

# Fire resistant hydraulic fluids



High performance hydraulic fluid ingredients for safe operation in high risk applications

**Cargill**<sup>®</sup>



## High performance fire resistant hydraulic fluids

Hydraulic fluids play several important roles in the smooth operation of a well-balanced and well designed hydraulic system. These roles include; heat transfer, power transfer, corrosion prevention, and lubrication.

Additionally, hydraulic fluids used in industries such as coal mining, iron and steel production, automotive manufacturing, the off-shore industry, or when used on aircraft and ships, must also have fire resistant properties.

Hydraulic lines can be subjected to very high pressures. Should a hydraulic line in close proximity to an ignition source fail, there is a high potential for the system to catch fire and to sustain a spray flame. This has the potential for catastrophic consequences.

Fortunately, the widespread use of fire resistant hydraulic fluids has dramatically reduced the risk and limited the damage caused by fires resulting from hydraulic system failures.

## Fire resistant hydraulic fluids (FRHFs)

Fire resistant hydraulic fluids are grouped under the generic descriptor of HF, and further classified according to their chemical composition under sub groups such as HFA, HFB, HFC and HFD.

### HFA

HFA's; oil-in-water emulsions (HFAE) or chemical solutions HFAS, contain a minimum water content of 90%. The remainder of the formulation contains base fluid, emulsifiers and other performance additives.

We offer a range of speciality emulsifiers and synthetic ester base fluids branded under industry recognised trade names of Celevida™, Pluvia™ and Priolube™. These products provide the formulator with the ability to control emulsion particle size, particle size distribution, long-term dynamic stability and to provide some degree of lubrication to the formulation.

### EMUSIFIERS

Product name	Physical form	Color	Flash point COC (°C)	Density at 25°C (g/cm <sup>3</sup> )	HLB
Celevida 4500	Liquid	Dark brown	268	0.97	6.0
Pluvia T 80 NV	Liquid	Yellow brown	>149	1.07	15.0
Pluvia T 85	Liquid	Yellow brown	>149	1.00	11.0

### BASE FLUIDS - HFAE

Product name	Kinematic viscosity at 40°C (mm <sup>2</sup> /s)	Kinematic viscosity at 100°C (mm <sup>2</sup> /s)	Viscosity index	Pour point (°C)	Flash point COC (°C)	Density at 25°C (g/cm <sup>3</sup> )	Iodine value (g/100g)
Priolube 1415	8.5	2.7	159	-27	220	0/87	68
Priolube 3952	380	34	142	-36	330	0.94	1
Priolube 3955	420	41	147	-21	320	0.97	1

**BASE FLUIDS - HFAS**

Product name	Kinematic viscosity at 40°C (mm <sup>2</sup> /s)	Kinematic viscosity at 100°C (mm <sup>2</sup> /s)	Viscosity index	Pour point (°C)	Flash point COC (°C)	Density at 25°C (g/cm <sup>3</sup> )
Emkarox VG 1055W	1052	171	284	-24	240	1.06
Emkarox VG 130W	152	25	197	-32	232	1.07
Emkarox VG 132W	131	25	225	-42	230	1.06
Emkarox VG 330W	328	56	239	-30	228	1.07
Emkarox VG 681W	680	116	274	-30	230	1.06

**HFB**

Water-in-oil (invert) emulsions have a minimum water content of around 40%. Due to their high oil content, HFBs impart excellent lubrication properties as well as providing excellent fire resistant characteristics.

We have a range of speciality emulsifiers and synthetic ester base fluids branded under industry recognised trade names of Celevida™, Pluvia™ and Priolube™, which can be used in the formulation of HFB fire resistant hydraulic fluids.

