

INDUSTRIAL FLUIDS

PYDRAUL* E SERIES FLUIDS

Phosphate ester fluids and lubricants provide fire protection to a wide range of industrial applications. For the past 20 years they have been integral parts of the Pydraul fluids formulations. Monsanto has now developed a series of "all phosphate ester" fluids to be known as the Pydraul* E Series Fluids.

The Pydraul E Series Fluids are available in seven viscosity grades - Pydraul 10E, Pydraul 29E LT, Pydraul 30E, Pydraul 50E, Pydraul 65E, Pydraul 90E and Pydraul 115E. The number represents the approximate viscosity in centistokes at 100°F. and the E denotes phosphate ester. The viscosity grades correspond approximately to 60, 140, 150, 220, 300, 420 and 550 SSU at 100°F.

Pydraul 10E (formerly Pydraul 60) and Pydraul 29E LT offer improved performance at low temperatures combined with excellent shear stability. These fluids are suggested for industrial hydraulic and control systems.

Pydraul 30E, Pydraul 50E, Pydraul 65E, Pydraul 90E and Pydraul 115E are a unique family of fluids. These particular phosphate ester fluids offer improved thermal and hydrolytic stability with corresponding long service life compared to presently available phosphate ester fluids. Fire resistance, excellent lubricating ability, stability under use conditions, ease of handling and good materials compatibility are added advantages. These fluids should provide excellent performance in nearly all industrial hydraulic systems, as compressor lubricants and as turbine control fluids and bearing lubricants.

Specifications and typical properties for Pydraul 30E, 50E, 65E, 90E and 115E Fluids are listed on the following pages. Additional information can be obtained from your Monsanto representative.

* Pydraul is a registered trademark of Monsanto Company

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Monsanto

Monsanto Specifications

	<u>Pydraul 30E</u>	<u>Pydraul 50E</u>	<u>Pydraul 65E</u>	<u>Pydraul 90E</u>	<u>Pydraul 115E</u>
Appearance	Clear Blue liquid	Clear Blue liquid	Clear Blue liquid	Clear Blue liquid	Clear Blue liquid
Specific Gravity, 25°/25°C.	1.150-1.170	1.140-1.160	1.125-1.145	1.145-1.165	1.145-1.165
Moisture (maximum)	0.10%	0.10%	0.10%	0.10%	0.10%
Neutralization Number (Acidity) (maximum)	0.15	0.15	0.15	0.15	0.15
Viscosity in centistokes at 100°F.	30-34	44-50	62-68	85-95	115-125
Weight per gallon, pounds at 77°F. (approx.)	9.66	9.58	9.45	9.62	9.62

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Typical Properties

<u>Property</u>	<u>Pydraul 30E</u>	<u>Pydraul 50E</u>	<u>Pydraul 65E</u>	<u>Pydraul 90E</u>	<u>Pydraul 115E</u>
Viscosity, centistokes					
210°F.	4.77	5.87	7.11	7.90	9.1
100°F.	31.9	49.7	67.3	89.6	122
40°F.	330	715	1250	2270	4500
Viscosity, SSU					
210°F.	42	46	50	52	56
100°F.	150	231	312	415	565
40°F.	1520	3300	5800	10,500	20,800
Pour Point, °F.	-15	-5	0	+10	+10
Specific Gravity, 25/25°C.	1.170	1.153	1.140	1.160	1.155
Density, grams/ml.					
210°F.	1.110	1.089	1.073	1.094	1.096
100°F.	1.155	1.135	1.118	1.141	1.141
40°F.	1.181	1.161	1.150	1.171	1.165
Moisture, % maximum	0.1	0.1	0.1	0.1	0.1
Acidity, NN maximum	0.1	0.1	0.1	0.1	0.1

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Typical Properties cont'd.

