S650 STS™, S660 STS™, S670 STS™, S680 STS™, S685 STS™, and S690 STS™ Combine Repair

TECHNICAL MANUAL

S650 STS™, S660 STS™, S670 STS™, S680 STS™, S685 STS™, and S690 STS™ Combine Repair

TM120819 02SEP23 (ENGLISH)

For complete service information also see:

S650 STS™, S660 STS™, S670 STS™, S680 STS™, S685 STS™, and S690 STS™ Combine Diagnostic Technical Manual	TM120719
Alternators and Starting Motors	CTM77
6090 PowerTech™ Plus Diesel Engines (Interim Tier 4/Stage III B Platform)	CTM104819
6090 PowerTech™ OEM Diesel Engines (Final Tier 4/Stage IV Platform)	CTM117719
6135 PowerTech™ Plus Diesel Engines (Interim Tier 4/Stage III B Platform)	CTM104919
6135 PowerTech™ OEM Diesel Engines (Final Tier 4/Stage IV Platform)	CTM119919
Hydraulic Cylinders	CTM120519
JDLink™ ZXLink™ (MTG) Technical Solutions Manual	TM114519
6090 PowerTech™ Diesel Engines (Stage II Platform)	CTM115419
JDPS Master Tool Manual	TM111119

John Deere Harvester Works
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Foreword

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Technical manuals are divided in two parts: repair and operation and tests. Repair sections tell how to repair the components. Operation and tests sections help you identify the majority of routine failures quickly.

Information is organized in groups for the various components requiring service instruction. At the beginning of each group are summary listings of all applicable essential tools, service equipment and tools, other materials needed to do the job, service parts kits, specifications, wear tolerances, and torque values.

Technical Manuals are concise guides for specific machines. They are on-the-job guides containing only the vital information needed for diagnosis, analysis, testing, and repair.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic type of failures and their causes.

DX,TMIFC-19-20140415

Contents

Storing Diesel Exhaust Fluid (DEF)
Testing Diesel Exhaust Fluid (DEF)
Diesel Engine Break-In Oil — Non-Emissions Certified and Certified Tier 1, Tier 2, Tier 3, Stage I, Stage II, and Stage III
John Deere Break-In Plus™ Engine Oil — Interim Tier 4, Final Tier 4, Stage IIIB, Stage IV, and Stage V
Hydrostatic Drive System, Main Hydraulic System, Main Engine Gear Case, Tracks
Tension, Mid and Rear Roller Hubs Oils
Diesel Engine Break-In Oil — Non-Emissions Certified and Certified Tier 1, Tier 2, Tier 3, Stage I, Stage II, and Stage III
Feeder House Reverser Gear Case
Multipurpose Extreme Pressure (EP) Grease
Corn Head Grease
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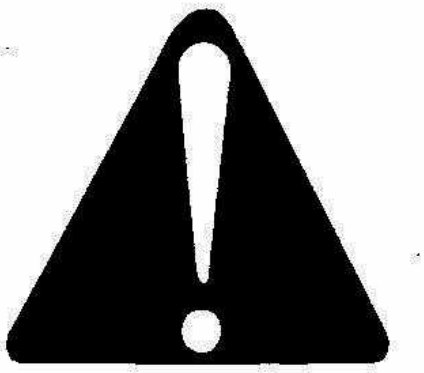
DX,TMIFC-19-20140415

Recognize Safety Information

This is a safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.



T81389-UN: Safety-alert symbol

DX,ALERT-19-20220829

Service Tires Safely

Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims, or missing lug bolts and nuts.

Wheels and tires are heavy. When handling wheels and tires use a safe lifting device or get an assistant to help lift, install, or remove.

RXA0103438-UN: Explosive Tire and Rim Parts

DX,WW,RIMS-19-20170228

Understand Signal Words

DANGER ; The signal word DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING ; The signal word WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION ; The signal word CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events which could lead to personal injury.

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards. DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

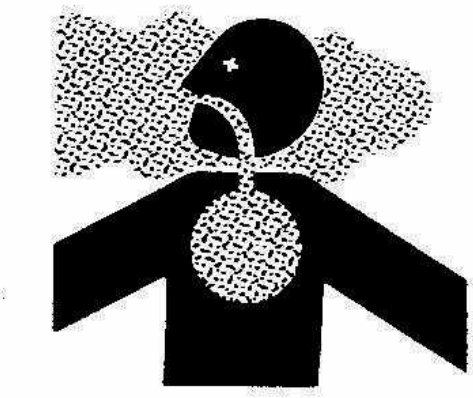
TS187-19: Signal Words

DX,SIGNAL-19-20161005

Remove Paint Before Welding or Heating

Avoid potentially toxic fumes and dust.
Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.
Remove paint before heating:

- Remove paint a minimum of 100 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator before heating or welding.
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



TS220-UN: Toxic Fumes

Do not use a chlorinated solvent in areas where welding will take place.
Do all work in an area that is well ventilated to carry toxic fumes and dust away.
Dispose of paint and solvent properly.

DX,PAINT-19-20020724

Handle Fluids Safely—Avoid Fires

When you work around fuel, do not smoke or work near heaters or other fire hazards.
Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.
Make sure machine is clean of trash, grease, and debris.
Do not store oily rags; they can ignite and burn spontaneously.

TS227-UN: Avoid Fires

DX,FLAME-19-19980929

Prevent Battery Explosions

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

TS204-UN: Battery Explosions

DX,SPARKS-19-19930303

Handling Batteries Safely

Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace grounded clamp last.

Sulfuric acid in battery electrolyte is poisonous and strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid hazards by:

- Filling batteries in a well-ventilated area
- Wearing eye protection and rubber gloves
- Avoiding use of air pressure to clean batteries
- Avoiding breathing fumes when electrolyte is added
- Avoiding spilling or dripping electrolyte
- Using correct battery booster or charger procedure.

TS204-UN: Caution

If acid is spilled on skin or in eyes:

TS203-UN: Caution

1. Flush skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 qt.).
3. Get medical attention immediately.

WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**

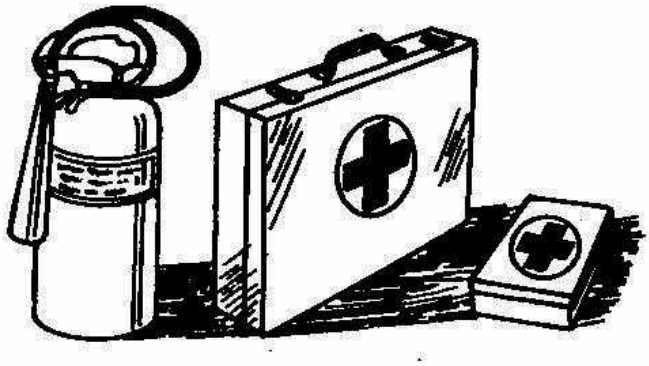
DX,WW,BATTERIES-19-20101202

Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291-UN: First Aid Kit

DX,FIRE2-19-19930303

Prevent Acid Burns

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

TS203-UN: Acid Burns

1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.

DX,POISON-19-19930421

Avoid High-Pressure Fluids

Inspect hydraulic hoses periodically – at least once per year – for leakage, kinking, cuts, cracks, abrasion, blisters, corrosion, exposed wire braid or any other signs of wear or damage.

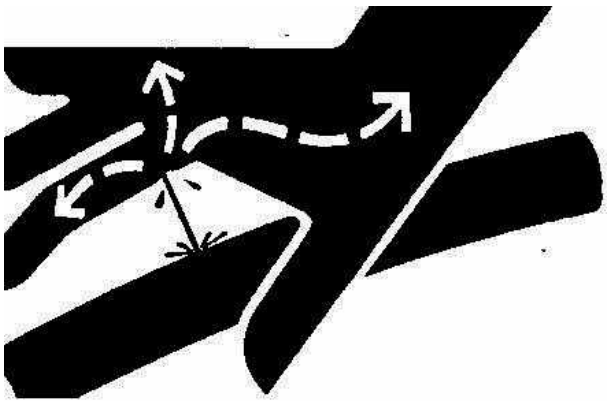
Replace worn or damaged hose assemblies immediately with John Deere approved replacement parts.

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available in English from Deere & Company Medical Department in Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.



X9811-UN: High Pressure

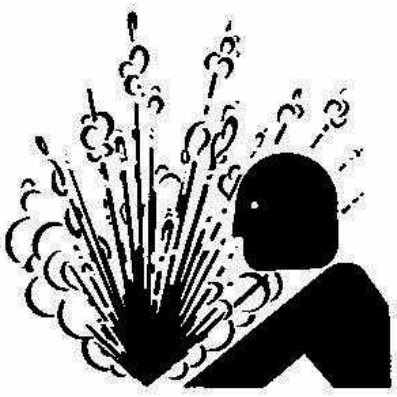
DX,FLUID-19-20111012

Service Accumulator Systems Safely

Escaping fluid or gas from pressurized hydraulic accumulator systems can cause serious injury. Extreme heat can cause the accumulator to burst, and pressurized lines can be accidentally cut. Do not weld or use a torch near a pressurized accumulator or pressurized line.

Relieve pressure from the hydraulic system before removing accumulator. Never attempt to relieve hydraulic system or accumulator pressure by loosening a fitting.

Accumulators cannot be repaired.



TS281-UN: Hydraulic Accumulator

DX,WW,ACCLA-19-20030415

Wait Before Opening High-Pressure Fuel System

High-pressure fluid remaining in fuel lines can cause serious injury. Only technicians familiar with this type of system should perform repairs. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High-Pressure Common Rail (HPCR) fuel system, confirm that the fuel pressure is relieved.

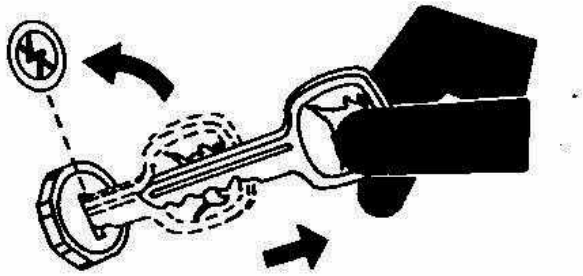
TS1343-UN: High-Pressure Fuel Lines

DX,WW,HPCR2-19-20140909

Park Machine Safely

Before working on the machine:

- Lower all equipment to the ground.
- Stop the engine and remove the key.
- Disconnect the battery ground strap.
- Hang a "DO NOT OPERATE" tag in operator station.



TS230-UN: Remove the Key

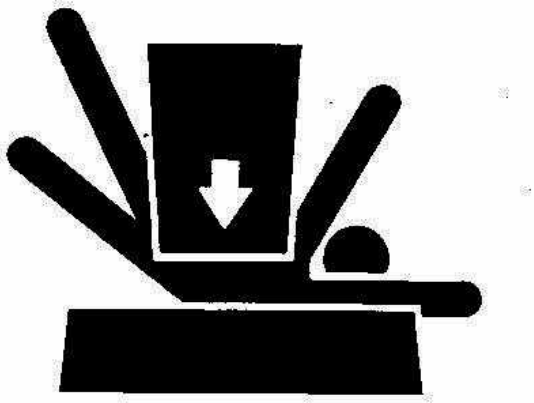
DX,PARK-19-19900604

Support Machine Properly

Always lower the attachment or implement to the ground before you work on the machine. If the work requires that the machine or attachment be lifted, provide secure support for them. If left in a raised position, hydraulically supported devices can settle or leak down.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

When implements or attachments are used with a machine, always follow safety precautions listed in the implement or attachment operator's manual.



TS229-UN: Support Properly

DX,LOWER-19-20000224

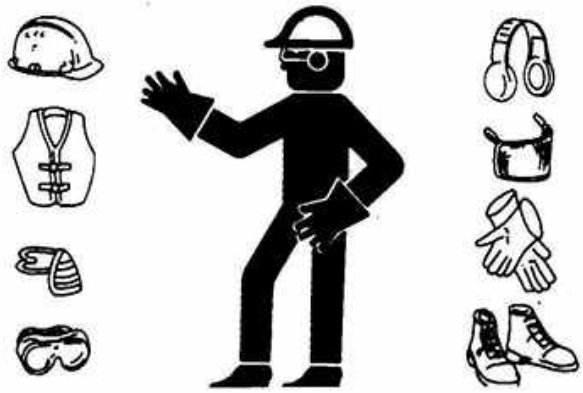
Wear Protective Clothing

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.



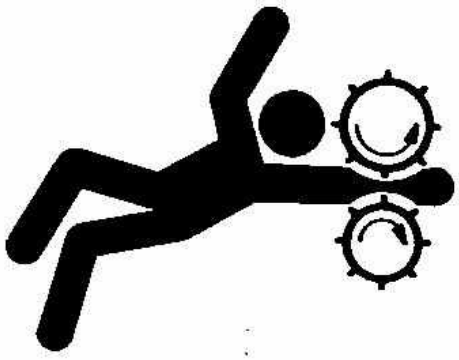
TS206-UN: Protective Clothing

DX,WEAR-19-19900910

Service Machines Safely

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



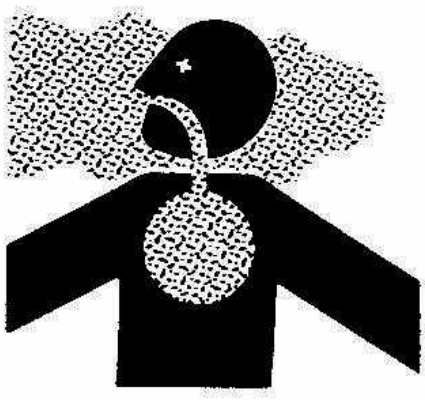
TS228-UN: Moving Parts

DX,LOOSE-19-19900604

Work In Ventilated Area

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.



