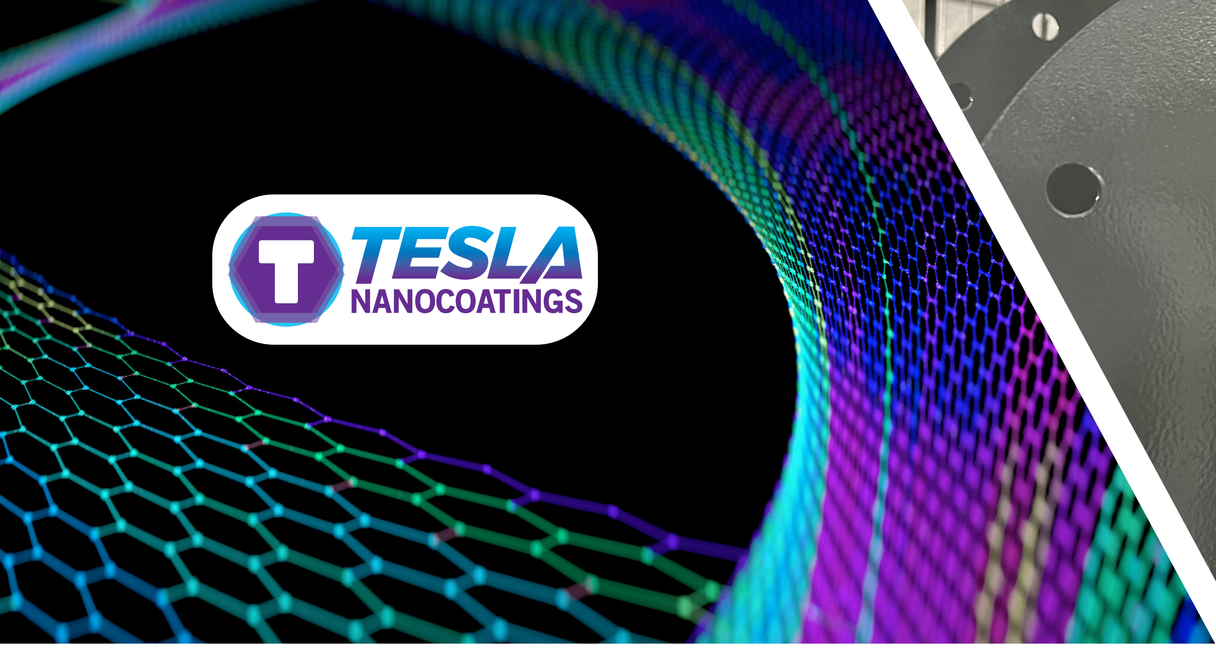

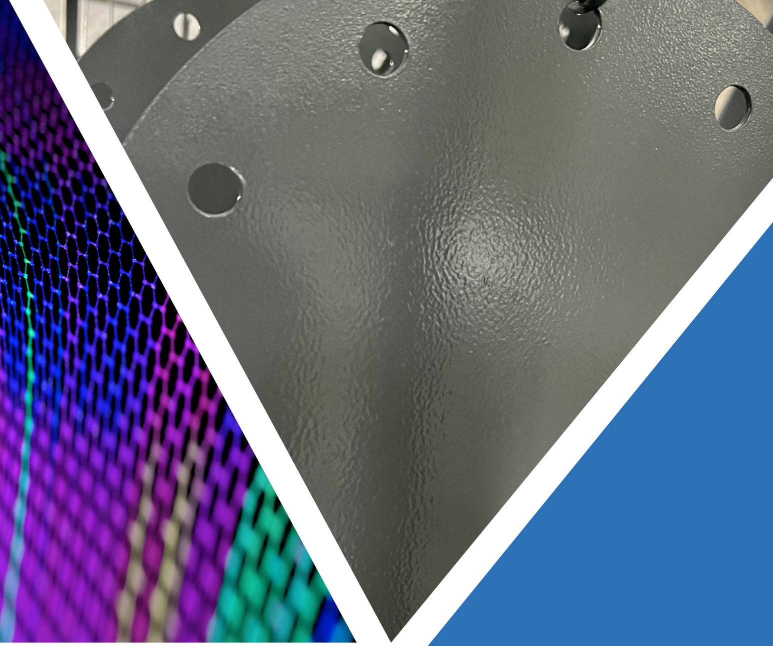

BOLTED TANKS
BY WESTON

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ABOUT US

Weston and Associates, LLC – is a complete storage solutions provider for liquid & dry bulk storage systems worldwide with a combined 150+ years of experience in the tank industry. Whether You Need A New Storage Application or A Custom Solution – We Can Help.

