

Selection Guide for UCON Quenchants



UCON™ quenchants are a series of nonflammable, aqueous solutions containing special polymers and corrosion inhibitors for quenching both ferrous and nonferrous metals. They can replace water, oil, or brine solutions and are the preferred quenching media for both low- and high-hardenability, plain carbon, and alloy steels. UCON quenchants provide much wider flexibility in quench severity than water or oil, thus reducing cracking, distortion, and residual stress in quenched parts. Use of UCON quenchants is permitted by most major industrial and military specifications. UCON Quenchant A is classified as a Type I quenchant (AMS 3025B) for aluminum heat treating in the aerospace industry. UCON quenchants have been tested to the Standard 6930 Flammability Classification of Industrial Fluids and approved by FM Approvals as “FM Approved” products.

UCON™ Quenchant E and E-XL

<i>Item</i>	<i>Alloy</i>	<i>Heating Method ⁽¹⁾</i>	<i>Quenchant Concentration, %</i>	<i>Fluid Temp., °F</i>	<i>Prior Quench Media</i>	<i>As-Quenched Hardness, R_c</i>
Gear Blanks	4140	DFQ	24-26	120-130	Oil	55-62
	4150	DFQ	24-26	120-130	Oil	55-62
Gears	4140	FB	24-26	100-120	Oil	54-62
	4150	FB	24-26	100-120	Oil	54-62
Oil Field Components	4140	PF	22-26	120-130	Oil	55-64
	4150	PF	22-26	120-130	Oil	55-64
	4340	PF	22-26	120-130	Oil	55-64
Shafts	4140	PF	20-25	120-130	Oil	55-64
	4150	PF	20-25	120-130	Oil	55-64
	5200	PF	20-25	120-130	Oil	55-64
	9 Cr, 1 Mo	PF	20-25	120-130	Oil	55-64
	8260	PCF	18-24	90-100	Oil	60+ (Surf.)
Shoe Shanks	1060	CF	18-22	90-110	Oil	60+
	1065	CF	18-22	90-110	Oil	60+
Spindles	4140	FB	22-26	12-130	Oil	51-55
Sprocket Gears	PM ⁽²⁾ 1.0C, 2.0 Cu	I	23-27	120-130	Water	59-62
Agricultural Tools	1080	DFQ	22-26	130	Oil	60-62
	1085	DFQ	22-26	130	Oil	60-62
Hard Faced (Brazed) Disk	1085	F	22-25	140	Oil	59-62
Large Carburized Gears (30,000 lb.)	4320	F	22	120	Oil	59-63
Die For Engine Valves	H13	F	22-24	90	Oil	53-55
Crankshaft	1043	F	15	86	Oil	95-99 HB
	4140H	F	10	100	Oil	105-109 HB
Track Links	15B37	F	10-12	95-104	Oil	38-40

⁽¹⁾CF=Continuous Furnace, DFQ=Direct Forge Quench, FB=Fluidized Bed, I=Induction, PCF=Pit Carburizing Furnace, F=Furnace, PF=Pit Furnace

⁽²⁾Powdered Metallurgical Parts

UCON™ Quenchant A or A-XL

<i>Item</i>	<i>Alloy</i>	<i>Heating Method⁽¹⁾</i>	<i>Quenchant Concentration, %</i>	<i>Fluid Temp., °F</i>	<i>Prior Quench Media</i>	<i>As-Quenched Hardness, R_c</i>
Axles	1045	I	10	100	-	40-45
Ball Bearing Plates	Meehanite	F	15	Ambient	-	40-45
Cam Follower Studs	1070	I	15	100	Brine	60
Camshafts	Gray Iron	I	20	110-120	Water	-
Caster Horns	1012	C	8	80	Oil	-
	1020	C	8	80	Oil	-
Cast Iron Saddles	Cast Iron	FL	6	85	-	56-60
Crankshafts	1050	I	10-12	100	Oil	56+
	5046	I	10-12	100	Oil	-
	1048	I	11-14	115-120	Water	48
	1046	I	10-11	110	PVA	56+
Drive Shafts	Carbon	I	10-12	90-120	-	-
Forged Joints	1045	F	18-19	130-140	Oil	350-500 (BHN)
	1141	F	18-19	130-140	Oil	350-500 (BHN)
Gears	4140	I	10-15	80-100	-	50-60
	4150	I	10-15	80-100	-	50-60
	1040	I	10-12	60-100	-	52-56
Pins	1045	I	8-10	70	Water	59-60
Roller Cutters	4870	F	18	100+	Oil	59-60
Screws	1022	CN	10	95	Oil	83(R _n)
Splined Shafts	1046	I	20	100+	Oil	56-58
	1041	I	10	80-110	Water	49-55
	1141	I	10	80-110	Water	49-55
	410 SS	I	14-16	100-120	Oil	38-42
	8645	I	14-16	100-120	Oil	58-62
	8650	I	14-16	100-120	Oil	58-62
	8655	I	14-16	100-120	Oil	58-62
	1050	I	14-16	100-120	Oil	58-62
	8620	C	14-16	100-120	Oil	58-62
Track Links	5135	F	5	80-110	Oil	52-57

