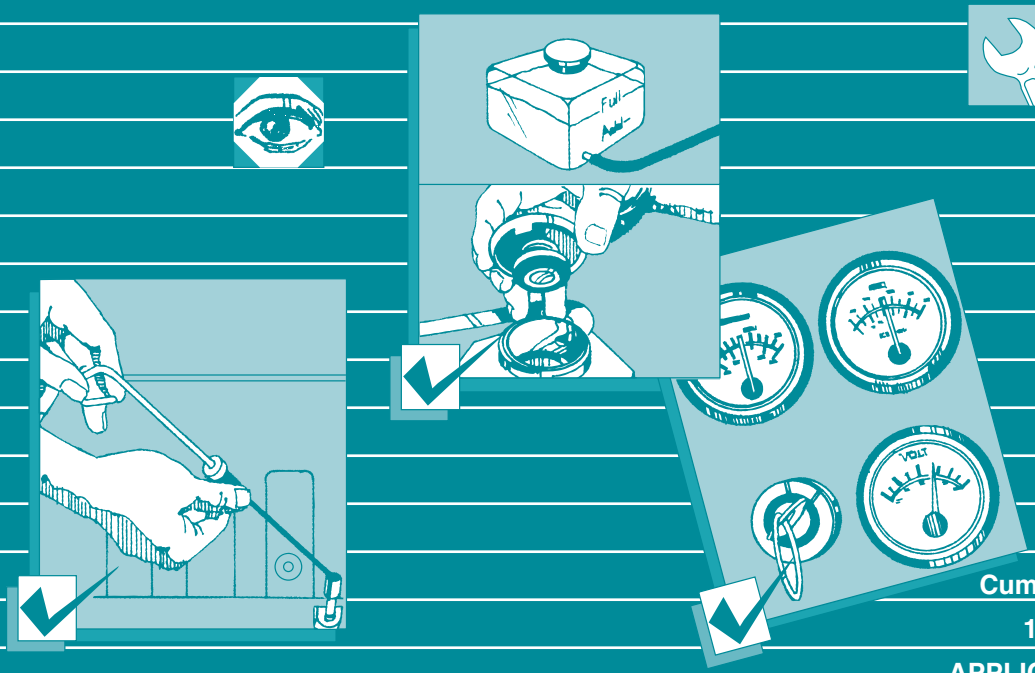
# Owners Manual
# Commercial Marine and Industrial C8.3 Series Engine




Cummins Customer Assistance Center

1-800-DIESELS™ (1-800-343-7357)

APPLICABLE ONLY IN U.S.A. AND CANADA

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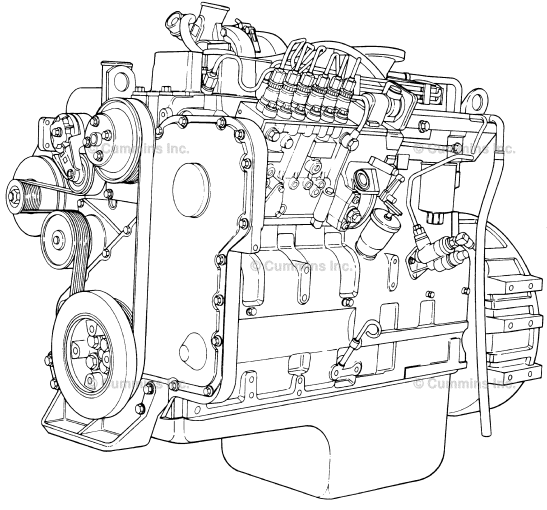
# Commercial Marine and Industrial C8.3 Series Engine



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# Foreword

This manual contains information for the correct operation and maintenance of your Cummins® Product.

**Read and follow all safety instructions. Refer to the WARNING in the General Safety Instructions in Section i - Introduction.**

Keep this manual with the equipment. If the equipment is traded or sold, give the manual to the new owner.

The information, specifications, and recommended maintenance guidelines in this manual are based on information in effect at the time of printing. Cummins Inc. reserves the right to make changes at any time without obligation. If you find differences between your product and the information in this manual, contact your local Cummins Authorized Repair Location or call 1-800-DIESELS (1-800-343-7357) toll free in the U.S. and Canada.

