

# **SLFi**

## **Bio-Green and Gold**

### **Biodegradable**

### **Hydraulic Fluids**

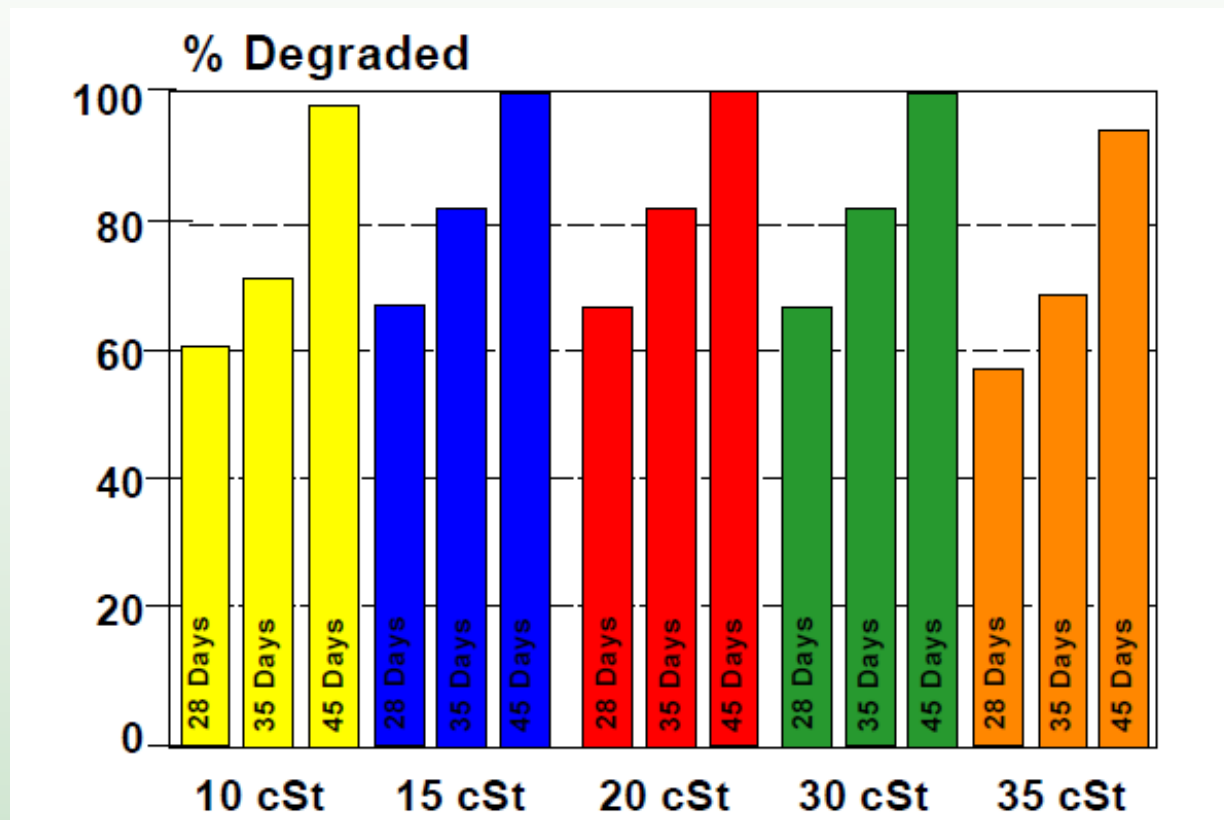
Synthetic Lubricants & Filters, Inc.  
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# Features of Bio-Green and Gold Biodegradable Hydraulic Fluid

- Meets hydraulic pump manufacturers Specifications: Vickers, Denison, Racine, Cincinnati, etc.
- Excellent lubricity and load carrying capability
- Reduces friction to help lubricate better
- Helps to protect from rust and corrosion
- Lubricant base is non-toxic and biodegradable (CECL33-T-82)
- Safer to use than other conventional hydraulic fluids

# Biodegradability of Bio-Green and Gold Synthetic Base Stocks

Test Method - CEC L-33-T-82 - % Degraded (Ground Bacteria) after 28, 35, & 45 Days



