SPECIALTY FLUIDS AND LUBRICANTS FOR THE OIL & GAS INDUSTRY

- Heat Transfer Fluids
- Fire-Resistant Hydraulic Fluids
- Fire-Resistant Air Compressor and Turbine Lubricants
- Traction Fluids



0107868

Monsanto

TOWOLDMON0022616
WATER_PCB-00007085

Monsanto serves the oil and gas industry with a complete line of high performance heat transfer fluids, hydraulic fluids and specialty additives. These proven, special purpose products offer significant reduction of fire threat, longer equipment life and improved efficiency in the machinery, power sources, process equipment and transport systems you operate. And they are backed by Monsanto's worldwide technical sales and service personnel, worldwide warehousing.

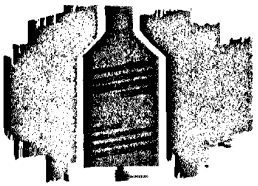
This pamphlet is supplied to give you a brief description of Monsanto fluids and lubricants pertaining to your particular application. Complete technical information on any of these precision products and how they can help will be sent to you upon request.

0107869

NOTICE: "Nothing contained herein is to be construed as a recommendation to use any product in conflict with any patent. MONSANTO MAKES NO WARRANTIES AS TO THE FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OF ANY PRODUCT REFERRED TO; no guarantee of satisfactory results from reliance upon contained information or recommendations, and disclaims all liability for any resulting loss or damage".

NOTE: As used herein, fluids designated "fire resistant" generally are more difficult to ignite or, once ignited, burn at a slower rate than conventional fluids. This does not mean that fire-resistant fluids will not burn.

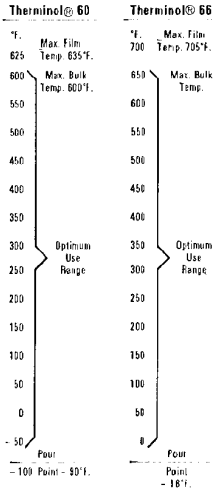
TOWOLDMON0022617
WATER_PCB-00007086



HEAT TRANSFER FLUIDS FOR HEATING AND COOLING APPLICATIONS

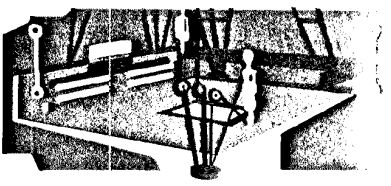
Therminol® heat transfer fluids work by *liquid* heat transfer in closed loop, non-pressurized systems. They are designed for operating temperature ranges up to 700°F. The non-pressurized, liquid systems can usually be designed for lower costs than pressurized systems operating on steam or vaporized heat transfer media. Therminol liquid heat transfer is used in: tanker and barge heating; glycol recovery systems; well choke heating; residential space heating; waste heat recovery; and refinery operations. Of the five Therminol heat transfer fluids available, Therminol 60 and 66 offer properties most typically required in these applications.

In Europe, Monsanto heat transfer fluids are sold under the name Santotherm® Heat Transfer Fluids. Santotherm fluids are identical to those sold under the Therminol name.



Typical Properties	Therminol® 60	Therminol® 66
Appearance	Light yellow liquid	Practically colorless liquid
Density @ 75°F	8.33 lbs./gal.	8.35 lbs./gal.
Fire Point (C.O.C.)	320°F	382°F
Autogenous Ignition Point	835°F (445.8°C)	705°F (374°C)
Viscosity,		
Centistokes @ 0°F	65.0	50,000
Centistokes @ 100°F	4.90	28.0
Centistokes @ 250°F	1.25	2.60
Vapor Pressure (mm Hg absolute)		
@ 250°F	5	2
@ 500°F	240	100
Specific Heat @ 250°F	0.470	0.455
B.T.U./lb. @ 500°F	0.593	0.580
Thermal Conductivity (B.T.U./hr.ft., F°)		
@ 250	0.0718	0.678
@ 500	0.0656	0.637

®Registered Trademark of Monsanto Company



FIRE-RESISTANT FLUIDS FOR HYDRAULIC SYSTEMS

Pydraul® hydraulic fluids were developed to meet the need in industry for a line of *fire-resistant* hydraulic fluids. In the oil and gas industry, these Pydraul fluids are used in riser tensioners, heave compensators, guideline tensioners and blow-out preventers. Pydraul 29 E-LT and 50-E fluids are Factory Mutual approved; they pass the spray test (1,000 psi spray through propane flame); channel iron test (spray impacting 1,300°F red hot metal); and the hot manifold test (Federal Standard 791, dripped on 1,300°F Manifold). Pydraul fluids do not foam or corrode, and they are available in viscosity ranges that ensure smooth operation and rapid equipment response. The following Pydraul fluids are those most frequently used in offshore hydraulics.