TANKS. DOMES. LINERS.

Liquid & Dry Bulk Storage Tanks.
From Epoxy-Coated, Glass-Fused-to-Steel, Tesla NanoCaoted or Stainless Steel bolted tanks we've got you covered, no matter the application.

Al Geodesic Domes & Covers Our Sur-Seal Covers™
Al Geodesic Domes, Fixed Steel Roofs and flexible membrane cover are the perfect blend of corrosion resistance and customization.

Custom & Unique Drop-In Liners
Our Sur-Seal Liners™ are the only solution of its type on, the market today, with a unique drop-in design that protect against corrosion.

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WESTON EPOXY PRODUCT REVIEW

Table 1. Test data comparison after ISO 12944-9 testing.

Parameter		1102/3100	1102/3102
DFT (micron)		440	420
Rust creep (mm)	Cyclic ageing	5.29	5.33
	Immersion	1.13	0.28
Adhesion (MPa)	Pre-test	10.94	12.56
	Post-test (Cyclic ageing)	11.88	11.06
	Post-test (Immersion)	9.62	11.97

Table 2. Test data of 3100 after chemical resistance testing.

System	Immersion		Vapor	
	Post-test appearance	Adhesion loss	Post-test appearance	Adhesion loss
Acetone	Excellent	Minor	Excellent	Minor
MEK	Excellent	Minor	Excellent	Minor
Methanol	Excellent	No	Excellent	No
Methanol, 1% H_2O	Excellent	No	Excellent	No
Unleaded gasoline	Excellent	Minor	Excellent	Minor
Diesel	Excellent	Minor	Excellent	No
Kerosene	Excellent	Minor	Excellent	No
Motor oil	Excellent	Minor	Excellent	No
Toluene	Excellent	Minor	Excellent	Minor
10% HCl	Detached blister	N/A	Excellent	Significant
10% H_2SO_4	Detached blister	N/A	Excellent	Minor
Brine	Excellent	Minor	Excellent	No

Table 3. Test data comparison after Taber abrasion testing.

Formulation	Average total weight loss (mg)	Average thickness loss (micron)
3100	124.8	28
3102	79.2	20

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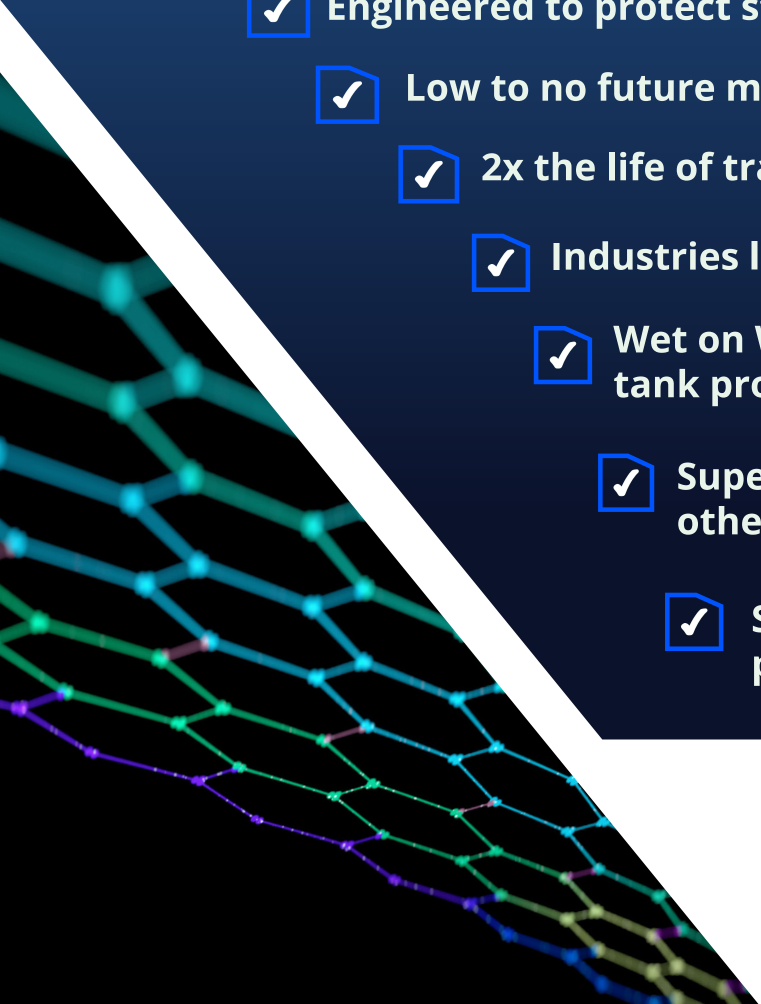
THE **FUTURE** OF **INDUSTRIAL COATINGS** HAS ARRIVED