TS220-UN: Engine exhaust fumes

DX,AIR-19-19990217

Illuminate Work Area Safely

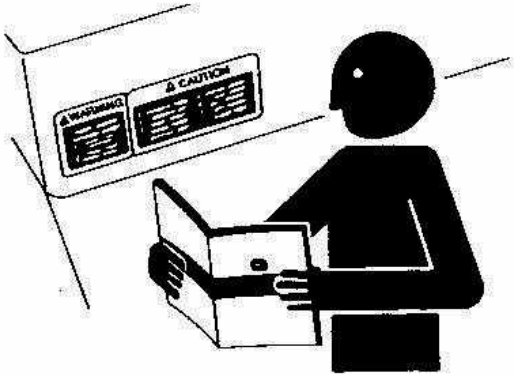
Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

TS223-UN: Work Area Safely

DX,LIGHT-19-19900604

Replace Safety Signs

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



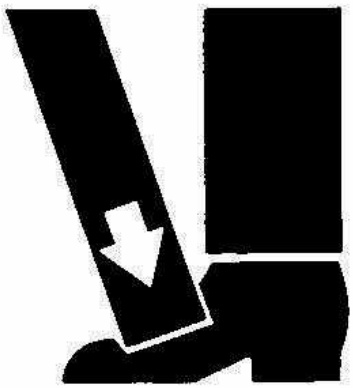
TS201-UN: Safety Signs

DX,SIGNS1-19-19900604

Use Proper Lifting Equipment

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.



TS226-UN: Proper Lifting Equipment

DX,LIFT-19-19900604

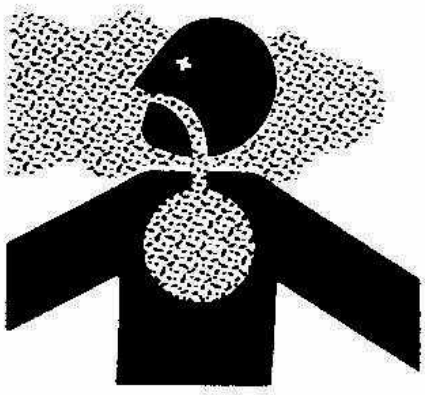
Avoid Harmful Asbestos Dust

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos.

Keep bystanders away from the area.



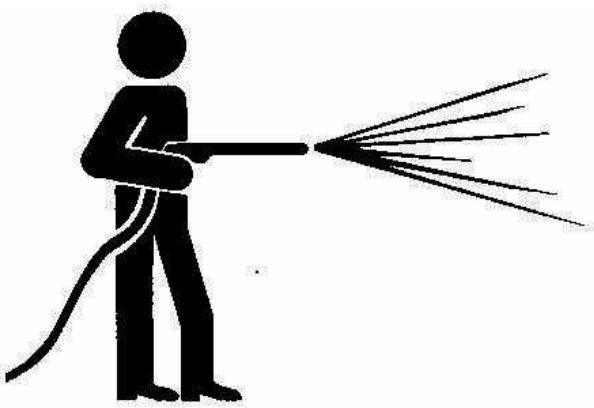
TS220-UN: Asbestos Dust

DX,DUST-19-19910315

Work in Clean Area

Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



T6642EJ-UN: Clean Work Area

DX,CLEAN-19-19900604

Practice Safe Maintenance

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet, and clothing away from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

Falling while cleaning or working at height can cause serious injury. Use a ladder or platform to easily reach each location. Use sturdy and secure footholds and handholds.

TS218-UN: Keep Area Clean

DX,SERV-19-20170228

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards.

Use power tools only to loosen threaded parts and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only service parts meeting John Deere specifications.

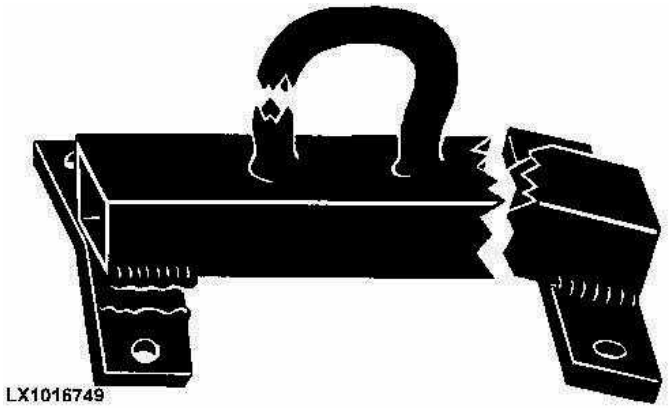
TS779-UN: Proper Tools

DX,REPAIR-19-19990217

Construct Dealer-Made Tools Safely

Faulty or broken tools can result in serious injury. When constructing tools, use proper, quality materials, and good workmanship.

Do not weld tools unless you have the proper equipment and experience to perform the job.



LX1016749-UN: Construct Dealer-Made Tools Safely

DX,SAFE,TOOLS-19-19971010

Avoid Heating Near Pressurized Fluid Lines

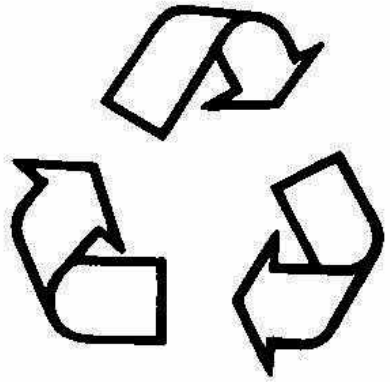
Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can accidentally burst when heat goes beyond the immediate flame area.

TS953-UN: Flammable Spray

DX,TORCH-19-20041210

Decommissioning — Proper Recycling and Disposal of Fluids and Components

Safety and environmental stewardship measures must be taken into account when decommissioning a machine and/or component. These measures include the following:



TS1133-UN: Recycle Waste

- Use appropriate tools and personal protective equipment such as clothing, gloves, face shields or glasses, during the removal or handling of objects and materials.
- Follow instructions for specialized components.
- Release stored energy by lowering suspended machine elements, relaxing springs, disconnecting the battery or other electrical power, and releasing pressure in hydraulic components, accumulators, and other similar systems.
- Minimize exposure to components which may have residue from agricultural chemicals, such as fertilizers and pesticides. Handle and dispose of these components appropriately.
- Carefully drain engines, fuel tanks, radiators, hydraulic cylinders, reservoirs, and lines before recycling components. Use leak-proof containers when draining fluids. Do not use food or beverage containers.
- Do not pour waste fluids onto the ground, down a drain, or into any water source.
- Observe all national, state, and local laws, regulations, or ordinances governing the handling or disposal of waste fluids (example: oil, fuel, coolant, brake fluid); filters; batteries; and, other substances or parts. Burning of flammable fluids or components in other than specially designed incinerators may be prohibited by law and could result in exposure to harmful fumes or ashes.
- Service and dispose of air conditioning systems appropriately. Government regulations may require a certified service center to recover and recycle air conditioning refrigerants which could damage the atmosphere if allowed to escape.
- Evaluate recycling options for tires, metal, plastic, glass, rubber, and electronic components which may be recyclable, in part or completely.
- Contact your local environmental or recycling center, or your John Deere dealer for information on the proper way to recycle or dispose of waste.

DX,DRAIN-19-20150601

Use Adequate Service Facilities

Keep the service area clean and dry. Wet or oily floors are slippery. Wet spots can be dangerous when working with electrical equipment.
Make sure the service area is adequately vented.
Periodically check the shop exhaust system for leakage. Engine exhaust gas is dangerous.
Be sure all electrical outlets and tools are properly grounded.
Use adequate light for the job at hand.
Service the machine on a level, hard-surfaced area.
Use lifting equipment and safety stands which have adequate strength for the job being performed.

HX,1401,1005,A-19-19921211

Live With Safety

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

TS231-19: Safety Systems

DX,LIVE-19-19920925

Servicing Electronic Control Units

1. **IMPORTANT:**

   Do not open control unit and do not clean with a high-pressure spray. Moisture, dirt, and other contaminants can cause permanent damage.

   Control units are not repairable; replace only if indicated in the diagnostic procedure.
2. Since control units are the components LEAST likely to fail, isolate failure before replacing by completing the diagnostic procedure.
3. The wiring harness terminals and connectors for electronic control units are repairable.
4. **IMPORTANT:**

   If an electronic control unit is not programmed identical to the original control unit, misleading diagnostic messages and poor performance will occur.

   Before putting back into service, verify that the control unit is programmed identical to the original control unit.

DX,WW,ECU01-19-20151002

Welding Near Electronic Control Units

TS953-UN: Welding Graphic

1. **IMPORTANT:**
   Do not jump-start engines with arc welding equipment. Currents and voltages are too high and may cause permanent damage.

   Disconnect the negative (-) battery cable(s).
2. Disconnect the positive (+) battery cable(s).
3. Connect the positive and negative cables together. Do not attach to vehicle frame.
4. Clear or move any wiring harness sections away from welding area.
5. Connect welder ground close to welding point and away from control units.
6. After welding, reverse Steps 1—5.

DX,WW,ECU02-19-20090814

Precautions for Welding

Remove paint before welding or heating (see Safety Section in this manual for more information on paint removal and high-pressure lines).

Avoid potentially toxic fumes and dust. Hazardous fumes can be generated when paint gets heated from welding, soldering, or using a torch. Do all work outside or in a well ventilated area. Dispose of paint and solvent properly. If you sand or grind paint, avoid breathing the dust by wearing an approved respirator. If you use solvent or paint stripper, remove with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area before welding. Allow fumes to disperse at least 15 minutes before welding or heating.

IMPORTANT:
Welding on the engine is NOT ALLOWED. If the welding must be performed on the machine, follow these precautions.

IMPORTANT:
High currents or electrostatic discharge into electronic components from welding can cause permanent damage.

TS953-UN: Welding Precaution

1. Remove paint from the area to be welded and ground cable clamp location.
2. Disconnect the negative (-) battery cables.
3. Disconnect the positive (+) battery cables.
4. Clear or move any wiring harness sections away from the welding area.
5. Welding on engine components is not allowed.
6. Never connect the welder ground to any engine component or engine driven components that are connected to the engine.
7. After welding, reverse steps 2—3.

OUO6083,0001C2C-19-20210111

Keep Electronic Control Unit Connectors Clean

1. **IMPORTANT:**
   Keep terminals clean and free of foreign debris. Moisture, dirt and other contaminants may cause the terminals to erode over time and not make a good electrical connection.

   If a connector is not in use, put on the proper dust cap or an appropriate seal to protect it from foreign debris and moisture.

2. **IMPORTANT:**
   Do not probe through the wire insulation or through the back of the connector. Do not insert items such as paper clips or wires into connector terminals.

   Make measurements on a connector terminal using JDG10466 Flex Probe Kit in SERVICEGARD.
3. Observe the locking mechanism of the connector when disconnecting and reconnecting.
4. Do not pull on wires to disconnect.
5. Before reconnecting:
   - Look for bent terminals; do not force connectors into each other.
   - Replace any terminal where corrosion exists.
   - Clean the connector of any foreign debris.
   - Dry the connector of any moisture.

6. When reconnecting, make sure seals around the connector pairs are functional.

DX,WW,ECU03-19-20090611

Clean Exhaust Filter Safely

During exhaust filter cleaning operations, the engine may run at elevated idle and hot temperatures for an extended period of time. Exhaust gases and exhaust filter components reach temperatures hot enough to burn people, or ignite or melt common materials.

Keep machine away from people, animals, or structures which may be susceptible to harm or damage from hot exhaust gases or components. Avoid potential fire or explosion hazards from flammable materials and vapors near the exhaust. Keep exhaust outlet away from people and anything that can melt, burn, or explode.

Closely monitor machine and surrounding area for smoldering debris during and after exhaust filter cleaning.

Adding fuel while an engine is running can create a fire or explosion hazard. Always stop engine before refueling machine and clean up any spilled fuel.

Always make sure that engine is stopped while hauling machine on a truck or trailer.

Contact with exhaust components while still hot can result in serious personal injury.

Avoid contact with these components until cooled to safe temperatures.

If service procedure requires engine to be running:

- Only engage power-driven parts required by service procedure
- Ensure that other people are clear of operator station and machine

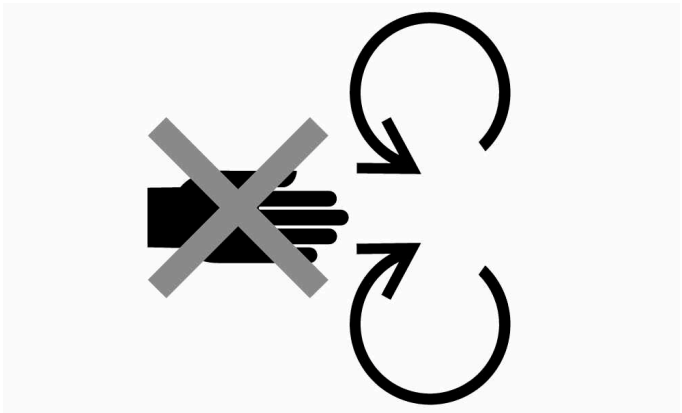
Keep hands, feet, and clothing away from power-driven parts.

Always disable movement (neutral), set the parking brake or mechanism and disconnect power to attachments or tools before leaving the operator's station.

Shut off engine and remove key (if equipped) before leaving the machine unattended.

TS227-UN: Fire Safety

TS271-UN: Hand Over Flame



TS1693-UN: Moving Parts

TS1695-UN: Stop

DX,EXHAUST,FILTER-19-20110112

Avoid Static Electricity Risk When Refueling

The removal of sulfur and other compounds in Ultra-Low Sulfur Diesel (ULSD) fuel decreases its conductivity and increases its ability to store a static charge.

Refineries may have treated the fuel with a static dissipating additive. However, there are many factors that can reduce the effectiveness of the additive over time.

Static charges can build up in ULSD fuel while it is flowing through fuel delivery systems. Static electricity discharge when combustible vapors are present could result in a fire or explosion.

Therefore, it is important to ensure that the entire system used to refuel your machine (fuel supply tank, transfer pump, transfer hose, nozzle, and others) is properly grounded and bonded. Consult with your fuel or fuel system supplier to ensure that the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

RG22142-UN: Explosion

RG21992-UN: Static Discharge (Fuel Nozzle)

DX,FUEL,STATIC,ELEC-19-20130712

Operating Speeds (S650 STS™, S660 STS™, and S670 STS™)

Speeds shown are average and can vary from machine to machine.

NOTE:
Operating speed specifications and design subject to change without notice.

