Title: ANHYDROUS HYDRAULIC FLUID COMPOSITIONS

(57) Abstract: Novel anhydrous hydraulic fluid composition comprising: (a) from 65 to 100 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of an alkylxate compound having the following formula (I), wherein R and R² are each hydrogen or an alkyl group having from 1 to 4 carbon atoms; R¹, R³, R⁴, and R⁵ are each hydrogen, methyl, ethyl, or OR³ group, or CH₃-O-R⁶; R⁶ is hydrogen, or an alkyl group having from 1 to 4 carbon atoms; and n is an integer from 1 to 4;

(b) from 1 to 35 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of a thickener; and, optionally, (c) from 0 to 10 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of at least one additive selected from the group consisting of lubricity additives, corrosion inhibitors, metal passivators, antioxidants, anti-foam additives, dyes, perfumes and detergents. The novel anhydrous hydraulic fluid compositions not only provide superior fire resistant and high pressure properties, but can also provide superior lubrication. Many of these novel anhydrous hydraulic fluids can also be used in applications where environmentally friendliness is required because of their water solubility, rapid biodegradability, and low aquatic toxicity.
ANHYDROUS HYDRAULIC FLUID COMPOSITIONS

The present invention relates to hydraulic fluid compositions and, more specifically, to glycol based anhydrous hydraulic fluid compositions. The hydraulic fluids described by this invention can be employed in applications where fire resistance and environmental friendliness are desired.

Various types of synthetic (non-hydrocarbon based), fire resistant hydraulic fluids have been described in the literature and used commercially. Examples include water containing hydraulic fluids such as water-glycol hydraulic fluids, water-in-oil emulsions, and high water content fluids (greater than 80 percent water). Water-glycol containing hydraulic fluids have been used for years. These fluids consist of 40 percent water, 40 percent glycol (ethylene glycol, diethylene glycol, and/or propylene glycol), 15 percent of a polyalkylene glycol thickener, and 5 percent additives for improved lubricity, corrosion protection, yellow metal passivation, etc. While they are very fire resistant, their use is limited at high temperatures or pressures because of the problem of pump cavitation caused by the relatively high vapor pressure of water. For example, U.S. Patent No. 6,211,121 B1 (Willis) discloses a lubricant containing fire resistant water/glycol mixture combined with polytetrafluoroethylene. U.S. Patent No. 4,233,170 (Genjida et al) discloses a non-flammable hydraulic fluid comprising a water soluble alkylene oxide adduct of nitrogen-free polyhydric alcohol having at least five hydroxyl groups, water and a glycol. International Patent Publication No. WO 96/34076 (Houghton Vaughan plc) discloses a water-glycol hydraulic fluid composition for use in the control of sub surface safety valves which are used to shut off the flow of well fluids (oil or gas) in the event of an emergency in undersea wellheads. U.S. Patent No. 4,855,070 (Lewis) discloses a water-glycol energy transmitting fluid comprising (a) 30-40 wt percent water, (b) diethylene glycol, (c) 0.8-5.0 wt percent an aliphatic carboxylic acid having 9-12 carbon atoms, (d) a water-soluble polymeric viscosity control agent, (e) a corrosion inhibitor, and (f) a metal deactivator.

Water-in-oil emulsions and high water containing hydraulic fluids, as well as water glycol hydraulic fluids, are well described in the Handbook of Hydraulic Fluid Technology (edited by G. E. Totten, published by Marcel Dekker in 2000).

Examples of anhydrous fire resistant hydraulic fluids include polyalkylene glycols, phosphate esters, polyl esters, and halogenated hydrocarbons.
For example, U. S. Patent No. 5,141,663 (P Miller) discloses an anhydrous fire
resistant hydraulic fluid composition comprising: (a) a base fluid selected from the
group consisting of esters, diesters, polyol esters, polyalkylene glycol esters,
polyalkylene glycols, and combination thereof and (b) as an anti-mist additive, an
alkylene-vinyl ester copolymer, soluble in the base fluid, having a molecular weight of
between 5,000 and 100,000.

International Patent Publication No. WO 01/90232 A2 (Union Carbide
Chemicals & Plastics Technology Corporation) discloses anhydrous poly(alkylene-
glycol) based fire resistant hydraulic fluid.

Polyol-ester and phosphate ester fire resistant hydraulic fluids are also described
extensively in Handbook of Hydraulic Fluid Technology (edited by G. E. Totten,
published by Marcel Dekker in 2000).

