OIL SALES GUIDE

JOHN DEERE

DEF / GREASE / COOLANT / FUEL ADDITIVES

Hy-Gard™ and Low-Viscosity Hy-Gard Transmission and Hydraulic Oil

Hy-Gard and Low-Viscosity Hy-Gard transmission and hydraulic oils are unique oils developed by John Deere engineers to meet the exact needs of John Deere machines. Both Hy-Gard fluids are multi-grade fluids with high-viscosity index. Low-Viscosity Hy-Gard has an ISO 32 viscosity grade. Hy-Gard viscosity places it between ISO 46 and 68 grades. Hy-Gard may be used in many applications specifying either of these grades. Low-Viscosity Hy-Gard has the same performance specifications as Hy-Gard and can be used as a replacement for Hy-Gard in cold weather. In some machines, Low-Viscosity Hy-Gard is the correct fluid to use year around. Consult the Operator's Manual for recommended fluid operating temperatures.

Applications:

- The exclusive Hy-Gard formula was designed for use in John Deere equipment; however, it can also be used in many non-John Deere transmission and hydraulic systems.
- Low-Viscosity Hy-Gard is used for factory fill in some machines. Consult the machine's Operator's Manual to determine what machines require Low-Viscosity Hy-Gard. It is also used as a replacement for Hy-Gard in cold-weather applications.

Features:

- Performance tested both in the lab and in the field, and approved by John Deere engineers to meet the increased demands for performance and protection of transmissions and hydraulic systems.
- Hy-Gard utilizes a polymeric viscosity index improver to expand the usable operating temperature range and make it a multi-grade oil. Proper viscosity control is extremely important. If viscosity is too low, it can lead to increased wear, leakage in pumps and around seals, and generate additional heat. If viscosity is too high, more energy is used to pump the oil and starvation can occur at lower temperatures.
- Reduces wet-brake chatter and ensures high braking capacity.
- Superior wet-clutch performance smooths clutch operation.
- High tolerance to water contamination without sludge formation, which could cause filter clogging and hydraulic-system malfunction.
- The antioxidation capability allows the oil to work effectively at high temperatures, helping keep transmissions and hydraulic system parts cool and clean.
- Provides protection against rust and corrosion, particularly during low-use periods.
- Anti-wear additives keep gear and bearing wear to a minimum. The extreme-pressure formulation of Hy-Gard develops a durable surface film, which helps prevent metal-to-metal contact.

Functions:

Because some systems have combined transmission and hydraulic oil reservoirs, the oil must perform many different tasks at the same time. There is very little margin for error. Robust balanced properties are essential. To understand the complexity of transmission hydraulic oil, let's review its functions:

1. Prevents wear of heavily loaded gears and bearings.
2. Provides wear and corrosion protection for the hydraulic pump.
3. Provides proper friction for clutches to engage and absorb shock loads without excessive slipping or abrupt shifts.
4. Withstands extreme pressures in the hydraulic system without breaking down.
5. Prevents the formation of deposits on all internal parts.
6. Prevents foam and water damage to all internal parts.
7. Provides proper friction for brakes to ensure low chatter, long life, and high capacity.

An industry classification for Transmission Hydraulic Fluid (THF) does not exist. Each manufacturer establishes a minimum requirement that oils must meet for use in their equipment. John Deere has established the JDM J20 specification for minimum THF performance. John Deere does not monitor competitive or "will-fit" oils, or approve JDM J20 oils. While claiming to meet John Deere requirements, it is possible that the competitive or "will-fit" oils do not meet even the minimum performance requirements for John Deere machines, which could result in premature failures.

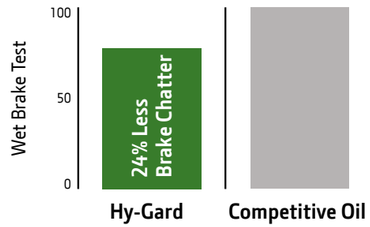
John Deere Hy-Gard™ and John Deere Low-Viscosity Hy-Gard exceed the performance of their JDM J20 specification counterparts. The performance requirements for our family of Hy-Gard products are higher, and many extra performance tests are mandatory.