Various Bio-Green and Gold Blended Lubricant Base Components

# Six Day Seed Germination Study using Bio-Green and Gold Blended Lubricant Base Components

| Seed   | Control  | ISO 100<br>(1%) | ISO 100<br>(2%) | ISO 100<br>(4%) |
|--------|----------|-----------------|-----------------|-----------------|
| Canola | 22+3.4   | 24.6            | 22.7            | 21.7            |
| Radish | 22+1.7   | 21.7            | 20.3            | 23.3            |
| Wheat  | 16.3+1.8 | 16.3            | -               | -               |

## Notes:

- Data represents number of seeds germinated out of 25
- Tests were conducted in triplicate.

## Conclusion:

Bio-Green and gold ISO base component had no affect on seed germination.

# Phytotoxicity of Bio-Green and Gold Lubricants Base Components

| Seed   | Control | ISO 100<br>72 Gal/Acre | ISO 100<br>143 Gal/Acre | ISO 100<br>214 Gal/Acre |
|--------|---------|------------------------|-------------------------|-------------------------|
| Canola | 100     | 100                    | 98.3                    | 100                     |
| Radish | 100     | 90.0                   | 93.3                    | 96.0                    |
| Wheat  | 100     | 98.3                   | 93.3                    | 100                     |

Notes:

- Spray concentrations are cumulative of two sprayings
- No statistical difference could be determined

Conclusion:

Bio-Green and gold ISO 100 base component displayed no phytotoxicity.

# Bioassay of Bio-Green and Gold base Fluids

| Test Species          | Test Duration / Mode | Test Type | Concentration Test Score | Conclusion    |
|-----------------------|----------------------|-----------|--------------------------|---------------|
| Ceriodaphnia<br>Dubia | 48 hours             | LC 50     | >100,000 mg/L            | Non-hazardous |
| Mysid Shrimp          | 96 hours             | LC 50     | >100,000 mg/L            | Non-hazardous |
| Rainbow Trout         | 96 hours             | LC 50     | >100,000 mg/L            | Non-hazardous |
| Rabbit                | Oral                 | LD 50     | >5,000 mg/Kg             | Non-hazardous |
| Rabbit                | Dermal               | LD 50     | >2,000 mg/Kg             | Non-hazardous |
| Rabbit                | Eye                  | 72 hours  | 0                        | Non-hazardous |
| Rabbit                | Skin                 | 72 hours  | 0                        | non-hazardous |

# Comparison of Bio-Green and Gold Biodegradable Fluids and Rape Seed Based Hydraulic Fluids

| Item                  | Bio-Green and Gold  | Rape Seed Based Hydraulic Fluid  |
|-----------------------|---|--|
| Flushing Procedure    | Not required for compatibility with other standard hydraulic oils. Bio-degradability and toxicity is altered by previous fluid. | Required for change over. Not compatible with other fluids. Flushing procedures involve solvent, cleaning, and filter replacement. |
| Water Contamination   | Sheds water can be drained from system. Minimal affect on product performance.  | Water contamination affects performance of hydraulic fluid, especially oxidation life.   |
| Available Viscosities | Available in 32, 46, 68   | Available in limited ISO Grade only  |
| Color                 | <.5 Very light color  | 2 Yellow tint  |
| Food Value            | None  | Problems with rodents chewing through hydraulic lines  |
| Oxidation D943        | Excellent oxidation resistance<br>10,000+ hours D943  | Oxidation resistance poor,<br>approx. 75 hours D943  |
| Pump Wear Tests       | Pass  | Pass   |