Engine Speeds	**S660 and S670 (9.0 L Tier 2/Stage II) Engine**	**S650, S660 and S670 (9.0 L Final Tier 4/Stage IV) Engine**
Slow Idle (Separator Off)	1200 rpm	1200 rpm
Mid Speed (Separator Off)	1690 rpm	1690 rpm
Fast Idle (Separator Off)	2340 rpm	2340 rpm
Full Load Rated Speed	2200 rpm	2200 rpm
Separator Drive Shaft Speed		1453 rpm
Main Countershaft Speed		1453 rpm

Separator Speeds	**S650 and S660**	**S670**
High Range	380 - 1000 rpm	400 - 1000 rpm
Low Range	210 - 530 rpm	210 - 530 rpm

Feeder House Lower Shaft Speeds	
Fixed Speed (If Equipped)	490 rpm
Heavy Duty Variable Speed (If Equipped)	490 - 750 rpm
High Torque Variable Speed (If Equipped)	490 - 750 rpm
Multi-Speed (If Equipped)	1st Gear: 490 rpm, 2nd Gear: 550 rpm, 3rd Gear: 600 rpm, 4th Gear: 670 rpm, 5th Gear: 750 rpm
Feed Accelerator Speeds	
Feed Accelerator (Standard Speed)	430/780 rpm
Feed Accelerator (Optional Slow Speed)	310/770 rpm
Feed Accelerator (High Speed High Capacity)	520/970 rpm

Discharge Beater Speed	**S650 and S660**	**S670**
	998 rpm	995 rpm

Jackshaft Speeds	
Front Right-Hand Jackshaft	518 rpm
Rear Right-Hand Jackshaft	518 rpm
Cleaning Fan Speeds	
Standard Speed	620 - 1350 rpm
Special Slow Speed	250 - 500 rpm

Elevator Speeds	**S650 and S660**	**S670**
Clean Grain Elevator	417 rpm	415 rpm
Clean Grain Loading Auger	448 rpm	445 rpm
Tailings Elevator, Lower Auger	395 rpm	395 rpm
Tailings Elevator, Upper Auger	625 rpm	625 rpm
Shoe Drive	298 rpm	298 rpm
Conveyor Augers	420 rpm	420 rpm

Unloading System Speeds (Separator Engaged)	**S650**	**S660**	**S670**
Unloading System Countershaft	1000 rpm	1000 rpm	1000 rpm
Unloading Auger Gearbox, Input Shaft	435 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate	435 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate 460 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate	460 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate
Unloading Vertical Auger	435 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate	435 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate 460 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate	460 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate
Unloading Outer Auger	435 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate	435 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate 460 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate	460 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate
Grain Tank Horizontal Augers (Front and Rear)	405 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate	405 rpm 78 L/sec. (2.2 bu./sec.) Unload Rate	330 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate

Unloading System Speeds (Separator Engaged)	S650	S660	S670
		330 rpm 116 L/sec. (3.3 bu./sec.) Unload Rate	
Chopper Speeds (Deluxe Residue)			
Chopper/Discharge Beater Jackshaft			1880 rpm
Chopper (Two Speed)			1505/2350 rpm
Chopper Speeds (Premium Residue)			
Chopper/Discharge Beater Jackshaft			2045 rpm
Chopper (Two Speed)			1400/2995 rpm
Overshot Beater			995 rpm

OUO6083,0000D3A-19-20130418

Operating Speeds (S680 STS™, S685 STS™, and S690 STS™)

Speeds shown are average and can vary from machine to machine.

NOTE:
Operating speed specifications and design subject to change without notice.

Engine Speeds	**(13.5 L Tier 2/Stage II) Engine**	**(13.5 L Final Tier 4/Stage IV) Engine**
Slow Idle (Separator Off)	1200 rpm	1200 rpm
Mid Speed (Separator Off)	1690 rpm	1690 rpm
Fast Idle (Separator Off)	2240 rpm	2240 rpm
Full Load Rated Speed	2100 rpm	2100 rpm
Separator Drive Shaft Speed		1466 rpm
Main Countershaft Speed		1466 rpm
Separator Speeds		
High Range	400 - 1000 rpm	
Low Range	210 - 530 rpm	
Tailings System Speed		880 rpm
Feeder House Lower Shaft Speeds		
Fixed Speed	490 rpm	
Multi-Speed	1st Gear: 490 rpm, 2nd Gear: 550 rpm, 3rd Gear: 600 rpm, 4th Gear: 670 rpm, 5th Gear: 750 rpm	
Feed Accelerator Speeds		
Feed Accelerator (Standard Speed)		430/780 rpm
Feed Accelerator (Optional Slow Speed)		310/770 rpm
Feed Accelerator (High Speed High Capacity)		520/970 rpm
Discharge Beater Speed		995 rpm
Jackshaft Speeds		
Front Right-Hand Jackshaft		520 rpm
Rear Right-Hand Jackshaft		520 rpm
Cleaning Fan Speeds		
Standard Speed	620 - 1350 rpm	
Special Slow Speed	250 - 500 rpm	

Elevator Speeds	**S680 and S685**	**S690**
Clean Grain Elevator	415 rpm	460 rpm
Clean Grain Loading Auger	450 rpm	500 rpm
Tailings Elevator, Lower Auger	490 rpm	
Tailings Elevator, Upper Auger	580 rpm	
Shoe Drive	300 rpm	
Conveyor Augers	425 rpm	

Unloading System Speeds (Separator Engaged)	
Unloading System Countershaft	1005 rpm
Unloading Auger Gearbox, Input Shaft	460 rpm 134 L/sec. (3.8 bu./sec.) Unload Rate
Unloading Vertical Auger	460 rpm 134 L/sec. (3.8 bu./sec.) Unload Rate
Unloading Outer Auger	460 rpm 134 L/sec. (3.8 bu./sec.) Unload Rate
Grain Tank Horizontal Augers (Front and Rear)	450 rpm 134 L/sec. (3.8 bu./sec.) Unload Rate

Chopper Speeds (Deluxe Residue)	
Chopper/Discharge Beater Jackshaft	1880 rpm
Chopper (Two Speed)	1500/2350 rpm
Chopper Speeds (Premium Residue)	
Chopper/Discharge Beater Jackshaft	2045 rpm
Chopper (Two Speed)	1400/2995 rpm
Overshot Beater	995 rpm

OUO6083,0000FB0-19-20140428

Specifications (S650 STS™, S660 STS™, and S670 STS™)

NOTE:
Specifications and design subject to change without notice.

Engine			
Make	John Deere		
Model	6090HH006 Export (9.0 L Tier 2/Stage II) 6090HH015 (9.0 L Interim Tier 4/Stage III B) 6090HH016 (9.0 L Final Tier 4/Stage IV)		
Type	six-cylinder, in line, valve-in-head (four valve), air-to-air aftercooled diesel turbocharged		
	S650	**S660**	**S670**
Rated Power	220 kW (295 hp.)	239 kW (320 hp.)	278 kW (373 hp.)
Rated Speed	2200 rpm	2200 rpm	2200 rpm
Power Boost at Rated Speed	25 kW (34 hp.)	25 kW (34 hp.)	25 kW (34 hp.)
Peak Power	251 kW (337 hp.)	272 kW (365 hp.)	317 kW (425 hp.)
Peak Power Speed (Rated Speed -200 rpm)	2000 rpm	2000 rpm	2000 rpm
Displacement	9.0 L (549 cu. in.)	9.0 L (549 cu. in.)	9.0 L (549 cu. in.)
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4	1-5-3-6-2-4
Air Cleaner	Dry-type with safety element	Dry-type with safety element	Dry-type with safety element

Electrical System	
Battery Voltage	12 Volts
Battery Terminal Grounded	Negative
Alternator (9.0 L Tier 2/Stage II)	200 amp
Alternators (9.0 L Final Tier 4/Stage IV)	
Transmission	
Speeds (Mechanical Shift Machines)	Three Speeds
Speeds (Push Button Shift Machines)	Three Speeds
Speeds (Two-Range Automatic Transmission Machines)	Two Speed Auto Shift
Brakes	
Type (Mechanical Shift Machines)	Hydraulic Shoe
Type (Push Button Shift Machines)	Hydraulic Shoe
Type (Two-Range Automatic Transmission Machines)	Multiple Wet Discs

Feed Accelerator	**S650**	**S660 and S670**
Number of Wings	Standard: 10	Standard: 10 Tough Crop: 8 Rice: 5

Separator Elements	
Threshing Elements (TriStream™ Rotor)	Corn/Small Grain: 15
Threshing Elements (Variable Stream Rotor)	Corn/Small Grain: 15 Rice Option: 15 elements and 12 threshing tines in dense pack locations
Tines (TriStream™ Rotor)	24
Tines (Variable Stream Rotor)	20
Concave	
Number of Concaves	3
Number of Bars Per Concave	Grain—Front 25, Mid/rear 25; Corn 31
Separating	
Number of Grates	4
Discharge Grate	
Number of Grates	3

Discharge Beater	**S650**	**S660 and S670**
Number of Wings	Standard: 5	Standard: 5 Tough Crop: 8

Grain Tank	**S650**
Capacity	8850 L (250 bu.) Extensions
Average Unloading Rate, 78 L/sec. (2.2 bu./sec.) Unload Rate	4650 L/min. (132 bu/min)
Maximum Unloading Rate, 78 L/sec. (2.2 bu./sec.) Unload Rate	5285 L/min. (150 bu/min)
Grain Tank	**S660**
Capacity	10,572 L (300 bu.) Extensions 10,572 L (300 bu.) Covers
Average Unloading Rate, 78 L/sec. (2.2 bu./sec.) Unload Rate	4650 L/min. (132 bu/min)
Average Unloading Rate, 116 L/sec. (3.3 bu./sec.) Unload Rate	6977 L/min. (198 bu/min)
Maximum Unloading Rate, 78 L/sec. (2.2 bu./sec.) Unload Rate	5285 L/min. (150 bu/min)
Maximum Unloading Rate, 116 L/sec. (3.3 bu./sec.) Unload Rate	7612 L/min. (216 bu/min)
Grain Tank	**S670**
Capacity	10,572 L (300 bu.) Extensions

Grain Tank	S670
	10,572 L (300 bu.) Covers
Average Unloading Rate, 116 L/sec. (3.3 bu./sec.) Unload Rate	6977 L/min. (198 bu/min)
Maximum Unloading Rate, 116 L/sec. (3.3 bu./sec.) Unload Rate	7612 L/min. (216 bu/min)

Weight	S650	S660	S670
Machine Weight [Weight is based on corn machine configuration with 950 L (250 gal.) of diesel fuel in diesel fuel tank, empty grain tank, and no header attached.]	18,000 kg (39,690 lb.)	19,650 kg (43,328 lb.)	20,000 kg (44,100 lb.)

Turning Radius	
Rear Wheel Tread Width	3.35 m (10 ft. 10 in.)
Turning Radius (Non-Powered Axles)	8.02 m (26 ft. 3 in.)
Turning Radius (Powered Axles)	7.73 m (25 ft. 4 in.)

Capacities	S650 and S660	S670
Fuel Tank	950 L (250 gal.)	950 L (250 gal.)
Diesel Exhaust Fluid (DEF) Tank (9.0 L Final Tier 4/Stage IV)	52.2 L (13.8 gal.)	52.2 L (13.8 gal.)
Cooling System w/ heater (9.0 L Tier 2/Stage II)	53 L (14 gal.)	53 L (14 gal.)
Cooling System w/ heater (9.0 L Final Tier 4/Stage IV)	53 L (14 gal.)	53 L (14 gal.)
Engine Crankcase w/ filter (9.0 L Tier 2/Stage II)	27.5 L (7.25 gal.) [It is vital to maintain engine oil at correct levels. Always verify that oil level is at correct location on dipstick when servicing.]	27.5 L (7.25 gal.) [It is vital to maintain engine oil at correct levels. Always verify that oil level is at correct location on dipstick when servicing.]
Engine Crankcase w/ filter (9.0 L Final Tier 4/Stage IV)	27.5 L (7.25 gal.) [It is vital to maintain engine oil at correct levels. Always verify that oil level is at correct location on dipstick when servicing.]	27.5 L (7.25 gal.) [It is vital to maintain engine oil at correct levels. Always verify that oil level is at correct location on dipstick when servicing.]
Transmission (Mechanical Shift and Push Button Shift Machines)	9.6 L (2.5 gal.)	9.6 L (2.5 gal.)
Final Drives	8 L (2.1 gal.)	8 L (2.1 gal.)
Heavy Duty Feeder House Reverser Gear case w/o cooler	2.3 L (2.4 qt.)	2.3 L (2.4 qt.)
Heavy Duty Feeder House Reverser Gear case w/ cooler	3.5 L (1.75 qt.)	NA
Extra Heavy Duty Feeder House Reverser Gear case w/ cooler	4.9 L (5.2 qt.)	4.9 L (5.2 qt.)
Multi-Speed Feeder House Reverser Gear case w/ cooler	NA	5.2 L (5.5 qt.)
Premium Overshot Beater Gear case (If Equipped)	NA	0.2 L (0.42 pt.)
Countershaft Drive Gear case	1.9 L (2.04 qt.)	1.9 L (2.04 qt.)
Loading Auger Gear case	3.8 L (4 qt.)	3.8 L (4 qt.)
Two Speed Separator Drive Gear case	4.7 L (1.25 gal.)	4.7 L (1.25 gal.)
Engine Gear case w/ transfer (Mechanical Shift and Push Button Shift Machines)	21.3 L (5.6 gal.)	21.3 L (5.6 gal.)
Engine Gear case w/ transfer (Two-Range Automatic Transmission Machines)	NA	51 L (13.5 qt.)
Hydraulic/Hydrostatic Reservoir	31 L (8.2 gal.)	31 L (8.2 gal.)

TriStream is a trademark of Deere & Company

OUO6083,0000FF3-19-20140602

Specifications (S680 STS™, S685 STS™, and S690 STS™)

NOTE:
Specifications and design subject to change without notice.

