



UOP High Cond™ Tubing

Petrochemical

Introduction

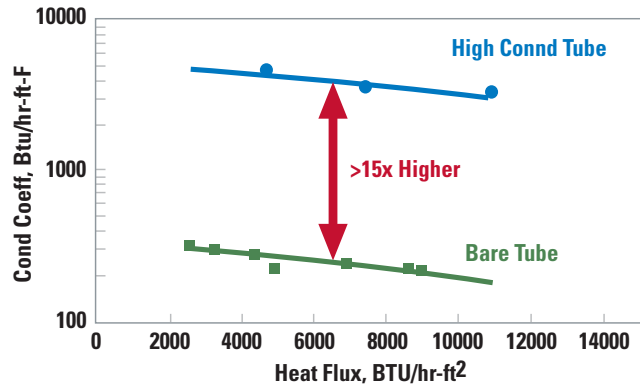
UOP is a proven provider of enhanced heat transfer technology with over 40 years of commercial experience in this field. UOP has successfully developed and commercialized numerous condensing surfaces including proprietary OD tube fluting profiles for shellside condensing in vertical heat exchanger orientations as well as various spiral ID fin profiles for tubeside condensing in horizontal heat exchanger orientations. Most recently, UOP has expanded its enhanced heat transfer product portfolio with the development of High Cond tubing for shellside condensing in horizontal heat exchanger orientations.

High Cond tubing is an enhanced hydrocarbon condensing technology that is especially well suited for use in horizontal cooling water condenser applications. The proprietary tube OD surface has been optimized to minimize liquid condensate film thicknesses and improve condensate drainage. These technical features maximize the tube's condensing and overall heat transfer coefficients. The vastly improved heat transfer performance allows reductions in capital investment, achievement of higher heat exchanger capacity, and/or optimization of process operation.

Maximized Condensing Coefficient

The surface of the High Cond tube reduces the thickness of the liquid condensate layer on the tube. The surface tension draws liquid into the gaps in the enhanced condensing surface thereby reducing the condensate thickness at the top. The shape of the gaps in the enhanced condensing surface create small separations that act as capillaries. Surface tension helps draw the liquid condensate away from the top surface of the tubes, thinning the liquid film and greatly increasing the condensing coefficient. Condensate then collects and drains from the bottom of the tube, improving overall condensing performance. The improvement in condensing performance is significantly greater than that which can be obtained merely by extended area surfaces. In fact, the condensing coefficient for High Cond tubing is more than 15 times greater than that achieved with a bare surface.

Condensing Performance



Revamp Existing Heat Exchangers for Higher Capacity

In plant revamps, the superior performance of High Cond tubing is extremely beneficial in the retrofit of existing tube bundles and/or condensers to achieve higher capacity. Retrofitting heat exchangers with High Cond tubes allows existing shells, heads, piping and valves to be reused, conserves existing plot space, requires no modification of existing structure and minimizes plant downtime.

High Cond tubing is also very beneficial in retrofitting cooling water condensers which are summer time limited.

Revamp Example

Depropanizer Condenser

	<i>Before</i>	<i>After</i>
Tube Type	Bare	High Cond
Duty, MW	17.8	26.7
ΔT , °C	8.6	6.2
U Value, W/m ² °C	618	1647
Tube OD, mm	19.05	25.4
Area, m ²	3,043	2,603
Hx size, mm	1830x12000	1830x12000

Capital Savings for Grassroots Plants

Specifying High Cond tubing in the design of new plants can save considerably on capital and installation costs. The total installed cost of the heat exchanger is significantly lowered, especially in applications where multiple bare tube shells are required. In those cases,

utilizing High Cond tubing will typically reduce the number of required heat exchanger shells in half. This results in large cost savings associated with lower heat exchanger fabrication costs, less plot space, smaller/lighter exchangers, less piping, smaller structure and less civil foundation.

Examples of applications for High Cond tubing include propylene splitter overhead condensers, propylene refrigerant condensers, naphtha splitter condensers and other water cooled shell and tube condensers.

Grassroots Example

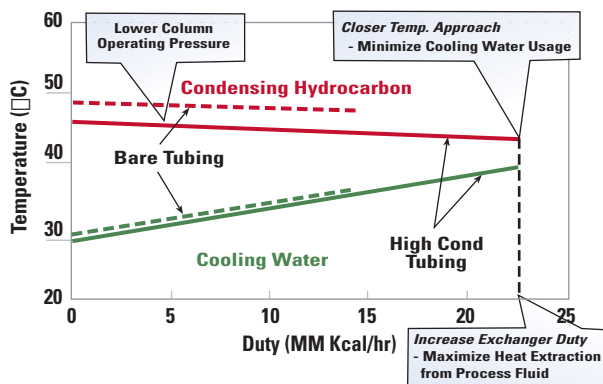
Propylene Splitter Overhead Condenser

	<u>Bare Tube</u>	<u>High Cond</u>
Duty, MW	57.4	57.4
T, °C	8.0	8.0
U Value, W/m ² °C	681	1647
Area, m ²	10,536	4,362
Number of shells	4	2

Reliable Operation at Low ΔT

Due to its higher heat transfer performance, High Cond tubing can be operated more optimally at closer temperature approaches, thereby allowing the maximum heat extraction from process fluids, column operating pressures to be reduced, and/or the minimization of cooling water usage.

Process Improvements



Design Pcedures

Design procedures for exchangers using High Cond tubing are similar to those using bare tube. Proprietary heat-transfer correlations have been developed for condensation on the OD of horizontal tube bundles.

Fabrication Considerations

High Cond tubing is provided with plain ends and intermediate lands to ensure easy installation with tube sheets and tube baffles, via conventional heat exchanger fabrication techniques. The nominal OD of the enhanced surface portion of the High Cond tubing is essentially the same as the nominal OD of the bare ends. This also ensures easy bundle fabrication via conventional heat exchanger techniques.

High Cond tubing is supplied in carbon steel material and is produced from plain surface tube material purchased according to SA-179, and SA-214 standards. Plain ends and intermediate bare lands, if required, are supplied in the condition as described by the governing plain tube ASTM or ASME standard. The finished High Cond tubing is supplied in the “as finned” condition and is additionally governed by the ASTM A498 specification.

For More Information

For more information, contact your local UOP representative or our Des Plaines sales office:

e-mail: info@uop.com
 fax: +1-847-391-2253
 phone: +1-847-391-2000

UOP LLC

25 East Algonquin Road
 Des Plaines, IL 60017-5017
 U.S.A.
 www.uop.com

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