

Z625, Z645, Z655, and Z665 EZtrak Residential Mower Diagnostic and Repair



TECHNICAL MANUAL

EZtrak Mower models Z645, Z655, Z665, Z625 (SN. 130001-)

TM113119 22 NOV 14 (ENGLISH)



Table of contents

FOREWORD

Section 10 - GENERAL INFORMATION

- Group 05 - Safety
- Group 10 - General Specifications
- Group 15 - Fuel and Lubricants
- Group 20 - Machine Specifications

Section 20 - ENGINE REPAIR B&S

- Group 10 - Repair Engine Twin Cylinder

Section 25 - ENGINE REPAIR KAWASAKI

- Group 10 - Engine Repair
- Group 20 - Starting Motor Repair

Section 30 - ELECTRICAL REPAIR

- Group 10 - Component Location
- Group 20 - Wiring Harness

Section 40 - POWER TRAIN REPAIR

- Group 10 - Component Location (S.N. -130000)
- Group 15 - Component Location (S.N. 130001-)
- Group 20 - Repair (S.N. -130000)
- Group 25 - Repair (S.N. 130001-)

Section 50 - ATTACHMENTS REPAIR

- Group 10 - Component Location
- Group 20 - Repair

Section 60 - MISCELLANEOUS REPAIR

- Group 10 - Component Location
- Group 20 - Repair

Section 220 - ENGINE DIAGNOSIS, TESTS, AND ADJUSTMENTS B&S

- Group 10 - Diagnosis
- Group 20 - Tests and Adjustments

Section 225 - ENGINE DIAGNOSIS, TESTS, AND ADJUSTMENTS KAWASAKI

- Group 10 - Component Location
- Group 20 - General Information
- Group 30 - Theory of Operation
- Group 40 - Diagnosis
- Group 50 - Tests and Adjustments

Section 230 - ELECTRICAL DIAGNOSIS, TESTS, AND ADJUSTMENTS

- Group 10 - Theory of Operation
- Group 20 - Diagnosis
- Group 30 - Tests and Adjustments
- Group 40 - Wiring Schematics
- Group 50 - Connector Information

Section 240 - POWER TRAIN DIAGNOSIS, TESTS, AND ADJUSTMENTS

- Group 10 - Theory of Operation (S.N. -130000)
- Group 15 - Theory of Operation (S.N. 130001-)
- Group 20 - Diagnosis (S.N. -130000)
- Group 25 - Diagnosis (S.N. 130001-)
- Group 30 - Tests and Adjustments (S.N. -130000)
- Group 35 - Tests and Adjustments (S.N. 130001-)

Section 250 - ATTACHMENTS DIAGNOSIS, TESTS, AND ADJUSTMENTS

- Group 10 - Diagnosis
- Group 20 - Tests and Adjustments

Section 260 - MISCELLANEOUS TESTS AND ADJUSTMENTS

- Group 10 - Tests and Adjustments

Section 299 - SERVICE TOOLS AND KITS

Group 10 - Service Tools



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.

**CAUTION:**

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.

Section 10 - GENERAL INFORMATION

Table of contents

Group 05 - Safety	1
Recognize Safety Information	1
Understand Signal Words	1
Follow Safety Instructions	1
Practice Safe Maintenance	3
Use Proper Tools	3
Handle Fluids Safely—Avoid Fires	4
Drain Gasoline When Storing Machine	4
Prevent Acid Burns	6
Prevent Battery Explosions	6
Handling Batteries Safely	7
Prepare for Emergencies	9
Park Machine Safely	9
Support Machine Properly	9
Wear Protective Clothing	11
Work in Clean Area	11
Service Machines Safely	12
Work In Ventilated Area	12
Illuminate Work Area Safely	12
Replace Safety Signs	13
Use Proper Lifting Equipment	13
Service Tires Safely	14
Dispose of Waste Properly	14
Protect Against High Pressure Spray	15
Live With Safety	15
Group 10 - General Specifications	17
Service Recommendations for O-Ring Boss Fittings	17
Service Recommendations For Flat Face O-Ring Seal Fittings	19
Metric Cap Screw Torque Values—Grade 7	20
Metric Bolt and Screw Torque Values	21
Unified Inch Bolt and Screw Torque Values	22
Group 15 - Fuel and Lubricants	23
Gasoline Engine Oil	23
Oil Filters	24
Gasoline Fuel for 4-Cycle Engines	24
Transmission and Hydraulic Oil	25
Grease	25
Mixing of Lubricants	26
Alternative and Synthetic Lubricants	26
Lubricant Storage	26
Gasoline and Engine Storage	28
Carburetor Cleaning	30
Carburetor Cleaning Methods	31
Group 20 - Machine Specifications	32
Machine Specifications (S.N. - 130000)	32
Machine Specifications (S.N. 130001-150000)	34
Machine Specifications (S.N. 150001-170000)	35
Machine Specifications (S.N. 170001-)	37
Product Identification Number Location	38

Group 05 - Safety

Recognize Safety Information



Safety-alert symbol

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.