Engine

Make	John Deere	
Model	6135HH004 Export (13.5 L Tier 2/Stage II) 6135HH003 (13.5 L Interim Tier 4/Stage III B) 6135HH005 (13.5 L Final Tier 4/Stage IV)	
Type	six-cylinder, in line, valve-in-head, air-to-air aftercooled diesel turbocharged	
	S680 STS Combine	**S685 STS Combine**
Rated Power	353 kW (473 hp.)	373 kW (500 hp.)
Rated Speed	2100 rpm	2100 rpm
Power Boost at Rated Speed (Interim Tier 4/ Stage III B) (Final Tier 4/Stage IV)	37 kW (50 hp.)	37 kW (50 hp.)
Peak Power (Interim Tier 4/ Stage III B) (Final Tier 4/Stage IV)	402 kW (540 hp.)	425 kW (570 hp.)
Peak Power Speed (Rated Speed -200 rpm)	1900 rpm	1900 rpm
Displacement	13.5 L (824 cu. in.)	13.5 L (824 cu. in.)
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4
Air Cleaner	Dry-type with safety element	Dry-type with safety element

	S690 Combine
Rated Power	405 kW (543 hp.)
Rated Speed	2100 rpm
Power Boost at Rated Speed (Tier 2/Stage II)	23 kW (31 hp.)
Power Boost at Rated Speed (Interim Tier 4/ Stage III B) (Final Tier 4/Stage IV)	37 kW (50 hp.)
Peak Power (Tier 2/Stage II)	458 kW (614 hp.)
Peak Power (Interim Tier 4/ Stage III B) (Final Tier 4/Stage IV)	460 kW (617 hp.)
Peak Power Speed (Rated Speed -200 rpm)	1900 rpm
Displacement	13.5 L (824 cu. in.)
Firing Order	1-5-3-6-2-4
Air Cleaner	Dry-type with safety element

Electrical System

Battery Voltage	12 Volts
Battery Terminal Grounded	Negative
Alternator (13.5 L Tier 2/Stage II)	200 amp
Alternators (13.5 L Interim Tier 4/Stage III B, Final Tier 4/Stage IV)	

Transmission

Speeds	Two Speed Auto Shift

Brakes

Type	Multiple Wet Discs

Feed Accelerator

Number of Wings	Standard: 10 Tough Crop: 8 Rice: 5

Separator Elements

Threshing Elements (TriStream™ Rotor)	Corn/Small Grain: 15
Threshing Elements (Variable Stream Rotor)	Corn/Small Grain: 15 Rice Option: 15 elements and 12 threshing tines in dense pack locations
Tines (TriStream™ Rotor)	24
Tines (Variable Stream Rotor)	20

Concave

Number of Concaves	3
Number of Bars Per Concave	Grain—Front 25, Mid/rear 25; Corn 31

Separating

Number of Grates	4

Discharge Grate

Number of Grates	1

Discharge Beater

Number of Wings	Standard: 10 Tough Crop: 8

Grain Tank

Capacity	14,096 L (400 bu.) Extensions 14,096 L (400 bu.) Covers
Average Unloading Rate, 134 L/sec. (3.8 bu./sec.) Unload Rate	8035 L/min. (228 bu/min)

Grain Tank

Maximum Unloading Rate, 134 L/sec. (3.8 bu./sec.) Unload Rate	8670 L/min. (246 bu/min)

Weight

Corn Machine [Weight is based on corn machine configuration with 1250 L (330 gal.) of diesel fuel in fuel tank, empty grain tank, and no header attached.]	22,300 kg (49,172 lb.)

Turning Radius

Rear Wheel Tread Width	3.35 m (10 ft. 10 in.)
Turning Radius (Non-Powered Axles)	8.02 m (26 ft. 3 in.)
Turning Radius (Powered Axles)	7.73 m (25 ft. 4 in.)

Capacities

Fuel Tank	1250 L (330 gal.)
Diesel Exhaust Fluid (DEF) Tank (13.5 L Final Tier 4/Stage IV)	52.2 L (13.8 gal.)
Cooling System w/ heater (13.5 L Tier 2/Stage II)	61.2 L (16.25 gal.)
Cooling System w/ heater (13.5 L Final Tier 4/Stage IV)	85 L (22.5 gal.)
Engine Crankcase w/ filter (13.5 L Tier 2)/Stage II	39 L (10.25 gal.) [It is vital to maintain engine oil at correct levels. Always verify that oil level is at correct location on dipstick when servicing.]
Engine Crankcase w/ filter (13.5 L Final Tier 4/Stage IV)	43 L (11.4 gal.) [It is vital to maintain engine oil at correct levels. Always verify that oil level is at correct location on dipstick when servicing.]
Final Drives	8 L (2.13 gal.)
Extra Heavy Duty Feeder House Reverser Gear case w/o cooler	3.6 L (3.9 qt.)
Multi-Speed Feeder House Reverser Gear case w/ cooler (optional)	5.2 L (5.5 qt.)
Premium Overshot Beater Gear case (If Equipped)	0.2 L (0.21 qt.)
Countershaft Drive Gear case (Non Multi-Speed)	1.9 L (2.04 qt.)
Loading Auger Gear case	3.8 L (4 qt.)
Two Speed Separator Drive Gear case	4.7 L (5 qt.)
Engine Gear case w/ transfer	51 L (13.5 gal.)
Hydraulic/Hydrostatic Reservoir	47 L (12.5 gal.)

OUO6083,0000FF4-19-20140602

Dimensions (S650 STS™)

NOTE:
Dimensions are approximate and subject to change without notice.

Dimension	S650
A	10.46 m (34 ft. 3 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger
B	Not Applicable
C	8.51 m (27 ft. 9 in.)
D	Not Applicable
E	4.54 m—4.67 m (14 ft. 9 in.—15 ft. 3 in.) Clean Grain Loading Auger
F	4.07 m—4.19 m (13 ft. 4 in.—13 ft. 8 in.) with 8850 L (250 bu.) Extensions
G	3.82 m—3.94 m (12 ft. 5 in.—12 ft. 9 in.)
H	3.71 m—3.84 m (12 ft. 2 in.—12 ft. 6 in.)
I	0.69 m (2 ft. 3 in.)
J	3.52 m (11 ft. 6 in.)
K	7.61 m (24 ft. 10 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger
L	4.77 m—4.89 m (15 ft. 7 in.—16 ft. 0 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger
M	4.07 m—4.20 m (13 ft. 4 in.—13 ft. 8 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger
N [Dimension is measured 1.22 m (4 ft.) from the grain spill point. This represents the unloading auger when centered over the grain cart.]	3.96 m—4.09 m (12 ft. 10 in.—13 ft. 4 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger
O [Due to different tire configurations, row spacings, axle configurations, wheel offsets, axle positions and spindles types, machine widths will vary. Measurements given in chart are for minimum and maximum widths.]	3.65 m (11 ft. 10 in.) Rear Tires
P [Due to different tire configurations, row spacings, axle configurations, wheel offsets, axle positions and spindles types, machine widths will vary. Measurements given in chart are for minimum and maximum widths.]	3.62 m (11 ft. 9 in.) Front Tires

OUO6083,0000FB3-19-20210303

Dimensions (S660 STS™, and S670 STS™)

NOTE:
Dimensions are approximate and subject to change without notice.

Dimension	S660	S670
A	10.46 m (34 ft. 3 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger	Not Applicable
	11.00 m (36 ft. 1 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger	
	12.11 m (39 ft. 7 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger	
	12.87 m (42 ft. 2 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger	
B	9.10 m (29 ft. 9 in.) with 6.9 m (22 ft. 6 in.) Power Fold Auger	
	9.91 m (32 ft. 5 in.) with 7.9 m (26 ft. 0 in.) Power Fold Auger	
C	8.51 m (27 ft. 9 in.)	
D	4.66 m—4.93 m (15 ft. 3 in.—16 ft. 2 in.) with 10 572 L (300 bu.) Covers	
E	4.51 m—4.79 m (14 ft. 8 in.—15 ft. 7 in.) Clean Grain Loading Auger	
F	4.04 m—4.32 m (13 ft. 3 in.—14 ft. 2 in.) with 10 572 L (300 bu.) Extensions	
G	3.79 m—4.06 m (12 ft. 4 in.—13 ft. 3 in.)	
H	3.68 m—3.96 m (12 ft. 1 in.—12 ft. 10 in.)	
I	0.69 m (2 ft. 3 in.)	
J	3.52 m (11 ft. 6 in.)	
K	7.61 m (24 ft. 10 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger	Not Applicable
	8.03 m (26 ft. 4 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger	
	9.13 m (29 ft. 10 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger	
	9.89 m (32 ft. 4 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger	
L	4.74 m—5.02 m (15 ft. 6 in.—16 ft. 5 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger	Not Applicable
	4.78 m—5.05 m (15 ft. 7 in.—16 ft. 6 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger	
	5.00 m—5.28 m (16 ft. 4 in.—17 ft. 3 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger	
	5.26 m—5.55 m (17 ft. 3 in.—18 ft. 2 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger	
M	4.04 m—4.32 m (13 ft. 3 in.—14 ft. 2 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger	Not Applicable
	4.13 m—4.41 m (13 ft. 6 in.—14 ft. 5 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger	
	4.28 m—4.56 m (14 ft. 0 in.—14 ft. 10 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger	
	4.42 m—4.70 m (14 ft. 5 in.—15 ft. 4 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger	
N [Dimension is measured 1.22 m (4 ft.) from the grain spill point. This represents the unloading auger when centered over the grain cart.]	3.93 m—4.21 m (12 ft. 9 in.—13 ft. 8 in.) with 6.6 m (21 ft. 6 in.) Unloading Auger	Not Applicable
	4.07 m—4.35 m (13 ft. 4 in.—14 ft. 3 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger	
	4.39 m—4.66 m (14 ft. 6 in.—15 ft. 3 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger	
	4.67 m—4.95 m (15 ft. 3 in.—16 ft. 2 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger	
O [Due to different tire configurations, row spacings, axle configurations, wheel offsets, axle positions and spindles types, machine widths will vary. Measurements given in chart are for minimum and maximum widths.]	3.39 m—3.88 m (11 ft. 1 in.—12 ft. 7 in.) Rear Tires	
P [Due to different tire configurations, row spacings, axle configurations, wheel offsets, axle positions and spindles types, machine widths will vary. Measurements given in chart are for minimum and maximum widths.]	3.62 m—4.98 m (11 ft. 9 in.—16 ft. 3 in.) Front Tires	3.93 m—4.98 m (12 ft. 9 in.—16 ft. 3 in.) Front Tires

OUO6083,0000FB4-19-20210303

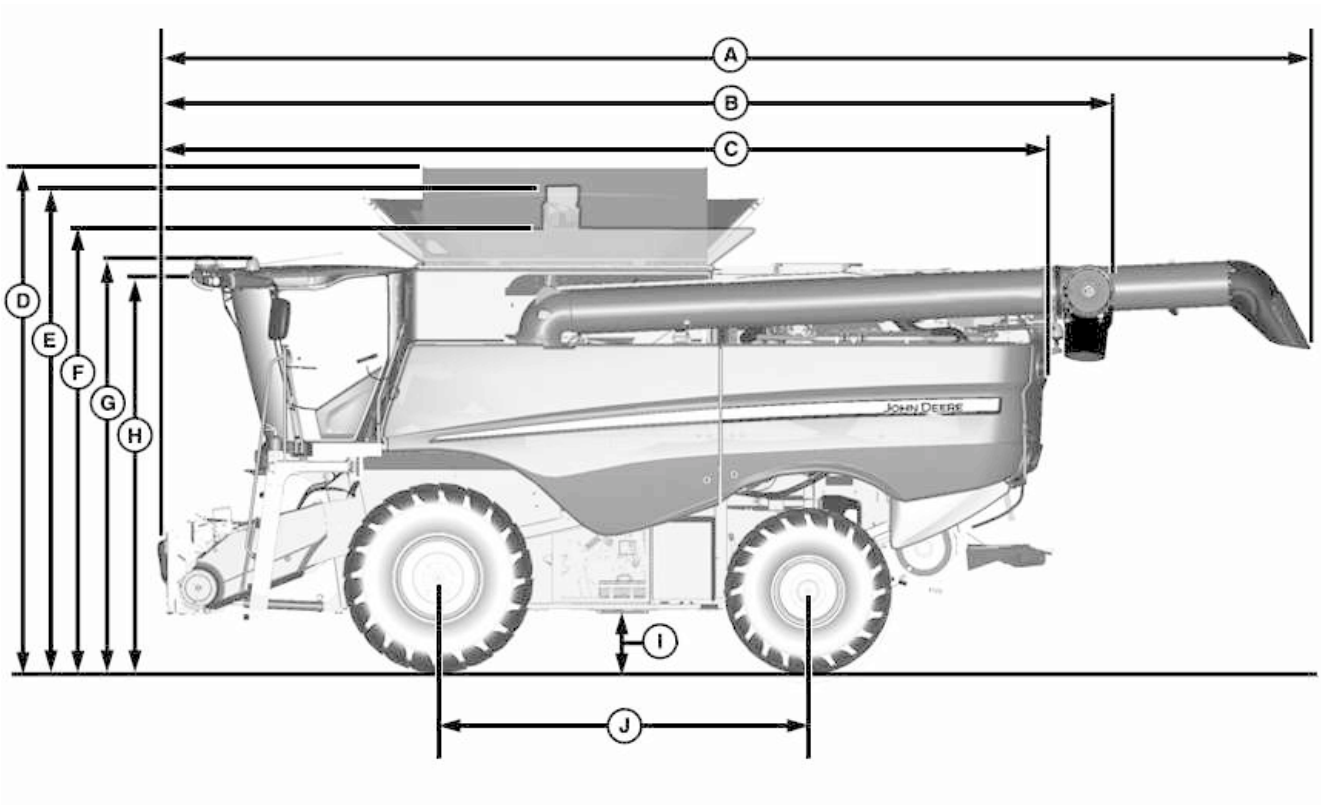
Dimensions (S680 STS™, S685 STS™, and S690 STS™)

NOTE:
Dimensions are approximate and subject to change without notice.

