



# MACHINE OIL

## ANTI-WEAR HYDRAULIC OILS

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**Machine** oils are formulated to meet the stringent requirements of positive displacement, high pressure, high speed hydraulic pumps.

In service Economy **Machine** 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. **Machine** 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 **Machine** oil in severe-service hydraulic systems employing axial and radial piston pumps.

In addition to their anti-wear properties and thermal and hydrolytic stability, **Machine** 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 (4000 SUS) at startup and a minimum of 13 cSt (70 SUS) at operating temperatures

**Machine** 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**

**Machine** oils 20 oils are approved against CM specifications P69. They pass the Denison Division vane and piston pump performance test and are approved against Denison specifications HF-0.

## Product Maintenance and Handling

**Machine** oils are manufactured from high quality petroleum base stocks, 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 vapour inhalation. Please refer to the Material Safety Data Sheet for further information.

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

### Typical Properties

Machine Oil	20	40
ISO Viscosity Grade	68	150
Density @ 15°C, kg/m <sup>3</sup>	878	881
Pour Point, °C	-33	-21
Flash point, °C	244	276
Viscosity Index	106	95
Kinematic Viscosity, cSt		
@ 40°C	68.0	153.8
@ 100°C	9.0	14.8
Neutralization number	0.35	0.35
Rust Test, Sea Water	Pass	Pass
Hydrolytic stability, Cu mass loss, mg/cm <sup>2</sup>	0.12	0.12
Denison HF-0 pump test	Approved	Approved
Cincinnati Milacron Spec. No.	P69	—
Vane pump test total ring and vane wear, mg	25.0	25.0
35VQ25 Vane Pump Test	Pass	Pass
Oxidation Stability, hrs.	2500+	2000+
RBOT, min.	310	295

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
<b>Hägglands Denison</b>	Piston Pumps	10	162	1618	30
<b>Bulletin 2002-I</b>	Vane Pumps	10	108	862	30
<b>Racine</b> <b>Form No. S-106</b>	FA; RA; K vane pumps	15	216	864	26-54
	Q; Q6; SV-10,15,20,25 vane pumps	21	216	864	32-54
	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
<b>Vickers</b>	In-line piston pumps & motors	13	54	220	--
<b>Data Sheet I-286</b>	Angle piston, vane and gear pumps & motors	13	54	860	--
	MHT vane motors	13	54	110	--
<b>Sundstrand</b>	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
<b>Mannesmann</b>	V5 vane pumps	16	200	800	--
<b>Rexroth</b>	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)