Phosphate ester-based hydraulic fluids are well known and have been used for
decades. For example, U.S. Patent No. 6,391,225 B1 (Poirier) discloses the use of a
polyether amine as an additive to improve the performance and stability of fire resistant
phosphate ester hydraulic fluids in aircraft. European Patent No. 0 573 082 B1 (FMC
Corporation) discloses a composition of alkylated phenyl phosphate esters for use as a
fire resistant hydraulic fluid. European Patent Application No. 0 823 472 A1 (Rohm
and Haas Co.) disclosed the use polymer compositions based on certain alkyl
(meth)acrylate monomers as viscosity index improving additives for phosphate ester-
based hydraulic fluids. A major problem with phosphate ester-based hydraulic fluids is
that phosphate esters are prone to hydrolysis when contaminated with water.

Polyol ester-based and halogenated hydrocarbon-based hydraulic fluids have
also been used as fire resistant hydraulic fluids. For example, International Patent
Publication No. WO 9116389 (Atochem North America, Inc.) discloses fire resistant
hydraulic fluids comprising (a) one or more esters of polyhaloaromatic acids \textit{per se} or
in combination with (b) one or more hydraulic fluids independently selected from
mineral oil, poly-\(\alpha\)-olefins, alkylated aromatics, cycloaliphatics, ester of dibasic acids,
polyol esters, polyglycols, silicones, silicate esters, phosphate esters, and halogenated
compositions other than (a), and (c) one or more shear-stable polymers. While they
are not as fire resistant as water-glycol or high water based hydraulic fluids, polyol
esters can be used at higher pressures and temperatures than water containing fluids. Like phosphate esters, these products are prone to hydrolysis when contaminated with water. Halogen containing hydraulic fluids are very fire resistant but they are expensive and can release hazardous chemicals upon degradation.

It has now been discovered new anhydrous fire resistant hydraulic fluids. These new hydraulic fluids overcome the disadvantages of the known hydraulic fluids. These new anhydrous fire resistant hydraulic fluids exhibit very good fire resistant properties. In addition, their water solubility, relatively low toxicity, and good biodegradability makes them very attractive for use in applications where environmental friendliness is important. The fact that new fire resistant hydraulic fluids are anhydrous means that they are resistant to the performance problems associated with water-containing hydraulic fluids such as corrosion and cavitation.

In one aspect the present invention concerns an anhydrous hydraulic fluid composition comprising:

(a) from 65 to 100 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of an alkoxylate compound having the following formula

\[
R^1 O - (C - C_O)_n - R^5
\]

wherein R and R^5 are each hydrogen or an alkyl group having from 1 to 4 carbon atoms; R^1, R^2, R^3, and R^4 are each hydrogen, methyl, ethyl, or OR^6 group, or CH2-O-R^6; R^6 is hydrogen, or an alkyl group having from 1 to 4 carbon atoms; and n is an integer from 1 to 4;

(b) from 1 to 35 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of a thickener; and, optionally,
(c) from 0 to 10 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of at least one additive selected from the group consisting of lubricity additives, corrosion inhibitors, metal passivators, antioxidants, anti-foam additives, dyes, perfumes and detergents.

In another aspect, the present invention concerns a process for imparting flame resistance, hydrolytic stability, and reduced wear characteristics to a hydraulic system which process comprises adding to the hydraulic system an anhydrous hydraulic composition comprising:

(a) from 65 to 100 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of an alkoxylation compound having the following formula:

\[
\begin{array}{c}
\text{R}^1 \quad \text{R}^3 \\
\text{R} \quad \text{O} - (\text{C} - \text{C} - \text{O})_n \text{R}^5 \\
\text{R}^2 \quad \text{R}^4
\end{array}
\]

wherein \( R \) and \( R^5 \) are each hydrogen or an alkyl group having from 1 to 4 carbon atoms; \( R^1, R^2, R^3, \) and \( R^4 \) are each hydrogen, methyl, ethyl, or \( OR^6 \) group, or \( \text{CH}_2-\text{O}-R^6; \) \( R^6 \) is hydrogen, or an alkyl group having from 1 to 4 carbon atoms; and \( n \) is an integer from 1 to 4;

(b) from 1 to 35 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of a thickener; and, optionally,

(c) from to 10 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of at least one additive selected from the group consisting of lubricity additives, corrosion inhibitors, metal passivators, antioxidants, anti-foam additives, dyes, perfumes and detergents.
The anhydrous hydraulic fluid compositions of the present invention exhibit very good fire resistant properties. Moreover, due to their water solubility, relatively low toxicity, and good biodegradability they are particularly suitable for use in applications where environmental friendliness is important. The fact that the hydraulic fluid compositions of the present invention are anhydrous means that these fluids are resistant to the performance problems associated with water-containing hydraulic fluids such as corrosion and cavitation.