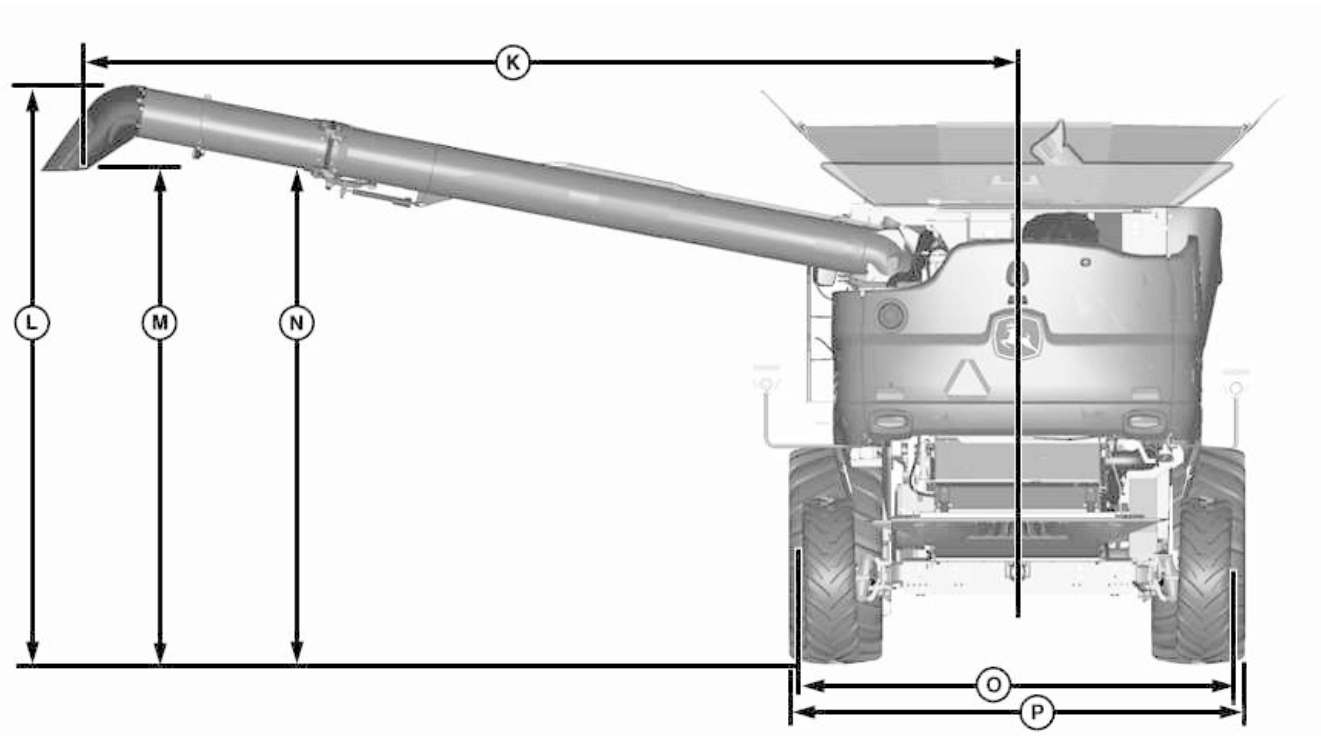
Dimension	S680 STS™, S685 STS™, and S690 STS™
A	11.00 m (36 ft. 1 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger
	12.11 m (39 ft. 7 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger
	12.87 m (42 ft. 2 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger
B	9.10 m (29 ft. 9 in.) with 6.9 m (22 ft. 6 in.) Power Fold Auger
	9.91 m (32 ft. 5 in.) with 7.9 m (26 ft. 0 in.) Power Fold Auger
C	8.51 m (27 ft. 9 in.)
D	4.69 m—4.93 m (15 ft. 4 in.—16 ft. 2 in.) with 14 096 L (400 bu.) Covers
E	4.55 m—4.79 m (14 ft. 9 in.—15 ft. 7 in.) Clean Grain Loading Auger
F	4.07 m—4.31 m (13 ft. 4 in.—14 ft. 1 in.) with 14 096 L (400 bu.) Extensions
G	3.82 m—4.06 m (12 ft. 5 in.—13 ft. 3 in.)
H	3.72 m—3.96 m (12 ft. 2 in.—12 ft. 10 in.)
I	0.69 m (2 ft. 3 in.)
J	3.52 m (11 ft. 6 in.)
K	8.03 m (26 ft. 4 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger
	9.13 m (29 ft. 10 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger
	9.89 m (32 ft. 4 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger
L	4.81 m—5.05 m (15 ft. 8 in.—16 ft. 6 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger
	5.04 m—5.28 m (16 ft. 5 in.—17 ft. 3 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger
	5.30 m—5.55 m (17 ft. 4 in.—18 ft. 2 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger
M	4.17 m—4.41 m (13 ft. 7 in.—14 ft. 5 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger
	4.31 m—4.56 m (14 ft. 1 in.—14 ft. 10 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger
	4.45 m—4.70 m (14 ft. 6 in.—15 ft. 4 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger
N [Dimension is measured 1.22 m (4 ft.) from the grain spill point. This represents the unloading auger when centered over the grain cart.]	4.11 m—4.35 m (13 ft. 5 in.—14 ft. 3 in.) with 6.9 m (22 ft. 6 in.) Unloading Auger
	4.42 m—4.66 m (14 ft. 5 in.—15 ft. 3 in.) with 7.9 m (26 ft. 0 in.) Unloading Auger
	4.71 m—4.95 m (15 ft. 4 in.—16 ft. 2 in.) with 8.7 m (28 ft. 6 in.) Unloading Auger
O [Due to different tire configurations, row spacings, axle configurations, wheel offsets, axle positions and spindles types, machine widths will vary. Measurements given in chart are for minimum and maximum widths.]	3.50 m—3.88 m (11 ft. 5 in.—12 ft. 7 in.) Rear Tires
P [Due to different tire configurations, row spacings, axle configurations, wheel offsets, axle positions and spindles types, machine widths will vary. Measurements given in chart are for minimum and maximum widths.]	3.93 m—4.98 m (12 ft. 9 in.—16 ft. 3 in.) Front Tires

OUO6083,0000FB5-19-20210303

Dimension Reference Points



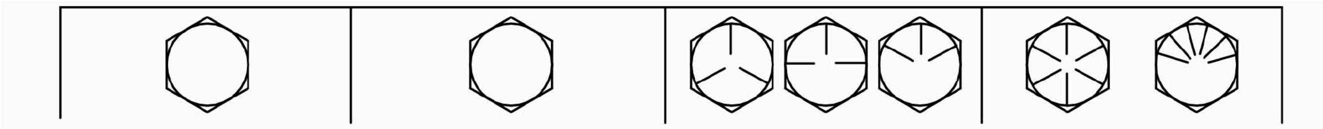
H106999-UN: Side View



H107000-UN: Rear View

OUO6083,0000CA3-19-20130314

Unified Inch Bolt and Screw Torque Values



TS1671-UN: Unified Inch Bolt and Screw

Bolt or Screw Size	SAE Grade 1 [Grade 1 applies for hex cap screws over 6 in (152 mm) long, and for all other types of bolts and screws of any length.]				SAE Grade 2 [Grade 2 applies for hex cap screws (not hex bolts) up to 6 in (152 mm) long.]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	
	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in
1/4	3.1	27.3	3.2	28.4	5.1	45.5	5.3	47.3	7.9	70.2	8.3	73.1	11.2	99.2	11.6	103
													N·m	lb·ft	N·m	lb·ft
5/16	6.1	54.1	6.5	57.7	10.2	90.2	10.9	96.2	15.7	139	16.8	149	22.2	16.4	23.7	17.5
									N·m	lb·ft	N·m	lb·ft				
3/8	10.5	93.6	11.5	102	17.6	156	19.2	170	27.3	20.1	29.7	21.9	38.5	28.4	41.9	30.9
					N·m	lb·ft	N·m	lb·ft								
7/16	16.7	148	18.4	163	27.8	20.5	30.6	22.6	43	31.7	47.3	34.9	60.6	44.7	66.8	49.3
	N·m	lb·ft	N·m	lb·ft												
1/2	25.9	19.1	28.2	20.8	43.1	31.8	47	34.7	66.6	49.1	72.8	53.7	94	69.3	103	75.8
9/16	36.7	27.1	40.5	29.9	61.1	45.1	67.5	49.8	94.6	69.8	104	77	134	98.5	148	109
5/8	51	37.6	55.9	41.2	85	62.7	93.1	68.7	131	96.9	144	106	186	137	203	150
3/4	89.5	66	98	72.3	149	110	164	121	230	170	252	186	325	240	357	263
7/8	144	106	157	116	144	106	157	116	370	273	405	299	522	385	572	422
1	216	159	236	174	216	159	236	174	556	410	609	449	785	579	860	634
1-1/8	305	225	335	247	305	225	335	247	685	505	751	554	1110	819	1218	898
1-1/4	427	315	469	346	427	315	469	346	957	706	1051	775	1552	1145	1703	1256
1-3/8	564	416	618	456	564	416	618	456	1264	932	1386	1022	2050	1512	2248	1658
1-1/2	743	548	815	601	743	548	815	601	1665	1228	1826	1347	2699	1991	2962	2185

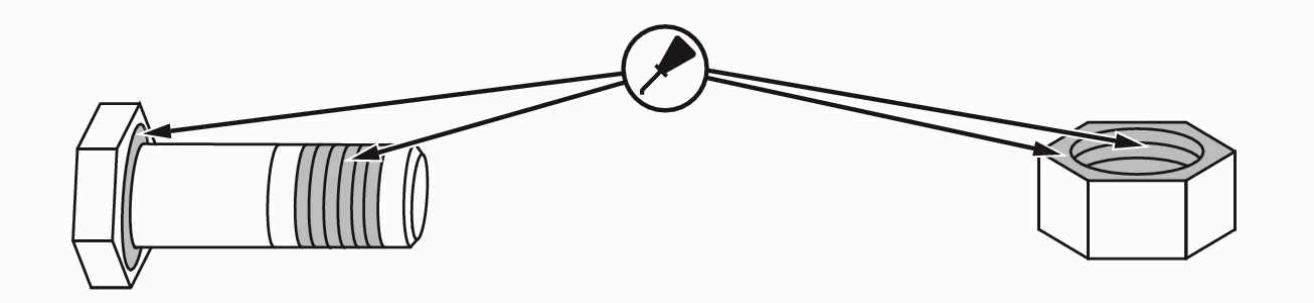
The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench.

DO NOT use these values if a different torque value or tightening procedure is given for a specific application.

For lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application.

Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original.

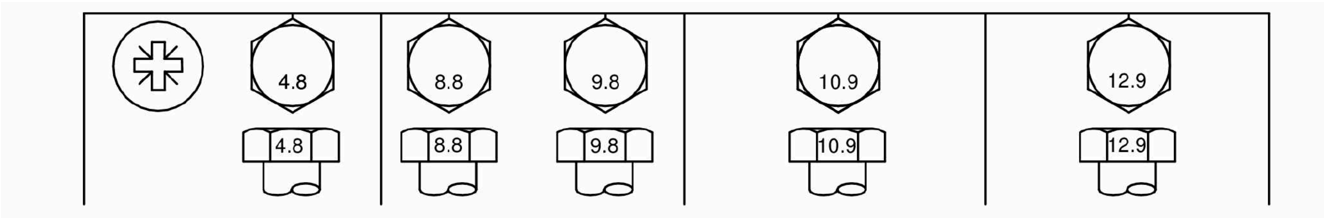
- Make sure that fastener threads are clean.
- Apply a thin coat of Hy-Gard™ or equivalent oil under the head and on the threads of the fastener, as shown in the following image.
- Be conservative with the amount of oil to reduce the potential for hydraulic lockup in blind holes due to excessive oil.
- Properly start thread engagement.



TS1741-UN: Lubricant Locations

DX,TORQ1-19-20220509

Metric Bolt and Screw Torque Values



TS1742-UN: Metric Bolt and Screw

Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]		Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]		Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	
	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in	N·m	lb·in
M6	3.6	31.9	3.9	34.5	6.7	59.3	7.3	64.6	9.8	86.7	10.8	95.6	11.5	102	12.6	112
									N·m	lb·ft	N·m	lb·ft	N·m	lb·ft	N·m	lb·ft
M8	8.6	76.1	9.4	83.2	16.2	143	17.6	156	23.8	17.6	25.9	19.1	27.8	20.5	30.3	22.3
			N·m	lb·ft	N·m	lb·ft	N·m	lb·ft								
M10	16.9	150	18.4	13.6	31.9	23.5	34.7	25.6	46.8	34.5	51	37.6	55	40.6	60	44.3
	N·m	lb·ft														
M12	—	—	—	—	55	40.6	61	45	81	59.7	89	65.6	95	70.1	105	77.4
M14	—	—	—	—	87	64.2	96	70.8	128	94.4	141	104	150	111	165	122
M16	—	—	—	—	135	99.6	149	110	198	146	219	162	232	171	257	190
M18	—	—	—	—	193	142	214	158	275	203	304	224	322	245	356	263
M20	—	—	—	—	272	201	301	222	387	285	428	316	453	334	501	370
M22	—	—	—	—	365	263	405	299	520	384	576	425	608	448	674	497
M24	—	—	—	—	468	345	518	382	666	491	738	544	780	575	864	637
M27	—	—	—	—	683	504	758	559	973	718	1080	797	1139	840	1263	932
M30	—	—	—	—	932	687	1029	759	1327	979	1466	1081	1553	1145	1715	1265
M33	—	—	—	—	1258	928	1398	1031	1788	1319	1986	1465	2092	1543	2324	1714
M36	—	—	—	—	1617	1193	1789	1319	2303	1699	2548	1879	2695	1988	2982	2199

The nominal torque values listed are for general use only with the assumed wrenching accuracy of 20%, such as a manual torque wrench.

