UCON™ Quenchant RL

**Product Description**

UCON™ Quenchant RL is a nonflammable polymeric quenchant manufactured by The Dow Chemical Company. It is an aqueous solution of a liquid organic polymer and a corrosion inhibitor. The organic polymer is soluble in water and produces a homogenous solution. At temperatures above 74°C (165°F), however, the polymer separates from water as an insoluble phase.

When hot metal is quenched in a diluted solution of UCON Quenchant RL, 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 RL in the quench bath.

The cooling rate is controlled also by adjusting the quench bath temperature and/or the rate of agitation. The major difference between UCON Quenchant RL and the other UCON Quenchants is the polymer composition, which provides uniform heat transfer in a broad range of applications.

**Applications**

UCON Quenchant RL is suitable for use in the hardening of:

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

**Advantages and Features**

- FM approvals has classified UCON Quenchant RL 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 RL minimizes replacement control due to its low deterioration and/or oxidation rate. The major make-up requirement is for water lost by evaporation.
- UCON Quenchant RL eliminates the smoke, soot, and residues common to oil quenchants. Equipment maintenance and plant cleanliness are easier to achieve.
- UCON Quenchant RL is fully soluble in water and resistant to bacterial growth.
- UCON Quenchant RL will freeze below 0°C (32°F). It should be thawed to room temperature and mixed before use. The product will not be affected in any way.
Performance

UCON Quenchant RL is used for quenching of medium- to high-carbon steel and alloy steels of most grades including 300 and 400 series stainless steels.

UCON Quenchant RL is readily adapted to induction hardening, camshafts, and other pieces of intricate geometry and different metallurgy.

UCON Quenchant RL may follow oxidizing, neutral, or protective atmosphere furnaces of shaker, rotary, batch or continuous design. The quenchant may be used for direct quenching from the forge, for continuous cast quenching, and for general hardening of forged and cast steels and cast irons.

Typical Physical Properties†

<table>
<thead>
<tr>
<th>Property</th>
<th>UCON Quenchant RL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight per Gallon @ 20°C</td>
<td>8.97</td>
</tr>
<tr>
<td>Specific Gravity at 20/20°C</td>
<td>1.077</td>
</tr>
<tr>
<td>Flash Point, Cleveland Open Cup, ASTM D 92</td>
<td>None</td>
</tr>
<tr>
<td>Pour Point, °C (°F)</td>
<td>0 (32)</td>
</tr>
<tr>
<td>Rust Inhibition, ASTM D 665A</td>
<td>Pass</td>
</tr>
<tr>
<td>Viscosity at 100°F (37.8°C), SUS</td>
<td>1000 - 1250</td>
</tr>
</tbody>
</table>

†Typical physical properties, not to be construed as specifications

Cooling Curves

Figures 1 and 2 illustrate the rate of cooling achieved with UCON Quenchant RL in laboratory tests using a 750 mm x 12.5 mm (dia.) Inconel probe fitted with a Type K thermocouple. Figure 1 illustrates the influence of variations in concentration at constant temperature and agitation. Figure 2 illustrates the change in cooling rate at elevated bath temperatures, again, with uniform agitation.

Figure 1 • Concentration Effect on Cooling and Cooling Rate for UCON™ Quenchant RL
Agitation Rate = 15 L/min.
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 of 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.
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