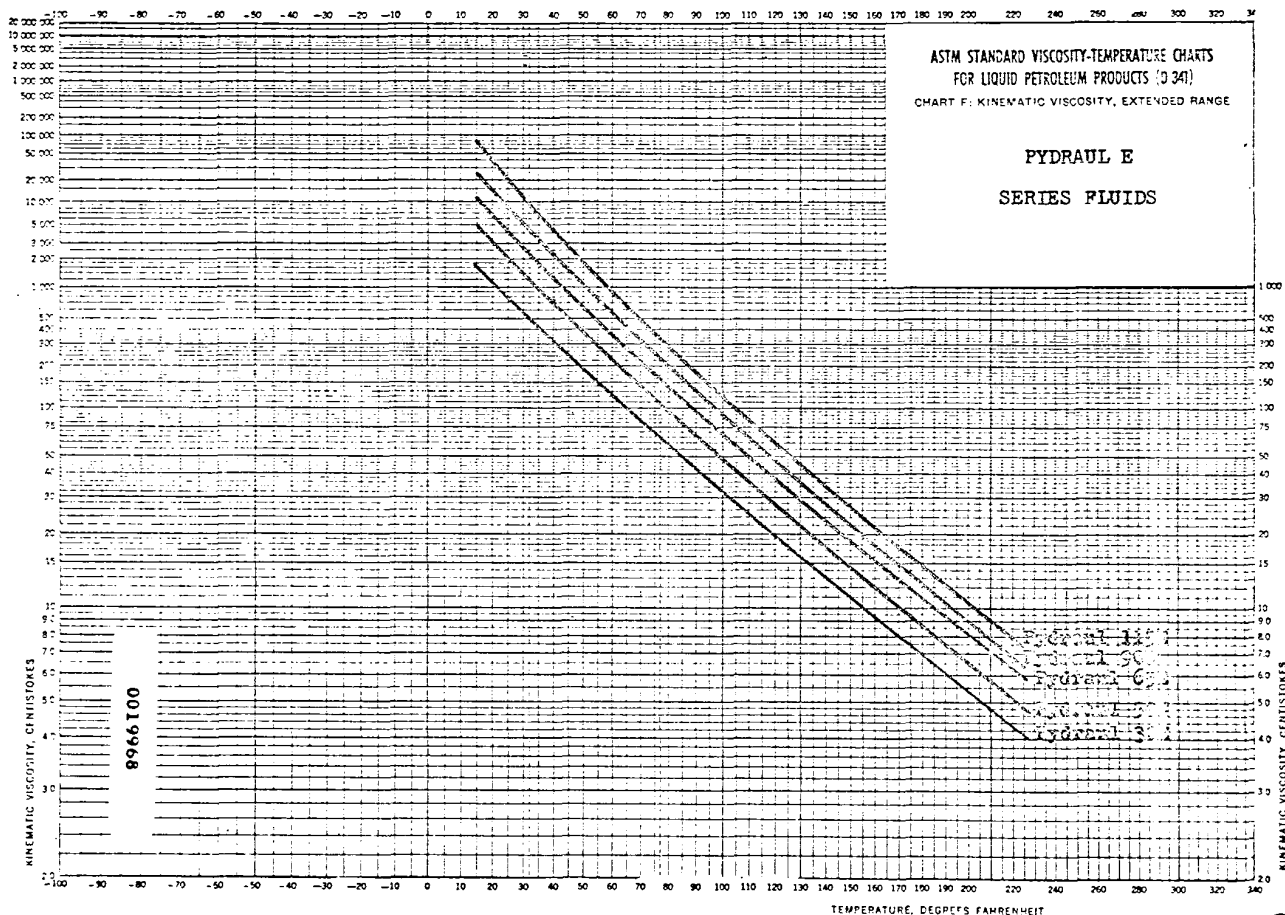
<u>Property</u>	<u>Pydraul 30E</u>	<u>Pydraul 50E</u>	<u>Pydraul 65E</u>	<u>Pydraul 90E</u>	<u>Pydraul 115E</u>
Specific Heat, BTU/lb/°F.					
77°F.	0.362	0.372	0.376	0.377	0.378
100°F.	0.376	0.381	0.383	0.384	0.385
150°F.	0.391	0.398	0.401	0.403	0.405
200°F.	0.407	0.415	0.419	0.420	0.422
Thermal Conductivity, BTU/hr/°F/ft.					
77°F.	0.0737	0.0730	0.0726	0.0723	0.0721
100°F.	0.0736	0.0729	0.0725	0.0722	0.0721
150°F.	0.0732	0.0727	0.0722	0.0720	0.0718
200°F.	0.0726	0.0721	0.0718	0.0717	0.0715
Vapor Pressure, mm HG at 200°F.	0.002	0.002	0.001	< 0.001	< 0.001
Evaporation Loss, 22 hr at 210°F. (ASTM D972)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4