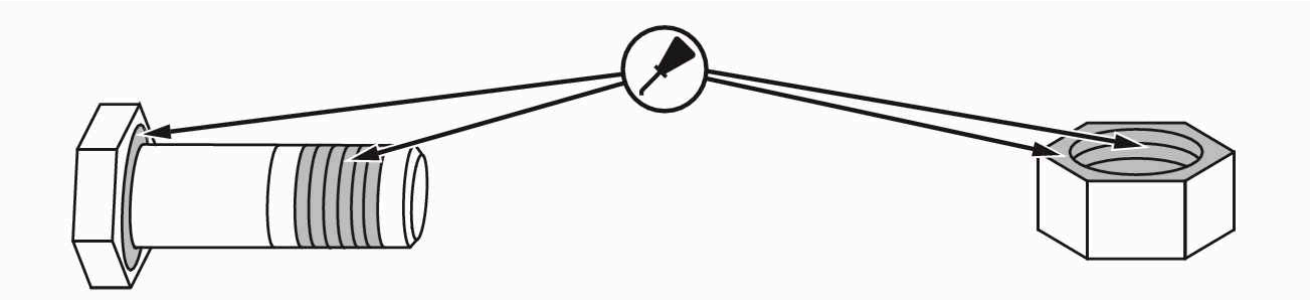
DO NOT use these values if a different torque value or tightening procedure is given for a specific application.

For lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application.

Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original.

- Make sure that fastener threads are clean.
- Apply a thin coat of Hy-Gard™ or equivalent oil under the head and on the threads of the fastener, as shown in the following image.
- Be conservative with the amount of oil to reduce the potential for hydraulic lockup in blind holes due to excessive oil.
- Properly start thread engagement.

Bolt or Screw Size	Class 4.8		Class 8.8 or 9.8		Class 10.9		Class 12.9	
	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]	Hex Head [Hex head column values are valid for ISO 4014 and ISO 4017 hex head, ISO 4162 hex socket head, and ISO 4032 hex nuts.]	Flange Head [Hex flange column values are valid for ASME B18.2.3.9M, ISO 4161, or EN 1665 hex flange products.]



TS1741-UN: Lubricant Locations

DX,TORQ2-19-20220509

Sealants and Adhesives Cross-Reference Chart

U.S. Part Number	Canadian Part Number	Color	Size	Description	LOCTITE™ Number
Bonding					
PM37513	PM38606	BLACK and WHITE	41 mL	Epoxy Adhesive	21425 [Loctite global IDH part number.]
PM37391	PM38615	CLEAR	2 gm	Gel Super Glue	454
Gasketing					
PM38655	PM38625	PURPLE	50 mL	Flexible Form-in-Place Gasket	515
PM37463	PM38618	CLEAR	300 mL	RTV Clear Silicone	595
PM37521	PM38618	CLEAR	11 oz.	RTV Clear Silicone	595
PM37465	—	METALLIC BLUE	300 mL	RTV Silicone Adhesive	587
N271002	—	GREEN	—	Green Sealant	—
Priming					
PM37509	PM38611	GREEN	4.5 oz	Cure Primer	Klean N Prime “Primer N” 7649 [Loctite global IDH part number.]
Retaining					
PM37485	PM38626	GREEN	50 mL	Retaining Compound—Maximum Strength	680
Thread Locking and Sealing					
PM38653	—	PURPLE	6 mL	Low Strength	222
PM37477	PM38622	BLUE	36 mL	Medium Strength	242
PM37418	PM38621	BLUE	6 mL	Medium Strength	242
PM38654	PM38624	CLEAR (or RED)	50 mL	High Strength	271
PM37421	PM38623	CLEAR (or RED)	6 mL	High Strength	271
PM37397	PM38613	WHITE	50 mL	Pipe Sealant with TEFLON™	592
PM37481	PM1036823	GREEN	36 mL (US) 6 mL (Canada)	Penetrating Thread Lock	290
Other					
PM38619	PM38619	SILVER	8 oz.	Anti-Seize	—

LOCTITE is a trademark of Loctite Corp.
TEFLON is a trademark of Du Pont Co.

MR67966,000070F-19-20130813

Face Seal Fittings Assembly and Installation—All Pressure Applications

Face Seal O-Ring to Stud End Installation

1. Inspect the fitting surfaces. They must be free of dirt and/or defects.
2. Inspect the O-ring. It must be free of damage and/or defects.
3. Lubricate O-rings using system oil, and install into groove.
4. Push O-ring into groove so O-ring is not displaced during assembly.
5. Index angle fittings and tighten by hand pressing joint together to insure O-ring remains in place.
6. Tighten fitting or nut to torque value shown on the chart per dash size stamped on the fitting. DO NOT allow hoses to twist when tightening fittings.

Face Seal Adjustable Stud End O-Ring Installation

1. Back off lock nut (jam nut) and washer to full exposed turned down section of the fitting.
2. Install a thimble over the fitting threads to protect the O-ring from nicks.
3. Slide the O-ring over the thimble into the turned down section of the fitting.
4. Remove thimble.

Face Seal Straight Stud End O-Ring Installation

1. Install a thimble over the fitting threads to protect the O-ring from nicks.
2. Slide the O-ring over the thimble into the turned down section of the fitting.
3. Remove thimble.

Fitting Installation

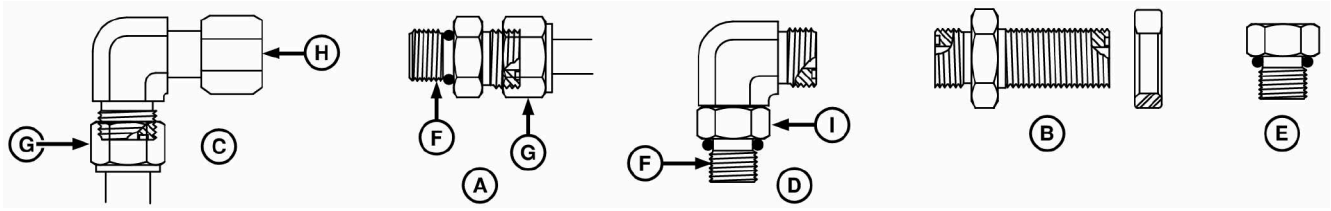
1. Install fitting by hand until snug.
2. Position adjustable fittings by unscrewing the fitting no more than one turn.
3. Apply assembly torque per table.

Assembly Torque

1. Use one wrench to hold the connector body and one wrench to tighten nut.
2. For a hydraulic hose, it may be necessary to use three wrenches to prevent twist; one on the connector body, one on the nut, and one on the body of the hose fitting.

OUO6435,0001557-19-20150406

Metric Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressures



N79757-UN: Fitting

A - Straight Stud and Tube Nut
B - Bulkhead Union and Bulkhead Jam Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Jam Nut

Metric Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressure-Below 27.6 MPA (4,000 PSI)

Nominal Tube OD Hose ID				O-Ring Face Seal/ Tube Swivel Nut			Bulkhead Jam Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]						
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut/Swivel Nut Torque	Jam Nut Hex Size	Jam Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque		Aluminum or Brass Torque[C]	
mm	Dash Size	in.	mm	in.	mm	N˙m	lb-ft	mm	N˙m	lb-ft	mm	mm	mm	N·m	lb-ft	N˙m	lb-ft
4	-2	0.125	3.18	—	—	—	—	—	—	—	M8 X 1	12	12	8	6	5	4
5	-3	0.188	4.76	—	—	—	—	—	—	—	M10 X 1	14	14	15	11	10	7
6	-4	0.250	6.35	9/16-18	17	16	12	22	32	24	M12 X 1.5	17	17	25	18	17	12
8	-5	0.312	7.92	—	—	—	—	—	—	—	M14 X 1.5	19	19	40	30	27	20
10	-6	0.375	9.53	11/16-16	22	24	18	27	42	31	M16 X 1.5	22	22	45	33	30	22
12	-8	0.500	12.70	13/16-16	24	50	37	30	93	69	M18 X 1.5	24	24	50	37	33	25
16	-10	0.625	15.88	1-14	30	69	51	36	118	87	M22 X 1.5	27	27	69	51	46	34
20	-12	0.750	19.05	1-3/16-12	36	102	75	41	175	129	M27 X 2	32	32	100	74	67	49
22	-14	0.875	22.23	1-3/16-12	36	102	75	41	175	129	M30 X 2	36	36	130	96	87	64
25	-16	1.000	25.40	1-7/16-12	41	142	105	46	247	182	M33 X 2	41	41	160	118	107	79
28	—	—	—	—	—	—	—	—	—	—	M38 x 2	46	46	176	130	117	87
32	-20	1.250	31.75	1-11/16-12	50	190	140	50	328	242	M42 X 2	50	50	210	155	140	103
38	-24	1.500	38.10	2-12	60	217	160	60	374	276	M48 X 2	55	55	260	192	173	128
50	-32	2.000	50.80	—	—	—	—	—	—	—	M60 X 2	65	65	315	232	210	155

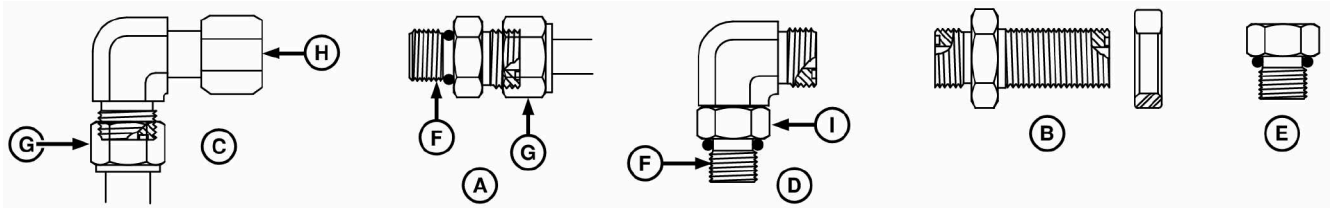
[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

[C]These torques were established using steel plated connectors in aluminum and brass.

OUO6083,000004E-19-20080428

Metric Face Seal and O-Ring Stud End Fitting Torque Chart—High-Pressure Applications



N79757-UN: Fitting

A - Stud Straight and Tube Nut
B - Bulkhead Union and Bulkhead Lock Nut
C - 90° Swivel Elbow and Tube Nut
D - 90° Adjustable Stud Elbow
E - Port Plug
F - Stud End
G - Tube Nut
H - Swivel Nut
I - Lock Nut

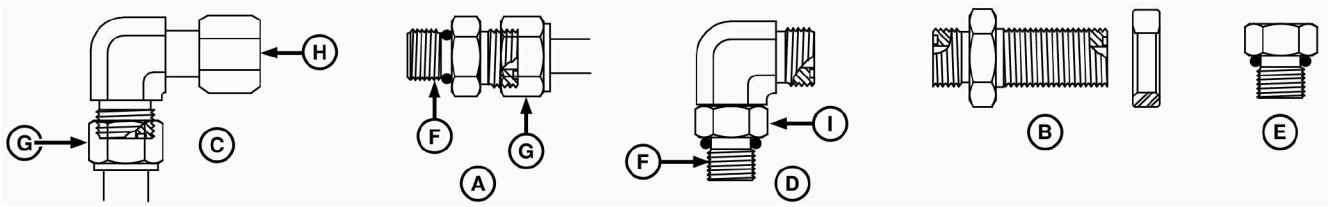
Metric Face Seal and O-Ring Stud End Fitting Torque Chart—High Pressure: Above 27580 kPa (275.8 bar) (4000 psi), Working Pressure: 41370 kPa (413.7 bar) (6,000 psi)

Nominal Tube OD Hose ID				O-Ring Face Seal/ Tube Swivel Nut			Bulkhead Lock Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]				
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut/Swivel Nut Torque	Lock Nut Hex Size	Lock Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque	
mm	Dash Size	in	mm	in	mm	N˙m	lb-ft	mm	N˙m	lb-ft	mm	mm	mm	N˙m	lb·ft
4	-2	0.125	3.18	—	—	—	—	—	—	—	M8 X 1	12	12	8	6
5	-3	0.188	4.76	—	—	—	—	—	—	—	M10 X 1	14	14	15	11
6	-4	0.250	6.35	9/16-18	17	24	18	22	32	24	M12 X 1.5	17	17	35	26
8	-5	0.312	7.92	—	—	—	—	—	—	—	M14 X 1.5	19	19	45	33
10	-6	0.375	9.53	11/16-16	22	37	27	27	42	31	M16 X 1.5	22	22	55	41
12	-8	0.500	12.70	13/16-16	24	63	46	30	93	69	M18 X 1.5	24	24	70	52
16	-10	0.625	15.88	1-14	30	103	76	36	118	87	M22 X 1.5	27	27	100	74
20	-12	0.750	19.05	1-3/16-12	36	152	112	41	175	129	M27 X 2	32	32	170	125
22	-14	0.875	22.23	1-3/16-12	36	152	112	41	175	129	M30 X 2	36	36	215	159
25	-16	1.000	25.40	1-7/16-12	41	214	158	46	247	182	M33 X 2	41	41	260	192
28	—	—	—	—	—	—	—	—	—	—	M38 x 2	46	46	320	236
32	-20	1.250	31.75	1-11/16-12	—	286	211	50	328	242	M42 X 2	50	50	360	266
38	-24	1.500	38.10	2-12	—	326	240	60	374	276	M48 X 2	55	55	420	310

[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.
[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

OUO1073,00022E2-19-20210910

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressures



N79757-UN: Fitting

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G - Tube Nut
H - Swivel Nut
I - Lock Nut

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—Standard Pressure: Below 27580 kPa (275.8 bar) (4000 psi)

Nominal Tube OD / Hose ID				O-Ring Face Seal/ Tube Swivel Nut				Bulkhead LockNut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]						
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut Swivel Nut Torque		Lock Nut Hex Size	Lock Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque		Aluminum or Brass Torque[C]	
mm	Dash Size	in	mm	in	in	N˙m	lb·ft		N˙m	lb·ft	lb·ft in	in	in	N·m	lb·ft	N˙m	lb·ft
5	-3	0.188	4.78	—	—	—	—	—	—	—	3/8-24	5/8	9/16	12	9	8	6
6	-4	0.250	6.35	9/16-18	11/16	16	12	13/16	32	24	7/16-20	5/8	5/8	16	12	11	8
8	-5	0.312	7.92	—	—	—	—	—	—	—	1/2-20	3/4	11/16	24	18	16	12
10	-6	0.375	9.53	11/16-16	13/16	24	18	1	42	31	9/16-18	3/4	3/4	37	27	25	18
12	-8	0.500	12.70	13/16-16	15/16	50	37	1-1/8	93	69	3/4-16	7/8	15/16	50	37	33	25
16	-10	0.625	15.88	1-14	1-1/8	69	51	1-5/16	118	87	7/8-14	1-1/16	1-1/16	69	51	46	34
20	-12	0.750	19.05	1-3/16-12	1-3/8	102	75	1-1/2	175	129	1-1/16-12	1-1/4	1-3/8	102	75	68	50
22	-14	0.875	22.23	1-3/16-12	—	102	75	—	175	129	1-3/16-12	1-3/8	1-1/2	122	90	81	60
25	-16	1.000	25.40	1-7/16-12	1-5/8	142	105	1-3/4	247	182	1-5/16-12	1-1/2	1-5/8	142	105	95	70
32	-20	1.25	31.75	1-11/16-12	1-7/8	190	140	2	328	242	1-5/8-12	1-3/4	1-7/8	190	140	127	93
38	-24	1.50	38.10	2-12	2-1/4	217	160	2-3/8	374	276	1-7/8-12	2-1/8	2-1/8	217	160	145	107
50.8	-32	2.000	50.80	—	—	—	—	—	—	—	2-1/2-12	2-3/4	2-3/4	311	229	207	153

[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

[C]These torques were established using steel plated connectors in aluminum and brass.

