

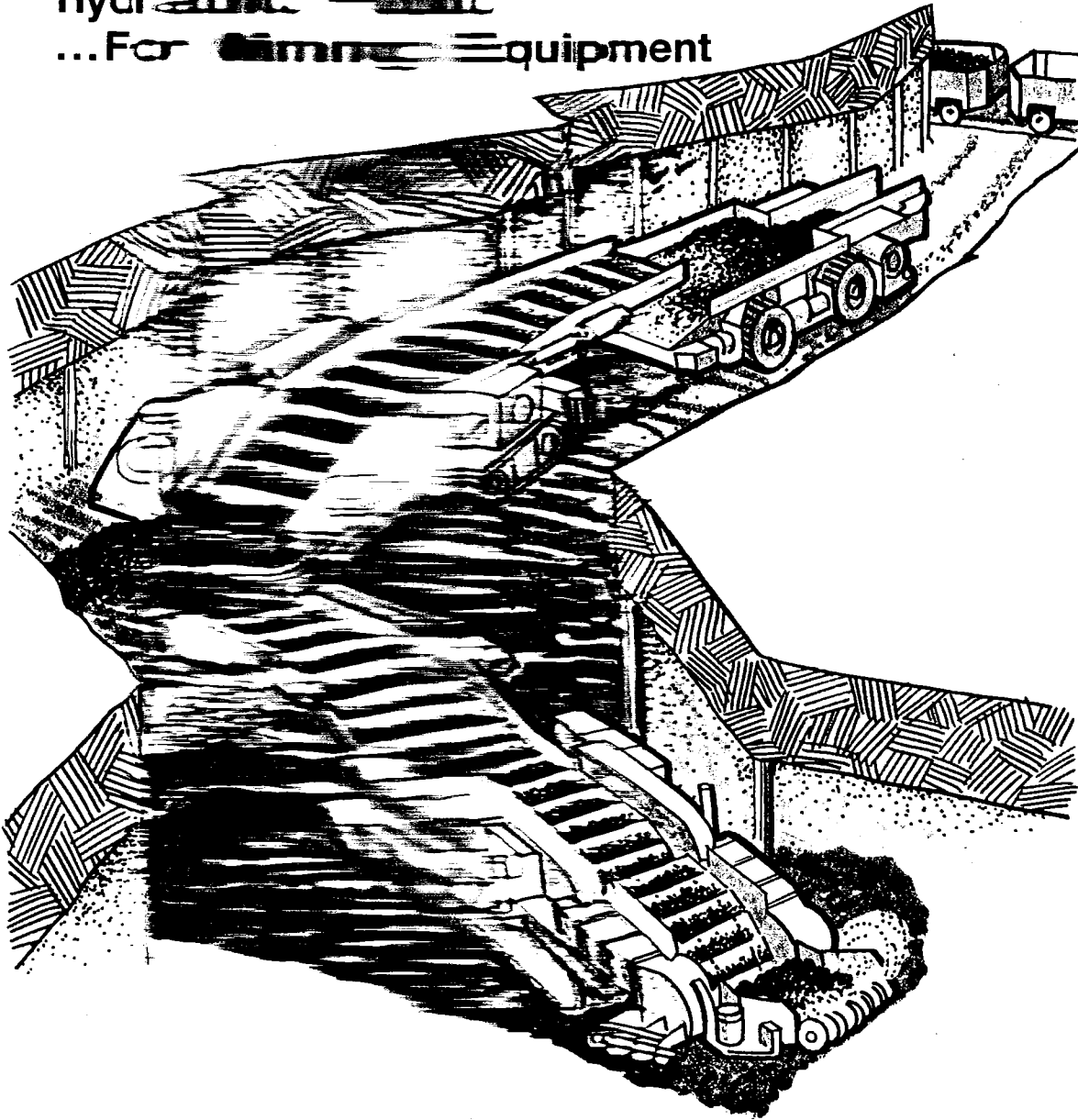
PYDRAUL[®] MC

Bulletin No. IC/FF-48

Fire ~~Essential~~

Hydraulic ~~Equipment~~

...For ~~Various~~ Equipment



Monsanto

DSW 281786

PYDRAUL[®] MC

DSW 281787

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* **"NOTE:** Materials designated 'fire resistant' generally are more difficult to ignite, or once ignited, burn at a slower rate than corresponding conventional materials. This term does not mean that fire resistant materials will not burn. However, when properly used, Monsanto's fire resistant PYDRAUL[®] HYDRAULIC FLUIDS are useful in helping customers meet their fire safety requirements."