The latest technology and the highest quality components were used to produce this product. When replacement parts are needed, we recommend using only genuine Cummins® or ReCon® exchange parts.

**NOTE:** Warranty information is located in Section W. Make sure you are familiar with the warranty or warranties applicable to your product.

# Table of Contents

# Important Reference Numbers

Fill in the part name and number in the blank spaces provided below. This will give you a reference whenever service or maintenance is required.

| Name | Number | Number |
|---|---|---|
| Engine Model | | |
| Engine Serial Number (ESN) | | |
| Control Parts List (CPL) | | |
| Fuel Pump Part Number | | |
| Electronic Control Module (ECM) | | |
| Electronic Control Module Serial Numbers (ECM) | | |
| Filter Part Numbers: | | |
| • Air Cleaner Element | | |
| • Lubricating Oil | | |
| • Fuel | | |
| • Fuel-Water Separator | | |
| • Coolant | | |
| • Crankcase Ventilation | | |
| • Cummins Particulate Filter | | |
| Governor Control Module (GCM) (if applicable) | | |
| Belt Part Numbers: | | |

| | | |
|---|---|---|
| • | | |
| • | | |
| • | | |
| Clutch or Marine Gear (if applicable): | | |
| • Model | | |
| • Serial Number | | |
| • Part Number | | |
| • Oil Type | | |
| • Sea Water Pump | | |
| - Model | | |
| - Part Number | | |

# Section i - Introduction

## Section Contents

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# Symbols

## General Information

The symbols have been used in this manual to help communicate the intent of the instructions. When one of the symbols appears, it conveys the meaning defined below.

**NOTE:** It is possible to have four symbols for each text and graphic combination.

**⚠ WARNING ⚠**
**Serious personal injury or extensive property damage can result if the warning instructions are not followed.**

**△CAUTION△**
**Minor personal injury can result or a part, and assembly, or the engine can be damaged if the caution instructions are not followed.**

Indicates a **REMOVAL** or **Dissassembly** step.

Indicates an **INSTALLATION** or **ASSEMBLY** step.

**INSPECTION** is required.

**CLEAN** the part or assembly.

**PERFORM** a mechanical or time **MEASUREMENT**.

**LUBRICATE** the part or assembly.

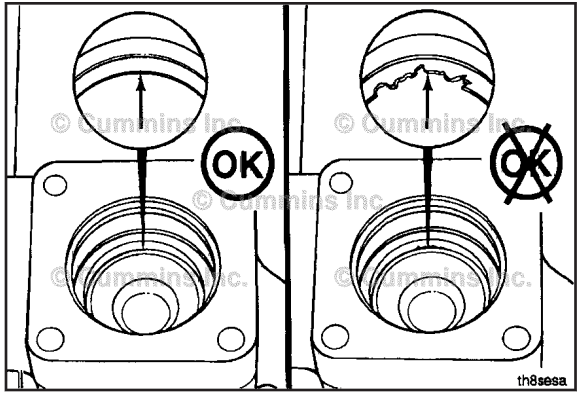
Indicates that a **WRENCH** or **TOOL SIZE** will be given.

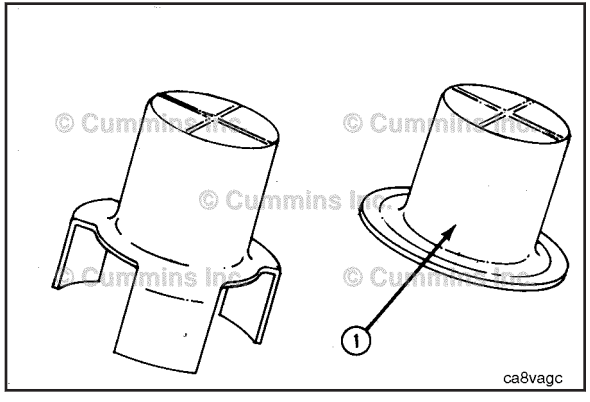
**TIGHTEN** to a specific torque.

