UCON Quenchant E and E-NN

Product Description

UCON™ Quenchant E and E-NN (non-nitrite) are nonflammable polymeric quenchants and are aqueous solutions of a liquid organic polymer and a corrosion inhibitor. The organic polymer is soluble in water. At temperatures above 74°C (165°F), however, the polymer separates from water as an insoluble phase.

UCON Quenchant E-NN is formulated with a proprietary non-nitrite corrosion inhibitor which is completely compatible with UCON Quenchant E without nitrosamine formation. Analogous quenching performance is obtained with either UCON Quenchant E or E-NN.

When hot metal is quenched in a diluted solution of UCON Quenchant E or E-NN, a film of the liquid organic polymer is deposited on the surface of the hot metal. The rate at which the metal is cooled is governed, in part, by the thickness of the polymer-rich film. The thickness of this film is controlled by the concentration of UCON Quenchant E or E-NN in the quench bath.

The cooling rate is controlled also by adjusting the quench bath temperature and/or the rate of agitation. The main difference between UCON Quenchant E and E-NN and other UCON Quenchants is the choice of the polymer composition, which provides uniform heat transfer in typical oil applications.

Applications

UCON Quenchant E and E-NN are suitable for the hardening of:

- Large alloy parts from tilt-top, car-bottom and pit furnaces
- Forged parts that are quenched directly from the forge
- Sensitive alloys and shapes heated by induction
- Parts processed from continuous and batch-furnace operations employing gas-fired, neutral, and carburizing-carbonitriding atmospheres requiring oil quenching rates

Advantages and Features

- FM Approvals has classified UCON Quenchant E and E-NN as “FM Approved” as tested against the latest testing criteria.
- The optimum operating conditions for a specific metal or part may be determined by control of concentration, bath temperature, and/or agitation.
- UCON Quenchant E and E-NN minimize replacement control due to its low deterioration and/or oxidation rate. The major make-up requirement is for water lost by evaporation.
- UCON Quenchant E and E-NN eliminate the smoke, soot and residues common to oil quenchants. Equipment maintenance and plant cleanliness are easier to achieve.
- UCON Quenchant E and E-NN are soluble in water and resistant to bacterial growth.
- UCON Quenchant E and E-NN will freeze below 0°C (32°F). They should be thawed to room temperature and mixed before use. The product will not be affected in any way.

Performance

UCON Quenchant E and E-NN are used for quenching of high carbon and most alloy grades of steel associated with typical oil quenching.

UCON Quenchant E and E-NN are adaptable to induction and flame hardening, both spray quench and immersion, for a high alloy with an intricate geometry. This would include the nodular, malleable, and cast irons.

UCON Quenchant E and E-NN would follow oxidizing, neutral, and protective atmosphere furnaces of shaker, rotary batch or continuous design. It can be used for direct quenching from the forge, for continuous case quenching, and for general hardening of forged and cast steels, and cast irons.