**A high-performance
hydraulic fluid
hydraulic operation
minimum maintenance**

Pydraul® MC is a water-based hydraulic fluid specifically formulated for use in equipment. It is a water-based formulation that meets the requirements of the Bureau of Mines Schedule 1972 shows that this fluid offers the following advantages:

- **Reduced Fluid Consumption**
Unlike water-based fluids that are subject to evaporation or glycol solutions, Pydraul MC does not evaporate, its position and
- **Eliminates Maintenance Spillage**
Water-based fluids evaporate and component corrosion and flammable reservoirs, crevices.
- **Operates At High Temperatures**
Pydraul MC has a viscosity characteristic that permits efficient hydraulic operation at pressures up to
- **Gives Equipment Protection From Corrosion**
Pydraul MC fluid creates a rust-free environment for equipment. It is stable to help prevent corrosion problems.

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Monsanto's development of fire protection for industrial hydraulic operations began with the first Pydraul fluid in 1951. Pydraul fluids have since provided industry with millions of machine hours of safe operation.

Pydraul MC was designed to enable ore and coal mine operators meet the current safety legislation that requires a fire-resistant fluid in unattended equipment and either a fire-resistant fluid or suitable fire suppression devices in attended equipment. The initial cost and maintenance of fire suppression devices may show that a stable fluid such as Pydraul MC would be the most economical choice in the long run.

Pydraul MC is a dependable hydraulic fluid for safer operation of above- and below ground equipment with minimized maintenance. It may be considered for use in the hydraulic systems of the following:

- Power Shovels & Draglines
- Blasthole Drills
- Bulldozers & Rippers
- Tractors
- Scrapers & Graders
- Crushers
- Ore Feeders
- Trucks
- Jumbos
- Ore Drills
- Mechanical Loaders & Scrapers

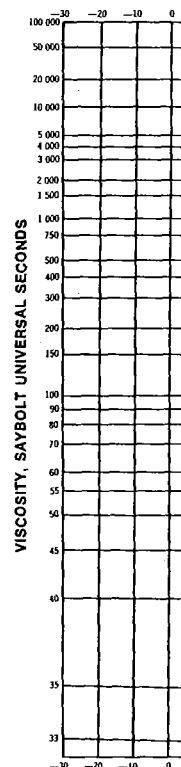
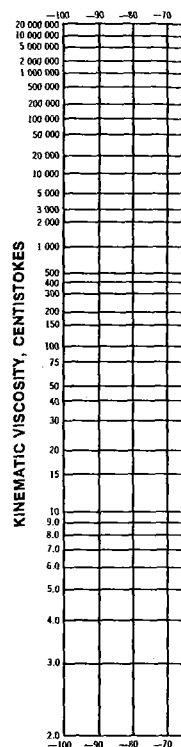
The following pages give data that illustrate the typical properties and performance of Pydraul MC as measured by standard test procedures used to describe hydraulic operation and fire resistance:

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Typical Physical Properties*

Appearance	Clear Green Liquid
Specific Gravity 25 °C	1.098
Density at 140°F.	1.075 grams/ml.
77°F.	1.100 grams/ml.
Neutralization No.	0.30
Moisture (max.) %	0.15
Viscosity	
Centistokes @ 40°F.	1250 cs
@ 100°F.	69 cs
@ 210°F.	6.9 cs
SSU @ 40°F.	5800 SSU
@ 100°F.	320 SSU
@ 210°F.	48 SSU
Pour Point	-10°F.
Coefficient of Thermal Expansion	0.00034
Specific Heat BTU/lb. °F.	0.39
Thermal Conductivity BTU/hr. ft. °F.	0.0728
Solubility in Water	Negligible