- Hy-Gard oil can be used in most transmission and hydraulic applications calling for 10W-30 or 5W-30 engine oil. NOTE: Hy-Gard should be used in all applications calling for JDM J20C.
- Low-Viscosity Hy-Gard should be used in all applications calling for JDM J20D.

Wet Brake Test

Result: Customers can expect better brake-chatter control using John Deere Hy-Gard Transmission and Hydraulic Oil compared to oils meeting the minimum performance JDM J20 specification.

Competitive Oil Tested to Meet John Deere Current JDM J20 Specifications



Hy-Gard has been formulated to ensure wet brakes have high braking capacity with minimum brake chatter. Three elements are considered in the wet brake test:

1. Braking capacity — the ability of the brake system to absorb energy, which is measured in torque.
2. Torque variation — the ability of the brake system to maintain smooth frictional operation without vibration or brake chatter.
3. Wear — low wear to ensure long life.

Feature: Hy-Gard Oil is formulated to maximize brake capacity with minimum brake chatter and wear.

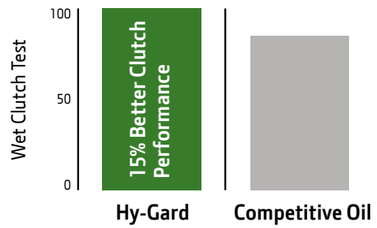
Advantage: This formula provides better brake-chatter control than competitive oil.

Benefit: Better brake-chatter control provides smooth stopping, reduced damage from vibration, less noise, and longer brake life.

Wet Clutch Test

Result: Customers can expect better clutch performance (smoother engagement, less slippage, and reduced wear) when using John Deere Hy-Gard™ Transmission and Hydraulic Oil.

John Deere Current JDM J20 Specifications



Three elements are compared in the wet clutch test:

1. The ability of the clutch to provide smooth engagement under maximum load.
2. The ability of the clutch to resist slippage.
3. The ability of the clutch to resist wear.

Feature: Hy-Gard's friction modifiers provide smooth clutch engagement.

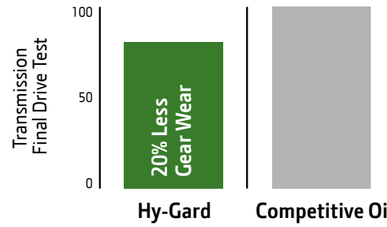
Advantage: Smooth clutch engagement provides better clutch performance than competitive oils.

Benefit: Better clutch performance provides longer clutch life with reduced maintenance costs. Hy-Gard allows limited clutch slippage for smooth engagement, which reduces clutch wear and provides long life. Too little clutch slippage results in rough, jerky engagement, while too much slippage can cause clutch surfaces to burn or glaze.

Gear Test

Result: Wear in the JDQ 95B final drive test run with Hy-Gard Transmission and Hydraulic Oil was shown to be less than the wear of a minimum-performance JDM J20C fluid.

Competitive Oil Tested to Meet John Deere Current JDM J20 Specifications



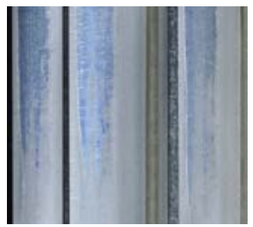
Anti-wear extreme-pressure additives play a vital role in keeping gear and bearing wear to a minimum. Oil without these additives lacks the qualities to properly lubricate transmission parts.

The JDQ95A and B spiral bevel/final drive-gear test measures a fluid's ability to prevent destructive wear of gear-contact surfaces.

Feature: Hy-Gard contains superior anti-wear additives.

Advantage: These additives have been shown to generate less than the wear of a JDM J20C fluid.

Benefit: Less gear wear extends component life and reduces downtime.



John Deere Hy-Gard *Competitive Oil*

Low Temperature Flow

Oil needs to flow properly at low temperature to ensure lubricant gets to where it is needed. Flow requirements are specified at low temperature to ensure the proper flow is provided by the oil. The picture above shows how the cold temperature flow of Hy-Gard™ can be much better than oils that claim they meet JDM J20C (tested after aging).