Understand Signal Words



▲ WARNING

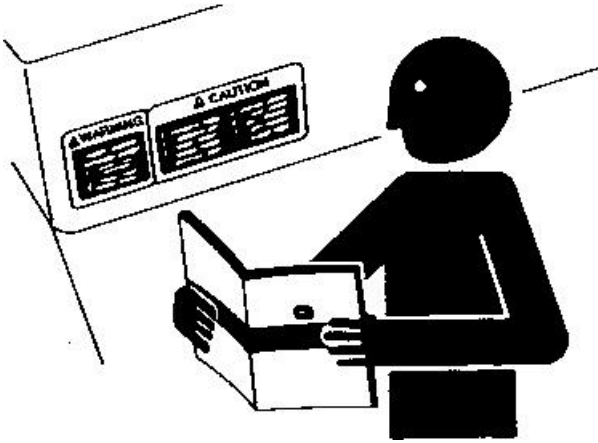
▲ CAUTION

Signal Words

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.

Follow Safety Instructions



Safety Messages

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.

Practice Safe Maintenance



Keep Area Clean

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 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.

Use Proper Tools

**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.

Handle Fluids Safely—Avoid Fires**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.

Drain Gasoline When Storing Machine

**Storing Gasoline**

Gasoline stored in fuel tank can explode.

Never store equipment with gasoline in the tank inside a building where fumes may reach an open flame or spark.

Always drain gasoline from fuel tank and carburetor bowl when storing machine. Allow engine to cool before storing.

Prevent Acid Burns



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:

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:

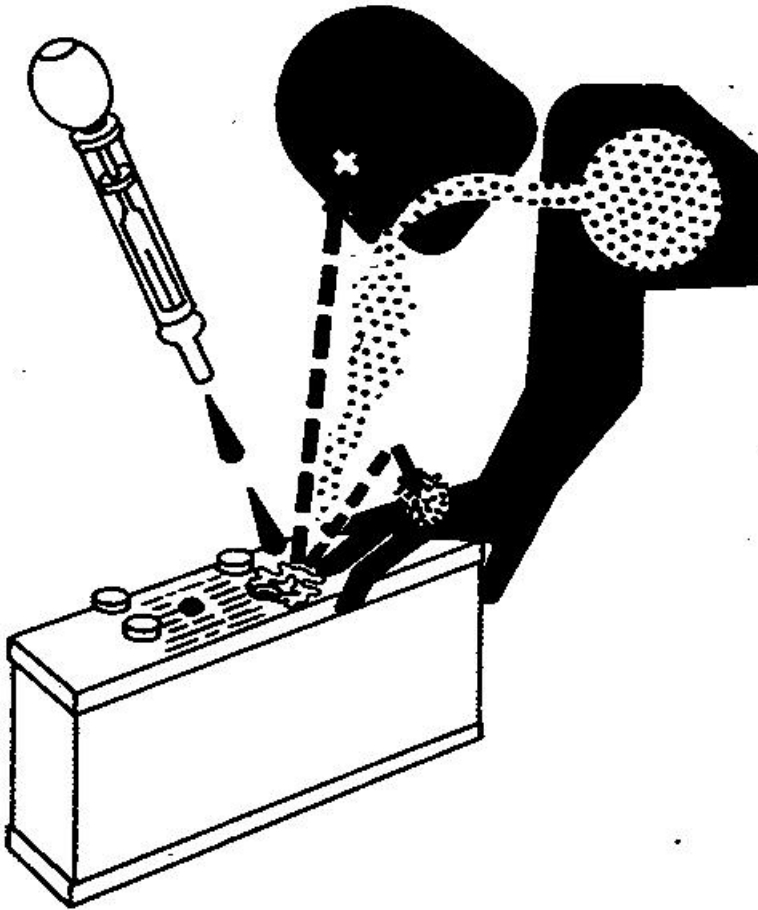
1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 quarts).
3. Get medical attention immediately.

Prevent Battery Explosions

**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).

Handling Batteries Safely**Caution**

**Caution**

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.