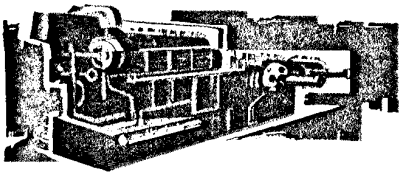
Typical Properties	Pydraul® 10-E*	Pydraul 29E-LT	Pydraul 50 E
Appearance	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid
Specific Gravity 25°/25°C	1.088-1.091	1.093-1.113	1.142-1.160
Viscosity,			
Centistokes @ 100°F	10.0	30.9	48
Centistokes @ 210°F	2.4	6.9	9.9
Absolute SSU @ 100°F	60.5	158	262
Pour Point,	- 70°F	- 45°F	- 5 F
Max. Bulk Operating Temperature	175°F	175°F	225 F
Vapor Pressure (mm Hg @ 200°F)	0.002	0.002	0.0

*Not FM approved; passes F.T.M. Std. 791 Hot Manifold Test

0107870

®Registered Trademark of Monsanto Company

TOWOLDMON0022618
WATER_PCB-00007087



FIRE AND EXPLOSION-RESISTANT AIR COMPRESSOR LUBRICANTS

Many air compressor explosions and receiver fires can be traced to the use of petroleum oil lubricants. Oil mists and films in the air compressor systems oxidize to a carbon-oxygen complex. Accelerated by heat, pressure or triggered by shock-wave - oil mists and residues break down into combustible gases that can explode and/or ignite in the air lines and receivers. Pydraul® air compressor lubricants were designed to ensure safer air compressor lubrication. In use since 1954, the fire-resistant Pydraul compressor lubricants provide excellent lubrication, allow minimum maintenance, and offer maximum safety to critical compressor installations. The following Pydraul lubricants are specifically designed for use in air compressors.

Typical Properties	Pydraul® 30-E	Pydraul 90-E	Pydraul 115-E
Appearance	Clear Blue Liquid	Clear Blue Liquid	Clear Blue Liquid
Specific Gravity 25°/25°C	1.150-1.1770	1.145-1.165	1.145-1.165
Viscosity, Centistokes @ 100°F	30-40	85-95	115-125
Centistokes @ 210°F	4.6-5.0	7.7-8.1	8.9-9.3
Absolute SSU @ 100°F	173	473	695
Pour Point	- 15°F	10°F	10°F
Max. Exit Air Temp.	350°F	350°F	350°F
Boiling Point °F @ 760 mm Hg	725°F	805°F	820°F

Shell Four-Ball Wear (167°F., 1 hour, 630 rpm., mm scar diameter)			
STEEL ON STEEL	PYDRAUL® 30E	PYDRAUL 90E	PYDRAUL 115E
4 kg	0.47	0.28	0.29
10 kg	0.50	0.32	0.39
40 kg	0.64	0.54	0.56
STEEL ON BRONZE			
10 kg	0.46	0.35	0.45
40 kg	0.97	0.65	0.66

®Registered Trademark of Monsanto Company



FIRE-RESISTANT INDUSTRIAL TURBINE LUBRICANTS

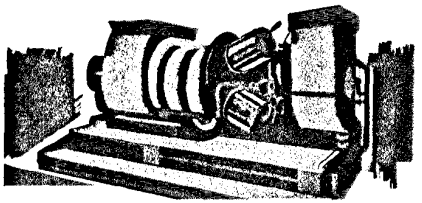
Turbinol® fluids are synthetic, fire-resistant lubricants for turbine and turbine control systems and are approved by major turbine manufacturers. They are inert, oxidation-resistant, and shear stable. Turbinol lubricants maintain lubricity and film integrity at 450 to 500°F operating temperatures; pass ASTM rust and foam tests; are non-corrosive and compatible with all commonly used metals of construction. Turbinol lubricants are used in high-speed, gas combustion and steam turbines - used to drive generators, gas compressors and other equipment. Turbinol fluids offer excellent lubricating performance plus the added safety of fire resistance.