Typical Physical Properties†

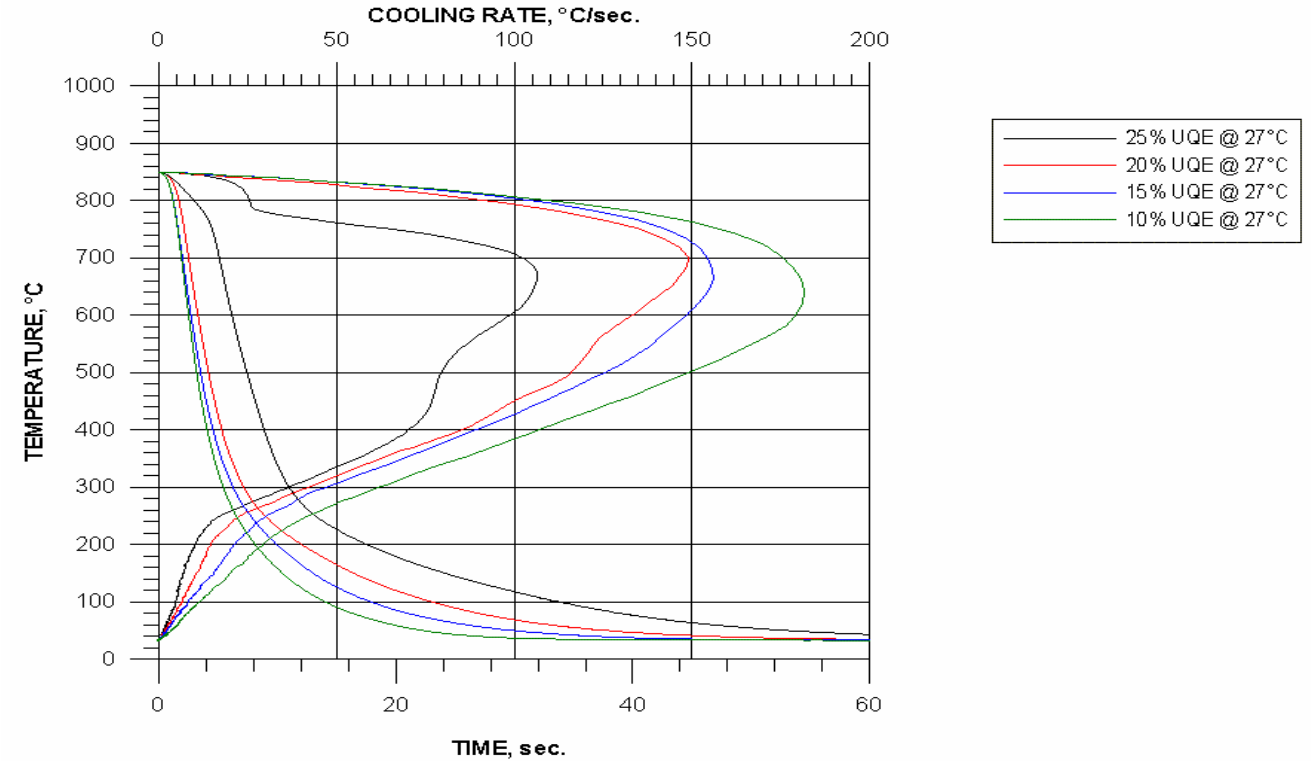
	UCON Quenchant E	UCON Quenchant E-NN
Weight per Gallon @ 20°C, lb	8.94	8.88
Specific Gravity at 20/20°C	1.074	1.067
Flash Point, Cleveland Open Cup, ASTM D 92	None	None
Pour Point, °C (°F)	-11 (-12)	<0 (<32)
Rust Inhibition, ASTM D 665A	Pass	Pass
Viscosity at 100°F (37.8°C), SUS	1120 - 1375	1110 - 1370

†Typical physical properties, not to be construed as specifications

Cooling Curves

Figures 1 and 2 illustrate the cooling achieved with UCON Quenchant E in laboratory tests using a 750 mm x 12.5 mm Inconel probe fitted with a Type K thermocouple. Figure 1 illustrates temperature and agitation. Figure 2 represents similar data but at multiple bath temperatures. These curves are useful only for a general comparison. UCON Quenchant E-NN will yield equivalent results.

Figure 1 ● Concentration Effect on Cooling and Cooling Rate for UCON™ Quenchant E
Agitation Rate = 15 L/min.