# Comparison Between Bio-Green and Gold and Other Common Hydraulic Fluids

| Characteristic                | Test Method   | Bio-Green and Gold | Amoco AW Hydraulic 46 | Exxon Terestic 46 | Shell Tellus AW 46 | Mobil DTE Med 46 | Comments   |
|-------------------------------|---------------|--------------------|-----------------------|-------------------|--------------------|------------------|--|
| Grade                         | ISO Viscosity | 46                 | 46                    | 46                |                    |                  |  |
| Density                       | D4052 / D1298 | .86                | No data               | .87               | .88                | .86              |  |
| Viscosity cSt @ 40° C         | D445          | 45                 | 44                    | 44                | 42                 | 44               |  |
| Viscosity Index               | D2270         | 101                | 90                    | 97                | No data            | 95               | Higher Viscosity Index results in better equipment protection at elevated temperatures.                              |
| Pour Point °F                 | D97           | -30                | -30                   | -6                | -10                | 20               | Low pour points indicate pour depressed or Naphthenic Base Stocks  |
| Flash Point °F                | D92           | 435                | 425                   | 414               | 430                | 400              | Higher flash points result in lower volatility safer operation   |
| Oxidation Stability Hr        | D943          | 10,000+            | No data               | No data           | 1500+              | No data          | Regular Hydraulic Oils are normally between 1000 & 2000 Hrs  |
| Color                         | D1500         | <.5                | >2                    | >2                | >2                 | >2               | Higher color results from Sulfur compounds which have greater Phytotoxicity  |
| Copper Corrosion              | D130          | 1                  | No data               | 1                 | 1                  | No data          | Most Hydraulic oils do not corrode copper. A "1" rating is best  |
| Rust Test                     | D665          | No rust            | No rust               | No rust           | No rust            | No rust          | Most Hydraulic Oils protect from rust and corrosion  |
| Foam Sequence 1               | D892          | 0/0                | No data               | No data           | No data            | No data          | Foaming is normally controlled with additives  |
| Pump Wear Test (mg) (Vickers) | D2882         | 20                 | No data               | No data           | No data            | No data          | Typical Zn anti-wear additives used in most hydraulic oils will show about 57 mg of lost vane material in this test. |
| Denison HF-O                  | Various       | Meets              | Meets                 | No data           | Meets              | Meets            | Most Hydraulic Oils meet all Pump manufacturers tests  |
| Racine                        | Various       | Meets              | Meets                 | No data           | Meets              | Meets            |  |
| Cincinnati Milacron           | Various       | Meets              | Meets                 | No data           | Meets              | Meets            |  |

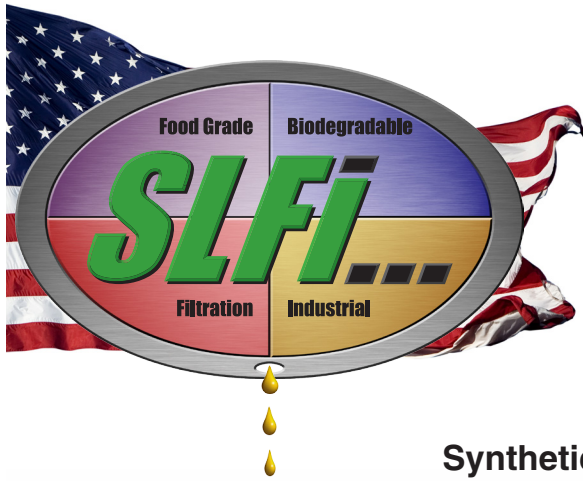


# **Conclusions**

## **Bio-Green and Gold**

### **Biodegradable hydraulic Fluid**

- Meets Hydraulic pump manufacturers Specifications: Vickers, Denison, Racine, Cincinnati, etc.
- Reduces Friction to help lubricate better
- Excellent lubricity and load carrying capability
- Helps to protect from rust and corrosion
- Lubricant base is Non-Toxic & Biodegradable (CEC L33-T-82)
- Safer to use than other conventional hydraulic fluids



