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# REF: General-MSR 10

## Assembly Lubes, Oils and Sealant

### Case Half Sealant

Apparently HondaBond, YammaBond, and ThreeBond are all the same product, all manufactured by 3M company.<sup>1)</sup>

These are recommended for this application.

## Wheels

### Bearings and Packing

- HD-99855-89 Bearing Grease is suggested for use on front and rear/ cast and laced;<sup>2)</sup>
  - Inner and outer bearing races
  - Between oil seal and bearings and packed in the roller cavities.
    - Substitutes for the HD bearing grease include; marine grade bearing/ axle grease
- Light clean engine oil is suggested for use on front and rear/ cast and laced;<sup>3)</sup>
  - Outside lip of the hubs oil seal

## Tires

- Tire lube or soapy water when installing on rim<sup>4)</sup>

## Axles

- Front axle- light coat of bearing grease<sup>5)</sup>
- Rear axle- light coat of Loctite anti-seize lube<sup>6)</sup>

## Secondary Drive Sprocket

- Rear wheel sprocket to rim bolts - cast or laced- Red Loctite 271 (2-drops ea.)<sup>7)</sup>

## Wheel Weights

- Loctite 420 Super Bonder Adhesive is suggested for installing stick-on wheel weights.<sup>8)</sup>
  - 3 drops applied to the backing adhesive after peeling off the plastic seal, allow 8 hours to cure<sup>9)</sup>
  - FSM will direct you to the spoke weights on laced wheels but of late HD has went to the stick-on weights for both laced and cast wheels.

## Bearing Grease

- Grease consists of a base oil with a thickener added, consisting primarily of metal soaps (lithium, sodium, aluminum, and calcium), organic (ureas), or inorganic compounds. These thickeners greatly influence the characteristics of the grease and the lubricating properties of the grease are attributable to its base oil. Grease can contain additives (antioxidant, anticorrosion, anti-wear, fillers, fortifiers, and extreme pressure fortifiers) that improve its performance. Temperature range, base oil viscosity, and stiffness or penetration level are key characteristics to consider when selecting a grease.<sup>10)</sup>
- Greases can “age” in complicated ways. Grease quality could be affected by a change in the gel structure. If the gel contracts, significant oil bleed would be evident and the remaining grease would stiffen. The gel structure may also become softer over a period of time.
- Grease performance properties include many of the same properties used for lubricating oils, as well as others exclusive to grease. Properties exclusive to grease include dropping point, mechanical stability, water washout, bleed characteristics and pump ability. The most important performance properties are determined by the application. If an application operates continuously at room temperature, properties like dropping and upper operating temperature limits are not as important. If an application operates under heavy loads at low speeds, load carrying tests such as four-ball EP or Timken OK load should be considered. It is important to remember that greases, like oils, have a careful balance of properties. A product may excel in one category and perform poorly in another. For this reason, it is important to weigh each property’s significance relative to the intended applications to select the best overall fit.<sup>11)</sup>
- Numerous types of grease thickeners are currently in use, each with its own pros and cons. The most common types are simple lithium soaps, lithium complex and polyurea. Simple lithium soaps are often used in low-cost general-purpose greases and perform relatively well in most performance categories at moderate temperatures. Complex greases such as lithium complex provide improved performance particularly at higher operating temperatures. A common upper operating temperature limit for a simple lithium grease might be 250°F, while that for a lithium complex grease might be 350°F. Another thickener type that is becoming more popular is polyurea. Like lithium complex, polyurea has good high-temperature performance as well as high oxidation stability and bleed resistance.<sup>12)</sup>

- The color of the different grease formulas is mostly significant to the manufacturer of the product. The natural color of most grease is very close to mud. A moly or graphite grease is probably black. All the pretty green, blue and red hues are dyes and have no other chemical significance whatsoever.<sup>13)</sup> However, this may also give you a clue as to what type and or brand of grease that was previously used and that can also give clues (as to wear or non-wear during it's use) of it's abilities for the intended use.

## Some Wheel Bearing Grease Comparisons

When selecting a wheel bearing grease it is important to make sure it is classified as NLGI grade 2 for wheels bearings.