**PERFORM** an electrical **MEASUREMENT**.

Refer to another location in this manual or another publication for additional information.

The component weighs 23kg [50 lbs] or more. To reduce the possibility of personal injury, use a hoist or get assistance to lift the component.




# Illustrations

## General Information

Some of the illustrations throughout this manual are generic and will **not** look exactly like the engine or parts used in your application. The illustrations can contain symbols to indicate an action required and an acceptable or **not** acceptable condition.

The illustrations are intended to show repair or replacement procedures. The procedure will be the same for all applications, although the illustration can differ.

# General Safety Instructions

## Important Safety Notice

Read and understand the safety information and precautions before performing any repair or operating equipment. This procedure contains general safety precautions that **must** be followed to provide personal safety. **Always** follow procedures to mitigate safety concerns.

## Work Environment

Follow these recommended practices when servicing products.

- **Always** follow on-site safety requirements.
- **Always** follow local training, certification, authorization, and specific customer requirements. Do **not** work on products unless proper training has been completed to allow safe repair completion. Do **not** operate equipment unless proper training has been completed to allow safe operation..
- Work in a well-ventilated area away from ignition sources.
- If adverse weather conditions are present, take appropriate safety precautions when performing work.
- **Always** be aware of hazardous conditions that may exist in the work environment.

## Best Practices

Follow these recommended practices when servicing or operating equipment.

- **Always** wear protective glasses and protective shoes.
- Remove rings, watches, long jewelry, or metallic items.
- Do **not** wear loose fitting or torn clothing, jewelry, long hair, etc.. These increase the risk for personal injury.

- Do **not** perform any repairs, or operate equipment, when fatigued or impaired due to drugs or alcohol.
- **Always** use tools that are in good condition.
- Do **not** work on equipment that is running unless otherwise directed by troubleshooting procedures.
- If any work **must** be performed while the unit is running, use extreme caution around hot components, moving parts, etc..
- Exercise caution when working on products that have just been turned off. Hot parts may cause burns or ignite or melt common materials.
- Do **not** bleed the fuel system of a hot engine. Contact with hot manifolds or other components can cause a fire.
- Do **not** attempt to rotate the crankshaft by pulling or prying on the fan. **Only** use proper engine barring techniques.
- Do **not** lift components that weigh 23 kg [ 50 lb ] or more. Use mechanical help or seek assistance.
- Exercise caution when working around rotating parts. Rotating parts can cause cuts, mutilation, or strangulation.
- Exercise caution when working on electrical components. High voltages can cause serious injury or death.
- Relieve system pressure as instructed before removing or disconnecting lines, fittings, or related items.
- **Always** test for pressure leaks as instructed.
- **Always** torque fittings and connections to the required specifications. Over or under tightening can damage threads and create leaks.
- **Always** use the same fastener part number, or equivalent, when replacing fasteners.

Perform the following prior to beginning work on any products.

- Shutdown the equipment unless otherwise directed by troubleshooting procedures.
- **Always** allow the product to cool.

- **Always** ensure the product is properly supported by blocks or stands. Do **not** work on a product supported **only** by lifting jacks or hoists.
- Disconnect the battery unless otherwise directed by troubleshooting procedures.
- Disconnect the starting motor, if equipped, unless otherwise directed by troubleshooting procedures.
- Place a "Do NOT Operate" tag in the operator area or near the product controls.
- Become familiar with the tools required for performing the task at hand and how to use those tools correctly.
- Use only genuine Cummins or Cummins Recon replacement parts as instructed.

## Personal Protective Equipment (PPE)

To reduce the possibility of personal injury, personal protective equipment (PPE) should be utilized. Various types of PPE are listed below. Use proper judgment to determine which types of PPE are required for a given task. **Always** meet on-site safety regulations for required PPE. Proper maintenance of safety equipment **must** be practiced. Integrity of safety equipment **must** be checked to ensure equipment functionality is maintained.

### Eye Protection

Eye protection **must always** be worn. Wear appropriate eye protection based on the task being completed. Types of eye protection to consider are listed below.