# SLFi Series BGGCL Super Premium Synthetic Biodegradable Compressor Lubricants

**Synthetic Lubricants & Filters, Inc.**

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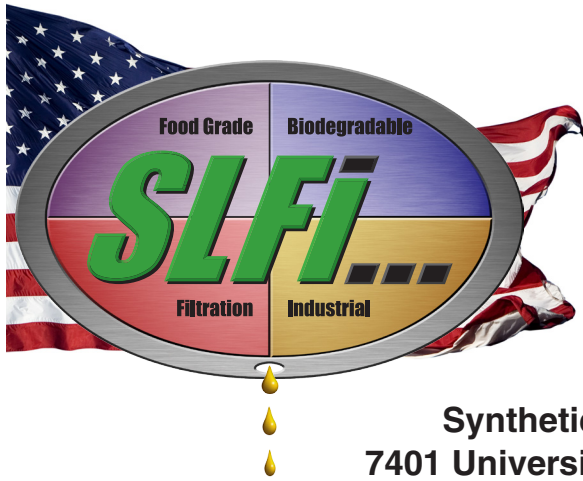
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SLFi's Bio Green & Gold Compressor Lubricants are biodegradable, non-Toxic, non-hazardous super high performance compressor lubricants. They are made using a proprietary food grade additive system which when combined in a synergistic way with the biodegradable synthetic food grade base fluid results in a compressor fluid that has excellent thermal and oxidative resistance, while providing superior resistance to sludge and varnish formation. SLFi's Bio Green & Gold Compressor Lubricants meet the requirements of FDA 21 CFR 178.3570. and can be used in H-1 applications where incidental food contact is possible. They provide excellent service in both stationary and portable compressors used in applications such as snow making, on ships, in wetlands and other environmentally sensitive areas.

- Excellent Oxidation Stability
- Very High Viscosity Index
- High Flash & Auto Ignition Points
- Very Low Volatility
- Extremely High Film Strength
- Excellent Coolant Properties
- Very Long Fluid Life
- Energy Savings
- Carbon and Varnish Control
- Reduced Maintenance Costs
- Reduced Downtime
- Excellent Materials Compatibility
- Reduced Lubricant Consumption
- Excellent Rust & Corrosion Control

## Typical Properties

| Lubricant Designation             | BGGCL 32 | BGGCL 46 | BGGCL 68 |
|-----------------------------------|----------|----------|----------|
| Viscosity Index                   | 121      | 119      | 112      |
| Viscosity cSt @ 40 °C (D445)      | 34.2     | 47.3     | 66.9     |
| Viscosity cSt @ 100 °C (D445)     | 6.0      | 7.4      | 9.1      |
| Color (D1500)                     | <.5      | <.5      | <.5      |
| Flash Point °F                    | 430      | 445      | 450      |
| Auto Ignition °F                  | 710      | 720      | 725      |
| Pour Point °F (D97)               | -45      | -38      | -34      |
| Four Ball, 40 Kg, 1200 RPM 167° F |          |          |          |
| 1 Hr, Scar Diam mm                | .40      | .40      | .40      |
| Commper Corrosion (D130)          | 1a       | 1a       | 1a       |
| Demulsibility, 130 °F, 30 min     | 40/40/0  | 40/40/40 | 40/40/0  |



# SLFi Series BG & GBHF Biodegradable Hydraulic Fluid

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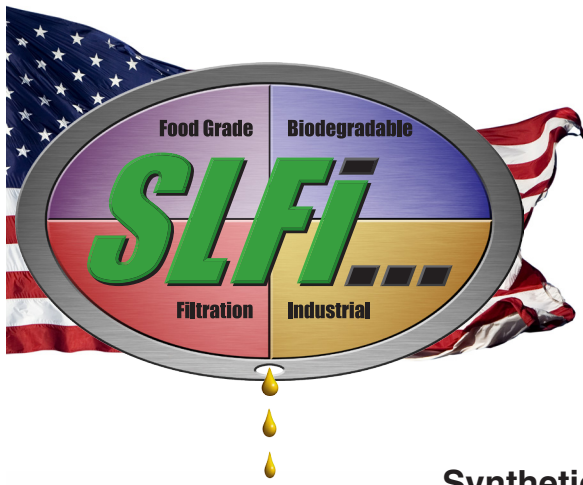
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SLFi BIO GREEN & GOLD Biodegradable hydraulic fluids are super high performance fluids made with synthetic biodegradable base fluids and special proprietary additives. This synergistic combination of additives and synthetic base fluids provides exceptional performance even in the most demanding applications. SLFi BIO GREEN & GOLD biodegradable hydraulic fluids are NON-Toxic / NON-Hazardous with excellent thermal and oxidative resistance. They resist sludge and varnish formulation and provide superior antiwear protection for hydraulic equipment.