Typical Properties	Turbinol® 1122	Turbinol 1223
Viscosity, Centistokes @ 40°F	320	750
Centistokes @ 210°F	4.82	6.02
Viscosity, SSU @ 40°F	1,480	3,460
@ 210°F	42.1	45.9
Pour Point	- 20°F	- 5°F
Specific Gravity, 25°/25°C	1.173	1.142
Vapor Pressure, mm Hg @ 200°F	0.002	0.003
Fire Resistance: Fire Point, C.O.C.	650°F	620°F
Autogenous Ignition Temp. (ASTM D2155)	1,050°F	910°F
Hot Manifold Test (FS 791) @ 1,300°F	Flashes, does not propagate	Flashes, does not propagate
Lubricating Performance, Four Ball Wear Test, 40 kilo load (625 rpm, 167°F 1 hr.)		
Steel on steel, scar dia., mm	0.58	0.58
Steel on bronze, scar dia., mm	1.01	0.65

0107871

®Registered Trademark of Monsanto Company

TOWOLDMON0022619
WATER_PCB-00007088



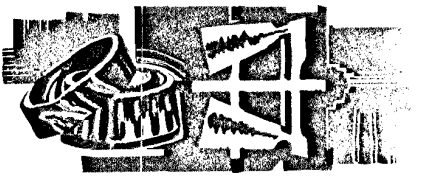
HIGH TEMPERATURE (Aircraft-type) HOT-GAS GENERATOR LUBRICANT

Skylube® 450 lubricant is an improved Type II lubricant for jet engine gas generators used as power sources for industrial turbines. It meets in all respects the performance specifications of major manufacturers, such as General Electric's GE-D50TFL and Pratt & Whitney's PWA 521B. Skylube 450 has extreme resistance to high temperature decomposition and oxidation degradation. Engines operated on Skylube 450 lubricant over the past four years include these classes: JT3D; JT8D, JT12, FT-4, and SPEY; plus AiResearch Turbocompressors & Air Cycle Machines and Sundstrand CSD's.

Typical Properties	Skylube® 450	Limits GE D50TFL-S3 Class B	Limits PWA 521B
Viscosity,			
Centistokes @ - 40°F	8860	13000 max.	13000 max.
Centistokes @ 400°F	1.3	1.0 min.	1.0 min.
Pour Point	- 75°F	-	Max. - 75°F
Flash Point, C.O.C.	535°F	Min. 400°F	Min. 400°F
Autogenous Ignition Temp.	785°F	Min. 750°F	-
Evaporation Loss, after 6½ hrs. @ 400°F (Sea Level, 759 mm Hg)	2.7%	10% max.	25% max.
Corrosion-Oxidation Stability After 72 hrs. @ 350°F, 10 L/hr. Dry Air			
Weight Change mg/cm²			
Steel	0.0	± 0.20	± 0.30
Copper	+ 0.01	± 0.40	± 0.30
Aluminum	+ 0.01	± 0.20	± 0.30

0107872

®Registered Trademark of Monsanto Company



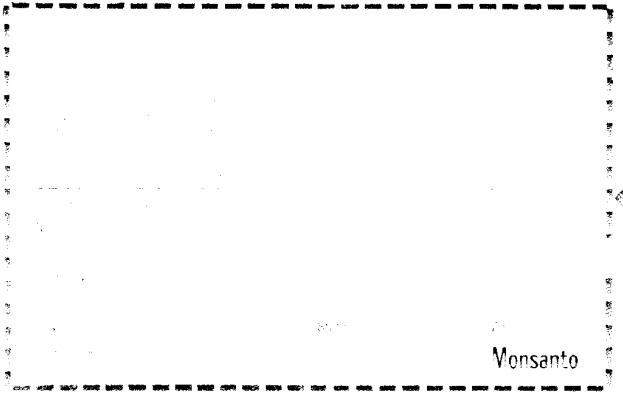
HIGH HEAT, HIGH PRESSURE RESISTANT TRACTION LUBRICANTS

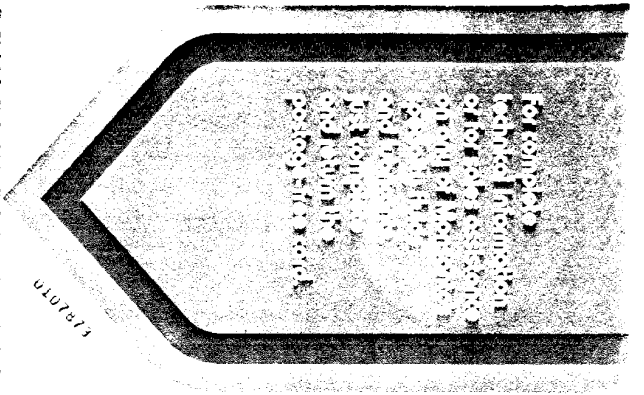
Santotrac® traction lubricants are a new family of synthetic hydrocarbon lubricating oils and greases developed for traction drives. They are lubricants with "grip" that increase the traction coefficient between driver and driven rolling surfaces from 40-80%. The film separates metal-to-metal contact at pressures up to 500,000 psi, and operates at temperatures up to 300°F. In laboratory wear tests, Santotrac lubricants approximately double the life of standard roller bearings. The synthetic hydrocarbon base has been formulated into four liquid lubricants and two greases. Santotrac 30 has the lowest operating temperature capability; Santotrac 50, the best balance of properties for most uses, medium viscosity, good anti-wear in sliding contact. The Santotrac greases have the highest traction coefficient of any lubricants known.