The fire resistant hydraulic fluid compositions of the present invention are conveniently formulated by blending in the alkoxyate compound of formula I above with a high molecular weight polyalkylene glycol thickener. If desired, at least one additive selected from the group consisting of lubricants, corrosion inhibitors, yellow metal passivators, antioxidants, anti foamers, dyes, perfumes and detergents can also be blended in the fire resistant hydraulic fluid composition of the present invention. The blending of the components of the hydraulic fluid composition of the present invention is done in conventional blending equipment and in the manner known to a person of an ordinary skill in the art.

The alkoxyate compounds, component (a), useful in the practice of the present invention are well known in the art and many methods of preparing these compounds are available and used in the art. Examples of useful alkoxyate compounds include, but are not limited to, ethylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, diethylene glycol butyl ether, triethylene glycol monoethyl ether, triethylene glycol dimethyl ether, diethylene glycol ethyl ether, propylene glycol, dipropylene glycol, dipropylene glycol butyl ether, tripropylene glycol propyl ether, and glycerol (glycerol can also be used as the thickener for a less viscous glycol).

The alkoxylated compounds are used in a fire resistant effective amount. As used herein, the fire resistant effective amount is an amount of the alkoxylated compound that provides the anhydrous hydraulic fluid composition of the present invention with the desired fire resistance. The fire resistant effective amount will vary depending on the alkoxylated compound and the thickener employed. Typically, the fire resistant effective amount is between 65 to 100, preferably from 80 to 99, percent by weight based on the total weight of the anhydrous hydraulic fluid composition.
Thickeners, component (b), useful in the practice of the present invention are known in the art as well as methods for the preparation thereof. Any thickener that is soluble in the alkoxylate compound, component (a) is useful in the practice of the present invention, but polyalkylene glycols having molecular weight of from 2500 to 30,000, preferably from 10,000 to 20,000, are preferred thickeners. Examples of useful high molecular weight polyalkylene glycol thickeners include, but are not limited to, UCON™ 50-HB-5100 Fluid, UCON™ 75-H-90,000 Fluid, and UCON™ 75-H-380,000 Fluid, sold by The Dow Chemical Company; and BASF’s Pluracol™ V-10, sold by BASF. Glycerol can also be used to thicken less viscous alkoxylate compounds [component (a)].

The high molecular weight polyalkylene glycols are used in an amount effective to bring the viscosity of the anhydrous hydraulic fluid composition to 10 to 500 cSt at 40 °C. The required amount of polyalkylene glycol can be easily determined by a person of an ordinary skill in the art without undue experimentation. Typically, the polyalkylene glycols are used in an amount of from 1 to 35, preferably from 1 to 15, percent by weight based on the total weight of the anhydrous hydraulic fluid composition.

Various additives, conventionally used in hydraulic fluids may also be formulated into the anhydrous hydraulic fluid composition of the present invention. Such known additives include, but are not limited to, lubricity additives (such as boundary agents, antiwear agents and extreme pressure agents), corrosion inhibitors, metal passivators, and antioxidants.

In addition, other known additives can be also be formulated into the anhydrous hydraulic fluid composition of the present invention. Such other known additives include, but are not limited to, anti-foam additives, dyes, perfumes and detergents.

Each of the aforementioned additives is used in an amount typical for use of such additive in hydraulic fluids. This amount will vary with the additive used and a person of an ordinary skill in the art would know which additive and what amount of the additive to use depending on the application for which the anhydrous hydraulic fluid composition of the present invention is used.
When used, the lubricity additives are typically used in an amount of from 0 to 10, preferably from 0.1 to 5, percent by weight based on the total weight of the anhydrous hydraulic fluid composition. Examples of lubricity additives include, but are not limited to, organic acids having from 4 to 18, preferably 7 to 12, carbon atoms; dithiophosphates, organic amine/phosphate blends (such as Irgalube 349, sold by Ciba Specialty Chemicals Corporation), organo-molibdenum compounds; phosphorothonates; alkylated phosphate esters; triphenyl phosphates; alkylated triphenyl phosphates; and fatty amines (such as Amine-O and Sarkosyl-O, sold by Ciba Specialty Chemicals Corporation).