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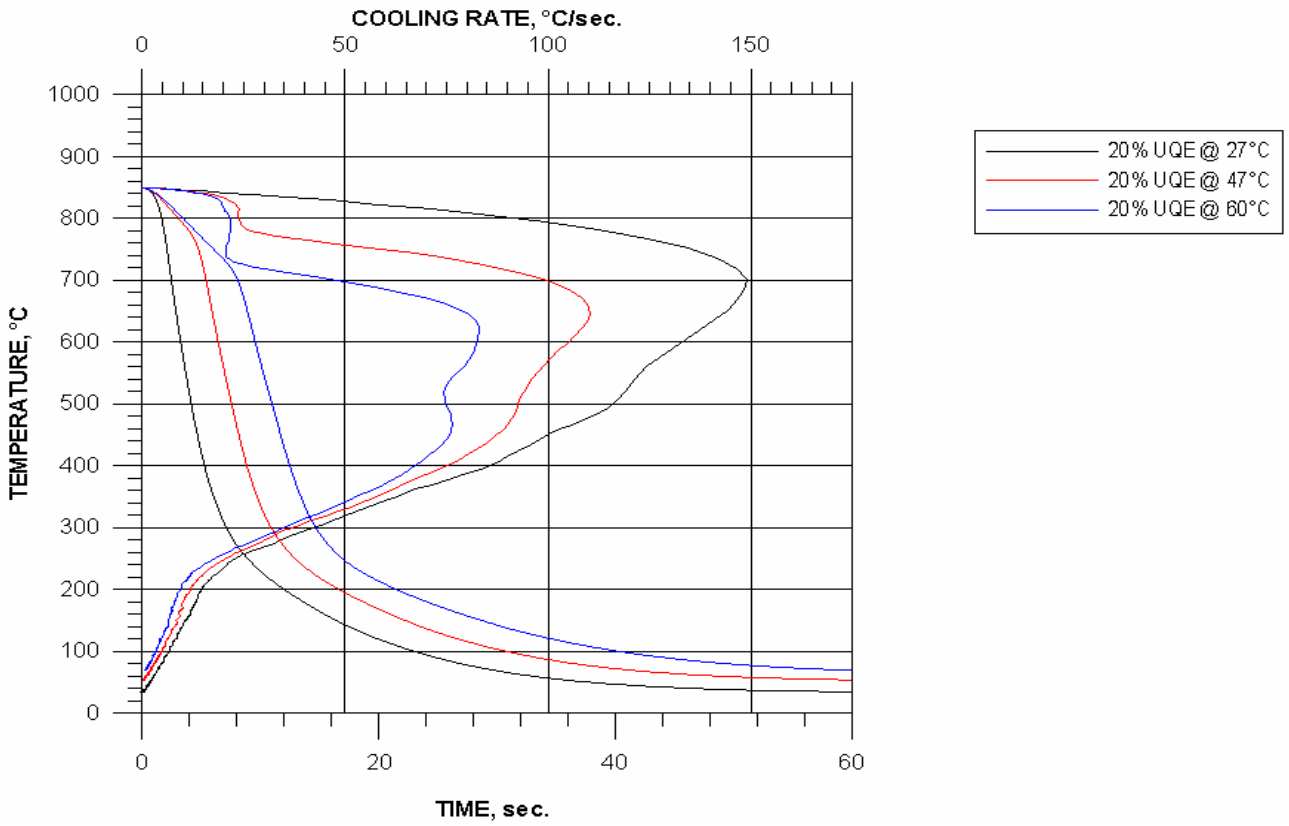
UCON Fluids and Lubricants

Figure 2 ● Temperature Effect on Cooling and Cooling Rate for UCON™ Quenchant E
Agitation Rate = 15 L/min.



Product Use Precautions

Steam and small amounts of organic vapors can be evolved during quenching. The vapors could be irritating and toxic if allowed to accumulate. Adequate workplace ventilation should be provided to prevent irritation and accumulation of vapors; this may require use of a special, local ventilation system in the immediate area where vapors are released.

Where this product is burned under conditions of relatively complete combustion, the major products are carbon dioxide and water vapor. Where this material is subjected to overheating (thermal degradation) but does not burn, the degradation products can be such things as organic acids (formic, acetic acids), aldehydes, esters, ketones, etc. These vapors or fumes can be highly irritating to the eyes, nose, and throat. Special ventilation may be needed. In normal use, no respiratory protective equipment should be needed, but self-contained breathing apparatus should be available for use in emergencies. Small amounts or organic vapors can be formed by oxidation of quenchants. These vapors could be irritating or toxic if released in a poorly ventilated area. Good ventilation should be maintained in the area around quench tanks.

Product Stewardship

Dow encourages its customers and potential users to review their applications from the standpoint of human health and environmental aspects. To help ensure that Dow products are not used in ways for which they are not intended or tested, Dow personnel will assist customers in dealing with environmental and product safety considerations. Dow literature, including Material Safety Data Sheets, should be consulted prior to the use.

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