- Dow Corning Molykote® 44 High Temperature Bearing Grease
  - Temperature range; -40 to 400 degrees F. A thickened, off-white, silicone oil with a lithium thickener that is used for lubricating plastics, rubber, and antifriction bearings. Resistant to corrosion, moisture, and oxidation.<sup>14)</sup>
  - This grease is recommended by the FSM. More importantly, are this grease's characteristics (silicone oil, lithium thickener).
- Timken Automotive Wheel Bearing Grease
  - Temperature range; -40°F to 300°F (-40°C to 149°C). Features a lithium- complex thickener that resists softening and provides mechanical stability. Contains corrosion inhibitors and anti-wear and water-resistant additives. Generally compatible with calcium, calcium 12-OH stearate, calcium sulfonate, lithium and lithium- complex thickened greases. TIMKEN recommends that all grease be removed from the application prior to changing greases.<sup>15)</sup>
- Royal Lubricant ROYCO 22MS
  - Temperature Range;; -65 to 450 degrees F. Gray - black colored synthetic oil based grease that is compounded with micro fine graphite and molybdenum disulfide for enhanced extreme pressure load carrying performance. ROYCO 22MS is compounded with additives to provide corrosion resistance, oxidation stability, rust protection, and water washout resistance over extreme temperature ranges.
- AMSOIL Synthetic Multi-Purpose Grease.
  - Temperature Range; -40 to 350 (-40 to 177). A synthetic oil base and calcium sulfonate complex thickeners, provides exceptional film strength, shear resistance, adhesion properties and mechanical stability. Providing excellent oxidation stability, high-temperature dropping point and low-temperature torque value and pumping capability. Formulated with oil soluble extreme-pressure additives for heavy loads, as well as oxidation and corrosion inhibitors.<sup>16)</sup>
- Castrol High Temperature Grease (read the temp range)
  - Temperature Range; -22°F to 240°F (-30°C to +140°C). A multipurpose mineral oil based lithium complex grease developed using an optimized combination of high quality mineral oil, proprietary thickener technology and a specially selected additive system enabling reliable performance across a wide range of temperatures whilst exposed to a variety of operational loads, speeds and environmental conditions.<sup>17)</sup>

Always remove any old/ previous grease before adding new grease to bearings whether or not you are changing brands of grease.

# Anti-seize compound

See also [Wet Torque Value Chart for Lubed Threads](#) in the Tool section of the Sportsterpedia.

- Anti-Seize is a general phrase used to describe a lubing compound commonly used for threaded connections. However, anti-seize technology goes way beyond that. Anti-seize compounds offer a solution to problems associated with metal to metal contact at high temperatures and aide in assembly and disassembly. Some of these problems include seizing, galling, cold welding and heat freezing. These problems are accelerated by corrosion, friction, high temperature, load and torque. Anti-seize protects against rust and corrosion, reduces friction by providing constant torque tension, speeds up assembly and disassembly, prevents seizing, galling & cold welding. It is non-hardening and non-dripping and it retards galvanic action between dissimilar metals.
- Anti-seize acts as a lubricant to perform as a barrier or shield preventing deterioration of the metal surfaces. Oils and conventional greases are OK for some applications, however they do not last well beyond temperatures of 400°F to 500°F. Anti- seize compounds were developed to handle the lubricating job at higher temperature limits of various applications. They contain oils and greases for protection at lower temperatures and are the vehicle for the metallic and other solids contained in the compounds. After the oils and greases dissipate, the solid content of the compound remains (in the threads, on the flanges, etc.) plating the metal surfaces to resist friction, rust, corrosion and other detrimental conditions.
- The presence of “solid contents” in the anti-seize compound is not only important at high temperatures (500° F to 2600° F), but also enhances the lubricant at lower temperatures. Copper, graphite, aluminum and others offer much higher load bearing pressures than greases alone can provide.
- The solids in the compound are important because the degree in protection and temperature limits are generally determined by the amount and type of solids that are in the formula. The melting point of the metallic ingredients limit the temperature recommendations of anti-seize compounds; Copper @ 1800° F, Nickel @ 2600° F, Graphite @ 1100° F. Nickel has better chemical resistance than copper and aluminum therefore nickel based anti seize is recommended for more corrosive applications. Average shelf life is plus 1 year.
- Typical applications include flanges and fittings, motor mounts, cam rollers and guides, press fits, keyways, heavily loaded and slow moving bearings, nuts, plugs, punches, taps, dies, drills, bolts, studs, gears/pulleys, couplings and joints. <sup>18)</sup>