Feature: Hy-Gard contains a polymeric viscosity index improver additive.

Advantage: This additive ensures proper viscosity at all operating temperatures; competitive oils may not contain this additive.

Benefit: The proper viscosity at all temperatures increases efficiency and decreases wear, resulting in lower operating costs and reduced downtime. It also reduces the cost of the multiple oil changes associated with mono-grade oils due to changes in operating temperatures.

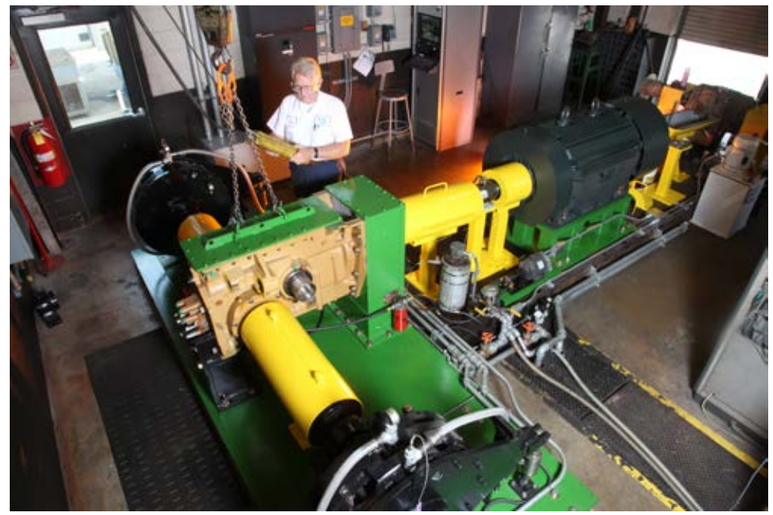
Hy-Gard can be used when the following oils are specified for use in hydraulic, transmission, hydrostatic, drivetrain, and/or gearbox systems:

AGCO
- Massey Ferguson M1135, M1141, M1139, M1143, M1145
- White Q-1722, Q-1766, Q-1766B, Q-1802, Q-1826
- Allis-Chalmers, Deutz-Allis, AGCO Allis ..... Power fluid 821XL

CNH
- Case, Case IH ..... MS 1207, MS 1209, MS 1210, MAT3505
- Ford/New Holland ESN-M2C41-B, M2C134-D, M2C48-B, M2C48-C, M2C159-B/C, M2C86-B, FNHA-2C-200, MAT3526, FNHA-2C-201, MAT3525

Caterpillar TO-2
Clark MS-68
Deutz ..... Hydraulic transmission fluid
Dresser ..... Transmission hydraulic fluid (HMS B806-0002)
Eaton Hydraulic Division ..... Hydraulic transmission (Form 3-401-123)
IHC B-6
John Deere ..... All-weather hydraulic fluid (JDM J21A)
Kubota ..... UDT hydraulic transmission fluid, Super UDT
Oliver ..... Type 55
Sunstrand ..... Hydrostatic transmission
Zetor ..... OT-H, GL-4
ZF ..... TE-ML 03E, 03L, 05F, 06D, 06E, 17E, and 21F

Check the Operator's Manual for specific applications. Low-Viscosity Hy-Gard should be used in place of an SAE 10W oil in John Deere combine hydraulic transmission systems.



TZT Oxidation Test

Hy-Gard™

Competitor's Oil

Test runs:

- At 160 °C (320 °F)
- 400 hours continuous test with air injection

John Deere uses the TZT Oxidation Test to determine a transmission and hydraulic oil's ability to protect against extreme heat. Oxidation resistance is important to ensure the oil is durable and will provide the proper performance for the entire service interval.

The pictures above show the difference in performance of Hy-Gard and an inferior hydraulic fluid. The competitor oil has left heavy deposits on the pan and the viscosity has increased dramatically. This can cause valve sticking and the oil may be corrosive.