Teslan Carbon Nanocoating is a two-coat system featuring low VOC epoxy primer and topcoat with significant advantages not only in corrosion protection, but also in application time and effort. Teslan can be applied to replace conventional three-coat systems traditionally used to protect steel surfaces in any environment.

WHY CHOOSE **NANOCOATING** ?

Teslan's difference is that it is formulated with carbon nanotubes that assemble into ropelike structures that make them **tough** and **flexible**. **"Tough"** translates into durability advantages over foes like weather, UV light, abrasion, and other wear and tear. **"Flexible"** means Teslan-coated surfaces can be formed before or after coating and still remain intact because the carbon nanotubes can be stretched without breaking.

- ✓ **Engineered to protect steel substrates.**
- ✓ **Low to no future maintenace costs.**
- ✓ **2x the life of traditional coating systems.**
- ✓ **Industries lowest up-front installation cost.**
- ✓ **Wet on Wet Application for 100% complete tank protection**
- ✓ **Superior adhesion to steel more than any other coating system.**
- ✓ **Simple & Fast application that acts & protects like plating.**



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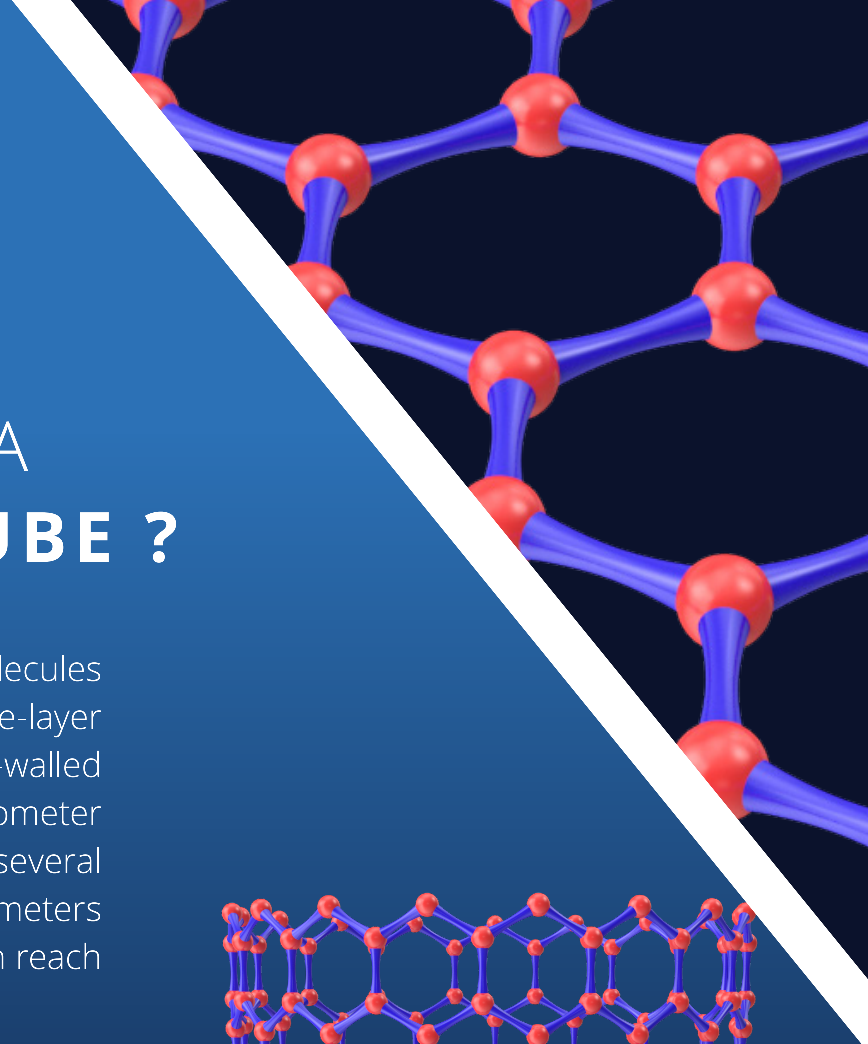
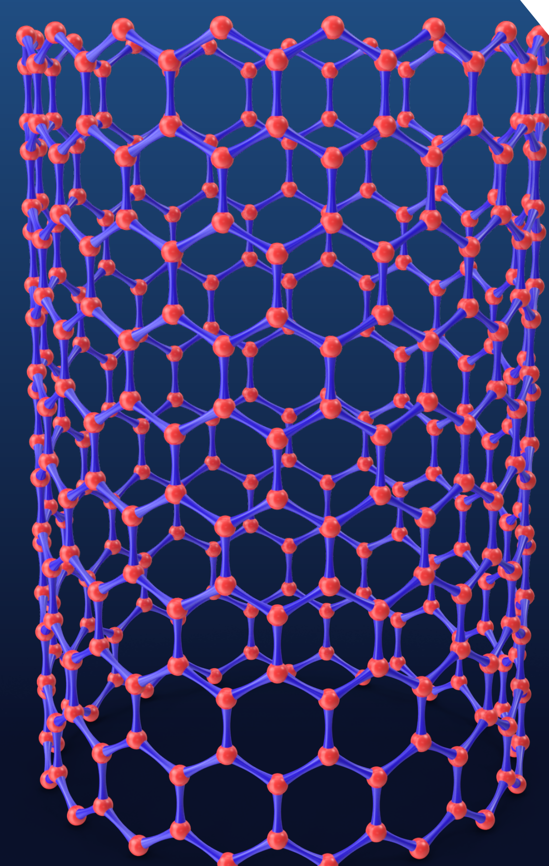


