

**All-Syn FR Series**  
**Fire Resistant Hydraulic Fluid**  
No. 316

ISO 46, 68

**Description:**

**All-Syn FR Series** fluids are fire resistant hydraulic fluids formulated with the highest quality synthetic, organic esters and carefully selected additives that achieve excellent hydraulic fluid performance. They provide a lubrication level equal to premium mineral oil anti-wear hydraulic fluids. **All-Syn FR Series** fluids are Factory Mutual certified, fire-resistant and have self-extinguishing properties.

**Performance Characteristics:**

**All-Syn FR Series** fluids can be used in any equipment designed for traditional mineral oil fluids. The products are fire resistant, for applications where fire hazard is a concern, and limit the spread of the fire through their self-extinguishing properties. In addition to fire resistance, these fluids provide excellent biodegradability, are non-irritating, contain no hazardous ingredients and are not toxic to aquatic life, making them ideal for use where better environmental protection is required. They are not water soluble and can be removed from collector systems by standard skimming techniques.

**Typical Applications:**

**All-Syn FR Series** hydraulic fluids have found widespread application in many industries including steel plants, coal mines and foundries. When properly maintained, **All-Syn FR Series** fluids have a useful life comparable to that of mineral oil fluids and offer lubrication levels comparable to that of premium anti-wear hydraulic fluids.

**Typical Specifications:**

ISO Grade	46	68
Appearance	Yellow to amber fluid	Yellow to amber fluid
Kinematic viscosity		
at 40°C	46 mm <sup>2</sup> /s or cSt	68 mm <sup>2</sup> /s or cSt
at 100°C	10 mm <sup>2</sup> /s or cSt	14 mm <sup>2</sup> /s or cSt
Viscosity Index	220	215
Density @ 15°C	0.90 g/cm <sup>3</sup>	0.91 g/cm <sup>3</sup>
Acid Number	2.0 mg KOH/g	1.5 mg KOH/g
Pour Point	<-20°C (<-4°F)	<-20°C (<-4°F)
Foam test	50-0 ml	50-0 ml
Corrosion protection	Pass	Pass
Flash point	302°C (575°F)	302°C (575°F)
Fire point	360°C (680°F)	350°C (662°F)
Auto ignition temperature	450°C (842°F)	450°C (842°F)
Fire resistance -	Pass	Pass
<b>Pump test - ASTM D2882</b>	< 5 mg wear	<5mg wear
<b>Gear lubrication</b>	> 12 FZG load stage	> 12 FZG load stage
<b>Demulsibility</b>	41-39-0 (15)	42-38-0 (30)
	ml-ml-ml (min.)	ml-ml-ml (min.)

## Material Compatibility:

### **Elastomers:**

The following chart contains our recommendations regarding the use of **All-Syn FR Series** in commonly used elastomers. Three categories of elastomer applications are listed. "Static" refers to trapped nonmoving seals such as O-rings in valve sub-plates and rigid, low pressure hose connections. "Mild Dynamic" applications include accumulator bladders and hose linings where the hoses are exposed to high pressure and light flexing. "Dynamic" refers to cylinder rod seals, pump shaft seals and constantly flexing hydraulic hose.

<b>ISO 1629</b>	<b>Description</b>	<b>Static</b>	<b>Mild- Dynamic</b>	<b>Dynamic</b>
NBR	Medium or high nitrate rubber (Buna N >30% acrylonitrile)	C	C	C
NBR	Low nitrite rubber (Buna N <30% acrylonitrile)	S	N	N
FPM	Fluoroelastomer (Viton)	C	C	C
CR	Neoprene	S	S	S
IRR	Butyl rubber	S	N	N
EPDM	Ethylene propylene rubber	N	N	N
AU	Polyurethane	C	C	C
PTFE	Teflon	C	C	C

C = Compatible    S = Okay for short term use, but replace with a completely compatible elastomer is recommended.    N = Not compatible

### **Metals:**

**All-Syn FR Series** is compatible with iron and steel alloys and most nonferrous metals and their alloys. It is not compatible with lead, cadmium, zinc, and alloys containing high levels of these metals. Suitable substitutes for these materials are available and should be used.

### **Paints and Coatings:**

**All-Syn FR Series** is compatible with multi-component epoxy coatings. It is not compatible with zinc based coatings.

## Conversion Procedures:

### **Mineral oil based fluids:**

**All-Syn FR Series** fluids are miscible with nearly all mineral oil type hydraulic fluids. To convert a system simply drain and refill with **All-Syn FR**. For proper fire resistance, at least 95% of the oil based product must be removed.

### **Water glycol (HFC) and invert emulsions (HFB):**

**All-Syn FR Series** fluids are not miscible or compatible with water containing fluids and these fluids must be removed from the system. Drain reservoir and lines. Remove residual fluid by circulating **All-Syn FR** and draining. Refill system with fresh fluid. Repeat until residual fluid is less than 1% of system volume.

### **Phosphate ester:**

**All-Syn FR Series** fluids are compatible with some, but not all phosphate esters. Testing prior to conversion is recommended. Please contact Frontier Performance Lubricants Inc. "Technical Services" department prior to conversion for testing and conversion recommendations.

**PERFORMANCE PRODUCTS GUARANTEED**

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