If acid is spilled on skin or in eyes:

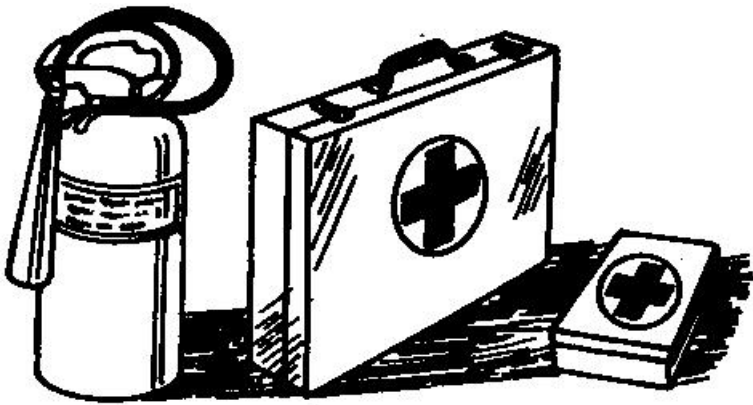
1. Flush skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush eyes with water for 15–30 minutes. Get medical attention immediately.

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.**

Prepare for Emergencies



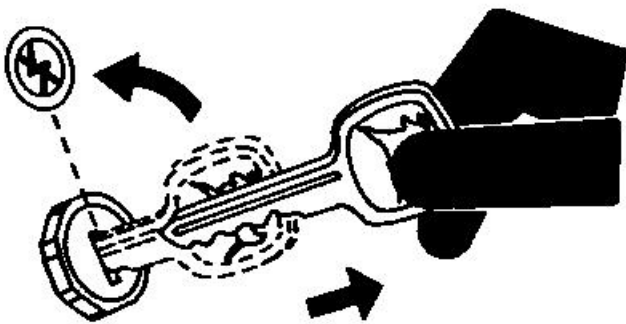
First Aid Kit

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.

Park Machine Safely

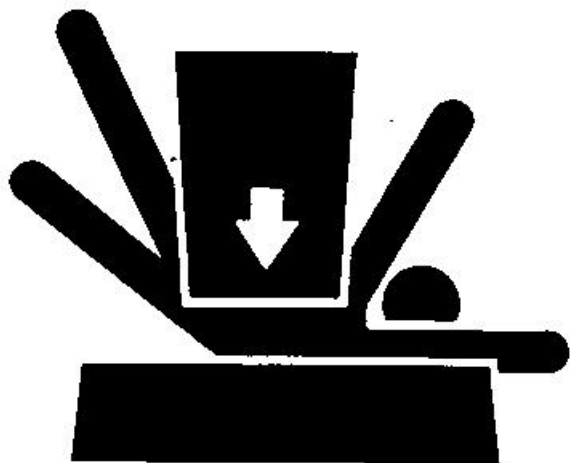


Remove the Key

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.