WHAT EXACTLY IS A **CARBON NANOTUBE ?**

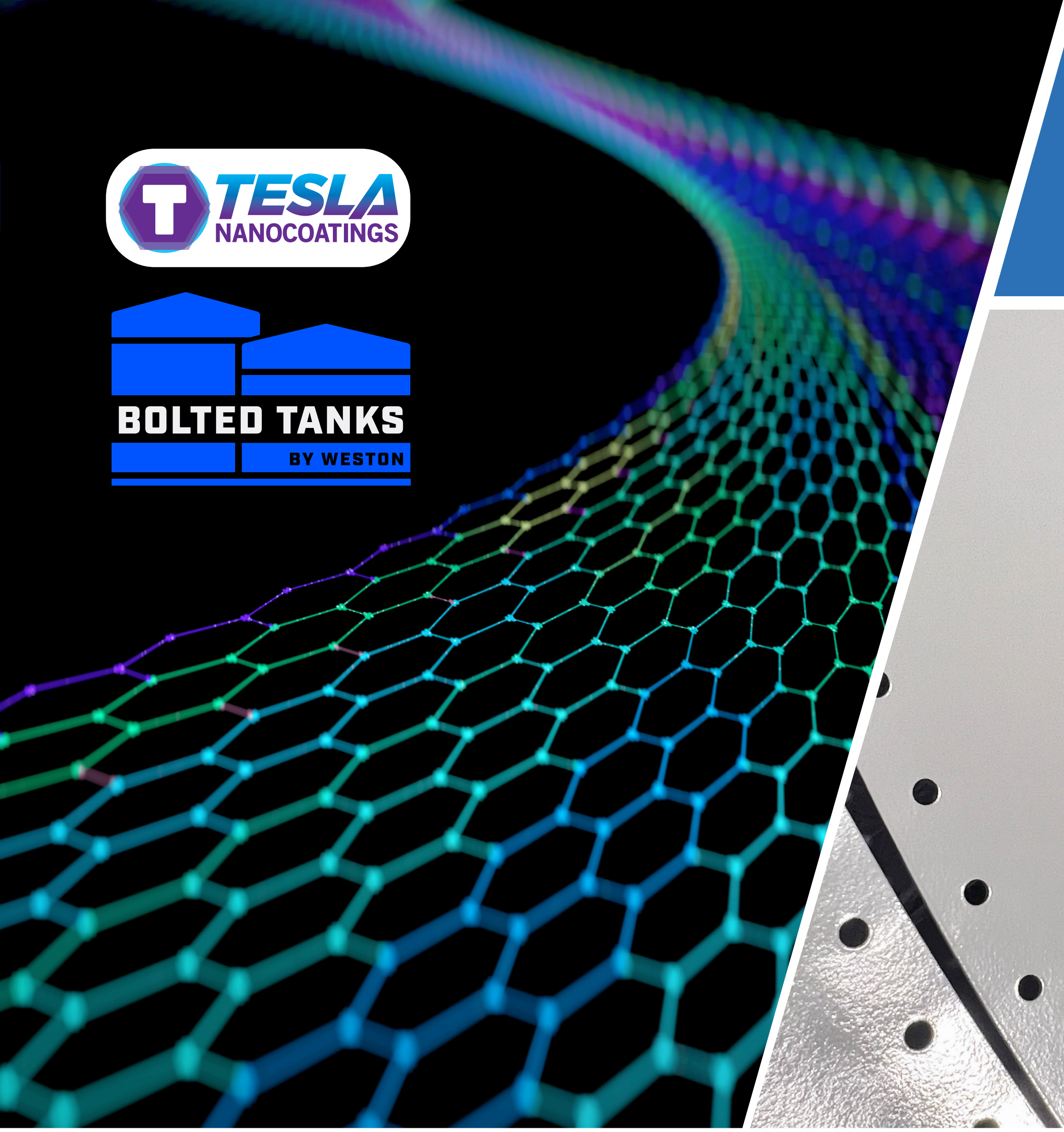
Carbon nanotubes (CNTs) are cylindrical molecules that consist of rolled-up sheets of single-layer carbon atoms (graphene). They can be single-walled (SWCNT) with a diameter of less than 1 nanometer (nm) or multi-walled (MWCNT), consisting of several concentrically interlinked nanotubes, with diameters reaching more than 100 nm. Their length can reach several micrometers or even millimeters.