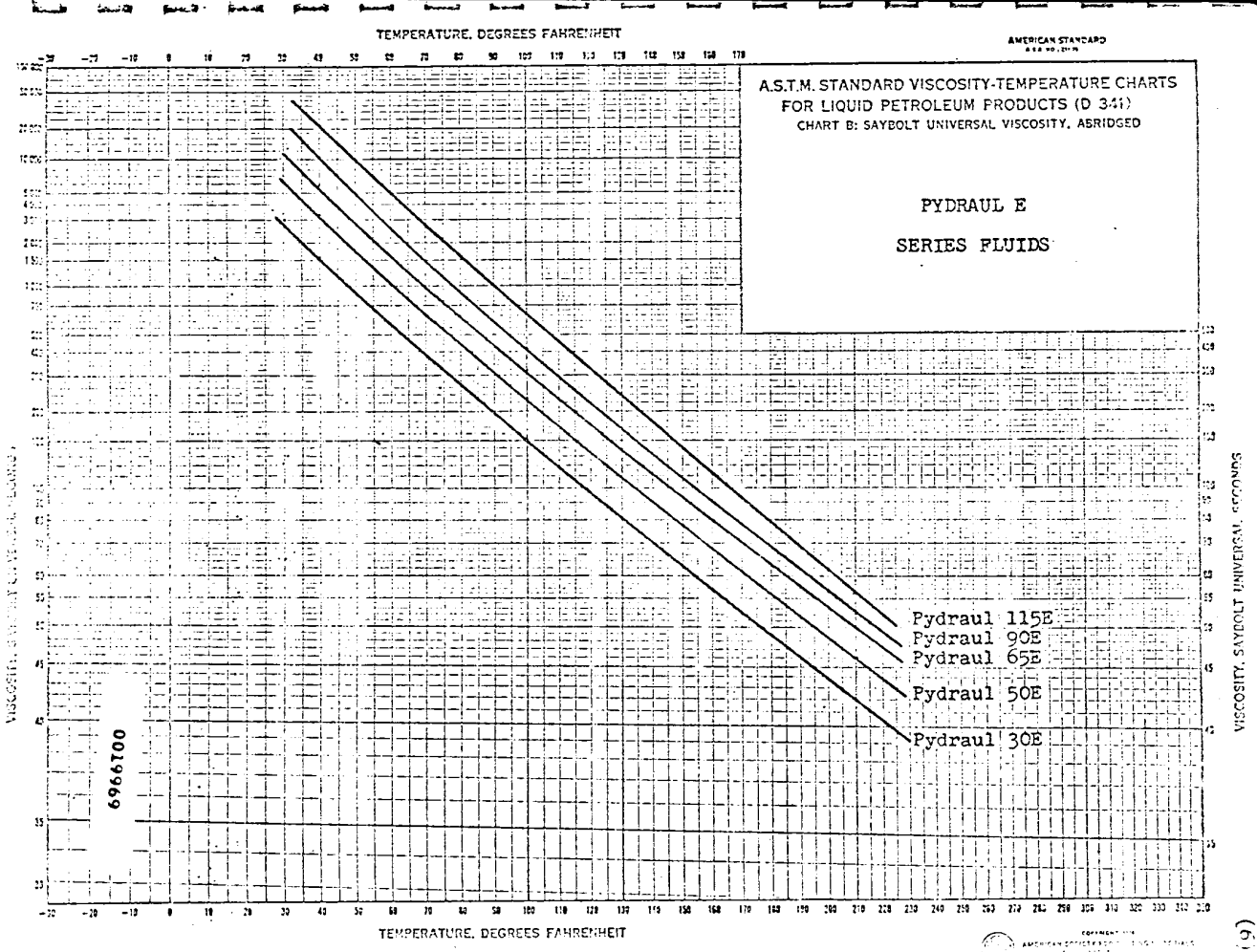
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TEMPERATURE, DEGREES FAHRENHEIT

ASTM STANDARD VISCOSITY-TEMPERATURE CHARTS
FOR LIQUID PETROLEUM PRODUCTS (D 341)
CHART F: KINEMATIC VISCOSITY, EXTENDED RANGE

PYDRAUL E
SERIES FLUIDS





Fire Resistance

<u>Property</u>	<u>Pydraul 30E</u>	<u>Pydraul 50E</u>	<u>Pydraul 65E</u>	<u>Pydraul 90E</u>	<u>Pydraul 115E</u>
Flash Point, °F.	475	480	485	520	475
Fire Point, °F.	615	620	625	660	670
AIT, °F. (ASTM D2155)	990	910	880	930	930
AIT, °F. (ASTM D286)	> 1000	> 1000	> 1000	> 1000	> 1000
High Pressure Spray (AMS 3150C)	Intermittent flashing, self- extinguishing	Same	Same	Same	Same
Hot Manifold (FS 791)					
1300°F.	Flashes, does not propagate	Same	Same	Same	Same
950°F.	No flashing or burning	Same	Same	Same	Same
Molten Metal Test at 1300°F.	No ignition	Same	Same	Same	Same
FM Approval	Yes	Yes	Yes	Yes	Yes