Support Machine Properly

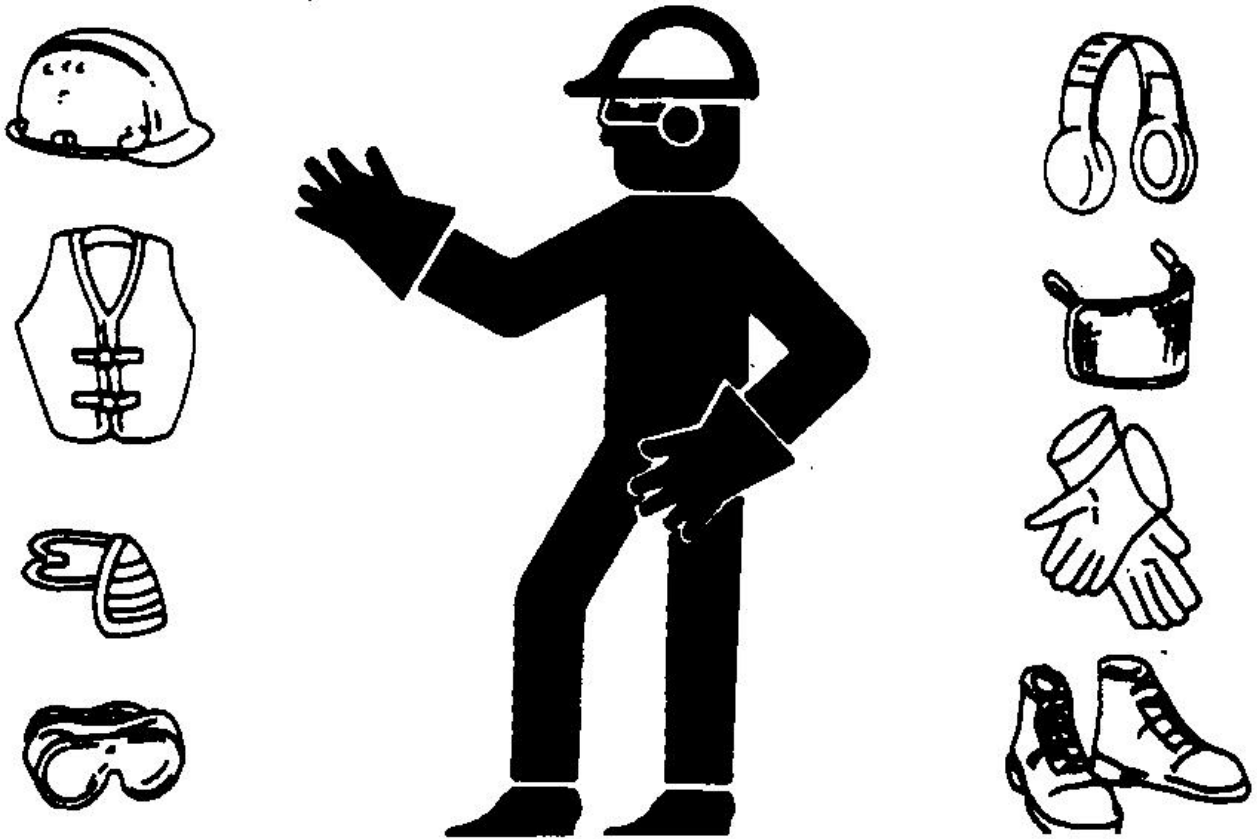
**Support Properly**

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.

Wear Protective Clothing



Protective Clothing

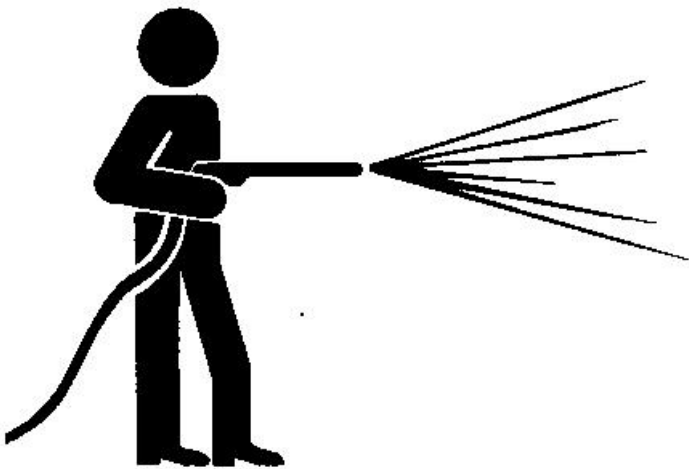
Wear close fitting clothing and safety equipment appropriate to the job.

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.

Work in Clean Area



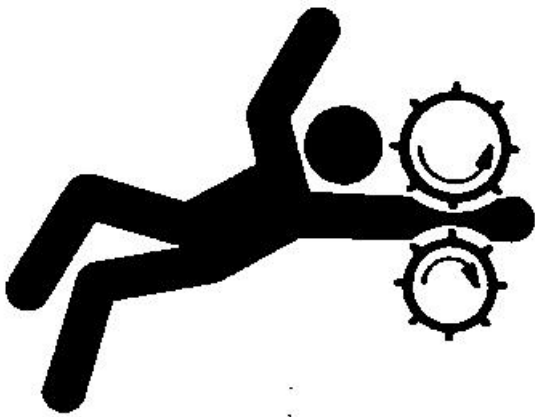
Clean Work Area

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.

Service Machines Safely

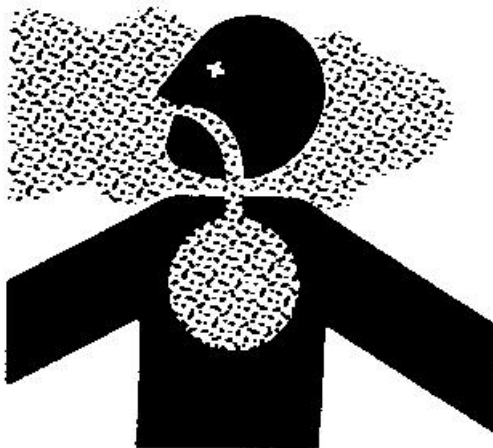


Moving Parts

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.

Work In Ventilated Area



Engine exhaust fumes

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.