Like their building block graphene, CNTs are chemically bonded with sp2 bonds, an **extremely strong** form of molecular interaction. This feature combined with carbon nanotubes' natural inclination to rope together via van der Waals forces, provide the opportunity to develop **ultra-high strength, low-weight materials that possess highly conductive electrical and thermal properties**. This makes them highly attractive for industrial applications and is **only available from Bolted Tanks by Weston**.



TESLA NANOCOATINGS

BOLTED TANKS BY WESTON



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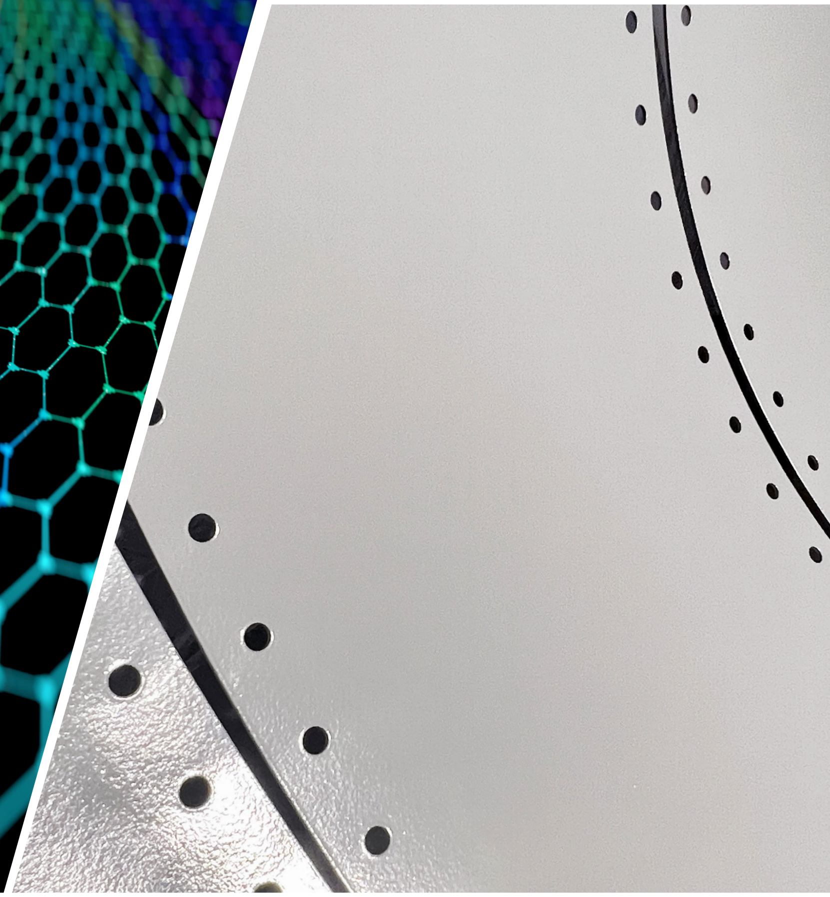

