with a Hydrothane matt Ral 3000 topcoat.

Further applications

At the end of the maintenance work, SIOT and paint applicator were extremely impressed by the performance of the water-based system. The ease of application in the very severe climatic conditions, the thicknesses obtained and the final aesthetic appearance were the factors that impressed the most. It is for those reasons that SIOT decided to use the same high-performance water-based technology on a second tank (TK-42).

The primer selected for TK-42 was the same Hydroguard HB off-white, but for the topcoat, SIOT chose Hydrothane DTM semi-gloss, a high-solid, water-based polyurethane topcoat with semi-gloss final appearance, instead of the Hydrothane matt.

Hydrothane DTM semi-gloss was chosen because of its higher solids by volume, enabling a reduction in paint consumption.

All water-based paints were applied by brush and roller, with application beginning in June 2020.



The final TK-42 tank colour was Ral 9010 (with semi-gloss appearance) as required by SIOT.

The stairs and handrails were painted with a Hydrothane DTM semi-gloss Ral 3000 topcoat.

Pioneering spirit

TiPiCi and SIOT have pioneered the application of 'green' anticorrosive protection even in the oil sector, where even today, it is erroneously believed that it is only possible to protect structures with solvent-based products. This has environmental pollution implications and has unfortunately been going on far too long. ■

Type of coating	Solids	DFT	VOC Level	Product
Water-based 'surface tolerant' high-build epoxy mastic	74%	150µ	<65 g/l	Hydroguard HB off-white
Water-based polyurethane semi-gloss topcoat	61%	2x50µ	<130 g/l	Hydrothane DTM semi-gloss Ral 9010

← Table 2: Water-based protective system applied on TK-42 tank.