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Performance Properties

<u>Property</u>	<u>Pydraul 30E</u>	<u>Pydraul 50E</u>	<u>Pydraul 65E</u>	<u>Pydraul 90E</u>	<u>Pydraul 115E</u>
Four Ball Wear Test, scar diameter in mm. 625 rpm, 167°F., 1 hr.					
Steel on steel					
4 kg load	0.47	0.45	0.30	0.28	0.29
10 kg load	0.50	0.45	0.33	0.32	0.39
40 kg load	0.64	0.62	0.55	0.54	0.56
Steel on bronze					
10 kg load	0.46	0.39	0.30	0.35	0.45
40 kg load	0.97	0.63	0.65	0.65	0.66
1825 rpm, 130°F., 1 hr.					
40 kg load	0.71	0.72	0.67	0.71	0.68
Falex Wear Test, mg weight loss, 750 lb. load, 15 min.					
Pin	+0.1	-0.5	-0.1	-0.7	-1.0
Block	-0.2	+0.5	-0.4	-1.0	-0.3
Rust Test (ASTM D665) 24 hr., distilled water	No rust	No rust	No rust	No rust	No rust
Foam Test (ASTM D892) Sequence 1, 2, 3	Pass	Pass	Pass	Pass	Pass

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Performance Properties cont'd.

<u>Property</u>	<u>Pydraul 30E</u>	<u>Pydraul 50E</u>	<u>Pydraul 65E</u>	<u>Pydraul 90E</u>	<u>Pydraul 115E</u>
Oxidation and Corrosion					
Test (FS 791-5308)					
100°F. Viscosity					
change, % at test					
temperature of					
250°F.	+3.6	+4.6-7.2	+4.9	+7.0	+8.5
325°F.		+9-14			
350°F.		+17.6			+21.4
Standard Test - 168 hr.,					
250°F.					
Metal weight changes					
in mg/cm ²					
Magnesium	-0.02	+0.00	+0.04	-0.02	0.0
Aluminum	+0.02	+0.01	+0.03	-0.02	-0.02
Cadmium	+0.04	+0.03	+0.03	-0.04	-0.05
Steel	-0.01	+0.04	+0.01	+0.01	-0.04
Copper	-0.16	-0.16	-0.07	-0.08	-0.41
Acidity increase,	+0.02	0.00	+0.04	+0.05	+0.20
NN					
100°F. viscosity	+3.6	+6.9	+4.9	+6.0	+8.5
increase, %					

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Compatibility with Materials

Metals

The Pydraul E Series Fluids are compatible with all commonly used metals of construction.

Packings, Seals, Hoses and Bladders

Materials compatible with Pydraul E fluids are necessary for dynamic or moving seals. For static seals they are preferred but not essential. The following table indicates materials recommended, depending on the Pydraul E fluid selected.

Pydraul Fluid	Butyl	EPR	Viton	Teflon	Silicone	Buna N	Neoprene	Natural Rubber	Nylon
30E	R	R	R	R	R	U	U	U	R
50E	R	R	R	R	R	U	U	U	R
65E	R	R	R	R	R	U	U	U	R
90E	R	R	R	R	R	U	U	U	R
115E	R	R	R	R	R	U	U	U	R

R - Recommended

U - Unsatisfactory

Paints

Cured epoxy, phenolic, polyurethane and nylon based paints are satisfactory for use with the Pydraul E Series Fluids. Interior surfaces are preferred unpainted.

Other Fluids

Pydraul E Series Fluids are miscible in all proportions with each other and with non-Monsanto phosphate ester fluids. They are essentially insoluble in water. They will dissolve up to 10% of petroleum oil depending upon the type of oil.

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The following table gives the inter-compatibility of the Pydraul Fluids:

	<u>Pydraul E Series</u>				
	<u>30E</u>	<u>50E</u>	<u>65E</u>	<u>90E</u>	<u>115E</u>
Pydraul 60	Yes	Yes	Yes	Yes	Yes
Pydraul 150A	No	No	No	No	No
Pydraul F9A	Yes	Yes	Yes	Yes	Yes
Pydraul A200B	Yes	Yes	Yes	Yes	Yes
Pydraul 625A	Yes	Yes	Yes	Yes	Yes
Pydraul ACA	Yes	Yes	Yes	Yes	Yes
Pydraul ACA/WG	Yes	Yes	Yes	Yes	Yes

The Pydraul E Series, like other phosphate ester fluids, may give some separation when mixed with Pydraul 135A, 230A, 312A or 540B. Please see your Monsanto representative for specific recommendations on conversion procedures.

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Toxicity and Safe Handling

Animal studies indicate that the Pydraul E Series Fluids can be classed as practically non-toxic when considered as an industrial fluid. They are 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 their low order of toxicity, the Pydraul E Series require no special handling precautions.

REH 1/17/72

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