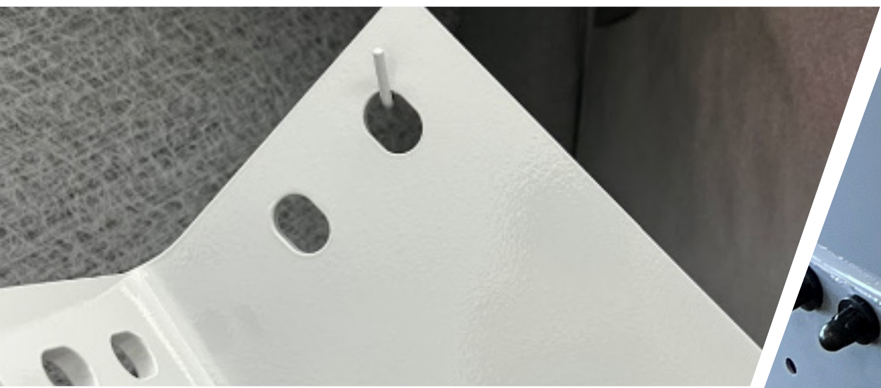

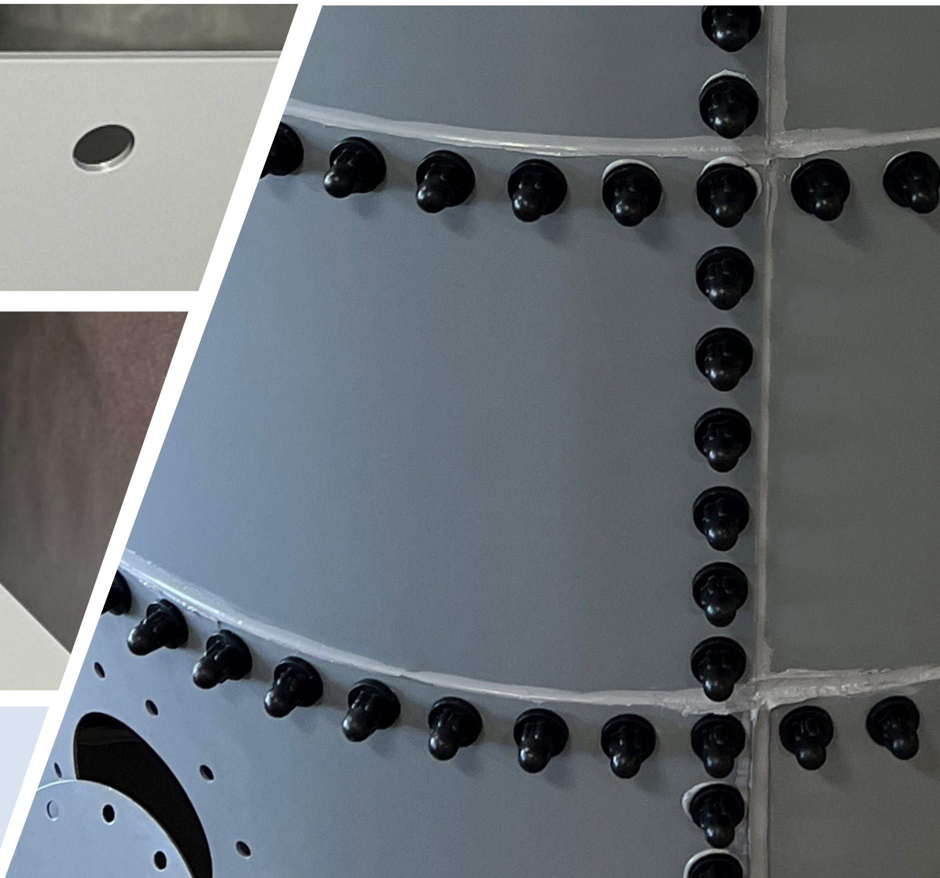

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WESTON ASSOCIATES BOLTED TANK SPECS

1.0 PURPOSE AND SCOPE

This Work Instruction sets forth the requirements for the Tesla NanoCoatings Project including pre-preparation, surface preparation, and lining applications, for the interior and exterior metal components for the Weston Assoc. bolted tank panel applications.

