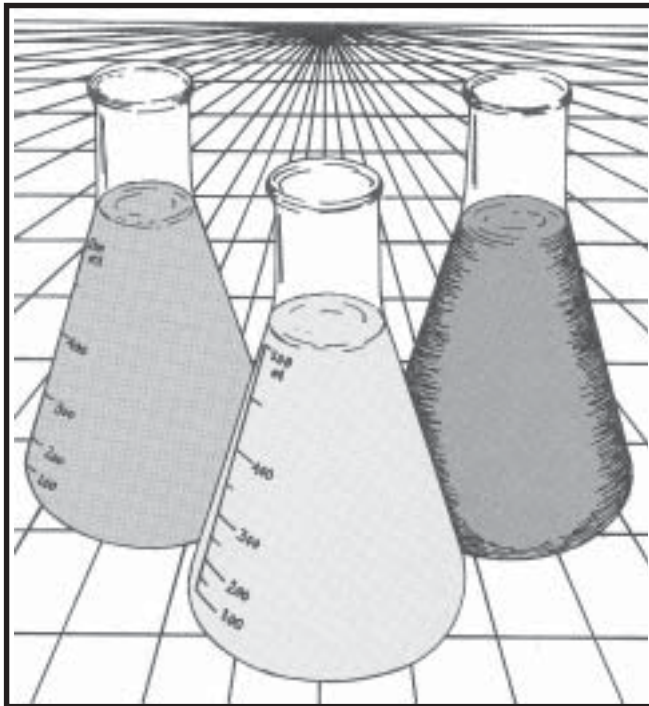


FLUID RECOMMENDATIONS

FOR OILGEAR EQUIPMENT



PURPOSE OF RECOMMENDATIONS:

This information recommends certain standards when selecting fluids for use in Oilgear equipment and components. We feel confident Oilgear equipment will provide optimum performance and service life if these recommendations are followed. For questions concerning operation under unusual conditions, equipment compatibility or use of fluids not referred to please contact The Oilgear Company.

FLUID POWER MEDIUMS:

Oilgear equipment and components are available for use with petroleum based or synthetic fluids which serve dual purposes in lubrication of internal working parts and the transmission of power. The buyer must specify the fluid type to be used with new, repair or replacement equipment or parts. Consult your hydraulic fluid supplier for flammability, toxicity and viscosity/temperature characteristics of specified fluid.

(Continued on Page 3)

REFERENCE MATERIAL

DESCRIPTION	BULLETIN
Contamination Evaluation Guide	90004
Storage Recommendations for Oilgear Units	90006
Filtration Recommendations	90007
Fluid Supplier Recommendations	90008
High Water Content Fluid/Laboratory Report	90009

THE OILGEAR COMPANY

2300 So. 51st. Street
Milwaukee, WI 53219

OPERATING CONDITIONS

UNIT TYPE DESIGNATION	Max. (4) ISO Contam. Grade	RECOMMENDED VISCOSITY GRADE		INTAKE CONDITIONS				
		ISO VG @ 40 Deg. C.	SUS @ 100 Deg. F.	VISCOSITY RANGE		TEMP-F° (2) RANGE		
				MAX. SUS	MIN. cSt		SUS	cSt
<u>PUMPS: Axial Piston Port Plate</u>								
PVW (3) PFW (3) PVG PVZ	19/16	SAE 10W (1) 22 *32 *46 68 100 150	170 116 165 240 350 530 690	2000	500	65	13	30 to 150 14 to 136 27 to 155 39 to 172 50 to 190 62 to 190 74 to 190
PVL PFL	18/15	46 68 *100 150	240 350 530 690	1900	450	240	52	40 to 98 52 to 115 64 to 128 75 to 140
PVK PFK PVV Fluid must be anti-wear	18/15	32 46 *68 100 150	165 240 350 530 690	2000	500	80	16	27 to 136 39 to 140 50 to 140 62 to 140 74 to 140
<u>PUMPS: Axial Piston Check Valve</u>								
PFCM (3) PFCS (3) PFBK (3) A X	19/16	22 *32 *46 68 100	116 165 240 350 530	450	97	97	20	49 to 108 64 to 125 77 to 140 90 to 140 104 to 140
<u>PUMPS: Radial Piston</u>								
D-C Size 100 or larger DN	19/16	68 *100 150	350 530 690	1900	450	200	43	52 to 121 64 to 135 75 to 135
D - C Size 60 or smaller and	19/16	46 *68	240 350	1900	450	130	28	40 to 127 52 to 135
A, AN, PVA	18/15	100	530	1900	450	130	28	64 to 135
<u>MOTORS: Bent Axial</u>								
MFS MVS	18/15	32 46 68 *100 150	165 240 350 530 690	1900	450	200	43	28 to 92 40 to 106 52 to 121 64 to 135 75 to 135
<u>MOTORS: Axial Piston</u>								
MFQ _A MVQ _A	19/16	SAE 10W (1) 22 *32 *46 68 100 150	170 116 165 240 350 530 690	2000	500	65	13	30 to 150 14 to 136 27 to 155 39 to 172 50 to 190 62 to 190 74 to 190

* Recommended viscosity for industrial applications

- (1) If SAE 10W oil is preferred to the ISO grade, it should meet API Engine Service Classification SG.
- (2) The temperature range is determined to maintain the proper viscosity using a fluid with a viscosity index of 90. By using a fluid with a higher viscosity index, one can determine what temperatures would still be within the recommended viscosity range.
- (3) For pumps using high water content fluids or viscosities below 65 SUS refer to Oilgear Bulletin 90009.
- (4) The maximum water content should be 0.1% or less.