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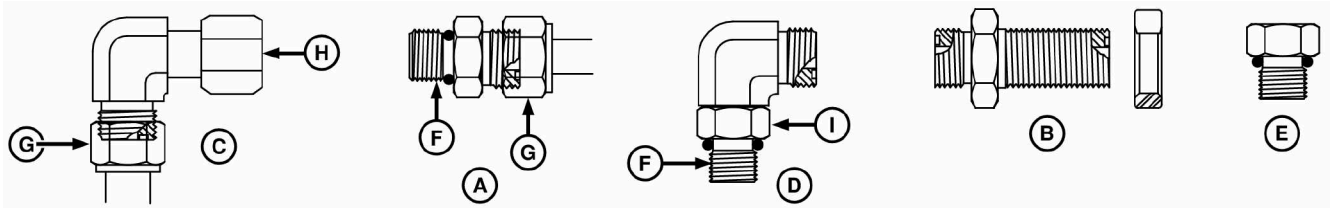
SAE Face Seal and O-Ring Stud End Fitting Torque Chart—High Pressure Applications



N79757-UN: Fitting

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G - Tube Nut
H - Swivel Nut
I - Lock Nut

SAE Face Seal and O-Ring Stud End Fitting Torque Chart—High-Pressure: Above Below 27580 kPa (275.8 bar) (4000 psi), Working Pressure: 41370 kPa (413.7 bar) (6,000 psi)

Nominal Tube OD Hose ID				O-Ring Face Seal/ Tube Swivel Nut				Bulkhead Lock Nut Torque[A]			O-Ring Straight, Adjustable, and External Port Plug Stud Ends[A]				
Metric Tube OD	Inch Tube OD			Thread Size	Swivel Nut Hex Size	Tube Nut/Swivel Nut Torque		Lock Nut Hex Size	Lock Nut Torque		Thread Size	Straight Hex Size[B]	Adj Lock Nut Hex Size	Steel or Gray Iron Torque	
mm	Dash Size	in	mm	in	in	N˙m	lb·ft		N˙m	lb·ft	in	in	in	N˙m	lb·ft
5	-3	0.188	4.78	—	—	—	—	—	—	—	3/8-24	5/8	9/16	18	13
6	-4	0.250	6.35	9/16-18	11/16	24	18	13/16	32	24	7/16-20	5/8	5/8	24	18
8	-5	0.312	7.92	—	—	—	—	—	—	—	1/2-20	3/4	11/16	30	22
10	-6	0.375	9.53	11/16-16	13/16	37	27	1	42	31	9/16-18	3/4	3/4	37	27
12	-8	0.500	12.70	13/16-16	15/16	63	46	1-1/8	93	69	3/4-16	7/8	15/16	75	55
16	-10	0.625	15.88	1-14	1-1/8	103	76	1-5/16	118	87	7/8-14	1-1/16	1-1/16	103	76
20	-12	0.750	19.05	1-3/16-12	1-3/8	152	112	1-1/2	175	129	1-1/16-12	1-1/4	1-3/8	177	131
22	-14	0.875	22.23	1-3/16-12	—	152	112	—	175	129	1-3/16-12	1-3/8	1-1/2	231	170
25	-16	1.000	25.40	1-7/16-12	1-5/8	214	158	1-3/4	247	182	1-5/16-12	1-1/2	1-5/8	270	199
32	-20	1.25	31.75	1-11/16-12	1-7/8	286	211	2	328	242	1-5/8-12	1-3/4	1-7/8	286	211
38	-24	1.50	38.10	2-12	2-1/4	326	240	2-3/8	374	276	1-7/8-12	2-1/8	2-1/8	326	240

[A]Tolerance is +15%, minus 20% of mean tightening torque unless otherwise specified.

[B]The straight hex wrench sizes listed apply to connectors only and may not be the same as the corresponding plug of the same thread size.

OUO1073,00022E0-19-20210910

Four Bolt Flange Fittings Assembly and Installation—All Pressure Applications

1. Inspect the sealing surfaces for nicks or scratches, roughness or out-of-flat condition. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If these defects cannot be polished out, replace the component.
2. Install the correct O-ring (and back-up washer if required) into the groove using petroleum jelly to hold it in place.
3. For split flange; loosely assemble split flange halves, being sure that the split is centrally located and perpendicular to the port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring.
4. For single piece flange; put hydraulic line in the center of the flange and install four cap screws. With the flange centrally located on the port, hand tighten cap screws to hold it in place. Do not pinch O-ring.
5. For both single piece flange and split flange, be sure the components are properly positioned and cap screws are hand tight. Tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten the two remaining cap screws. Tighten all cap screws within the specified limits shown in the chart.
   DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT overtighten.

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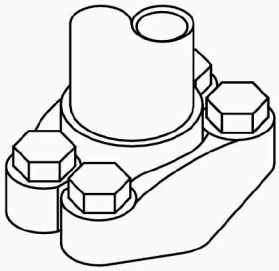
SAE Four Bolt Flange Cap Screw Torque Values—Standard Pressure Applications



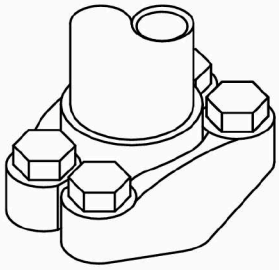
H70423-UN: Split Flange

SAE Four Bolt Flange Cap Screw Torque Values—27,600 KPA (4,000 PSI) Pressure Applications

Nominal Flange Size	Screw Size [JDM A17D, SAE Grade 5 or better cap screws with plated hardware.] [1.5.1.2 Lock washers are permissible but not recommended.]	Torque Newton Meters Min	Torque Newton Meters Max	Torque Foot Pounds Min	Torque Foot Pounds Max
1/2	5/16-18 UNC	20	31	15	23
3/4	3/8-16 UNC	28	54	21	40
1	3/8-16 UNC	37	54	27	40
1-1/4	7/16-14 UNC	47	85	35	63
1-1/2	1/2-13 UNC	62	131	46	97
2	1/2-13 UNC	73	131	54	97
2-1/2	1/2-13 UNC	107	131	79	97
3	5/8-11 UNC	187	264	138	195
3-1/2	5/8-11 UNC	158	264	117	195
4	5/8-11 UNC	158	264	117	195
5	5/8-11 UNC	158	264	117	195

OUO6435,0001549-19-20011120

SAE Four Bolt Flange Cap Screw Torque Values—High Pressure Applications



H70423-UN: Split Flange

SAE Four Bolt Flange Cap Screw Torque Values—41,400 KPA (6,000 PSI) Pressure Applications

Nominal Flange Size	Screw Size [JDM A17D, SAE Grade 5 or better cap screws with plated hardware.] [1.5.1.2 Lock washers are permissible but not recommended.]	Torque Newton Meters Min	Torque Newton Meters Max	Torque Foot Pounds Min	Torque Foot Pounds Max
1/2	5/16-18 UNC	20	31	15	23
3/4	3/8-16 UNC	34	54	25	40
1	7/16-14 UNC	57	85	42	63
1-1/4	1/2-13 UNC	85	131	63	63
1-1/2	5/8-11 UNC	159	264	117	195
2	3/4-10 UNC	271	468	200	345

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Tune-Up and Adjustment

General Information

Before tuning up engine, determine whether a tune-up will restore operating efficiency. When there is doubt, the following preliminary tests will help determine if the engine can be tuned up. If the condition is satisfactory, proceed with the tune-up. Choose from the following procedures only those necessary to restore the machine.

Preliminary Engine Testing

Test for engine compression (minimum readings at cranking speed). It is very important that all cylinder pressures be approximately alike. There should be less than 172 kPa (1.72 bar) (25 psi) difference between cylinder pressures.

Engine Tune-Up

Air Intake System:

- Check system for leaks.

Exhaust System:

- Check system for leaks. Check for restricted muffler or exhaust pipe.

Crankcase Vent:

- Check for restrictions.

Cooling System:

- Clean rotary screen, radiator core, air conditioning condenser, and charge air cooler.
- Check cooling system cap.
- Inspect all hoses.

Cylinder Head and Valves:

- Set valve clearance.

Fuel System:

- Check fuel tank for water and drain off if necessary.
- Check fuel tank and lines for leaks or restrictions.
- Bleed fuel system.
- Replace fuel filter.
- Replace water separator.

Electrical System

- Clean and tighten battery cables and connections.
- Check alternator belt tension.
- Check alternator output.
- Check neutral safety start switch operation.
- Check safety seat switch operation.
- Check starter draw.
- Check battery voltage.
- Inspect all wiring.

OUO6083,00003F2-19-20130523

Care and Maintenance of Belts

V-belts are an important part of a machine. Their care and maintenance is important. A V-belt transmits power by friction and a wedging action against the sheaves. Therefore, proper belt tension and the condition of the sheave side walls are of primary importance.

Since the power is transmitted between the belts and the sides of the sheave, look there for signs of wear. All belts and sheaves wear with use. Normal wear can be recognized as even wear—both on the belt and the sides of the sheave. It is the unusual signs of wear to look for and correct.

When checking belts, remember that many belts reported as being defective have actually been damaged by a bad sheave, misaligned drive or some faulty mechanical component of the machine.

EXAMPLES OF UNUSUAL WEAR

Base Cracking—Excessive cross cracking extending into the rubber on the base of a belt having little or no side wear indicates that the belt has been run a relatively short time and, therefore, must be defective. Small cracks, which are in the cover material only, do not indicate belt failure.

If the side walls show substantial wear, the belt should not be classified as being defective. Actually, the cracks in the base of the belt show that it has been exposed to weather to the extent that the inner fabric is beginning to rot.

Fabric Rupture—A fabric rupture can be caused by operating a belt over badly worn sheaves, by too much tension which forces the belt down into the grooves, or by foreign objects falling into the sheave groove while the drive is operating.

In cases such as this, check condition of the sheaves. Avoid prying belts onto sheaves.

Cover Tear—A tear in the cover of a belt is caused by the belt accidentally coming into contact with some part of the machine. It is no fault of the belt or its construction.

In many cases, such failure is due to belts running too loose, allowing them to "throw-out" centrifugally so they rub on parts of the machine. Proper belt tension would prevent this from happening.

NOTE:
A slight raveling of the belt covering at the splice does not indicate premature failure. Cut off the raveling if the cover peels at the lap.

Slip Burn—This belt has been ruined by being operated too loose. The belt slipped under load and, when finally it grabbed, it snapped.

Check belt tension frequently. Turn drives over by hand to be sure they are free. Advise operators to clear machines of crop before stopping to avoid over loading drives when starting up again.

Gouged Edge—A gouged edge in a belt is caused by either a damaged sheave or interference with some part of a machine.

Check the condition of the sheaves. Be sure belt does not rub on any part of the machine while operating.

Burn Due to Locked Drive—A burned area in a belt is an indication that the drive locked, causing the belt to slip on the sheave.

Prevent drive from locking by checking the tension of any chain drives in the drive train. Avoid overloading and plugging the machine. Never attempt to unplug a machine with power without first cleaning it out. Lubricate the machine at the specified intervals to prevent bearing seizure.

Worn Sides—Badly worn sides of a belt result from long operation without enough tension. The sides will be worn and the entire circumference will be slightly burned.

Check belt tension. Also, check sheaves for incorrect alignment.

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Defective Belts

Excessive Stretch—A belt that stretches excessively is one that stretches beyond the tightener adjustment provided to take up normal belt stretch. If this condition occurs, it will usually develop within the warranty period.

Lumpy Belts—Lumpy belts usually occur and are more noticeable on variable speed drives and other high-speed belt installations. The result is excessive vibration. If belts are not relieved of tension while machine is stored, they will often cause temporary vibration upon start-up. Give them time to straighten out.

Internal Cord Failure—Failure of one or more of the internal tension cords will result in the belt rolling over in the sheaves. (Cords can be broken by prying a new belt over sheaves.)

Improper Length—It is possible for belts either too long or too short to be shipped accidentally in service parts orders. Such belts would not pass the line run-in for new machines at the factory.

Belt Replacement

Here are a few general facts to know when replacing V-belts.

Replace Matched Sets—Never replace just one belt of a matched set. Never install individual belts from matched sets. Install the complete matched set only.

Check Condition of Sheaves—Always check the condition of all sheaves before replacing a belt. Check the sheaves for chips, cracks, bent sidewalls, rust, corrosion, etc. V-belts must have a smooth, dry surface to grip in order to deliver full power. Replace any sheaves that are found to be defective.

Check Sheave Alignment—Misaligned sheaves will result in shortened belt life. Use a straightedge or cord to check sheave alignment.

Position straightedge or cord so it touches sheaves at all points. Shafts must be parallel.

Rotate each sheave a half revolution and note whether the contact of either sheave with the straightedge is disturbed. If so, it indicates a bent shaft or wobbling sheave.

Belt Installation

Always practice the following when installing new belts.

1. Before installing any new belt, move the adjustable tightener to the position where it provides the least tension when the belt is installed. In some cases, it may be necessary to remove the tightener to install the belt.
2. Examine sheaves for chips, cracks, bent sidewalls, rust, corrosion or other damage.
3. Check sheaves for alignment.
4. Place the belt in the sheave groove by hand.