2.0 SCOPE

The scope of this Work Instruction is limited to the use of:

INTERIOR: Teslan® Weston CNT Epoxy Tank Lining - color GRAY.

EXTERIOR: Teslan® Weston CNT Epoxy Tank Lining - color GRAY.

3.0 ENVIRONMENTAL COATING CONDITIONS

3.1 Temperature and Relative Humidity conditions shall meet the following recommendations.

3.1.1 Temperature (Air, Surface, Material) / Humidity Requirements Minimum:

41oF (5oC), 40% RH, Maximum: 105oF (40oC), 90% RH

3.2 As a general rule, the temperature of the surface to be coated should be a minimum of 5oF (3oC) above the Dew Point temperature.

4.0 PROCEDURE

4.1 Pre-Cleaning for chloride remediation:

4.1.1 Prior to abrasive blast cleaning surface preparation, the steel surfaces should be tested for chloride contamination levels. Due to portions of this project's substrate being categorized as immersion, it is recommended that the chloride tolerance of 25 mg/m2 be used as the maximum chloride threshold level. If levels exceed this concentration, then appropriate remediation methods should be undertaken to reduce the chloride level to below the 25 mg/m2 level.

4.2 Surface Preparation:

SSPC -SP10 /NACE 2 Near White Metal Blast Clean

4.2.1.1 Prepare the surface in accordance with SSPC -SP10 /NACE 2 Near White Metal producing an angular anchor profile of 1.5 – 2.5 mils.

4.2.1.2 Prior to lining application, the steel surfaces should again be tested for chloride contamination levels. The resultant surface should not exceed 25 mg/m2.

4.2.1.3 The resultant surface cleanliness prior to coating application shall be clean, dry, and contaminant free.

4.3 Coating Application:

4.3.1 All coating shall be applied at an ambient temperature of not less than 41oF (5oC). The coating and steel surface shall be approximately the same temperature with the surface temperature being at least 5oF (3oC) above the dew point temperature. For conditions outside of these parameters, please contact Tesla for specific recommendations.

4.3.2 Immediately prior to the application of the lining, the surface to be coated shall be blown down with clean, dry, compressed air and the lining then applied immediately following the air blow down process. This process shall continue for the duration of the lining application.

4.3.3 Edge Coat:

4.3.3.1 Teslan coatings shall be applied to edges, welds, and other critical areas via NACE TM0304, MIL-PRF 23236D, Framing technique, or a combination thereof.

4.3.4 Steel Plate Int/Ext:

4.3.4.1 Teslan® Weston CNT Epoxy Tank Lining is to be applied to a nominal wet film thickness (WFT) of 10 mils, with the minimum WFT no less than 9.0 mils and the maximum WFT not exceeding 12 mils in a single coat. Dry film thickness (DFT) should be between 5 and 7 mil DFT. Thinning/reducing should not be necessary.

4.3.5 Wet Film Thickness Readings:

4.3.5.1 Measure wet film thickness (WFT) in accordance with ISO 2808, Method No. 1A – comb gauge at least once for every 50 square feet of surface coated. Adjust coverage rate to maintain specified thickness. On radius surfaces, WFT must be measured longitudinally and should be measured in differing areas. WFT measurements shall to be taken throughout the lining application process.

4.3.5.2 All finished coating applications shall be applied and cured in accordance with TESLA printed literature, achieve uniform and monolithic film thickness and appearance, continuous in color, and free of film defects i.e. dry spray, pinholes, orange peel, sags, or other defects.

4.3.6 Dry Film Thickness (DFT) Inspection:

4.3.6.1 Perform DFT inspection using a properly calibrated digital gage in accordance with the direction specified by the gauge manufacturer or as found in SSPC PA2 Level 2.

5 COATING REPAIRS:

5.1 Coating repairs may be necessary due to mechanical impact damage or abrasion prior to complete cure.

5.2 Mechanical Damage Repair Procedure:

5.3.1 Spot repair and touch-up procedures would be to solvent clean the areas in accordance with SSPC SP1 using an appropriate and effective solvent.

5.3.2 Abrade the damage area to sound coating, or in the case of damaged coating, to sound substrate by whatever means feasible. The area immediately adjacent to the repair should also be feather-edge abraded and blended into the repair area; extending into the sound coating 2 to 4 inches.