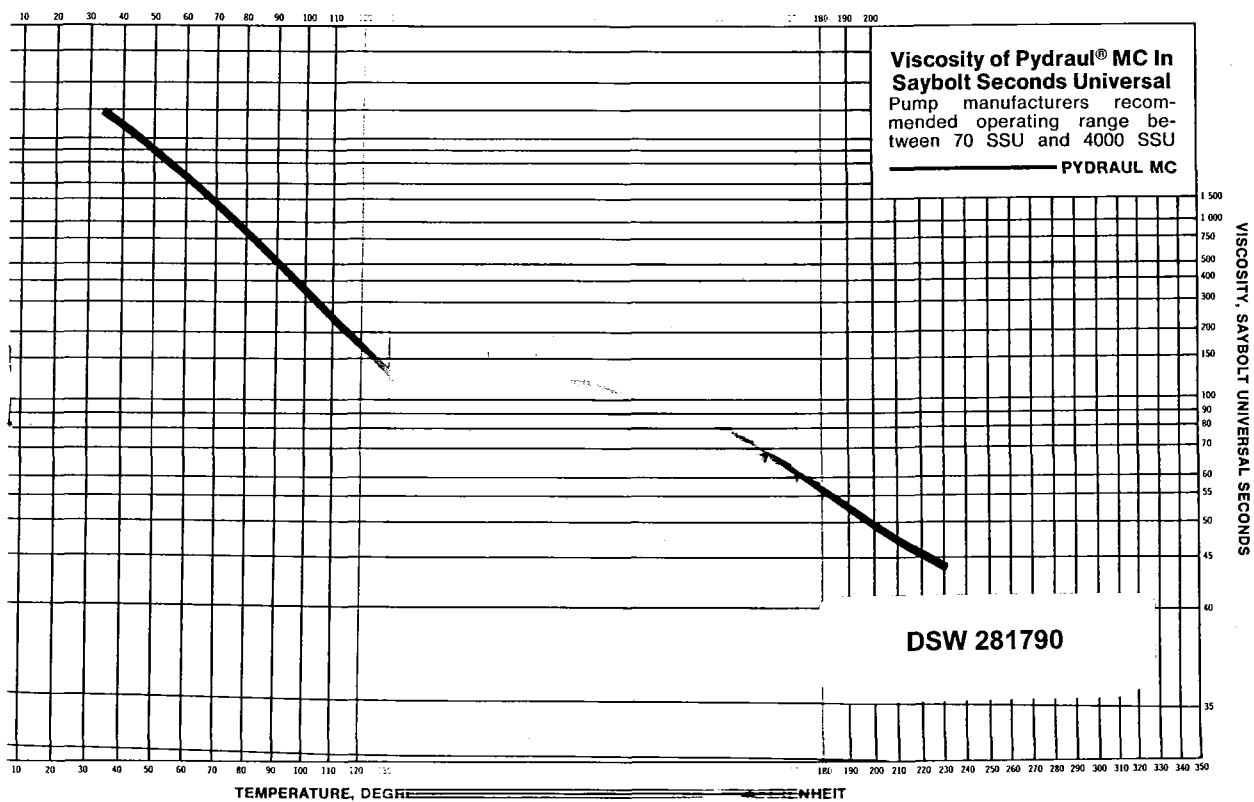
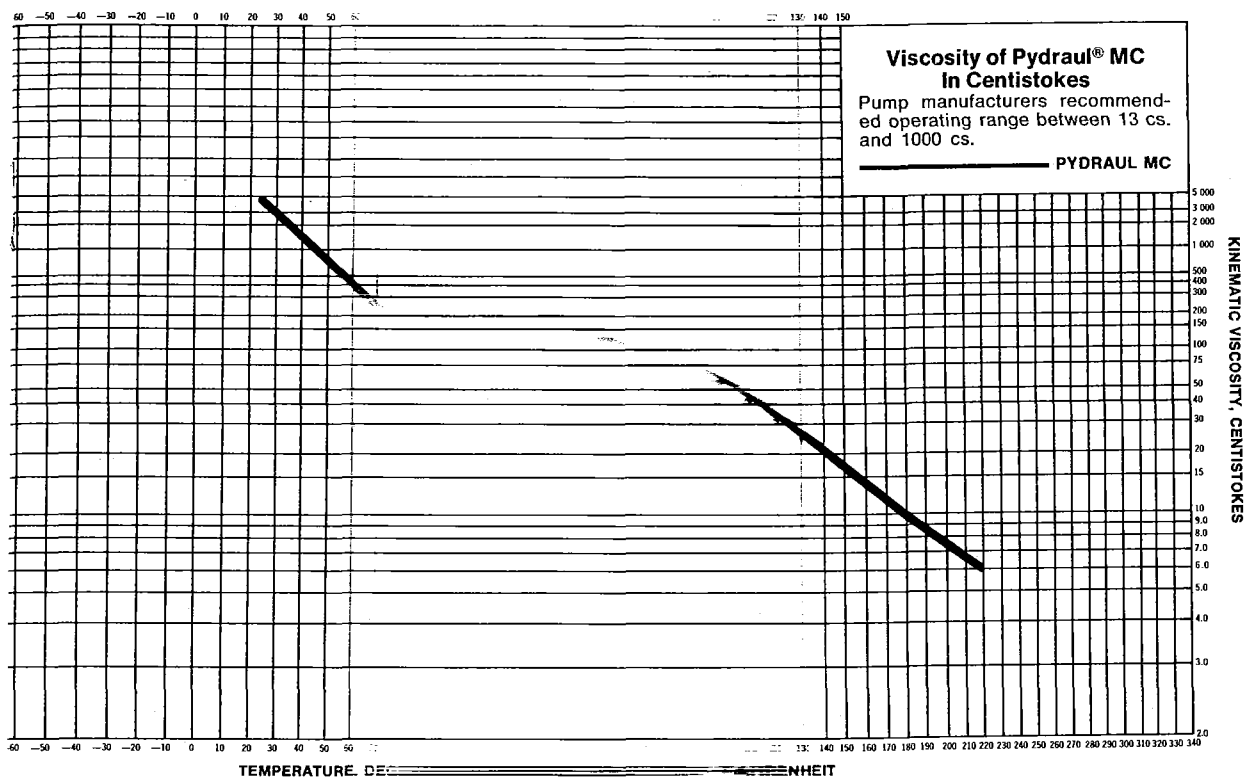
*This data is based on tests conducted in the laboratory. It is not guaranteed for all samples. The properties listed above, in addition to varying from sample to sample, are subject to change from time to time due to process modifications and improvements. For complete specifications write to Monsanto Company at the address listed in this bulletin.