- Safety glasses. Exposure to flying particles or debris, chemicals or caustic liquids, gases or vapors.
- Polarized safety glasses. Working in outdoor or bright lighting environments.
- Over-the-glass safety glasses. Add protection to prescription glasses.
- Safety goggles. Handling caustic liquids or chemicals.
- Shade or arc rated eyewear. Exposure to welding. Use appropriate filter ratings.

### Foot Protection

Protective shoes **must always**be worn. Wear appropriate foot protection based on the task being completed. Types of protective footwear to consider are listed below.

- Steel toed shoes. Exposure to falling or rolling objects. Working with or around parts, tools, and equipment.
- Chemical resistant. Exposure to chemicals and other fluids.
- Overshoes and overboots. Add protection to everyday work shoes.
- Foot, toe, and metatarsal guards. Add protection to everyday work shoes.
- Electrical hazard safety toe shoes. Exposure to electrical hazards.
- Leather footwear or shoe protectors. Exposure to welding or arc flash.
- Cold protection. Exposure to cold weather.

### Head and Face Protection

Wear appropriate face protection based on the task being completed. Types of head and face protection to consider are listed below.

- Hard hats. Exposure varies. Consider welding, heat, or arc-rated.
- Visors. Exposure varies. Consider welding, heat, or arc-rated.
- Face liners. Exposure to cold weather.
- Face shields. Exposure to liquid splash. Handling caustic liquids or chemicals.

### Hand Protection

Wear appropriate type and fit of gloves based on the task being completed. Types of protective gloves to consider are listed below.

- Heat resistant or insulated. Exposure to hot items.
- Flame resistant. Exposure to welding or arc flash.
- Impact resistant. Performing repetitive impact and vibration work. Using pneumatic tools.
- Impervious. Exposure to high pressure fluids.
- Chemical resistant. Exposure to chemicals, fluids, or batteries.
- Cut resistant. Handling sharp objects or tools.
- Cold weather. Exposure to cold weather.

**Hearing Protection**

When working around operating equipment, appropriately rated hearing protection should be worn. Types of hearing protection to consider are listed below.

- Single use ear plugs.
- Pre-formed ear plugs.
- Ear muffs.

**Protective Clothing**

Wear appropriate protective clothing based on the task being completed. Types of protective clothing to consider are listed below.

- Flame resistant. Exposure to electrical hazards. Exposure to oil and gas or generator set applications. Performing welding.
- Chemical resistant. Exposure to chemicals.

- High visibility. Exposure to reduced visibility working environments. Working on mining, oil and gas, or sites with large equipment.

**Respiratory Protection**

Wear appropriate respiratory protection based on the task being completed. Types of respiratory protection to consider are listed below.

- Disposable respirators. Exposure to dust and particles, welding fumes, nuisance odors, nuisance level acid gas.
- Reusable respirators. Exposure to cleaning, machining, welding, sanding, grinding, etc.

**Fall Protection**

Utilize fall protection if a task is being completed more than 1.2 m [ 4 ft ] above a solid surface. Types of fall protection to consider are listed below.

- Fall harness and lanyard combinations.
- Safety nets.
- Guardrails.

## Fuels

Follow these recommended practices when interacting with equipment that uses different fuel types. For information regarding proper handling of various substances, refer to the manufacturer's safety data sheet.

**Diesel Fuel**

- Protect eyes.
- Protect skin.

- **Always** test for fuel leaks as instructed.
- Do **not** dilute.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Provide extra ventilation to the work area.
- Do **not** troubleshoot or repair fuel leaks while the engine is running.
- If material is spilled, avoid contact and dispersal with runoff, soil, waterways, drains, and sewers. Absorb with sand, clay, or commercial absorbent. Transfer to containers and neutralize the material. Flush spill area with soap and excess water.
- Report spills effecting water source contamination to local authorities immediately.
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.
- **Always** torque fittings and connections to the required specifications. over or under tightening can damage threads and create leaks.

**Gasoline**

- Protect eyes.
- Protect skin.
- **Always** be alert for the smell of gas.
- **Always** test for fuel leaks as instructed.
- Do **not** dilute.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.