When used, the corrosion inhibitors are typically used in an amount of from 0 to 10, preferably from 0.1 to 5, percent by weight based on the total weight of the anhydrous hydraulic fluid composition. Examples of corrosion inhibitors include, but are not limited to, organic amines, amine-organic acid complexes, organic diacids, sarcosine and succinic acid derivatives, alkyl and aryl phosphites.

When used, the metal passivators are typically used in an amount of from 0 to 5, preferably from 0.05 to 2, percent by weight based on the total weight of the anhydrous hydraulic composition of the present invention. Examples of metal passivators include, but are not limited to, tolyltriazole and its derivatives, and benzotriazole and its derivatives.

When used, the antioxidants are typically used in an amount of from 0 to 10, preferably from 0.1 to 5, percent by weight based on the total weight of the anhydrous hydraulic fluid composition. Examples of the antioxidants include, but are not limited to, phenothiazine, propyl gallate, 2,6-di-tert-butyl-4-methylphenol (or butylated hydroxytoluene (BHT), vitamin E, hindered phenolic antioxidants (such as Irganox L135 and Irganox L-109, both sold by Ciba Specialty Chemicals Corporation), amine containing antioxidants (such as Irganox L06 and Irganox L57, both sold by Ciba Specialty Chemicals Corporation), and phosphites.

When used, the other additives, that is anti-foam additives, dyes, perfumes and detergents, are typically used in a combined amount of from 0 to 2 percent by weight based on the total weight of the anhydrous hydraulic fluid composition.
Anhydrous hydraulic fluid compositions of the present invention can be used in a number of industrial and commercial applications where the risk of fire is a critical concern due to their good fire resistant property. For example, hydraulic system failures have, in a number of instances, resulted in serious fires accompanied by loss of life. Accordingly, hydraulic fluids must not only have superior high pressure and lubricating properties, but these fluids must also provide fire resistance in those applications where a significant risk of fire would result from an hydraulic system failure.

Anhydrous hydraulic fluid compositions of the present invention not only provide superior fire resistant and high pressure properties, but can also provide superior lubrication. In addition, the anhydrous hydraulic fluid compositions of the present invention also exhibit good biodegradability and low aquatic toxicity.

All parts, percentages and ratios herein are by weight unless otherwise indicated.

The invention will be further clarified by a consideration of the following examples which are intended to be purely exemplary of the present invention.
Examples 1 and 2: Formulation of Hydraulic Fluid Compositions

Two anhydrous hydraulic fluid compositions were formulated by blending the components identified in Table 1 below. The weight percentage of each component in the formulated anhydrous hydraulic fluid composition is also given in Table 1 below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Example 1 (Composition 1)</th>
<th>Example 2 (Composition 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diethylene Glycol</td>
<td>88.00 wt percent</td>
<td>88.65 wt percent</td>
</tr>
<tr>
<td>UCON™ Fluid 75-H-90,000</td>
<td>9.00 wt percent</td>
<td>9.00 wt percent</td>
</tr>
<tr>
<td>Morpholine</td>
<td>1.50 wt percent</td>
<td>none</td>
</tr>
<tr>
<td>Pelargonic acid</td>
<td>0.90 wt percent</td>
<td>none</td>
</tr>
<tr>
<td>Phenothiazine</td>
<td>none</td>
<td>2.00 wt percent</td>
</tr>
<tr>
<td>Ortholeum 535</td>
<td>none</td>
<td>0.25 wt percent</td>
</tr>
<tr>
<td>Tolyltriazole</td>
<td>0.60 wt percent</td>
<td>0.10 wt percent</td>
</tr>
</tbody>
</table>

Physical properties of Compositions 1 and 2 are provided in Table 2 below. An industrial hydraulic fluid is typically expected to have a viscosity at 40 °C of between 32 and 68 cSt, a viscosity at 100 °C greater than 5 cSt, viscosity index (VI) greater than 100, and a pour point of less than 0 °C. Good corrosion protection is also required. Table 2 below shows that both Composition 1 and Composition 2 meet these requirements.