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PYDRAUL[®] MC
HYDRAULIC FLUID

STLCOPCB4063117



Typical Performance Properties**

Foam Test (ASTM D 892) Sequence 1, 2, 3	Pass
Rust Test (ASTM D 665) Sequence A	Pass
Hydrolytic Stability Test (MIL-H-19457)	Pass
Oxidation and Corrosion Test (FS791-3508). (168 hr., 250°F., 5 l air per hr.)	
Metal Weight Changes, mg/cm ²	
Magnesium	-0.01
Aluminum	+0.05
Cadmium	-0.01
Steel	+0.01
Copper	-0.02
Acidity Increase, NN	2.58
100°F. Viscosity Increase, %	13.1

Compatibility With Materials

Metals	Pydraul MC is compatible with all the commonly used metals of construction.
Paints	Cured epoxy, phenolic, polyurethane and nylon based paints are satisfactory. INTERIOR SURFACES ARE PREFERABLY LEFT UNPAINTED.
Other Fluids	Pydraul MC is miscible in all proportions with the Pydraul E and Pydraul C Series of fluids. It is essentially insoluble in water.
Packings, Seals, Hoses and Bladders	Materials compatible with Pydraul MC are necessary for dynamic or moving seals. For static seals they are preferred but not essential.

Recommended	Marginal**	Unsatisfactory
VITON ¹	BUTYL ²	BUNA-N
NYLON	EPR	NEOPRENE
TEFLON ³		NATURAL RUBBER
FLUOREL ²		
SILICONE		

¹Trademark of E. I. Du Pont. ²Trademark of Three-M Company. ³Trademark of Enjay Chemical Co.

**Although generally classified as marginal with Pydraul fluids, butyl and EPR (ethylene propylene rubber) have proven satisfactory in equipment operating under certain conditions of temperature, fluid cleanliness, maintenance, etc. For best service under general all-around operating conditions, elastomers of Viton, Nylon, Fluorel, Teflon, and silicone are suggested.

Fire Resistance Properties

Flash Point	475°F.
Fire Point	525°F.
Autogenous Ignition Temperature (ASTM D 2155)	800°F.
Factory Mutual High Pressure Spray Test (Test fluid sprayed @ 1000 psi through orifice, passing through flame of propane torch.)	Pass Extinguished in less than 5 sec. after torch removed.
Factory Mutual Hot Channel Test (Test fluid sprayed @ 1000 psi through orifice, onto hot channel iron @ 1300°F.)	Pass
U.S. Bureau of Mines Approval Schedule 30	Yes, Number 30-6

Fire Resistance Advantages of Pydraul

Pydraul fluids protect hydraulic equipment and personnel with permanent fire protection. Pydraul fluids contain no water to evaporate and leave a flammable residue. During their many millions of machine hours of use, Pydraul fluids have been accidentally sprayed over molten metal, through electrical arcs, into flames and sparks without disaster. They pass all of the important ignition tests for fire resistance.

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Conversion Mining Hydraulic to Pydraul

Regarding hydraulic fluid being a system to Pydraul, usually every type of hydraulic fluid is fire-resistant. It has been converted from phosphate-ester hydraulic fluid to Pydraul. Component manufacturers experienced in conversion should be consulted and should be followed.

If change is necessary, equipment can be recommended, and many can be compatible seals. Lab tests and operational experience show that Teflon, and other materials are preferred.

To recommend which are compatible and where compatible in the system, to add Pydraul MC fluid. It is not necessary to drain. However, when converting from petroleum oils, non-compatible fluids, water-glycol, or water-in-oil emulsions, the steps are recommended to conform to USA Standards.

Changing Oil

1. Completely drain the system. Some oil will not interfere with the performance of Pydraul, but the presence is reduced by the oil left in the system.
2. Drain and clean the reservoirs.
3. Open or drain all valves. Replace packings, and seals with compatible materials. It is particularly to change dynamic seals do not necessarily need to be changed if they are not compatible static seals when the component is for maintenance.
4. Remove accumulators, and cylinders. Drain. Replace gaskets, and bladder compatible with Pydraul.

5. Check component functions before the system is closed and fluid is added.

6. If the system cannot be completely drained, it may have to be flushed out with a small amount of Pydraul.

Changing from Water-Glycol or Water-in-Oil Emulsion

1. Drain and clean system thoroughly. Remove all traces of water. Empty all lines and low points or dead pockets in components.
2. Clean with steam or warm water. Follow by blowing with dry air.
3. Check sealing materials, hoses, and accumulator bags. Replace if necessary with compatible materials.
4. Install a minimum charge of Pydraul hydraulic fluid and operate the system from 16 to 24 hours. During this period, inspect the reservoir. If water or other contaminants float to the top, remove by skimming.
5. Drain the flushing charge immediately after shut-down while the fluid is warm. Drain all isolated points or parts which do not drain back to the reservoir. If water is apparent in fluid clinging to walls, wipe down all accessible parts.

Ask the Monsanto fluids specialist for suggestions and assistance. He may be reached by phoning the nearest sales office listed on the back cover.

Toxicity and Safe Handling

Animal studies indicate that Pydraul MC can be classed as practically non-toxic when considered as an industrial fluid. It is non-irritating when the skin is exposed to the fluid.

In case of skin contact wash off with soap and water as a hygienic procedure. In the case of eye contact flush with copious amounts of water.

Due to its low order of toxicity, Pydraul MC requires no special handling precautions.

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Montrose Development Park
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