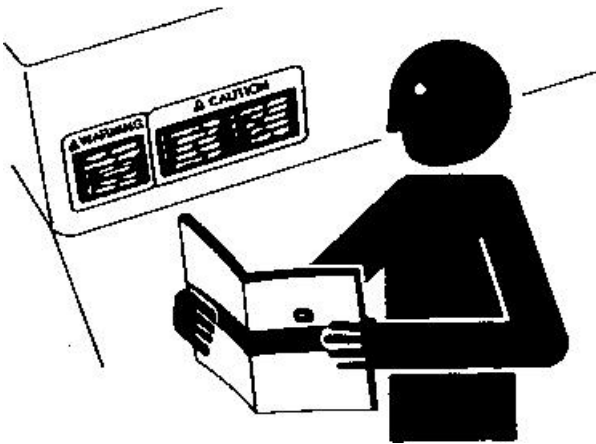
Illuminate Work Area Safely



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.

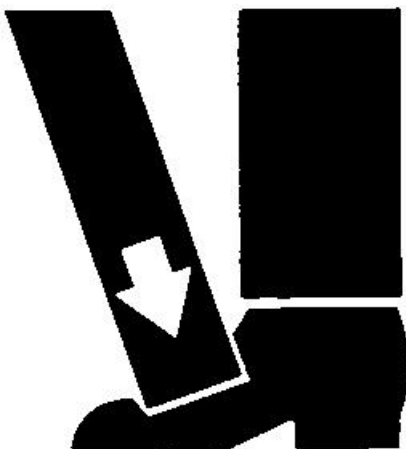
Replace Safety Signs



Safety Signs

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

Use Proper Lifting Equipment

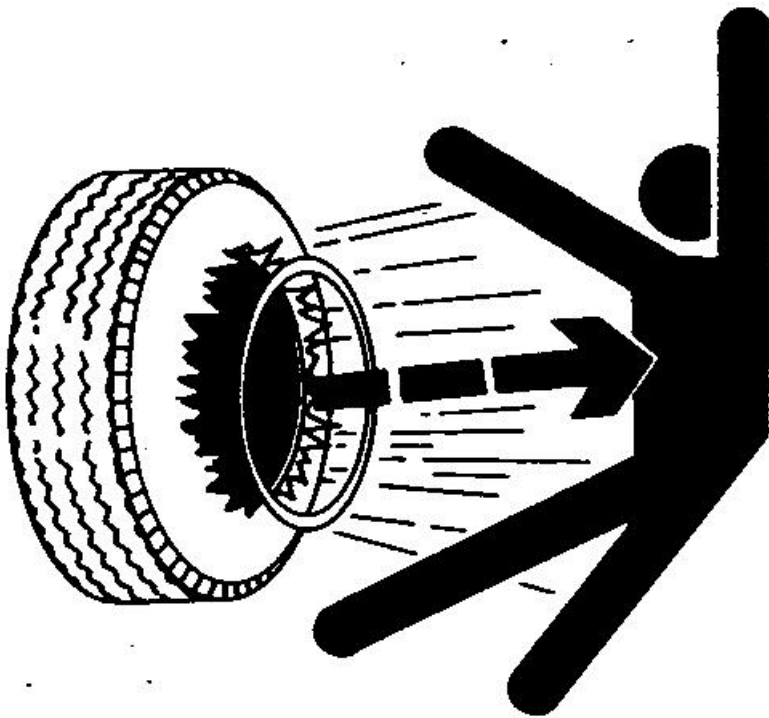


Proper Lifting Equipment

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

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

Service Tires Safely



Explosive Tire and Rim Parts

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

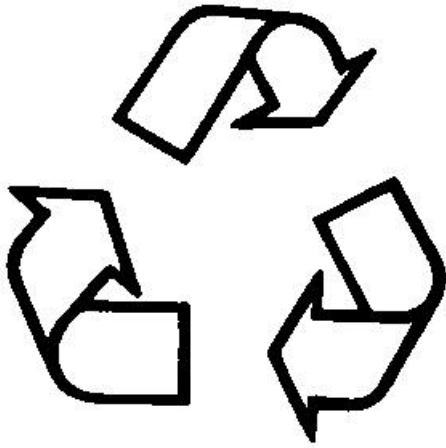
Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job.

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.

Dispose of Waste Properly



Recycle Waste

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.

Protect Against High Pressure Spray



High Pressure Spray

Spray from high pressure nozzles can penetrate the skin and cause serious injury. Keep spray from contacting hands or body.

If an accident occurs, see a doctor immediately. Any high pressure spray 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 from Deere & Company Medical Department in Moline, Illinois, U.S.A.