Corrosion inhibition was measured according to a modified version of the ASTM G31-72 test method. Steel, aluminum, brass, and copper strips were submerged in the hydraulic fluid at 70 °C for 200 hours while bubbling air through the hydraulic fluid. Iron and steel coupons were also exposed to the hydraulic fluid vapor. Compositions 1 and 2 both performed very well in this test as shown in Table 2 below.
Table 2

<table>
<thead>
<tr>
<th>Property</th>
<th>Composition 1</th>
<th>Composition 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity (cSt at 40 °C)</td>
<td>49.6</td>
<td>50.4</td>
</tr>
<tr>
<td>Viscosity (cSt at 100 °C)</td>
<td>9.3</td>
<td>9.4</td>
</tr>
<tr>
<td>Viscosity Index (VI)</td>
<td>173</td>
<td>172</td>
</tr>
<tr>
<td>Pour Point (°C)</td>
<td>&lt; -8</td>
<td>&lt; -8</td>
</tr>
<tr>
<td>Corrosion Results</td>
<td>pass</td>
<td>pass</td>
</tr>
</tbody>
</table>

Composition 2 was subjected to a 100 hour test in a hydraulic pump test stand equipped with a Vickers 20-VQ vane pump. The test was run at a pressure of 2700 psi and a temperature of 62 to 65 °C. Composition 2 performed very well exhibiting a total wear of only 61 mg. Any wear level over this 100 hour test of less than 100 mg is considered very good.

Compositions 1 and 2 have heats of combustion of approximately 20 to 30 kJ/g. This is significantly lower than mineral oils (45 kJ/g) and other anhydrous fire resistant hydraulic fluids such as polyesters (40 kJ/g), phosphate ester (35 kJ/g) and anhydrous polyalkylene glycols (32 kJ/g). In addition, the boiling point of the alkoxylation compound when the anhydrous hydraulic fluid composition of the present invention contact hot metal surfaces further reduces the intensity of the flame relative to the known anhydrous hydraulic fluids.

Composition 2 was evaluated in the Factory Mutual Research company’s Hot Surface Ignition test. In this test (Approval Standard 6930), the fluid spray is directed onto the hot surface (1300 °F or 704 °C) of a channel iron for 60 seconds from a distance of 6 inches. If ignition is established, the spray pattern is directed away from the hot surface to an open area; and strictly local burning on the channel may be approvable provided the flame does not follow the side-to-side or up and down movement of the spray pattern. In this test, Composition 2 did ignite within the 60 second time period but the flame did not follow the spray envelope as the nozzle was directed away from the channel. Therefore, the Composition 2 did pass this flammability test.

Composition 1 and a number of known hydraulic fluids were also subjected to the flammability testing in a modified Factory Mutual Research company’s Hot Surface Ignition Test (Approval Standard 6930)
In this modified test a steel pan was constructed. The pan was approximately 1 foot in diameter with 3 inch sides. The bottom of the pan was made out of 0.5 inch plate steel. A thermocouple was placed in the middle of the bottom of the pan to determine pan temperature. The pan was heated to a temperature of 550 °C with a propane gas burner. The gas flame was then turned off and a 50 gram sample of room temperature hydraulic fluid was poured into the center of the pan from a height of approximately 2 feet. The room in which this test was conducted was not occupied when the fluid was poured into the pan. The experiment was observed from a remote location. The visual results were recorded. The data obtained are provided in Table 3 below.

<table>
<thead>
<tr>
<th>Hydraulic Fluid Tested</th>
<th>Ignition</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition 1</td>
<td>No</td>
<td>Fluid boiled rapidly, resulting in the glycol-based mist.</td>
</tr>
<tr>
<td>Mobile DTE 25*</td>
<td>Yes</td>
<td>Fluid ignited quickly and burned with an intense yellow, very smoky flame.</td>
</tr>
<tr>
<td>Quintalubric 822-220*</td>
<td>Yes</td>
<td>Fluid ignition was delayed a few seconds, burned with a less intense flame than Mobile DTE 25 but with a heavy black smoke.</td>
</tr>
<tr>
<td>UCON™ Fluid LB 285*</td>
<td>Yes</td>
<td>Burned with an intense flame, but no significant smoke.</td>
</tr>
<tr>
<td>UCONALL™ 46*</td>
<td>Yes</td>
<td>Burned with an intense flame, but no significant smoke.</td>
</tr>
<tr>
<td>UCON™ Fluid 50-HB-260*</td>
<td>Yes</td>
<td>Burned with an intense flame, but no significant smoke.</td>
</tr>
<tr>
<td>CARBOWAX™ PEG 400*</td>
<td>Yes</td>
<td>Burned with an intense flame, but no significant smoke.</td>
</tr>
<tr>
<td>UCON™ Hydrolube HL-1046*</td>
<td>No</td>
<td>Fluid boiled rapidly, resulting in a glycol-based mist.</td>
</tr>
</tbody>
</table>

* Not an Example of the present invention.
Mobile DTE 25 is mineral based hydraulic fluid sold by Mobil Oil.