**EMUSIFIERS**

Product name	Physical form	Color	Flash point COC (°C)	Density at 25°C (g/cm <sup>3</sup> )	HLB
Celevida 4500	Solid	White	>200	1.03	6
Pluvia T 80 NV	Liquid	Yellow brown	100	1.07	15
Pluvia T 85	Liquid	Yellow brown	149	1.00	11
Pluvia S 80	Liquid	Amber	148	1.00	4

**BASE FLUIDS**

Product name	Kinematic viscosity at 40°C (mm <sup>2</sup> /s)	Kinematic viscosity at 100°C (mm <sup>2</sup> /s)	Viscosity index	Pour point (°C)	Flash point COC (°C)	Density at 25°C (g/cm <sup>3</sup> )	Iodine value (g/100g)
Priolube 1415	8.7	2.8	187	-27	220	0.87	68

## HFC

HFCs; polymer in water or water/glycol hydraulic fluids, typically contain 40% water. The lubrication properties of the HFC fluid are provided by the inclusion of high viscosity polyalkylene glycols (PAGs), at a treat-rate of approximately 15–20%. The remainder of the HFC formulation is made up of glycol (typically 40%) and performance enhancing additives.

HFCs are widely used in underground mining in hydraulic and hydrostatic transmission systems, as well as in other industrial applications such as die casting, section and bar mills, extrusion processes, robotic welding, forging and furnace tipping systems.

Our unique Emkarox™ range of polyalkylene glycols can offer outstanding shear stable thickening properties, excellent hydrodynamic lubrication properties, good compatibility with elastomers, good heat conductivity, and excellent viscosity temperature profiles.

Product name	Kinematic viscosity at 40°C (mm <sup>2</sup> /s)	Kinematic viscosity at 100°C (mm <sup>2</sup> /s)	Pour point (°C)	Flash point COC (°C)	Density at 20°C (g/cm <sup>3</sup> )
Emkarox HV 20 <sup>1</sup>	19,500	2,400	4	240	1.09
Emkarox HV 45 <sup>1</sup>	45,000	6,500	7	240	1.09

<sup>1</sup>Available in both neat and water diluted form

## HFDU

Water-free synthetic fire resistant hydraulic fluids are categorised as HFD. HFDU relates to ‘other compounds’ but is in practice based on polyol esters. HFDU hydraulic fluids have lower vapour pressures than the aqueous types and are less susceptible to bubble formation and cavitation erosion. HFDU formulations also have superior lubrication properties over water containing formulations.

Our synthetic Priolube™ ester base fluids are recommended for use where excellent lubrication, good oxidation stability, cleanliness of operation and low environmental impact are considered to be the main priorities for the formulator.

Product name	Kinematic viscosity at 40°C (mm <sup>2</sup> /s)	Kinematic viscosity at 100°C (mm <sup>2</sup> /s)	Viscosity index	Pour point (°C)	Flash point COC (°C)	Fire point (°C)	Density at 25°C (g/cm <sup>3</sup> )	Iodine value (gl/100g)
Priolube 3966	12.2	3.3	148	-78	235	-	0.911	0.5
Priolube 1446	30	7	207	-30	295	320	0.9	81
Priolube 1427	48	9.5	187	-39	300	355	0.9	84
Priolube 2065	48	9.8	196	-39	300	365	0.92	84
Priolube 1426	65	13	208	-27	310	360	0.92	84
Priolube 1445	67	12.5	188	-30	290	370	0.92	88
Priolube 3999	90	14	144	-27	290	-	0.921	50

<sup>1</sup>Density at 20°C (g/ml)







## Who are we?

The Energy Technologies business in Cargill Bioindustrial creates, makes and sells specialty chemicals and additives for the global energy market. Working in close collaboration with our customers, we apply sustainable concepts and deep scientific expertise so that together we can efficiently power the world of tomorrow.

At our core, we are experts in synthetic ester and polyalkylene glycol chemistries, taking products from lab scale through to full manufacturing. Investing in the development of new chemistries allows us to support our customers in meeting new industry challenges.

For those who dare to imagine a brighter future, we establish long lasting relationships and create bespoke industry solutions through our integrated research & development and global manufacturing capabilities. Being both global and local, you have direct access to our network of technical experts. We look forward to talking to you.

## Further information

Cargill Bioindustrial sales and distribution are coordinated through an extensive worldwide network of technical and commercial experts. For further information or guidance please contact us:

**[energy\\_technologies@cargill.com](mailto:energy_technologies@cargill.com)**

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