Live With Safety



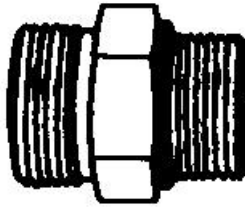
Safety Systems

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

Group 10 - General Specifications

Service Recommendations for O-Ring Boss Fittings

Straight Fitting



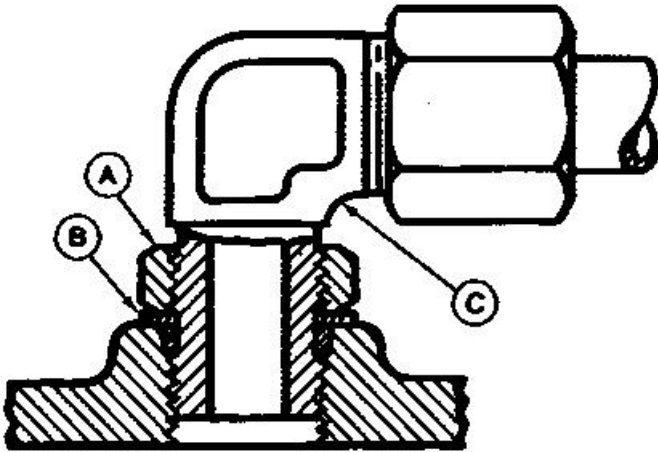
Straight Fitting

[1] - Inspect O-ring boss seat for dirt or defects.

[2] - Lubricate O-ring with petroleum jelly. Place electrical tape over threads to protect O-ring. Slide O-ring over tape and into O-ring groove of fitting. Remove tape.

[3] - Tighten fitting to torque value shown on chart.

Angle Fitting



Angle Fitting

[1] - Back-off lock nut (A) and back-up washer (B) completely to head-end (C) of fitting.

[2] - Turn fitting into threaded boss until back-up washer contacts face of boss.

[3] - Turn fitting head-end counterclockwise to proper index (maximum of one turn).

[4] -

→NOTE:

Do not allow hoses to twist when tightening fittings.

Hold fitting head-end with a wrench and tighten locknut and back-up washer to proper torque value.

Straight Fitting or Special Nut Torque Chart

STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART		
Thread Size	N'm	lb-ft
3/8-24 UNF	8	6
7/16-20 UNF	12	9
1/2-20 UNF	16	12
9/16-18 UNF	24	18
3/4-16 UNF	46	34
7/8-14 UNF	62	46
1-1/16-12 UN	102	75
1-3/16-12 UN	122	90
1-5/16-12 UN	142	105
1-5/8-12 UN	190	140
1-7/8-12 UN	217	160

→NOTE:
Torque tolerance is ± 10%.

Service Recommendations For Flat Face O-Ring Seal Fittings

[1] - Inspect the fitting sealing surfaces and O-ring. They must be free of dirt or defects.

[2] - Lubricate O-rings and install into groove using petroleum jelly to hold in place.

[3] - Index angle fittings and tighten by hand pressing joint together to insure O-ring remains in place.

[4] - Tighten fitting or nut to torque value shown on the chart. Do not allow hoses to twist when tightening fittings, use backup wrench on straight hose couplings.

IMPORTANT:

Tighten fittings to 150% of listed torque value if indexing is necessary or if fitting is attached to an actuating device.

Tighten fittings to 50% of listed torque value if used in aluminum housing.

O-ring Seal Fitting Torque

FLAT FACE O-RING SEAL FITTING TORQUE*						
Nomial Tube O.D.		Thread Size	Swivel Nut		Bulkhead Nut	
mm	in.	in.	N'm	lb.-ft.	N'm	lb.-ft.
6.35	0.250	9/16-18	16	12	12	9
9.52	0.375	11/16-16	24	18	24	18
12.70	0.500	13/16-16	50	37	46	34
15.88	0.625	1-14	69	51	62	46
19.05	0.750	1 3/16-12	102	75	102	75
22.22	0.875	1 3/16-12	102	75	102	75
25.40	1.000	1 7/16-12	142	105	142	105
31.75	1.250	1 11/16-12	190	140	190	140
38.10	1.500	2-12	217	160	217	160
*Torque tolerance is +15 -20% unless otherwise specified.						
Stud End O-ring Seal Torque for Straight and Adjustable Fittings*						
Thread Size	Straight Hex Size	Locknut Hex Size	Straight Fitting or Locknut Toque			
Inch	Inch	Inch	N'm	lb.-ft.		
3/8-24	5/8	9/16	12	9		
7/16-20	5/8	5/8	21	15		
1/2-20	3/4	11/16	26	19		
9/16-18	3/4	3/4	34	25		
3/4-16	7/8	15/16	73	55		
7/8-14	1 1/16	1 1/16	104	76		
1 1/16-12	1 1/4	1 3/8	176	130		
1 3/16-12	1 3/8	1 1/2	230	170		
1 5/16-12	1 1/2	1 5/8	285	210		
*Torque tolerance is +15 -20% unless otherwise specified.						