5.3.3 The abraded prepared area should then be again solvent wiped with an appropriate solvent and the coating then applied to a clean, dry, and contaminant free surface.

5.3.4 The application of the coating(s) should begin in the repair area and extend into the feather-edged margin, with care being taken to keep the application within the abraded area(s).

5.4 NOTE: Repairs should be blended into the original coating in a manner that maintains the Dry Film Thickness (DFT) requirements for all of the coating system layers

BOLTED TANKS
BY WESTON

TESLA NANOCOATINGS

WESTON EPOXY PRODUCT REVIEW

REPORT OVERVIEW

This report covers a brief product review of Weston epoxy CNT topcoat 3100 and 3102 for the reference of Weston & Associates, LLC. The review includes test data of anticorrosion performance, adhesion, chemical resistance, abrasion resistance, impact resistance, etc. Weston coating system is expected to be applied on both exterior and inner liner of stainless-steel tanks containing electrolyte.

TEST DATA AND REVIEW

Anti-corrosion performance and adhesion Anti-corrosion performance was evaluated by ISO 12944-9 testing using primer-topcoat systems in terms of rust creep. Adhesion was also measured before and after testing with 20 mm dollies and 150 psi/s rate. (Note that all adhesion data mentioned in this report followed this test method.) ISO 12944-9 includes 4,200 h of cyclic ageing and 4,200 h of synthetic seawater immersion. Weston Zinc CNT epoxy primer 1102 was used here with 3100 or 3102 and no topcoat only data is obtained yet. Regardless of coating systems involved, rust creep was less than 8 mm after cyclic testing and no significant changes in adhesion and color were found. Both systems also showed no flaking, no cracking, no disbonding, or softening, after ISO 12944-9 testing.

1. CHEMICAL RESISTANCE

Chemical resistance was evaluated in terms of film appearance and adhesion before and after testing. The testing followed a modified version of ASTM G20-10. Panels with single coat were placed into various solutions (half of the panel was immersed; the other half was maintained in the vapor phase) for one month. Containers were capped to avoid volatilization. In general, 3100 possesses excellent chemical resistance against various solvents. Chemical resistance of 3102 is not tested yet. However, it is expected that 3102 will show better chemical resistance than 3100, since a different curing agent that provides improved chemical resistance is used in 3102.

2. ABRASION RESISTANCE

Abrasion resistance was evaluated by ASTM D4060. Each single-coat sample was tested for thickness and weight loss after being worn for 1,000 cycles of testing. Both 3100 and 3102 showed excellent abrasion resistance and 3102 possesses the best performance.

3. IMPACT RESISTANCE

Impact resistance was evaluated by ASTM D2794. The final impact resistance value was determined by five replicate passing test results on one singe panel.

4. RESISTANCE TO HOT SERVICE

Resistance to hot service was evaluated by 4,200 h of exposure in an oven at 120 oC. Here, primer-topcoat systems 1102/3100 and 1102/3102 were analyzed and no topcoat only data is obtained yet. 1102/3100 exhibited slight darkening and discoloration, while darkening and yellowing were reported in the case of 1102/3102. However, both systems showed no flaking, cracking, disbonding, or softening.

6. CONDENSATION TANK EXPOSURE

Condensation tank exposure was evaluated by ISO 6270-1. Panels were exposed to continuous condensation in a high humidity chamber for 4,200 h. Chamber was filled with approximately 10-20% with water and heated to 40 ± 2 °C. Panels exposed to condensation at a 60 ° angle. Here, primer-topcoat systems 1102/3100 and 1102/3102 were analyzed and no topcoat only data is obtained yet. Both systems showed no blistering, discoloration, cracking or disbonding.

7. WAVE TANK TESTING

Wave tank testing is required for a coating system to be qualified for ballast tanks and void tanks on offshore and FPSO, storage temperature < 50 °C. Four panels are mounted in each tank, one at the top, one at the bottom, and two on opposite vertical sides. Only the panel at the top is focused since the top panel is heated to 50 °C for 12 h and 20 °C for 12 hours, which simulates the heat from the sun (12 h at 50 °C) and seawater condensation. Again, primer-topcoat systems 1102/3100 and 1102/3102 were analyzed and no topcoat only data is obtained yet. After 4,320 h of exposure, both systems showed no sign of loss of adhesion, blistering, discoloration, cracking or disbonding.

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