UCON Quenchant C

Product Description

UCON™ Quenchant C 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 homogeneous solution. At temperatures above 74°C (165°F), however, the polymer separates from water as an insoluble phase.

The cooling rate is controlled also by adjusting the quench bath temperature and/or the rate of agitation. The major difference between UCON Quenchant C and the other UCON Quenchants is their lower molecular weight, which provides uniform heat transfer in the range between brine and water.

Applications

UCON Quenchant C is currently being used for:

- Various applications for the hardening of lean-hardenability steels where water or brine quenches would normally be used.
- Induction hardening of lean alloy steels and applications where deep case patterns are required.
- Single-bath concentrations of polymer that operate over the range of thin and heavy wrought, cast, and/or forged aluminum alloys for maximum physicals with low distortion.
- Non-ferrous metals such as titanium alloys, beryllium-copper, and bronzes.

Advantages and Features

- FM Approvals has classified UCON Quenchant C 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 C 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 C eliminates the smoke, soot, and residues common to oil quenchants. Equipment maintenance and plant cleanliness are easier to achieve.
- UCON Quenchant C is soluble in water and resistant to bacterial growth.
- UCON Quenchant C 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

The broad temperature range for UCON Quenchant C makes the quenchant adaptable to batch-type integral quench furnaces. However, because of variations in equipment design, each installation will require individual attention to provide satisfactory performance.

UCON Quenchant C is useful with induction hardening, both spray and immersion quench, for overcoming lean chemistries of steel and/or where greater depth of case hardening is desired.
**Performance (continued)**

UCON Quenchant C produces lower levels of distortion than those resulting from water or brine applications.

- UCON Quenchant C is adaptable for hardening operations from molten lead or salt.
- UCON Quenchant C may be used for the quenching of lean-hardenability steels, and thin and heavy sections of wrought, case, or forged aluminum alloys.
- UCON Quenchant C reduces distortion versus water in the quenching of titanium alloys, beryllium-copper and aluminum bronzes.

**Typical Physical Properties†**

<table>
<thead>
<tr>
<th>Property</th>
<th>UCON Quenchant C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight per Gallon @ 20°C</td>
<td>9.14 lbs</td>
</tr>
<tr>
<td>Specific Gravity at 20/20°C</td>
<td>1.098</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>-20 (-4)</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>375 - 565</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 C in laboratory tests using probes fitted with a Type K thermocouple. Figure 1 illustrates the change in cooling rate as a function of flow rate using a 7075 aluminum test probe. Figure 2 illustrates the influence of variations in probe size at constant temperature and agitation.

**Figure 1 • Effect of Flow Rate on Cooling Rate Using 7075 Aluminum Test Probes (Center Thermocouples)***
Product Use

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.
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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