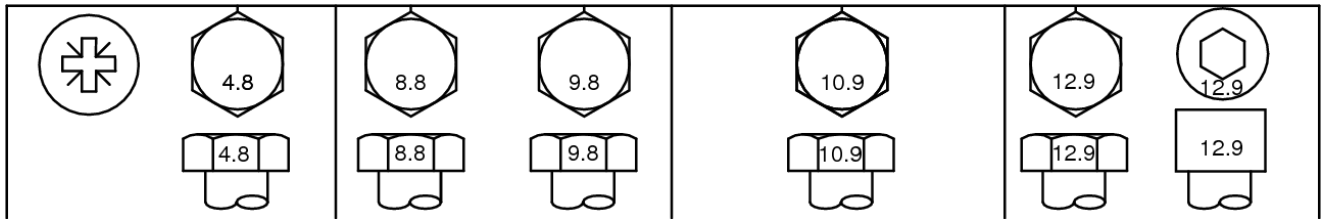
Metric Cap Screw Torque Values—Grade 7

→NOTE:
When bolting aluminum parts, tighten to 80% of torque specified in table.

Metric Cap Screw Torque Values—Grade 7

Size	N·m	(lb·ft)
M6	9.5–12.2	(7–9)
M8	20.3–27.1	(15–20)
M10	47.5–54.2	(35–40)
M12	81.4–94.9	(60–70)
M14	128.8–146.4	(95–108)
M16	210.2–240	(155–177)

Metric Bolt and Screw Torque Values

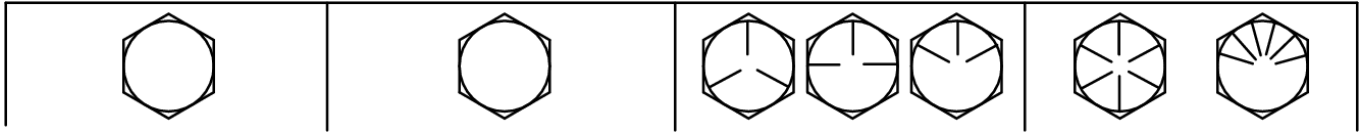


Metric Bolt and Screw

Metric Torque Values

Bolt or Screw Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B, F13E or F13H zinc flake coating.]	
	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	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
									N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
			N·m	lb.-ft.	N·m	lb.-ft.	N·m	lb.-ft.								
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
	N·m	lb.-ft.														
M12	40	29.5	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	46	80	59	120	88	150	110	175	130	220	165	205	150	260	190
M16	100	74	125	92	190	140	240	175	275	200	350	255	320	235	400	300
M18	135	100	170	125	265	195	330	245	375	275	475	350	440	325	560	410
M20	190	140	245	180	375	275	475	350	530	390	675	500	625	460	790	580
M22	265	195	330	245	510	375	650	480	725	535	920	680	850	625	1080	800
M24	330	245	425	315	650	480	820	600	920	680	1150	850	1080	800	1350	1000
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	2000	1475
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1580	2700	2000
M33	900	665	1150	850	1750	1300	2200	1625	2500	1850	3150	2325	2900	2150	3700	2730
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2770	4750	3500
Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For stainless steel fasteners or for nuts on U-bolts, see the tightening instructions for the specific application. Tighten plastic insert or crimped steel type lock nuts by turning the nut to the dry torque shown in the chart, unless different instructions are given for the specific application.									Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class. 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 fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.							