CLEANLINESS:

Oilgear units have many parts with precision finished surfaces working together. Contamination such as acid, water grit, etc. in the fluid will cause trouble and the eventual need for repairs. Use ONLY a fluid with an acceptable contamination level. Even new fluid should be filtered prior to using. Handle all fluid in CLEAN containers and introduce fluid into the system through CLEAN filter with a beta 10 rating of 15 or better. Refer to Oilgear Bulletin 90004 which describes contaminant evaluation and remedial action recommendations.

FILTRATION:

A filtering system should be used to keep the fluid at an acceptable contamination level (refer to Bulletin 90004). The dirt removal rate must be equal to or exceed the ingestion rate which depends on running conditions, ambient conditions, breather effectiveness, seal conditions, etc. Refer to Oilgear Bulletin 90007 for filter selection recommendations.

AIR IN THE FLUID:

Air in the fluid is detrimental to component life and system performance. Rapid oxidation of fluid, noise, cavitation, shock, pump damage, spongy action and lengthened machine cycle time can all be the result of air in the fluid. To reduce the air in the fluid it is desirable that all air leaks in the suction area be eliminated; all return lines should slowly return the fluid below the minimum fluid level in the reservoir; the reservoir should be kept to the maximum fluid level and a fluid with defoamers should be used. System operation at or above 120°F. (48°C) aids in the release of air from the fluid.

ADDITIVES:

Additives are most readily defined as materials added to the base fluid for the purpose of enhancing natural performance qualities. Hydraulic fluids usually have rust, oxidation, foam and scuff inhibitors which can help in the reduction of wear, assist in keeping systems cleaner, minimizes sludge and deposits and usually proves to be a very cost effective measure through improved performance and the extended life of hydraulic components.

VISCOSITY INDEX:

Oilgear systems and components are designed for the use of hydraulic fluids within certain maximum and minimum operating viscosity limits depending upon the unit type and horsepower rating. The viscosity index is a number which indicates how much viscosity changes for a given change in temperature. If you are using your equipment where there is a wide range of temperature swings, a high viscosity index fluid is recommended. By providing either your fluid supplier or Oilgear salesman the temperature range, they will reference the "Operating Conditions" table, find the acceptable viscosity limits and recommend a high viscosity index fluid.

CONTROL OF FLUID TEMPERATURE:

Conditioning fluid with heat exchangers may be necessary to keep the fluid at the pump intake within the recommended temperature range. When starting or operating equipment in low ambient temperature, use heaters with automatic temperature controls in the reservoir or other precautions. Provide fluid circulation around heater elements to prevent localized overheating. When high ambient temperatures prevail or operating temperatures exceed the recommended range, use heat exchangers with automatic temperature controls or other precautions to keep the fluid below the maximum operating temperature. Automatic over and under temperature alarm systems are recommended.

AVAILABILITY OF WARNING/CONTROL DEVICES:

Many devices are available to allow the system user adequate time to detect and correct any potentially disastrous situations from occurring. Shutdown switches or alarms for low fluid level, over and under temperature, over pressure, supercharge pressure and dirty filter elements switches, will immediately indicate the absence of a critical parameter. Automatic unloading controls, gages, recorders and complete annunciator system are other desirable devices. Refer to THE OILGEAR COMPANY for recommendations.

UNIT COMBINATIONS:

When two or more units connected to a common reservoir have different viscosity requirements, use the fluid with the highest viscosity recommendations.

FLUID CHANGE:

If the fluid system operates under average conditions, is automatically filtered and is periodically tested to insure stability, the fluid may be retained in service for many years. If the system operates under adverse conditions and shows signs of deterioration, the fluid must be changed.

COMPATIBILITY FACTORS:

Consult the fluid supplier for special precautions to be taken when changing between oil and phosphate ester type fluids. Consult THE OILGEAR COMPANY for equipment compatibility specifying the model type(s) and serial number(s) of unit(s) involved.

ADDITIONAL INFORMATION:

For information on operating under unusual conditions, equipment compatibility or use of fluids not referred to in this bulletin, please contact THE OILGEAR COMPANY.

**INTERNATIONAL STANDARDS ORGANIZATION
VISCOSITY GRADES**

ISO Vis Grade	cSt @ 40°C	SSU @ 100°F (assume 95 VI)
10	9.00 - 11.0	57.6 - 65.3
15	13.5 - 16.5	75.8 - 89.1
22	19.8 - 24.2	105 - 126
32	28.8 - 35.2	149 - 182
46	41.4 - 50.6	214 - 262
68	61.2 - 74.8	317 - 389
100	90.0 - 110	468 - 575
150	135 - 165	709 - 871
220	198 - 242	1047 - 1283
320	288 - 352	1533 - 1881
460	414 - 506	2214 - 2719
680	612 - 748	3298 - 4048

NOTES:



THE OILGEAR COMPANY
2300 So. 51st. Street
Milwaukee, WI 53219