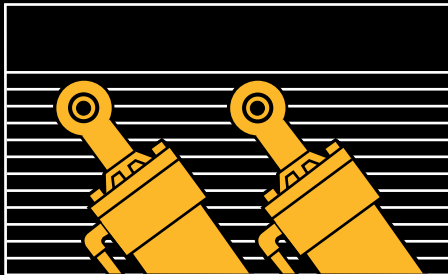


# Biodegradable Hydraulic Oil (HEES)

SAE 10W

ISO 46

For Cat hydraulic systems requiring a biodegradable and non-toxic hydraulic oil



Developed, tested, and approved by Caterpillar, Cat Biodegradable Hydraulic Oil (HEES) is a readily biodegradable oil that resists oxidation, corrosion, and wear. It meets accepted standards to be considered biodegradable and nontoxic.

## Recommended use

### Application

Cat BIO HYDO (HEES) is recommended for Cat hydraulic systems that require readily biodegradable and low-toxicity fluids, as well as:

- Cat hydraulic systems operating over a broad ambient temperature range (-32°C to 43°C) and at tank temperatures up to 100°C.
- For maximum performance and environmental compliance do not mix Cat BIO HYDO (HEES) with other oils.
- The maximum recommended water content for hydraulic systems that are filled with Caterpillar BIO HYDO (HEES) is 0.10%. If the water levels exceed 0.10%, the water should be removed or the oil should be replaced.

### Information sources

We can help you determine the right oil for your Cat machines, or you can refer to your "Operation and Maintenance Manual" or service publication SEBU6250 ("Caterpillar Machine Lubricant Recommendations").

Note: Cat BIO HYDO (HEES) should not be used in compartments requiring Cat TDTO or TO-4 commercial oils. For use in other machines, follow OEM recommendations.

## Typical Characteristics\*

SAE Viscosity Grade	10W
ISO Viscosity Grade	46
Specific Gravity (g/cm <sup>3</sup> ) @ 15°C	0.921
Flash Point °C (ASTM D92)	220
Pour Point °C (ASTM D97)	-58
Viscosity,	
cSt @ 40°C (ASTM 445)	48.7
cSt @ 100°C (ASTM 445)	8.7
Viscosity Index (ASTM D2270)	160
Zinc, ppm	<5
TAN mg KOH/g (ASTM 2896)	1.3

\* The values shown are typical values and should not be used as quality control parameters to either accept or reject product. Specifications are subject to change without notice.



Machines with this symbol are factory filled with biodegradable hydraulic oil. This symbol is located on the hydraulic tank.

# Biodegradable Hydraulic Oil (HEES)

## Unique formula for maximum performance and protection

Cat BIO HYDO (HEES) is formulated from a fully saturated Hydraulic Environmental Ester Synthetic (HEES) base stock and selected additives. It has excellent high-pressure characteristics and high-temperature oxidation stability, so it helps prevent gumming and deposits even at high operating temperatures. Cat BIO HYDO (HEES) also:

- provides superior wear protection.
- offers excellent cold flow characteristics (pour point of -58°C).
- allows operation over a broad temperature range (high viscosity index).
- does not affect conventional sealing materials (complies with VDMA 24'569).

## Fluid analysis for early detection

We recommend protecting your machine investment by using scheduled fluid analysis. Our S•O•S<sup>SM</sup> analysis program is the ultimate detection and diagnostic tool for your equipment, helping you head off potential problems before they can lead to major failures and costly unscheduled downtime.

Performance Specifications	
Cat BIO HYDO (HEES) exceeds Caterpillar BF-1 requirements for biodegradable hydraulic fluids.	
Vickers Vane Pump (35VQ25)	
Ring Wear	75 mg MAX
Vane Wear	15 mg MAX
FZG Rating (ASTM D5182)	11 MIN
Four-ball Wear Test (ASTM D4172)	
Scar length (40 kg, 93°C, 600 rpm, 30 min)	0.40 mm MAX
Friction Characteristics	Caterpillar BF-1, Section 7, SEQ1274
Fluid Cleanliness (ISO 4406)	15/13 MAX
Foaming Characteristics (ASTM D892)	
Without Added Water	
Sequence I	25/0 MAX
Sequence II	50/0 MAX
Sequence III	25/0 MAX
With 0.1% Water	
Sequence I	25/0 MAX
Sequence II	50/0 MAX
Sequence III	25/0 MAX
Elastomer and Seal Compatibility	Caterpillar BF-1, Section 2

Environmental Compliance
Cat BIO HYDO (HEES) is fully decomposed by soil or water microorganisms with little or no deposits.
<b>Biodegradability</b>
EPA 560/6-82-003 Minimum 60% biodegraded to CO <sub>2</sub> in 28 days
OECD 301B Minimum 60% biodegraded to CO <sub>2</sub> in 28 days
Biodegradation > 83% (CEC-L-33-A-93)
<b>Toxicity</b>
Water hazard classification WGK 0 maximum
Fish (Rainbow Trout) acute toxicity (OECD 203) LC <sub>50</sub> > 1000 ppm at 48 hours

## Proper use for health and safety

### Spills and leaks

Depending on contamination and degradation levels, small amounts of spilled or leaked Cat BIO HYDO (HEES) will not adversely affect ground water or the environment. If a small amount is spilled on the ground, the uncontaminated product will readily biodegrade in the presence of naturally occurring soil organisms and the air.

However, you should always handle spills of Cat BIO HYDO (HEES) according to currently acceptable methods for conventional mineral oil spills. Check with local environmental agencies for laws and regulations.

### Handling and use

According to toxicology information, Cat BIO HYDO (HEES) has little or no adverse effects if handled and used properly. No special precautions are suggested beyond attending to good personal hygiene and avoiding prolonged, repeated skin contact. For more information, refer to the "Material Safety Data Sheet," SEFV1602.