Unified Inch Bolt and Screw Torque Values



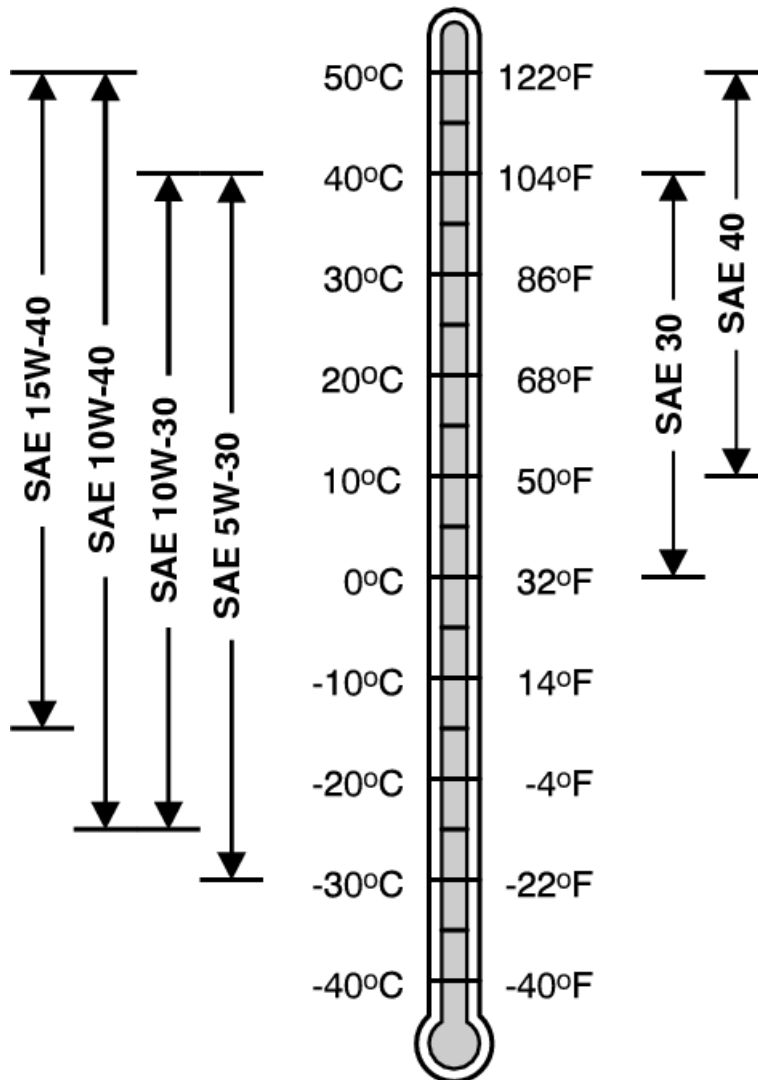
Unified Inch Bolt and Screw

Unified Inch Bolt and Screw Torque Values

Bolt or Screw Size	SAE Grade 1				SAE Grade 2 [Grade 2 applies for hex cap screws (not hex bolts) up to 6 in. (152 mm) long. 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 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
	Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]		Lubricated ["Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C, F13F or F13J zinc flake coating.]		Dry ["Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B, F13E or F13H zinc flake coating.]	
	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	3.7	33	4.7	42	6	53	7.5	66	9.5	84	12	106	13.5	120	17	150
													N'm	lb.-ft.	N'm	lb.-ft.
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
													N'm	lb.-ft.	N'm	lb.-ft.
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
													N'm	lb.-ft.	N'm	lb.-ft.
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N'm	lb.-ft.														
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350
Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.									Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.							

Group 15 - Fuel and Lubricants

Gasoline Engine Oil



Oil Viscosities for Air Temperature Ranges

Use oil viscosity based on the expected air temperature range during the period between oil changes.

John Deere TURF-GARD™ is preferred.

The following oils are also recommended:

- John Deere Plus-4™
- John Deere Plus-50™ II

Other oils may be used if they meet one or more of the following:

- ILSAC GF-5
- API Service Category SN
- API Service Category SM
- API Service Category SL

- API Service Category SJ
- ACEA Oil Sequence A5
- ACEA Oil Sequence A3
- ACEA Oil Sequence A1
- ACEA Oil Sequence C4
- ACEA Oil Sequence C3
- ACEA Oil Sequence C2
- ACEA Oil Sequence C1

Oil Filters

Filtration of oils is critical to proper operation and lubrication.

Always change filters regularly as specified in this manual.

Use filters meeting John Deere performance specifications.

Gasoline Fuel for 4-Cycle Engines

Use unleaded gasoline with a minimum octane rating of 87 AKI (anti-knock index) or 90 RON (research octane number). Gasoline fuels specified to EN 228 or ASTM D4814 are recommended.

Fuel blends of unleaded gasoline with a maximum 10% ethanol or 15% MTBE (methyl tertiary-butyl ether) are also acceptable.



CAUTION:

Reduce the risk of fire. Handle fuel carefully. DO NOT fill the fuel tank when the engine is running or hot. Stop engine and allow it to cool for several minutes before filling fuel tank. Fill fuel tank only to the bottom of the filler neck.

Refuel outdoors. DO NOT smoke while you fill the fuel tank or service the fuel system.

Store fuel in properly identified polyethylene containers.

When storing fuel, add John Deere Gasoline Conditioner and Stabilizer (or equivalent) at the specified concentration.

IMPORTANT:

DO NOT use methanol or fuel blends that contain methanol.

Avoid spilling fuel. Gasoline can damage plastic and painted surfaces.

DO NOT mix oil with gasoline.

