Quench Oils

Metal Quenching Oils

Quench Oils are high-quality oils developed for heat treatment of ferrous metals in a wide variety of quenching operations. They are formulated to provide deep and uniform hardening with minimum distortion and cracking for a smooth surface finish.

Quench Oils are available in three grades: 22, 22HS and 32HS. The 22 grade is a highly refined, straight (non-additized) paraffinic mineral oil recommended for conventional quenching of ferrous metals at bath temperatures up to 150°F (66°C). It has a slower quench speed than the other grades, and provides minimum hardening power. The other three grades are fortified with select additives to provide enhanced oxidation resistance and metal-wetting ability for use in fast quench operations where it is important to develop maximum hardness while minimizing distortion. The 22HS grade is a high-speed quench oil with moderate-to-high hardening power. The 32HS grade is a higher viscosity, high-speed quench oil that provides the highest hardening power.

Quench Oils provide a high initial cooling rate to induce maximum hardness. After the critical transformation temperature is passed, the cooling rate gradually decreases to a much slower rate to minimize the possibility of stress and metal distortion, thereby ensuring a smooth surface finish. These oils are highly stable throughout the hardening temperature range to provide long service life with minimal sludge formation. They have a high viscosity index for minimum viscosity change during the entire quenching operation, and have high flash and fire points to minimize fire hazards.

Applications

- Conventional and fast quenching of ferrous metals, such as carbon steel, gray iron and high-alloy steel

Caution: *Quench Oils must not be mixed with competitive quench oils, unless tested for compatibility. They are not recommended for marquenching or martempering operations, where oil temperatures can reach 150°C to 232°C (302°F to 450°F).*

Features/Benefits

- Controlled cooling rate to minimize cracking and distortion
- Good surface finish
- Excellent oxidation resistance and thermal stability
- High flash point for fire safety

Note: *Agitation, filtration and periodic product sweetening are essential to successful quenching operations. The quench tanks must be periodically cleaned and the quench oil filtered to remove scale, metal shavings and contaminants. A 50-micron double-bag filter is recommended for proper maintenance. The quench oil must be continuously agitated to provide uniform surface microstructure. Condition monitoring by oil analysis is essential in maintaining optimum performance and the desired quenching qualities of these oils.*

KEEPING THE WORLD RUNNING SMOOTHLY

Quench Oils

Typical Properties			
Grade	**22**	**22HS**	**32HS**
ISO Grade	22	22	32
Specific Gravity @ 60°F	0.854	0.855	0.864
Density, lbs/gal @ 60°F	7.11	7.12	7.19
Color, ASTM D1500	0.0	L 2.0	2.0
Flash Point (COC), °C (°F)	205 (401)	207 (405)	218 (424)
Pour Point, °C (°F)	-13 (9)	-15 (5)	-15 (5)
Viscosity			
cSt @ 40°C	22.0	23.1	32.9
cSt @ 100°C	4.5	4.5	5.5
SUS @ 100°F	115	120	170
SUS @ 210°F	41.4	41.4	44.7
Viscosity Index	118	107	103
Acid Number, ASTM D974, mg KOH/g	0.01	0.12	0.05
Cooling Characteristics[1], ASTM D6200			
Maximum Cooling Rate, °C/sec	29-40	74-85	76-87
Maximum Cooling Rate, °F/sec	85-105	165-185	169-189
Time to Cool to 600°C (1,112°F), seconds	12-15	9-10	9-10

[1] **Note**: *Values for cooling rates and quench speeds are typical for new oil. For used oil, values will vary due to aging and contamination.*

Health & Safety Information

For recommendations on safe handling and use of this product, please refer to the Safety Data Sheet via http://www.phillips66.com/EN/products/Pages/MSDS.aspx.

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