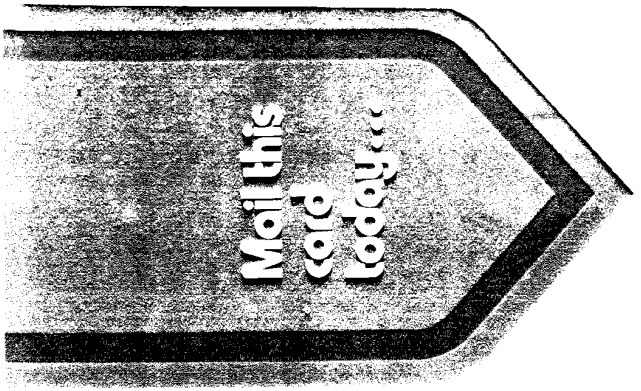
Typical Properties	Santotrac® Lubricating Oils			
	"30"	"40"	"50"	"70"
Viscosity,				
Centistokes @ - 40°F	23,400	-	-	-
Centistokes @ - 20°F	-	31,600	41,500	-
Centistokes @ 0°F	-	-	5,120	93,900
Centistokes @ 210°F	3.10	3.68	5.61	11.4
Pour Point	- 65°F	- 45°F	- 35°F	- 10°F
Density, gms/cc @ 100°F	0.891	0.886	0.889	0.957
Vapor Pressure @ 350°F (mm Hg absolute)	12	12	12	10
Autogenous Ignition Temp.	605°F	600°F	620°F	675°F
Coefficient of Traction	0.084	0.095 (napthenic oil = 0.066)	0.095	0.095
Shell 4-Ball Wear (200°F, 2 hrs., 1260 rpm, 40 kg load, steel-on-steel) Scar Diameter, mm	0.67	0.75 (napthenic oil = 1.10)	0.51	0.54

®Registered Trademark of Monsanto Company

TOWOLDMON0022620
WATER_PCB-00007089


Monsanto





BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY

Monsanto
Department B1N3
800 North Lindbergh Boulevard
St. Louis, Missouri 63166

0107874

MONSANTO INTERNATIONAL OFFICES

Argentina
BUENOS AIRES
Monsanto Argentina S.A.I.C.
Tucuman 117
Buenos Aires, Argentina

Australia
MELBOURNE
Monsanto Australia Limited
East Tower, Princess Gate
*51 Flinders St.
Melbourne, Victoria 3001
Australia
SYDNEY
Monsanto Australia Limited
35 Terry Street
Rozelle, Sydney, NSW,
Australia 2039

Austria
VIENNA
Monsanto GmbH Austria
Rudolfsplatz 12
Vienna 1, Austria

Belgium
BRUSSELS
Monsanto Europe S.A.
1, Place Madou
1030 Brussels, Belgium
ANTWERP
Monsanto Europe NV/SA
163 Mechelsesteenweg
2000 Antwerp, Belgium

Brazil
SAO PAULO
Monsanto Comercio e Industria Ltda.
Rua Araujo 216 6° Andar
Sao Paulo, Brazil 01220

Canada
LASALLE
Monsanto Canada Ltd.
425 St. Patrick St.
LaSalle, Quebec, Canada
REXDALE
Monsanto Canada Ltd.
175 Rexdale Blvd.
Rexdale, Ontario, Canada
VANCOUVER
Monsanto Canada Ltd.
1004 Hamilton St.
Vancouver 3, B.C., Canada

Chile
SANTIAGO
Servicios Tecnicos Pacifico Ltda. "Sertepal"
Edificio Espana Oficina 502
Calle Estado 337
Santiago de Chile

Colombia
BOGOTA
Monsanto Colombiana Inc.
Carrera 15 No. 77-50
Bogota, Colombia

Dominican Republic
SANTO DOMINGO
Monsanto Dominicana Inc.
Josefa Perdoma 17
Esquina Pasteur
Santo Domingo,
Republica Dominicana

