



AW HYDRAULIC OIL

PREMIUM, ANTI-WEAR HYDRAULIC OILS

APRIL 2016

CSR AW Hydraulic oils are premium grade anti-wear hydraulic oils blended from hydro-treated, Group II+ base oils, formulated to meet the stringent requirements of positive displacement, high pressure, high-speed hydraulic pumps.

In service **CSR AW Hydraulic oils** offer the following benefits:

- ◆ Corrosion and wear protection for critical pump components
- ◆ Oxidation stability for long service life
- ◆ Rapid release of entrained air
- ◆ Easy filterability
- ◆ Resistance to sludge and varnish deposits

Product Applications

The primary function of a hydraulic fluid is to act as a medium for transmitting power and it must be highly stable, readily filterable, protect critical system components from rust and corrosion and act as a coolant to remove excessive heat. **CSR AW Hydraulic oil** derives its anti-wear properties from a zinc dialkyldithiophosphate (ZDDP) additive with good thermal and hydrolytic stability. This additive is very effective in reducing vane and gear pump wear in systems operating at high loads, speeds, and temperatures. Its good additive stability also allows the use of **CSR AW Hydraulic oil** in severe-service hydraulic systems employing axial and radial piston pumps.

In addition to their anti-wear properties and thermal and hydrolytic stability, **CSR AW Hydraulic oils** are characterized by outstanding rust protection and oxidation stability, good demulsibility, and low air entrainment. All grades contain additives to resist oxidation and prevent rust and corrosion. They are non-corrosive to metal alloys, except those containing silver, and are fully compatible with common seal materials. They are fortified with an anti-foam agent and a pour-point depressant. They resist large changes in viscosity across the commonly encountered range of operating temperatures, and their low pour point assist in providing a ready flow of fluid during cold-weather startup.

A major pump manufacturer recommends a maximum oil viscosity of 865 cSt (4,000 SUS) at startup and a minimum of 13 cSt (70 SUS) at operating temperatures

CSR AW Hydraulic oils are multi-purpose hydraulic oils and can be used for all hydraulic applications, except for pumps, such as Lucas, with silver-alloy bearings. They are also an excellent choice for applications requiring premium rust- and oxidation-inhibited circulating oils, even though the anti-wear properties may not be required.

Product Recommendations and Approvals

CSR AW Hydraulic oils 32, 46, and 68 oils are approved against Cincinnati Machine specifications P-68, P-69, and P-70 respectively. They pass the Denison Division vane and piston pump performance test and are approved against Denison specifications Denison HF-0, HF-1, HF-2, Vickers 35VQ25, Eaton/Vickers M-2950-S, I-286-S, Ford M6C32, Chrysler, General Motors LS-2, and US Steel 136 specifications for stability and durability.

Product Maintenance and Handling

CSR AW Hydraulic oils are blended from hydro-treated, Group II+ base oils, carefully blended with selected additives. As with all petroleum products, good personal hygiene and careful handling should always be practiced. Avoid prolonged contact to skin, splashing into the eyes, ingestion or vapor inhalation.

Please refer to the Material Safety Data Sheet for further information.

Note: This product is not controlled under Canadian WHMIS legislation.

Typical Properties

AW Hydraulic Grade	22	32	46	68
ISO Viscosity Grade	22	32	46	68
Density @ 15°C, kg/m ³	851	854	857	865
Pour Point, °C	-42	-39	-36	-33
Flash point, °C	218	230	248	254
Viscosity Index	111	115	114	111
Kinematic Viscosity, cSt @ 40°C	22.0	32.0	46.0	68.0
@ 100°C	4.3	5.6	7.0	9.0
Neutralization number	0.50	0.35	0.35	0.35
Rust Test, D665A&B	Pass	Pass	Pass	Pass
Hydrolytic stability, Cu mass loss, mg/cm ²	0.17	0.12	0.12	0.12
Color, ASTM	L 1.0	L 1.0	L 1.5	L 2.5
Denison HF-0 pump test		Approved	Approved	Approved
Cincinnati Milacron Spec. No.		P68	P70	P69
Vane pump test total ring and vane wear, mg		25.0	25.0	25.0
35VQ25 Vane Pump Test	104/105C Vane Test – Pass	Pass	Pass	Pass
Oxidation Stability, hrs. D-943	4,000+	5,000+	5,000+	5,000+
Copper Corrosion	1A	1A	1A	1A

The typical properties shown above are representative of current production. Some are controlled by manufacturing and performance specifications while others are not. All may vary within modest ranges.

Machine Builders' Viscosity Guidelines For Hydraulic Oils

Manufacturer	Equipment	Operating Viscosity		Start-Up (under load) *	Optimum
		Min cSt	Max cSt	cSt	cSt
Hägglands Denison	Piston Pumps	10	162	1618	30
Bulletin 2002-I	Vane Pumps	10	108	862	30
Racine	FA; RA; K vane pumps	15	216	864	26-54
	Q; Q6; SV-10,15,20,25 vane pumps	21	216	864	32-54
	Form No. S-106 SV-40, 80 and 100 vane pumps	32	216	864	43-65
	Radial piston pumps	10	65	162	21-54
	Axial piston pumps	14	450	647	32-65
Vickers	In-line piston pumps & motors	13	54	220	--
Data Sheet I-286	Angle piston, vane and gear pumps & motors	13	54	860	--
	MHT vane motors	13	54	110	--
Sundstrand	Piston pumps, Series 30	6.4	--	--	13
	Other piston units	9.0	--	--	13
	Axial piston pumps	16	100	1000	16-36
	V2 vane pumps, MZ motors	16	160	800	--
	V3, V4 vane pumps	25	200	800	25-160
Mannesmann	V5 vane pumps	16	200	800	--
Rexroth	R4 radial piston pumps	10	200	--	--
	G2, G3, G4 gear pumps & motors	10	300	1000	--
	G8, G9, G10 gear pumps	10	1000	--	25-85
	GM gear pumps	20	300	1000	--

* Field experience shows that most systems can be started at 8000 cP (9300 cSt) under no load conditions. Full load can be applied when the start-up (under load) viscosity is reached (see above)