There are different brands and formulas for different applications but just remember that they are all formula based for certain applications. There are low temp formulas as well as the high temps already mentioned, formulas for marine based applications for salt and water and also food grade formulas for use in food prep machines. They are not however formulated for use with dissimilar metals or for certain metal combinations.

## Most manufacturer's products read that they are safe for use on all metals, however;

- Copper base anti-seize offers good corrosion protection on all kinds of steel except stainless steel. Copper on stainless steel creates an inter-crystalline corrosion, which can make actual stainless steel parts crack and break. This is why the nuclear power plants do not allow copper with any material which comes in contact with the stainless steel parts.
  - Temperature Range: 2200° F <sup>19)</sup>
- Aluminum as a base material for Anti-Seize is good for use on stainless steel, but cannot be used on carbon steel, due to the fact that when it comes in contact with an electrolyte it becomes an anode and since this anode is extremely small in volume compared to the large cathode of the steel, it usually deteriorates quickly, leaving no protection at all on the steel surface. Corrosion therefore takes place at a higher rate of speed, as if no anti-seize would have been present.
  - Temperature Range: 1470° F <sup>20)</sup>
- Nickel has been used extensively in Anti-Seize materials, because it has good anti-seize and corrosion protection for both steel and stainless steel. However, nickel has been for many years, on the list of carcinogens ( cancer producing products ) and should not be used in applications where nickel based anti-seize is used on materials handled in workshops.
  - Temperature Range: 2500° F <sup>21)</sup>

## Some examples of different brands

- Vibra-Tite:
  - Silver: Aluminum - Copper Anti-Seize is a general all metal formula. Viscosity of 120,000 - 175,000 in a paste and temperature range up to 1,600 degrees F.
  - C5-A: Copper Anti-Seize is ideal for soft metals. Viscosity of 120,000 - 175,000 in a paste and temperature range up to 1,800 degrees F.
  - Nickel: Nickel Anti-Seize ideal for extreme temperatures. Viscosity of 350,000 - 500,000 in a paste and temperature range up to 2,600 degrees F. <sup>22)</sup>
- MRO Solutions:
  - MRO Solution 800: Low-Friction Moly Lubricant safe for high temperature uses. Withstands temperatures up to 800°F as a lubricant, and 2400°F as an anti-seize.
    - Recommended Uses: High-torque bolting. Bearings, keyways and shafts, press-fits, screws, nuts, and bolts
  - MRO Solution 1800: General Purpose Anti-Seize Lubricant Aluminum Copper Anti-seize (Silver Color). Made of copper, aluminum and graphite in a high quality grease, this anti-seize lubricant formula is designed as a general purpose solution.
    - Recommended Uses: Nuts, bolts, and studs, manifolds and heat exchangers, fittings, shafts. press-fits, packings, flange bolts, pumps and valves
  - MRO Solution 2000 - Copper High Temperature Anti-Seize Lubricant made of a premium copper and graphite blend, this anti-seize lubricant formula is designed specifically for high temperature applications. Temperature range up to 2000 degrees F as an anti seize
    - Recommended Uses: Nuts, bolts, studs, manifolds, heat exchangers, fittings, shafts,

press-fits, packings, flange bolts, pumps, valves, marine fasteners, turbines, dies, farm equipment and steam traps <sup>23)</sup>