IMPORTANT:
Never pry or force a belt onto the sheave with screwdrivers, crowbars, wedges, etc. Damage to the belt and drive can result.

Belt Tension Adjustment

All belts and sheaves wear with use. For this reason, adjustable tightener arrangements are provided in the drive to maintain the proper belt tension.

More belts fail from under tension than over tension. To carry their full load, V-belts must be kept taut so they grip the full arc of contact with the sheave. Some belts may snap in two from a crack-the-whip effect caused by operating the belt too loose. Loose belts slip, heat and burn, causing unnecessary wear and damage.

Belts with spring-loaded idler will frequently appear quite loose but should be tightened only as instructed in the operator's manual.

However, V-belts should not be excessively tight. When belts are too tight, bearings and sheaves heat up, even though well lubricated. Too much tension stretches and weakens belts.

Never attempt to check or adjust belts while the machine is running.

Proper Belt Tension—After a new V-belt has been installed, adjust belt tension as follows:

1. Apply tension as instructed in the machine operator's manual or until the belt appears snug. Run the machine long enough for the belt to seat properly in the grooves.

2. *NOTE:*
   All new belts have an initial stretch. It will be necessary to adjust the tension at shorter intervals until the belt is properly seated and the initial stretch is eliminated.

   Stop the machine. Adjust the belt until it has the proper tension as described in the operator's manual or use the following “slap test”. Slap the belt sharply with your hand. It should feel springy and alive. A dead, lifeless feel means the belt is too loose and should be tightened.
3. Advise owner to check belt tension as instructed in the operator's manual. Under no circumstances should a belt be allowed to operate loose.

Belt Care

Belt dressing is not recommended on any belt, V- or flat, at any time. Most dressings contain chemicals which tend to soften belts. While this softening process actually does increase the friction between the belt and sheave grooves, the result is only temporary.

Remove grease and oil as quickly as possible before they can penetrate deeply into the belt, causing rapid deterioration.

Do not attempt to clean the belts while the machine is running. Never use flammable cleaning solvents.

Clean belts by wiping them with a clean cloth. Use a non-flammable cleaner or solvent to remove excessive grease and oil. Water and a detergent soap can be used, but it is not as satisfactory as a non-flammable cleaner.

Belt Storage

Proper belt storage is as important for new belts in your parts department as it is for those on the customer's machines.

In the Shop—Store new belts as follows to keep them factory-fresh for your customers.

1. Store belts in a clean, cool, dry atmosphere. Undue shrinkage or deterioration may occur if belts are piled on damp floors or stored near radiators.
2. Keep belts away from sun and heat.
3. Do not place belts in bins for long periods. To do so might distort the shape of the belt.
4. Do not hang belts on small pegs or nails. Heavy belts can be weakened due to distortion from such a practice.
5. Do not break matched sets.

On Customer's Machines—Pass along the following tips to your customers about storing belts:

1. If a belt is not to be removed, relieve belt tension by loosening the tightener adjustment. This is necessary to prevent the belt from “setting” or developing unequal stresses that might lead to early failure.
2. If possible, remove all belts. Thoroughly clean them as described earlier in this article. Then store them in a cool, clean, dry atmosphere.
3. If the belts have been removed, coat sheave grooves with anti-rust compound or grease prior to storage. Be sure to remove such rust preventative before installing the belts and starting the machine. Sheave grooves can also be protected with a section of discarded belt tied in place.
4. Protect all movable or sliding parts of variable speed drives by lubricating them thoroughly to prevent corrosion due to moisture.

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Prevent Hydraulic System Contamination

IMPORTANT:
Cleanliness is very important when working on the hydraulic system. Prevent contamination by assembling the cylinders, hoses, couplers, and valves in a clean area of the shop.

Leave protective caps on the fluid openings until ready to make the connection. When charging the system, use a tractor or other source that contains clean oil, free of abrasive materials. Keep couplers clean. Abrasive particles, like sand or metal fragments, can damage seals, barrels and pistons, causing internal leakage.

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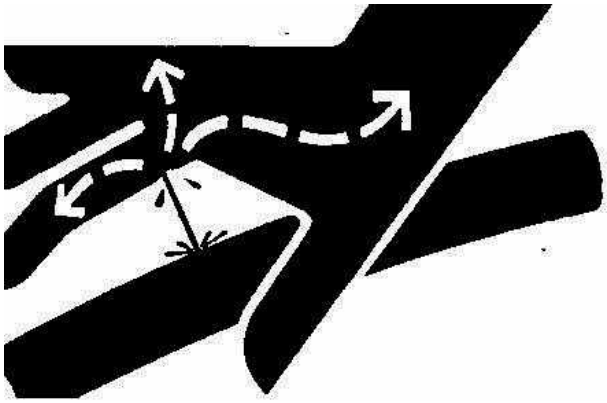
Check Oil Lines and Fittings

Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

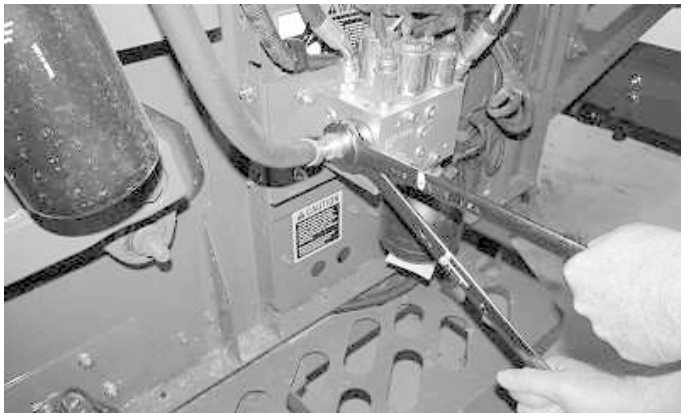
If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.



Check all oil lines, hoses and fittings regularly for leaks or defects. Make sure all clamps are in position and tight. Make sure hoses are not twisted or touching machine parts which are moving. Replace damaged parts.

IMPORTANT:
Tighten fittings as specified in torque chart.

If necessary, use two wrenches to prevent hoses from twisting, bending or breaking tubing and fittings.



H101658-UN: Fitting Removal

DL04547,0000020-19-20110523

Basic Electrical Component Handling / Precautions For Vehicles Equipped With Computer Controlled Systems

Electrical Precautions To Take:

Never disconnect the batteries while the key switch is running. Why: This can cause electrical voltage spikes that can damage electronic components.

Do not connect jumper cables while the key switch is on. Why: This can cause electrical voltage spikes that can damage electronic components.

Disconnect batteries prior to recharging (if possible). Why: Electrical loads in the combine can slow the recharging process. Battery chargers can cause electrical voltage spikes that can damage electronic components.

Never jump start the machine with a voltage higher than the machine is designed to operate on. Why: This can damage electronic components.

Do not connect or disconnect electrical connectors while the key switch is on or the combine is running. Why: This can cause computer system errors from interrupting a computer program while it is running and electrical voltage spikes that are produced can damage electronic components.

Do not apply power or ground to any component as a test unless specifically instructed to do so. Why: Connecting the wrong voltage to the wrong point of an electronic system can cause electronic component failures.

When welding on the machine, make sure to connect ground lead to the parts being welded. For maximum protection, disconnect all electronic control unit connectors before welding. Why: High currents associated with welding can damage wiring harnesses that are involved in the ground path. Welding can also cause electrical voltage spikes that can damage electronic components.

OUO6083,0000E7B-19-20131008

Handling and Storing Diesel Fuel

Handle fuel carefully. Do not fill the fuel tank when engine is running.
DO NOT smoke while you fill the fuel tank or service the fuel system.

Fill the fuel tank at the end of each day's operation to prevent condensation and freezing during cold weather.

When fuel is stored for an extended period or if there is a slow turnover of fuel, add a fuel conditioner to stabilize the fuel and prevent water condensation. Contact your fuel supplier for recommendations.

OUO6075,00036E2-19-20040504

Diesel Fuel

Consult your local fuel distributor for properties of the diesel fuel available in your area.

In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed.

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel fuel produced by hydrotreating animal fats and vegetable oils is basically identical to petroleum diesel fuel. Renewable diesel that meets EN 590, ASTM D975, or EN 15940 is acceptable for use at all percentage mixture levels.

Required Fuel Properties

In all cases, the fuel shall meet the following properties:

Cetane number of 40 minimum. Cetane number greater than 47 is preferred, especially for temperatures below –20 °C (–4 °F) or elevations above 1675 m (5500 ft.).

Cloud Point should be below the expected lowest ambient temperature or **Cold Filter Plugging Point** (CFPP) should be a maximum 10°C (18°F) below the fuel cloud point.

Fuel lubricity should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1. A maximum scar diameter of 0.45 mm is preferred.

Diesel fuel quality and sulfur content must comply with all existing emissions regulations for the area in which the engine operates. DO NOT use diesel fuel with sulfur content greater than 10 000 mg/kg (10 000 ppm).

Materials such as copper, lead, zinc, tin, brass and bronze should be avoided in fuel handling, distribution and storage equipment as these metals can catalyze fuel oxidation reactions which can lead to fuel system deposits and plugged fuel filters.

E-Diesel fuel

DO NOT use E-Diesel (Diesel fuel and ethanol blend). Use of E-Diesel fuel in any John Deere machine may void the machine warranty.

Avoid severe injury or death due to the fire and explosion risk from using E-Diesel fuel.

Sulfur Content for Interim Tier 4, Final Tier 4, Stage III A and B, Stage IV, and Stage V Engines Above 560 kW

- Use ONLY diesel fuel with a maximum of 500 mg/kg (500 ppm) sulfur content.

Sulfur Content for Interim Tier 4, Final Tier 4, Stage III B, Stage IV Engines, and Stage V Engines

- Use ONLY ultra low sulfur diesel (ULSD) fuel with a maximum of 15 mg/kg (15 ppm) sulfur content.

Sulfur Content for Tier 3 and Stage III A Engines

- Use of diesel fuel with sulfur content less than 1000 mg/kg (1000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 1000—2000 mg/kg (1000—2000 ppm) REDUCES the oil and filter change interval.
- BEFORE using diesel fuel with sulfur content greater than 2000 mg/kg (2000 ppm), contact your John Deere dealer.

Sulfur Content for Tier 2 and Stage II Engines

- Use of diesel fuel with sulfur content less than 2000 mg/kg (2000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 2000—5000 mg/kg (2000—5000 ppm) REDUCES the oil and filter change interval. [See DX,ENOIL12,OEM, DX,ENOIL12,T2,STD, or DX,ENOIL12,T2,EXT for more information on Engine Oil and Filter Service Intervals.]
- BEFORE using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your John Deere dealer.

Sulfur Content for Other Engines

- Use of diesel fuel with sulfur content less than 5000 mg/kg (5000 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm) REDUCES the oil and filter change interval.

IMPORTANT:
Do not mix used diesel engine oil or any other type of lubricating oil with diesel fuel.
Improper fuel additive usage may cause damage on fuel injection equipment of diesel engines.

DX,FUEL1-19-20200713

Lubricity of Diesel Fuel

Most diesel fuels manufactured in the United States, Canada, and the European Union have adequate lubricity to ensure proper operation and durability of fuel injection system components. However, diesel fuels manufactured in some areas of the world may lack the necessary lubricity.

IMPORTANT:
Make sure the diesel fuel used in your machine demonstrates good lubricity characteristics.

Fuel lubricity should pass a maximum scar diameter of 0.52 mm as measured by ASTM D6079 or ISO 12156-1. A maximum scar diameter of 0.45 mm is preferred.
If fuel of low or unknown lubricity is used, add John Deere Fuel-Protect Diesel Fuel Conditioner (or equivalent) at the specified concentration.

Lubricity of BioDiesel Fuel

Fuel lubricity can improve significantly with BioDiesel blends up to B20 (20% BioDiesel). Further increase in lubricity is limited for BioDiesel blends greater than B20.

DX,FUEL5-19-20140207

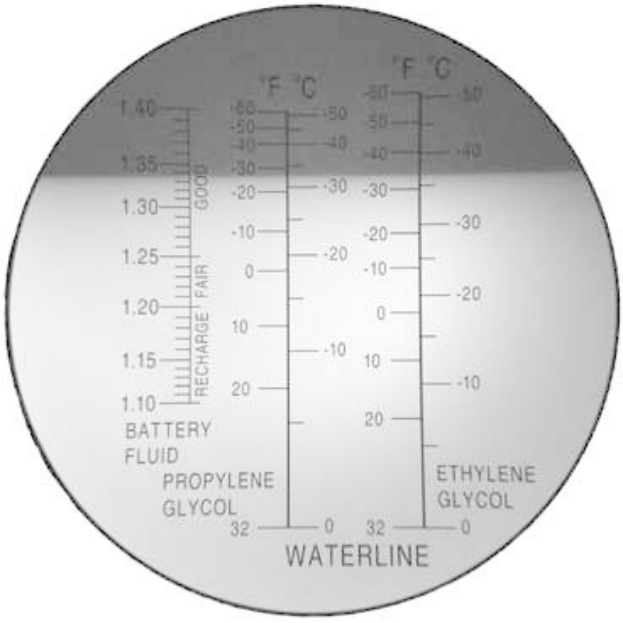
Testing Coolant Freeze Point

The use of a handheld coolant refractometer is the quickest, easiest, and most accurate method to determine coolant freeze point. This method is more accurate than a test strip or a float-type hydrometer which can produce poor results.

A coolant refractometer is available through your John Deere dealer under the SERVICEGARD™ tool program. Part number 75240 provides an economical solution to accurate freeze point determination in the field.

To use this tool:

TS1732-UN: SERVICEGARD™ Part Number 75240



TS1733-UN: Image with a Drop of 50/50 Coolant Placed on the Refractometer Window

1. Allow cooling system to cool to ambient temperatures.
2. Open radiator cap to expose coolant.
3. With the included dropper, collect a small coolant sample.
4. Open the lid of the refractometer, place one drop of coolant on the window and close the lid.
5. Look through the eyepiece and focus as necessary.
6. Record the listed freeze point for the type of coolant (ethylene glycol coolant or propylene glycol) being tested.

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DX,COOL,TEST-19-20130613