- Vapors accumulate near the floor. Check the work floor, sumps, and low lying areas for ignition sources before servicing equipment..
- Provide extra ventilation to the work area.
- Do **not** troubleshoot or repair fuel leaks while the engine is running.
- If material is spilled, avoid contact and dispersal with runoff, soil, waterways, drains, and sewers. Absorb with sand, clay, or commercial absorbent. Transfer to containers and neutralize the material. Flush spill area with soap and excess water.
- Report spills effecting water source contamination to local authorities immediately.
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.
- **Always** torque fittings and connections to the required specifications. over or under tightening can damage threads and create leaks.

**Biodiesel**

- Protect eyes.
- Protect skin.
- **Always** test for fuel leaks as instructed.
- Do **not** dilute.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Vapors accumulate near the floor. Check the work floor, sumps, and low lying areas for ignition sources before servicing equipment..
- Provide extra ventilation to the work area.
- Do **not** troubleshoot or repair fuel leaks while the engine is running.

- If material is spilled, avoid contact and dispersal with runoff, soil, waterways, drains, and sewers. Absorb with sand, clay, or commercial absorbent. Transfer to containers and neutralize the material. Flush spill area with soap and excess water.
- Report spills effecting water source contamination to local authorities immediately.
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.
- **Always** torque fittings and connections to the required specifications. over or under tightening can damage threads and create leaks.

**Compressed Natural Gas**

- Protect eyes.
- Protect skin.
- **Always** be alert for the smell of gas. Compressed natural gas is typically treated with an odor producing chemical for leak detection. Non-refined sources of natural gas (landfill gas, biogas, coal bed gas, wellhead gas, etc.) can **not always** be detected by smell.
- **Always** test for fuel leaks as instructed. Odorant can fade.
- Upon entering a room or approaching a vehicle where the smell of gas is present, immediately shutoff all engines and ignition sources.
- Natural gas ignites when there is a 5% - 15% mixture in the air. Asphyxiation can occur when concentration reaches 21% or more.
- Do **not** start equipment or nearby equipment until a suspected gas leak is corrected and the area is ventilated.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Work in areas that do **not** share common ventilation with areas containing ignition sources.

- Store and service natural gas fueled equipment in large, well-ventilated areas, or outside.
- Provide extra ventilation to the work area.
- Natural gas accumulates near the ceiling. Check the ceiling of the work area for ignition sources before servicing equipment.
- **Only** disconnect gas lines in a well-ventilated area.
- Do **not** troubleshoot or repair gas leaks while the engine is running.
- Natural gas ignition systems produce high voltage during operation. Do **not** touch ignition wiring or components while the engine is operating. If necessary, use **only** insulated tools.
- Natural gas exhaust systems operate at higher temperatures than similar diesel exhaust systems. Do **not** touch exhaust components. Do **not** route lines or hoses which deteriorate from heat exposure near exhaust components or in the flow path of the exhaust.
- **Always** torque fittings and connections to the required specifications. over or under tightening can damage threads and create leaks.

**Liquefied Natural Gas**

- Protect eyes.
- Protect skin.
- **Always** be alert for the smell of gas. Liquefied natural gas may **not** have an odor. Non-refined sources of natural gas (landfill gas, biogas, coal bed gas, wellhead gas, etc.) can **not always** be detected by smell.
- **Always** test for fuel leaks as instructed. Odorant can fade.
- Upon entering a room or approaching a vehicle where the smell of gas is present, immediately shutoff all engines and ignition sources.