⁽¹⁾C=Carburizing, CN=Carbonitriding, F=Furnace, FL=Flame, I=Induction

Limits for Quenching Aluminum Parts in UCON™ Quenchant A⁽¹⁾ Solutions

Alloy	Form	Maximum Thickness ⁽³⁾		Polymer ^(4/5) Concentration, %	Notes
		Inches	Millimeters		
2024	Sheet, Extrusions	0.040	1.02	34 Max.	(2)
2024		0.063	1.60	28 Max.	(2)
2024		0.071	1.80	22 Max.	(2)
2024		0.080	2.03	16 Max.	(2)
2219	Sheet, Extrusions	0.073	1.85	22 Max.	(2)
6061	Sheet, Plate, Bar	0.250	6.35	40 Max.	
6061		0.375	9.52	32 Max.	
6061		1.000	25.40	22 Max.	
7049	Sheet, Plate, Bar	0.080	2.03	40 Max.	
7050		0.250	6.35	34 Max.	
7075		0.375	9.52	28 Max.	
7175		0.500	12.70	22 Max.	
7175		1.000	25.40	16 Max.	
6061		Forgings	1.000	25.40	20-22
7075	2.000		50.80	13-15	(6)
7175	2.500		63.50	10-12	(6)
7049	Forgings	1.000	25.40	20-22	
7149		2.000	50.80	13-15	
7149		3.000	76.20	10-12	
7050	Forgings	1.000	25.40	28-32	
7050		2.000	50.80	26-28	
7050		3.000	76.20	20-22	
7050		4.000	101.50	15-17	
7049	Extrusions	0.250	6.35	28 Max.	
7050		0.250	6.35	28 Max.	
7075		0.250	6.35	28 Max.	
7175		0.250	6.35	28 Max.	
7049		0.375	9.52	22 Max.	
7050		0.375	9.52	22 Max.	
7075		0.375	9.52	22 Max.	
7175		0.375	9.52	22 Max.	

⁽¹⁾UCON™ Quenchant A is an AMEC approved Type 1 Polymer Quenchant according to AMS 3025B.

⁽²⁾Applicable when final temper is T4 or T42. When final temper is T6 or T62, sheet and plate up to 0.250 inch (6.35 mm), inclusive, may be quenched in UCON Quenchant A to a maximum concentration of 22%.

⁽³⁾Thickness is the minimum distortion of the heaviest section at the time of heat treatment.

⁽⁴⁾Where only maximum concentration is shown, any concentration equal to or below the maximum concentration shall be controlled within $\pm 2\%$ of that selected. When concentration is specified on a drawing or purchase order without tolerance or range, the tolerance shall be $\pm 2\%$.

⁽⁵⁾Concentration shall be checked according to ASTM D 445 weekly and whenever concentration is changed.

⁽⁶⁾Prohibited for 7075 alloy when final temper is T6.

UCON™ Quenchant HT

<i>Item</i>	<i>Alloy</i>	<i>Heating Method ⁽¹⁾</i>	<i>Quenchant Concentration, %</i>	<i>Fluid Temp., °F</i>	<i>Prior Quench Media</i>	<i>As-Quenched Hardness, R_c</i>
Crankshafts	1050	F	18-22	90-120	Water	56-62
Die Blocks	4140	F	23-25	110-130	Oil	55-62
	4340 (Mod)	F	23-25	110-130	Oil	55-62
Forged Roll Rings	Waspaloy	F	18-22	80-120	Water/Oil	Varies
	Inconel	F	18-22	80-120	Water/Oil	Varies
	Ti-6Al-4V	F	18-22	80-120	Water/Oil	Varies
	Al-6061	F	18-22	80-120	Water/Oil	Varies
Gears	4140	IQF	20-24	120-130	Oil	53-58
High-Pressure Cylinders	4130	F	18-20	90-120	Oil	53-58
	4140	F	18-20	90-120	Oil	53-58
Leaf Springs	5160	DFQ	30-34	130-160	Oil	50-60
Oil Tools	8620	ICF	28-32	90-120	Oil	50-60
	4320	ICF	28-32	90-120	Oil	50-60
	4820	ICF	28-32	90-120	Oil	50-60
Powdered Metallurgical Parts	0.54 C, 1.65Cu	F	12-16	100-120	Oil	40-50
Shafts	4140	F	22-26	120-130	Oil	55-60
	4150	F	22-26	120-130	Oil	55-60
Large Rings (22ft. dia., 62,000 lb.)	4340	F	20-24	120	-	50-55
	4140	F	20-24	120	-	50-55
	4150	F	20-24	120	-	50-55

⁽¹⁾DFQ=Direct Forge Quench,
 F=Furnace,
 ICF=Integral Carburizing Furnace,
 IQF=Integral Quench Furnace

To Learn More, Call...

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