- Excellent Oxidation Stability
- High Viscosity Index
- High Flash & Auto-Ignition Points
- Very Low Volatility
- Extremely High Film Strength
- Excellent Coolant Properties
- Very Long Life Fluid
- Energy Savings
- Carbon and Varnish Control
- Reduced Maintenance Costs
- Reduced Downtime
- Excellent Materials Compatibility
- Reduced Lubricant Consumption
- Excellent Rust & Corrosion Control

## Typical Properties

|                               | BG &<br>GBHF 22 | BG &<br>GBHF 32 | BG &<br>GBHF 46 | BG &<br>GBHF 68 |
|-------------------------------|-----------------|-----------------|-----------------|-----------------|
| Lubricant Designation         | 22              | 32              | 46              | 68              |
| Grade                         | 22              | 32              | 46              | 68              |
| Viscosity cSt @ 40 °C (D445)  | 23.1            | 31.0            | 45.1            | 66.3            |
| Oxidation Stability (D943)    | 10000+          | 10000+          | 10000+          | 10000+          |
| Color (D1500)                 | <.5             | <.5             | <.5             | <.5             |
| Flash Point °F                | 395             | 420             | 435             | 450             |
| Pour Point °F                 | -52             | -44             | -40             | -36             |
| Copper Corrosion (D130)       | 1A              | 1A              | 1a              | 1A              |
| Rust Test (D665)              | Pass            | Pass            | Pass            | Pass            |
| Foam Sequence 1               | 0/0             | 0/0             | 0/0             | 0/0             |
| Pump Wear Test (Vickers mg)   | 15              | 15              | 20              | 20              |
| Denison                       | Meets           | Meets           | Meets           | Meets           |
| FZG Stage (1-12) (DIN51354)   | 12              | 12              | 12              | 12              |
| Demulsibility, 130 °F, 30 min | 40/40/0         | 40/40/0         | 40/40/0         | 40/40/0         |



# SLFi Series BG&GMV Multi-Viscosity Biodegradeble Hydraulic Fluid

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SLFi BG&GMV Bio Green & Gold Multi-Viscosity Biodegradable hydraulic fluids are super high performance fluids made with synthetic biodegradable base fluids and special proprietary additives. This synergistic combination of additives and synthetic base fluids provides exceptional performance even in the most demanding applications. SLFi BG&GMV biodegradable hydraulic fluids are non-toxic / non-hazardous with excellent thermal and oxidative resistance. They resist sludge and varnish formulation and provide superior anti-wear protection for hydraulic equipment. SLFi BG&GMV Multi-Viscosity Biodegradable Lubricants also provide an extra level of protection when operating under wide temperature ranges.

- Very high viscosity index
- Excellent oxidation stability
- High flash and auto-ignition points
- Very low volatility
- Extremely high film strength
- Excellent coolant properties
- Very long life fluid
- Energy savings
- Carbon and varnish control
- Reduced maintenance costs
- Reduced downtime
- Excellent materials compatibility
- Reduced lubricant consumption
- Excellent rust and corrosion control

### Typical Properties

|                               |            |            |
|-------------------------------|------------|------------|
| Lubricant Designation         | PGMV 32/46 | PGMV 46/68 |
| Grade                         | 2/46       | 46/68      |
| Viscosity cSt @ 40 °C (D445)  | 33.9       | 44.9       |
| Oxidation Stability (D943)    | 10000+     | 10000+     |
| Color (D1500)                 | <.5        | <.5        |
| Flash Point °F                | 410        | 435        |
| Pour Point °F                 | -50        | -46        |
| Copper Corrosion (D130)       | 1A         | 1A         |
| Rust Test (D665)              | Pass       | Pass       |
| Foam Sequence 1               | 0/0        | 0/0        |
| Pump Wear Test (Vickers mg)   | 15         | 15         |
| Denison                       | Meets      | Meets      |
| FZG Stage (1-12) (DIN51354)   | 12         | 12         |
| Demulsibility, 130 °F, 30 min | 40/40/0    | 40/40/0    |