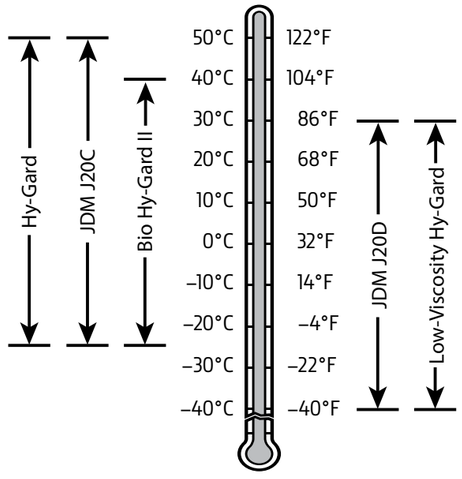
Hy-Gard parts look like new. It leaves no sludge or deposits for longer equipment life. You need a high-quality tractor hydraulic oil for tough off-road conditions.

Chemical and Physical Properties of Hy-Gard Fluids:

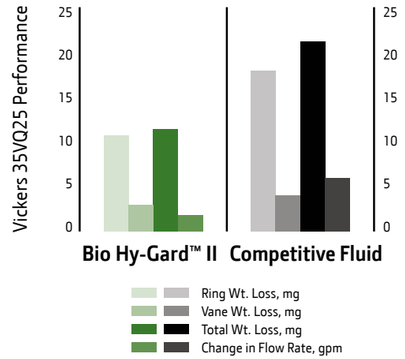
Property	Units	ASTM Method	Hy-Gard	Low-Viscosity Hy-Gard
Viscosity @ 40 °C	mm^2/s (cSt)	D-445	59	33
Pour Point	°C	D97	– 40	–51
Flash Point (typical)	°C	D92	227	180
Base Number	mg KOH/g	D2896	8.5	8.5
Viscosity Index	—	D2270	140	195

Air-Temperature Chart — John Deere Hy-Gard Hydraulic Transmission Oils

Use the oil viscosity based on the expected air-temperature range during the period between changes. Always check the Operator's Manual for specific applications. Some applications may be restricted at the upper or lower limits of the temperature range.



Vickers 35VQ25 Performance



- The Vickers 35VQ25 test was performed on Bio Hy-Gard II and competitive biodegradable oil.
- This test evaluates fluid in high-pressure operation using a Vickers 35VQ25 vane pump with the test fluid at a specified speed, pressure, and temperature.
- Three runs of 50 hours each are performed using a new pump cartridge for each run.
- The test consists of operating a Vickers 35VQ25 vane pump at high-pressure conditions for 50 hours. Test pressure is 3,000 psi, inlet fluid temperature is 200 °F, and pump speed is 2,400 rpm.
- The required horsepower input is in the range of 100.
- Evaluation of test results is done by a visual qualitative review of pump parts and weight-loss determinations.

Bio Hy-Gard II Chemical and Physical Properties:

Property	Units	ASTM Method	Bio Hy-Gard II
Viscosity @ 40 °C	mm^2/s (cSt)	D-445	46.5
Pour Point	°C	D97	– 36
Flash Point (min.)	°C	D92	251
ISO Viscosity	—	—	46

Bio Hy-Gard II has the following biodegradability and ecotoxicity properties:

- OECD 301b (Sturm) fast biodegradability 75%.
- OECD 202 EC50 >100mg/l.
- CEC L33-A-93 biodegradability 94%.
- WGK rating 1.

Bio Hy-Gard II Hydraulic Transmission Oil

Bio Hy-Gard II protects your land and your equipment. It can be recommended as a replacement for mineral oil-based hydraulic/transmission oil. Bio Hy-Gard II is formulated for multi-functional systems including transmissions, axles, hydraulics, wet brakes, and wet clutches. It is recommended when biodegradable tractor hydraulic fluid or hydraulic oils are desired. Bio Hy-Gard II meets the general performance requirements of regular Hy-Gard.

Applications:

Forestry, turf care (golf courses/cemeteries), construction, city services (garbage collection/street services), waterway operations, orchards, and farming operations.

Features:

- Base oil from farm-grown products.
- Formulated from canola-based oil.
- 94% biodegradable.
- Exceed environmental ecotoxicity performance requirements.
- Brake chatter suppressed while superior brake performance maintained.
- Excellent corrosion protection.
- Over 13,000 hours of trouble-free field-testing.
- Compatible with mineral-based oils.