- Natural gas ignites when there is a 5% - 15% mixture in the air. Asphyxiation can occur when concentration reaches 21% or more.
- Do **not** start equipment or nearby equipment until a suspected gas leak is corrected and the area is ventilated.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Work in areas that do **not** share common ventilation with areas containing ignition sources.
- Store and service natural gas fueled equipment in large, well-ventilated areas, or outside.
- Provide extra ventilation to the work area.
- Natural gas accumulates near the ceiling. Check the ceiling of the work area for ignition sources before servicing equipment.
- **Only** disconnect gas lines in a well-ventilated area.
- Do **not** troubleshoot or repair gas leaks while the engine is running.
- Natural gas ignition systems produce high voltage during operation. Do **not** touch ignition wiring or components while the engine is operating. If necessary, use **only** insulated tools.
- Natural gas exhaust systems operate at higher temperatures than similar diesel exhaust systems. Do **not** touch exhaust components. Do **not** route lines or hoses which deteriorate from heat exposure near exhaust components or in the flow path of the exhaust..
- Liquefied natural gas is stored in vehicle tanks at extremely cold temperatures. If there is a liquefied natural gas spill, evacuate the area immediately and do not attempt to make contact with the liquid.
- **Always** torque fittings and connections to the required specifications. over or under tightening can damage threads and create leaks.
- Vapors accumulate near the floor. Check the work floor, sumps, and low lying areas for ignition sources before servicing equipment.

### Liquefied Petroleum Gas

- Protect eyes.
- Protect skin.
- **Always** be alert for the smell of gas. Liquefied petroleum gas is typically treated with an odor producing chemical for leak detection.
- **Always** test for fuel leaks as instructed. Odorant can fade.
- Upon entering a room or approaching a vehicle where the smell of gas is present, immediately shutoff all engines and ignition sources.
- Do **not** start equipment or nearby equipment until a suspected gas leak is corrected and the area is ventilated.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Work in areas that do **not** share common ventilation with areas containing ignition sources.
- Store and service natural gas fueled equipment in large, well-ventilated areas, or outside.
- Provide extra ventilation to the work area.
- Liquefied petroluem gas accumulates near the floor. Check the work floor, sumps, and low lying areas for ignition sources before servicing equipment.
- **Only** disconnect gas lines in a well-ventilated area.
- Do **not** troubleshoot or repair gas leaks while the engine is running.
- Liquefied petroleum gas ignition systems produce high voltage during operation. Do **not** touch ignition wiring or components while the engine is operating. If necessary, use **only** insulated tools.

- Liquefied petroleum gas exhaust systems operate at higher temperatures than similar diesel exhaust systems. Do **not** touch exhaust components. Do **not** route lines or hoses which deteriorate from heat exposure near exhaust components or in the flow path of the exhaust..
- Liquefied natural gas is stored in vehicle tanks at extremely cold temperatures. If there is a liquefied natural gas spill, evacuate the area immediately and do not attempt to make contact with the liquid.
- **Always** torque fittings and connections to the required specifications. over or under tightening can damage threads and create leaks.

## Power Generation Applications

Follow these recommended practices when interacting with equipment in generator set applications.

Power generation applications produce high voltage during operation. When servicing a generator set, the following safety precautions **must** be taken.

- Remove any debris from the generator set.
- Keep the floor clean and dry throughout servicing
- Service access doors **must** be secured in the "open" position before working on enclosed generator sets.
- Use insulated or non-conducting tools.
- Prevent accidental or remote starting. Disconnect the starting battery cables. Disconnect the negative ( - ) terminal first.
- Isolate all auxiliary supplies.
- Switch the generator set control panel "off."
- Place a "Do **Not** Operate" tag on the control panel.

- Lock the generator set circuit breaker in the "Open" position.
- Activate the manual "Emergency Stop" device.
- Do **not** step on the generator set when servicing, entering, or leaving the generator room.

## Aftertreatment

Follow these recommended practices when interacting with equipment that utilize aftertreatment systems. For information regarding proper handling of various substances, refer to the manufacturer's safety data sheet.

**Diesel Exhaust Fluid**

- Avoid breathing vapor or mist.
- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes.
- Protect skin. In case of contact with skin, wash with soap and water.
- Do **not** ingest. If ingested, contact a physician immediately.

**Diesel Particulate Filter**

- Protect eyes.
- Protect skin.
- Avoid stirring up exhaust particulate dust.
- Avoid inhalation of exhaust particulate dust. Wear a dust mask. If respiratory irritation or discomfort occurs, leave the dusty area. Utilize breathing assistance or oxygen if necessary.
- Elevated concentrations of metals in the form of dust, soot, and contaminants are contained in these filters. Health regulations may exist for the materials found in these filters such as Zinc, Molybdenum, polynuclear aromatic

hydrocarbons. Potentially toxic materials found in these filters are oxides of calcium, zinc, phosphorous, silicon, sulfur, and iron.