Quintalubric 822-220 is a "less flammable" polyester based hydraulic fluid sold by Quaker Chemical Corporation.

UCON™ Fluid LB 285 is a butanol started polymer of propylene oxide. This product is available from Union Carbide Corporation.

UCONALL™ 46 is a fully formulated gear lubricant based on a water insoluble polyalkylene glycol. This product is available from Union Carbide Corporation.

UCON™ Fluid 50-HB-260 is a butanol started alkoxylate made from a 50:50 ethylene oxide:propylene oxide blend. This product is available from Union Carbide Corporation.

CARBOWAX™ PEG 400 is a polyethylene glycol with a molecular weight of 400. This product is available from The Dow Chemical Company.

UCON™ Hydrolube HL-1046 is a water-glycol based hydraulic fluid. This product is available from The Dow Chemical Company.

Other embodiments of the invention will be apparent to those skilled in the art from a consideration of this specification or practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with the true scope and spirit of the invention being indicated by the following claims.
Claims:

1. An anhydrous hydraulic fluid composition comprising:

   (a) from 65 to 100 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of an alkoxylate compound having the following formula

   \[
   \begin{align*}
   &\text{R} - \text{O} \underbrace{\text{C} - \text{C} - \text{O}}_{\text{n}} \underbrace{\text{C} - \text{O}}_{\text{R}^5} \\
   &\text{R}^1 \quad \text{R}^2 \quad \text{R}^3 \quad \text{R}^4
   \end{align*}
   \]

   wherein \( R \) and \( R^5 \) are each hydrogen or an alkyl group having from 1 to 4 carbon atoms; \( R^1, R^2, R^3, \) and \( R^4 \) are each hydrogen, methyl, ethyl, or \( OR^6 \) group, or \( CH_2-O-R^6; R^6 \) is hydrogen, or an alkyl group having from 1 to 4 carbon atoms; and \( n \) is an integer from 1 to 4; and

   (b) from 1 to 35 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of a thickener.

2. The anhydrous hydraulic fluid composition according to Claim 1 further comprising:

   (c) from 0 to 10 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of at least one additive selected from the group consisting of lubricity additives, corrosion inhibitors, metal passivators, antioxidants, anti-foam additives, dyes, perfumes and detergents.

3. A process for imparting flame resistance, hydrolytic stability, and reduced wear characteristics to a hydraulic system which process comprises adding to the hydraulic system an anhydrous hydraulic composition comprising:
(a) from 65 to 100 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of an alkoxyolate compound having the following formula

\[
\begin{array}{c}
\text{R}^1 \quad \text{R}^3 \\
\text{R}^2 \quad \text{R}^4 \\
\text{R} - \text{O} - \left( \text{C} - \text{C} - \text{O} \right)_n \text{R}^5
\end{array}
\]

wherein \( \text{R} \) and \( \text{R}^5 \) are each hydrogen or an alkyl group having from 1 to 4 carbon atoms; \( \text{R}^1, \text{R}^2, \text{R}^3, \) and \( \text{R}^4 \) are each hydrogen, methyl, ethyl, or \( \text{OR}^6 \) group, or \( \text{CH}_2\text{-O-}\text{R}^6 \); \( \text{R}^6 \) is hydrogen, or an alkyl group having from 1 to 4 carbon atoms; and \( n \) is an integer from 1 to 4; and

(b) from 1 to 35 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of a thickener.

4. The process according to Claim 3, wherein the anhydrous hydraulic composition further comprises:

(c) from 0 to 10 percent by weight, based on the total weight of the anhydrous hydraulic fluid composition, of at least one additive selected from the group consisting of lubricity additives, corrosion inhibitors, metal passivators, antioxidants, anti-foam additives, dyes, perfumes and detergents.