- Permatex® Anti-Seize Lubricant:
  - A highly refined blend of aluminum, copper and graphite lubricants. Salt, corrosion and moisture resistant with a temperature range between -60°F to 1600°F (-51°C to 871°C)
    - Recommended Uses: For easy removal of spark plugs, cylinder head and exhaust head bolts; apply to anchor pins on brake assemblies, u-bolts and spring bolts, hinges, gears, chain, sprockets and rollers. <sup>24)</sup>
    - Point of interest, Permatex® does not recommend the use of any anti-seize product on wheel studs. Because of the lubricity of anti-seize, there is the potential for over-torquing and therefore, higher clamp loads and potentially dangerous bolt stretch. <sup>25)</sup>
- Lub-O-Seal Zinc Anti-Seize:
  - General use anti-seize with a thread lubricant formulated from 50% petrolatum and 50% zinc dust to meet the requirements of U.S. Military Specification Mil-T-22361. It is designed to prevent galling and seizing during assembly or disassembly of threaded and unthreaded parts made of aluminum or aluminum alloys.
    - The zinc dust acts as an electromechanical “galvanizing compound” on metal to metal connections, therefore protecting the metal surfaces.
      - This gray color compound has a temp Range up to 500° F (260° C)
        - Recommended Use: Anti-seize for aluminum and aluminum alloys, pipe threads, nuts, bolts, studs, gears, sprockets and chains <sup>26)</sup>
  - Depac 505 Metal-Free Anti-Seize:
    - Can be used in all applications, is free of any hazardous metal particles, is nontoxic, and is totally environmentally friendly. A white, metal-free, high-temperature resistant and pressure resistant anti-seize.
      - Can be used for all kinds of metal connections, particularly chromium-nickel alloys and for prevention of frictional corrosion of all kinds and with all types of metals and alloys.
        - Does not alter the frictional coefficient between bolts and the female thread.
          - Temperature Range: Subzero to 2500° F <sup>27)</sup>

## Other

- Use wax on chrome fasteners as anti-seize compound. Works very well...probably as well as anti-seize in that application. <sup>28)</sup>
- If using new chrome nuts and bolt, you MUST use anti-seize lube. Else they will gall together. <sup>29)</sup>

**Upon comparison, copper based anti-seize seems to be the best choice used on a Sportster**

**The FSM points out areas to use anti-seize on:**

- Rear axle bolt

# Loctite or Threadlocker

See also [Wet Torque Value Chart for Lubed Threads](#) in the Tool section of the Sportsterpedia.

- Thread locker liquids have been around for many years and the brand, Loctite, has seemed to come to be synonymous for all brands just as the word Coke has replaced the phrase meaning a carbonated drink in general language since Loctite was the original inventor of anaerobic technology.<sup>30)</sup> Permatex also offers threadlocker formulas. Both of these companies do seem to share a certain conformity regarding colors/ strengths and applications. A threadlocker is an anaerobic adhesive used on threaded metals that cures at room temperature in the absence of air. The adhesive completely fills the gaps between mating threads to lock and seal the threaded assembly.<sup>31)</sup>
  - Low strength formulas are recommended for fasteners under 1/4" by Loctite and applications to 300 degrees F.
  - Medium strength formulas are recommended for fasteners from 1/4" up to 3/4" and applications to 300 degrees F (Loctite 243 up to 360 degrees F).
  - High strength formulas are recommended for up to 1" fasteners and applications to 450 degrees F.
  - There are many more formulas on the market with different strengths and applications. The ones mentioned are or have been most common. Most hardware stores carry a medium and a high strength and some the low strength. But, there are different strengths of low, medium and high formulas. Check with the manufacturer for a current list of products and applications offered. In general, all you need is the most common blue and red for a Sporty.

## Application (from the MoCo)

### General Locking and Sealing Compounds

In 1985, the MoCo issued a Service Bulletin documenting a recommended list of locking and sealing compounds. The products listed are designed to increase the retention of fasteners and to aid in minor repairs. However, the MoCo does not distribute Loctite or Duro products.<sup>32)</sup>

Product	Color	Type / Application
Loctite 222	Purple	Low strength - For fasteners less than 1/4" dia. - General body hardware.
Loctite 242 Duro Lock N Seal	Blue	Medium strength - For 1/4" dia. and larger fasteners - Lock fender braces, master cylinder bolts, brake disc mounting bolts, brake anchors, exhaust flanges and general body hardware.
Loctite 271 Duro Stud and Bearings	Red	Very high strength - For 1" dia. and smaller fasteners - Secure upper and lower fork assemblies, shock absorber mounts, fittings, axle nuts, shift lever screws, cylinder head / crankcase studs and handlebar clamps.

