



Exchanger full length tube IDs coated StreaMax™ anti-foul coating, applied by Curran International.

Curran Anti-Foul Exchanger Coatings Improve Refinery Operations – Worldwide

Curran International is known globally for its long-lasting, cost-efficient exchanger tube ID coatings.

Curran Coatings minimize tube fouling and inhibit corrosion.

Fouling causes reduced heat transfer, leading to production bottlenecks and increased maintenance durations. Corrosion risks the integrity of exchanger mechanical performance and plant safety.

A Wide Selection of Proven Coatings

Refinery process and reliability engineers can select from a full portfolio of Curran Thin Film Coatings; coatings that reduce surface energy and enhance release at the substrate. The combination of material and application technology delivers a highly-functional, anti-fouling, value-added solution.

Curran Coating Materials

The Curran exchanger coating portfolio offers a range of materials designed for a wide range of operating service and temperature.

- **Thin Film/Nano Sol Gel Material – DTI, Curramix 2500**
 - Crude, hydrocarbon, produced water services, <25 microns DFT
 - Suitable for service temperature up to 200°C (390°F)
 - Ideally suited for plate & frame exchangers and tubular IDs/ODs
- **Epoxy Material – Curran 1000T, StreaMax™, Teflon™ Ruby Red PFA**
 - Cooling water systems; corrosive services; 100 to 250 microns DFT
 - Suitable for service temperature up to 200°C (390°F)
 - Protection from galvanic attack; low pH oxidizing services

- **Ceramic Material – Nano-REE, Curramix 3500**

- Coke and crude fouling; high temperature oxidation
- Suitable for service temperature up to 1000°C (1830°F)
- Ideally suited for exchangers IDs/ODs; distillation tower structured packing

Curran Coatings for the Petrochemical and Refining Industries

Many global clients have installed Curran-coated exchangers for more than a decade.

Let's review performance benefits reported for a couple of these locations.

Overhead Trim Condensers in the Fluid Catalytic Cracker (FCC) Unit

For over 10 years, Curran has provided coated-exchangers to an international client with a large, complex refinery operation. In fact, that Curran client has more than 150 Curran-coated exchangers in cooling water service.

In the FCC unit, Curran-coated cooling water exchangers work in Main Column O/H Trim and HP Receiver O/H Trim. These coated exchangers helped sustain duty compared to the impacts of fouled condensers as described below.

- **Impact on Reactor Yield.** Fouled Main Column Trim Condensers were unable to condense properly. As a result, the reactor operated at lower temperature and at a higher pressure than designed, since more vapor resulted in higher back pressure.
- **Impact to Absorber Operation and Desired Propylene Recovery.** Fouled condensers increased temperature outlet, resulting in higher Absorber temperature and less propylene recovery.

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- **Impact to Wet Gas Compressor (WGC) Performance and HP Steam Consumption.** Fouled condensors were unable to condense properly and contributed to greater vapor flows to WGC, resulting in higher compressor BHP and higher HP steam consumption.

Thanks to Curran's work, tube-ID fouling was mitigated and a higher cooling water flowrate through tube side was achieved. This results in improvement in Log Mean Temperature Difference (LMTD), leading to better unit performance and an overall saving in operating cost.

Coated Feed Preheat Exchanger in the Fluid Catalytic Cracker (FCC) Unit

A 20 % Improvement!

At a large Gulf Coast refinery, a Curran anti-foul coating was applied to tube-IDs of an FCC Bottoms/Feed Exchanger. The tube-IDs were in FCC Bottoms/Slurry service, FCC Feed was shell side.

With the addition of the thin film ID coating, the initial reduction of heat transfer rate (Uclean) of the exchanger was about a 5%.

However, over five-months operation, the refinery reported a 20% improvement of the overall heat transfer rate (Uservice).

More than two years after coating, this exchanger continues in-service at better feed preheat temperature, and marginal improvement in unit performance was observed.

The Curran Coating More than Paid for Itself

The contribution to unit throughput and crude manufacturing may not be as readily measured, but in many cases, the benefits to operations are significant to the overall business case for coated versus uncoated exchangers.

Contact Curran International to find out more about anti-fouling and corrosion resistant exchanger coating solutions, Alex Barre, abarre@curranintl.com; 281.339.9993. www.curranintl.com

Catch Curran

Here's two opportunities to learn more about Curran Coatings and Curran's complete array of worldwide services.

NACE - Corrosion 2021 Conference and Expo, Salt Lake City, UT; April 18-22, 2021



API – 2021 Inspection and Mechanical Integrity Summit, San Antonio, TX; June 7-10, 2021



If you do not want to wait until next year, please contact Ed Deely edeely@curranintl.com, 281.339.9993.

Pressure Vessel Coatings Applied to Client Specification

Precise applications of protective coatings are everyday work at Curran International.

Pressure vessels, drums and kettles requiring an internal protective coating are projects expertly managed by Curran at its shops or in the field.

Curran has the discipline to achieve flawless surface preparation; and the experience and expertise to manage all types of environmental conditions. These factors and Curran's ability to adapt forced-curing techniques sets Curran apart.