El Salvador
SAN SALVADOR
Monsanto Centroamerica (El Salvador) S.A.
Edificio Plaza
67 Avenida sury Calle a Santa Tecla
San Salvador, El Salvador

Finland
HELSINKI
Monsanto (Scandinavia) AB
Arkadiankatu 8 C 20
001030 Helsinki 10, Finland

France
PARIS
Societe Monsanto S.A.
9, due d'Argenson
75 Paris (8) France

Guatemala
GUATEMALA CITY
Monsanto Guatemala Inc.
Edificio Casa
7a Avenida 711 Zona 9
Guatemala City, Guatemala

Holland
DEN HAAG
Monsanto NV
Jan van Nassaustraat 53/55
Den Haag, Holland

Hong Kong
HONG KONG
Monsanto Far East Ltd.
Management House
26 Canal Road West
Hong Kong

India
BOMBAY
Monsanto Chemicals of India Pvt. Ltd.
Wakefield House, 11 Sprott Road
Ballard Estates
Bombay 1, India
CALCUTTA
Monsanto Chemicals of India Pvt. Ltd.
19 Rajendranath Mukherjee Road
Calcutta 1, India
MADRAS
Monsanto Chemicals of India Pvt. Ltd.
310-311 Linghi Chetty Street
Madras 1, India
NEW DELHI
Monsanto Chemicals of India Pvt. Ltd.
3/8 Asaf Ali Road
Near Turkman Gate
New Delhi, India

Israel
ASHDAD
Israel Chemicals Fibres Ltd.
Industrial Zone
Ashdad, Israel

Italy
MILAN
Monsanto Italiana S.p.A.
Via Melchiorre Gioia 8
20124 Milan, Italy

Japan
TOKYO
Monsanto Japan Ltd.
Room 626 Chiyoda Building
1-2 Marunouchi 2-chome
Chiyoda-ku
Tokyo 100, Japan

Malaysia
PETALING JAYA
Monsanto Far East Ltd.
Malaysia Branch
116, Jalan Semangat
Petaling Jaya,
Selangor, Malaysia

Mexico
MEXICO CITY
Monsanto Comercial S.A. de C.V.
Calle Thiers No. 248
Mexico 5, D.F. Mexico

Nicaragua
MANAGUA
Monsanto Nicaragua S.A.
P. O. Box 288
Managua, Nicaragua

Norway
OSLO
Monsanto Norge A.S.
Fred Olsensgt 11
Oslo 1, Norway

Philippines
MANILA
Monsanto Philippines Inc.
Suite 314 Rufino Bldg.
6784 Ayala Avenue
Makati, Rizal D-708 Philippines

Puerto Rico
RIO PIEDRAS
Monsanto Puerto Rico Company
P.O. Box 837 Hato Rey Sta.
Rio Piedras, Puerto Rico 00919

Singapore
SINGAPORE
Monsanto Singapore Company (Pte.) Ltd.
(Off Jalan Jurong Kechi . 8 M.S.)
Singapore 21

South Africa
DURBAN
Monsanto South Africa (Pty.) Ltd.
151 Guildhall 25-31
Gardiner Street
Durban, South Africa

SANDTON CITY
Monsanto South Africa (Pty.) Ltd.
P. O. Box 78025
Sandton City, Transvaal, South Africa

Spain
BARCELONA
Monsanto Iberica SA
Lepanto 350
Barcelona 13, Spain

Sweden
STOCKHOLM
Monsanto (Scandinavia) AB
Ulysundavagen 108
16111 Stockholm 11, Sweden

Switzerland
ZURICH
Monsanto (Suisse) SA
Tiefenhofe 10
8001 Zurich, Switzerland

Taiwan
TAIPEI
Monsanto Far East Ltd.
Taiwan Branch
6th Floor, Section 1
36 Chang An East Road
Taipei, Taiwan

Thailand
BANGKOK
Monsanto Thailand Ltd.
5th Floor, Kasemkij Building
120 Silom Road
Bangkok, Thailand

United Kingdom
LONDON
Monsanto Chemicals Ltd.
Monsanto House
10-18 Victoria Street
London S.W.1, England

Venezuela
CARACAS
Monsanto (Venezuela) CA
Torre Phelps Piso 24
Plaza Venezuela
Caracas, Venezuela

West Germany
DUSSELDORF
Monsanto (Deutschland) GmbH
Immermannstr 3
4000 Dusseldorf
West Germany

0107875

Monsanto 800 North Lindbergh Boulevard, St. Louis, Missouri 63166

TOWOLDMON0022623
WATER_PCB-00007092