Loctite 290 Duro Wick N Lock	Green	High strength penetrating material - Lock adjustment screws and assembled parts. Secure footrests and kick starters.
Loctite RC/609	Green	3000 psi shear strength retaining compound - Retain brake pedal bushings, mainshaft sprockets, countershafts, oil seals, drive train, linkage, clutch hub and sprocket assemblies.
Loctite RC/620	green	3000 psi shear strength High Temp retaining compound - Locking crankpin and flywheel nuts.
Loctite 504 Gasket Eliminator	Orange	Instant sealant - Make emergency gaskets on-the-spot. Seal crankcase covers, cylinders to crankcase, oil pumps and rocker arm covers.
Loctite 495 Superbonder	Clear	Instant adhesive - bond brake pedal and kick starter pads. Secure loose hand grips. Repair loose windshield moldings and other rubber, vinyl and plastic components.
Hylomar PL32	Blue	Non hardening sealant - Retain engine gaskets in place during assembly. Seal crankcase halves.
Loctite Pipe Sealant With Teflon	White	General purpose sealant - Seal threaded fuel line fittings, hydraulic brake line fittings, engine plugs and oil drain plugs.
Loctite Anti-Seize	-	Temperature resistant heavy duty lubricant - Prevent galling, seizing and corrosion on front and rear axles.
Loctite Safety Solvent	-	General purpose cleaner - Dissolve grease, dirt and oil from parts quickly and safely.
Locquic Primer N	-	General purpose primer - Used for Loctite pipe sealants and flange sealants.
Locquic Primer T	-	Fast curing primer - Used for Loctite threadlockers, retaining compounds and sealants.
Locquic Primer NF 736	-	Very fast curing primer - Used for Loctite threadlockers, retaining compounds and sealants.

## Application (from manufacturers)

- In general, it's best to use the manufacturer's label for application mixed with a little common sense of your own since the manufacturers do not sell their products to just Sportster owners. Meaning, most applications are meant to keep the bolts from coming loose for a long time. Whereas a Sportster owner, by nature of the machine, will have to take things off and put them back on many times due to servicing, customizing and etc.
- Both Loctite <sup>33)</sup> and Permatex <sup>34)</sup> suggest to clean the threads thoroughly with parts cleaning sprays, let dry and then cover the threads with the product at the thread engagement areas.
- Both also recommend squirting several drops down a blind threaded hole, Loctite also adds extra to the thread and then the bolt is screwed down into the hole to allow air pressure to push the liquid up, into and around the mating threads.
- Loctite says to "tighten bolts as normal or recommended". Permatex says to tighten as usual and when "tightening to established torque values, torque compensation is not required".
- Both say their product to be extremely resistant to chemicals. Loctite says it can be used on "as received" bolts (meaning the oil supplied from the manufacturer on it so it doesn't rust until you buy it).
- Product cures fully in 24 hours.
- Both say a primer is not needed on active metals; Soft Steel- Iron, Copper, Brass, Manganese, Bronze, Nickel and Aluminum Alloy but primer is recommended (sold separately by them) for

inactive metals; Bright Platings, Anodized Surfaces, Titanium, Zinc, Pure Aluminum, Stainless Steel and Cadmium. The primer activates the inactive metals, speeds curing times and also acts as a cleaning agent.