"Boil down" vessel internally coated with Curran 1200 novolac epoxy, externally painted with Carboline IOZ, epoxy and urethane system.

Experience, the difference.

Refinery, petrochemical manufacturers use protective coatings to protect mild steel, extend service life of vessels operating in corrosive services. Client specifications are vetted in a pre-job meeting, during which an Inspection and Test Plan (ITP) is developed.

Client coating specifications that Curran has met or exceeded range across the spectrum of polymer technologies- from epoxy, to fluoropolymer, to FBE and baked phenolic coatings.



Power plant waterbox internal coating; Curran technician preparing blast mask to protect gasket sealing surfaces prior to grit blast surface prep and application of Carboline epoxy.

Thermal Spray Application

Another proven coating technology in Curran's portfolio is thermal-spray application. In this method, an electric arc melts alloy wire which is atomized and sprayed onto substrate to provide a sacrificial barrier to corrosion.

Curran applicators are experienced with protective coatings from leading manufacturers, including Chemours product line (PFA, PTFE, ETFE systems), Carboline, Durapol, International Protective Coatings, PPG Marine, Hempel, Saekaphen, Advanced Polymers/Chemline and Belzona.



Curran coating tech using hot flock method to apply Chemours ETFE fluoropolymer to vessel head; coating is catalyzed at 625F.

Curran has two full service coating shop; the Houston-area shop has a large natural gas-fired oven capable of curing coatings to 1000F. The shop also boasts nearly 20,000 square feet of inside-shop coating capacity, a 25-ton overhead crane and plenty of forklift capacity. Drums and vessels to 15' diameter can be managed inside Curran's full-service shop. Curran's shop near Edmonton, Alberta, can support year round coating projects and has and force curing oven.

Contact Curran International to learn more about precise coating services for vessels, drums and kettles. To reach Ed Deely, edeely@curranintl.com, or 281.339.9993. www.curranintl.com



7' diameter vessel in H2S storage service; internally coated with Advanced Polymers/Chemline; externally coated with Hempatop Repel 800 system.

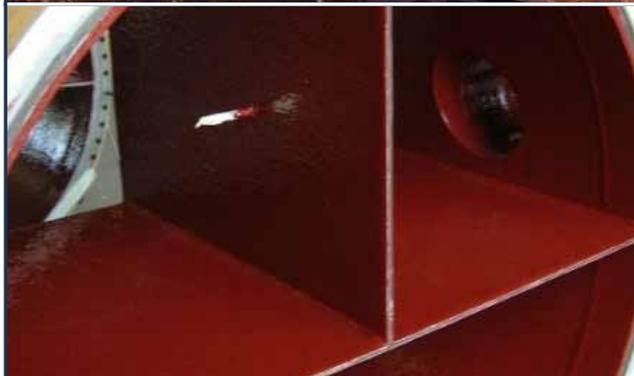
Curran Coatings Protect All Cooling Water Equipment

Curran coatings have been applied to exchangers in cooling water services across globe protecting refinery and petrochemical fixed assets.

From the Gulf Coast refineries to the oil sand upgraders in Edmonton – Curran 100% solids epoxy coatings have protected mild steel and thereby created additional years of reliable service.

Curran coatings provide extended protection coverage

To ensure fit-for-duty reliability exchanger components, channels, bonnets, and covers often need “TLC.” Curran coatings provide extended protection coverage!



A 46”-diameter cooling water channel. Curran coated for return to service. Stainless steel anode lugs were masked where already installed. Curran clients find extended life of anodes when combined with coating.

Specify Curran 1500 for exchanger components

Refineries and petrochemical clients have specified Curran 1000T for cooling water exchanger tube ID coating to for 10 years. Sealing components - exchanger channels, bonnets and covers - should be coated with Curran 1500, an ambient cured, paste grade novolac with superior resistance to hot excursions (385F).

Curran 1500 is available for contractor applicators. This easy availability makes in-plant coating work convenient and just-in-time.

Another 100% solids epoxy is formulated for chillers, condensers and HVAC systems. Curran 500 is a versatile system, protecting steel from galvanic corrosion and is used for rebuilding corroded/pitted surfaces. For service exposure less than 180F, Curran 500 epoxy offers wide-pH resistance.

All Curran coatings and have been tested using ASTM methods for cathodic disbondment, surface adhesion, abrasion resistance.

Quick Turnaround for Your Turnaround

Curran International has the capabilities to expertly apply durable protective coatings to exchanger components - fast!

Curran coating applications can be ready for return to service with accelerated curing in Curran’s gas-fired curing ovens at Currans shops in the Houston and Edmonton areas.

Simplify your turnaround and maintenance of cooling water components by specifying Curran 1500. It’s the one that delivers reliable protection when flanging-up for another run!



Exchanger channel shop coated with 1500 at Curran’s Edmonton area shop.

Contact Curran International edeely@curranintl.com, 281.339.9993, for datasheets, test reports, and package information concerning Curran 1500 and 500 epoxy coatings systems. www.curranintl.com