## Adding common sense to application

- Threads need to be clean and free of debris especially if they will receive torque during installation. Where threads have been chased or newly threaded, brake cleaner or WD-40 will blow out the shavings and clean out tapping/ cleaning oils. You can also spray or soak them with alcohol and blow them out with compressed air. <sup>35)</sup> Threadlocker will still work if a light film of oil (wiped, not dripping) is present. Run all bolts down dry with your finger first to make sure all threads are good else chase them if you can't with a tap and die.
- Install and snug all bolts with required lube or sealer (anti-seize/threadlocker /light oil) equally. Snug up all bolts in sequence from center out. Final torque is now based on sealant applied. The specs in the FSM are for dry threads only. Lube of any sorts including threadlocker on the threads adds pre-load to the bolt.
- Bolt pre-load is basically the spring pressure that holds materials together that is applied by the bolt. Once a bolt is tight, it doesn't turn any longer. You have a mating surface (underside of the bolt) touching the mating surface it is on. Any further tightening will stretch the bolt in a circular motion that adds clamp force to the mating surfaces. The amount of clamp force needed depends on the materials and application. Place one hand on top of the other and get a friend to hold them together. Now try to pull them apart. Your friend will now have to hold yours tighter else the mating surfaces (your hands) will loosen from each other. All bolts have a spring pressure limit called a point of "yield".
- The end result if using dry torque specs on a lubed bolt/ thread may result in over-torquing the threads even though your wrench will show you were at the torque specified, resulting in damaged threads and/ or sprung or broken bolts and damage to the material being fastened.
- Therefore, you should now use at least the low end of final torque specs if not less than that depending on lube and amount used.
- It only takes a drop or two at the most to accomplish thread seal. You just need to cover a few threads with it. Adding too much can cause it to back up under the bolt head or hydrolock the bolt, changing torque values and not allow proper mating of materials.
- There are different rules for thru and blind threaded holes as to the concept of tightening.
  - In to a thru hole, if you leave the bolt sappy with oil, the bolt needs to "set" a little after it is in just snug to allow any trapped oil to escape the threads before going to torque. Still, lubed threads will change installation torque values.
  - On blind threaded holes, hydrolock can happen if too much oil is left on the threads or too much threadlock is left in the bottom. Applying threadlock into a blind hole also allows for the bolt to be locked horizontally and vertically making it harder to remove and also you have to clean all that back out to re-install the bolt. Again, just a few threads covered will do.

## Removal

- Bolt removal:
  - Low (purple) and medium (blue) strength formulas can generally be wrenched loose with

common wrenches.

- High strength formulas (red) can be loosened with heat applied and a wrench while it's hot (melts the threadlocker...temporarily. Let it cool and the threadlocker hardens again).
- Removing threadlock from bolts and threaded holes is best done with tap and dies.

## **The FSM points out areas to use threadlocker on:**

### **Permanent strength- Red (271) or equivalent**

#### **Wheels**

- Rear wheel sprocket to rim bolts - cast or laced (2-drops ea.)

### **Permanent strength- Red (262) or equivalent**

#### **Primary**

- Engine sprocket nut, clutch basket nut.

#### **Gear Case**

- Pinion shaft nut.

#### **Final drive**

- 1986-1990 models: final drive sprocket nut.

### **Medium strength- Blue (242) or equivalent**

#### **Final drive**

- 1991-2003 models: final drive sprocket nut.
- Drive sprocket lock screws.

\* Where and how much threadlock you use is ultimately up to you based off what you think you may need. Always make a habit of checking for loose bolts.

Based on article by olrump1 from the XLFORUM <sup>36)</sup>

# Pipe Dope

Effective as thread sealant especially on tapered thread fittings.



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1)

IronMick of the XLFORUM

<https://www.xlforum.net/forum/sportster-motorcycle-forum/sportster-motorcycle-era-specific-and-model-specific/ironhead-sportster-motorcycle-talk-1957-1985/119047-case-halves-goo?s=5165c2d55507b0a80754920c69e24721#post2491282>

2) 3)

1998 HD FSM pg 2-13

4) 5) 6) 7) 9)

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18)

[http://www.antiseize.com/pdf/why\\_use\\_an\\_antiseize.pdf](http://www.antiseize.com/pdf/why_use_an_antiseize.pdf)

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<http://www.lub-o-seal.com/products/datasheets/antiseize-zinc.html>

28)

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30) 33)

[http://www.na.henkel-adhesives.com/us/content\\_data/316041\\_FINAL\\_LT4680\\_AAM\\_Do\\_It\\_Guide\\_v7.pdf](http://www.na.henkel-adhesives.com/us/content_data/316041_FINAL_LT4680_AAM_Do_It_Guide_v7.pdf)

31)

<http://na.henkel-adhesives.com/industrial/threadlocker-loctite-13445.htm>

32)

HD Service Bulletin #M-902 dated June 4, 1985

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35)

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37)

photo by Hippysmack

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