- Proper disposal of the exhaust dust and filter are required. Dispose of in accordance with local and environmental regulations.
- Diesel particulate filter maintenance **must** be completed by appropriately trained personnel.

**Selective Catalytic Reduction (SCR) Catalyst**

- Protect eyes.
- Protect skin.
- Avoid stirring up exhaust catalyst dust.
- Avoid inhalation of exhaust catalyst dust. Wear a dust mask. If respiratory irritation or discomfort occurs, leave the dusty area. Utilize breathing assistance or oxygen if necessary.
- Do **not** cut open exhaust catalyst assemblies.
- Proper disposal of the exhaust catalyst is required. Dispose of in accordance with local and environmental regulations.

**Oxidation Catalysts**

Types of Oxidation Catalysts may include, but are not limited to the following.

- Diesel Oxidation Catalyst (DOC)
- 3-way Oxidation Catalyst

When working with oxidation catalysts, perform the following.

- Protect eyes.

- Protect skin.
- Avoid stirring up exhaust catalyst dust.
- Avoid inhalation of exhaust catalyst dust. Wear a dust mask. If respiratory irritation or discomfort occurs, leave the dusty area. Utilize breathing assistance or oxygen if necessary.
- Do **not** cut open exhaust catalyst assemblies.

## Common Substances

Follow these recommended practices when interacting with the following substances. For information regarding proper handling of various substances, refer to the manufacturer's safety data sheet.

**Coolant**

- Coolant is also referred to as antifreeze.
- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes. Receive medical attention immediately.
- Protect skin. In case of contact with skin, wash with soap and water. Remove contaminated clothing. If injection occurs, it is a medical emergency. Receive medical attention immediately.
- Do **not** ingest. If ingested, drink excess water for dilution and seek medical attention.
- Do **not** pour used antifreeze into containers that have been used to store other chemicals or products, such as oil or gasoline, unless they have been thoroughly cleaned.
- If material is spilled, avoid contact and dispersal with runoff, soil, waterways, drains, and sewers. Provide adequate ventilation to the area. Absorb with sand, clay, or commercial absorbent. Transfer to containers and neutralize the material. Flush spill area with soap and excess water.

- Report spills effecting water source contamination to local authorities immediately.
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.

**Liquid Nitrogen**

- Work in a well-ventilated area.
- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes. Receive medical attention immediately.
- Protect skin. In case of contact with skin, receive medical attention immediately.
- Wear protective clothing and gloves that insulate.
- Handle items with tongs or wire hooks.
- Avoid prolonged breathing of liquid nitrogen vapors. Utilize breathing assistance or oxygen if necessary.

**Lubricating Oil**

See Lubricating Oil in the "Hazardous Substances" step.

**Refrigerant**

- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes. In case of frostbite, use lukewarm water, not hot. Seek medical attention if irritation continues.
- Protect skin. Wear leather or insulated gloves. In case of contact with skin, wash with soap and water. Seek medical attention if irritation continues.
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.
- **Only** disconnect liquid refrigerant lines in a well-ventilated area. liquid refrigerant systems **must** be properly emptied and filled using equipment that prevents the release of refrigerant gas into the atmosphere. Federal law requires capturing and recycling refrigerant in the United States of America.

### Solvents

- Follow the manufacturer's instructions for safe handling practices.
- Follow the manufacturer's recommendations for use.
- Some solvents are flammable and toxic..
- Protect eyes. In case of contact with eyes, follow manufacturer's recommendations.
- Protect skin. In case of contact with skin, follow manufacturer's recommendations.
- Dispose of in accordance with manufacturer's recommendations.

### Starting Aids (Starting Fluid)

- Do **not** use starting fluid if the intake air heater option is used.
- Do **not** use volatile cold starting aids in underground mine or tunnel operations. The local United States Bureau of Mines inspector can provide more information and instructions.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Work in a well-ventilated area.
- Avoid inhalation.

## Hazardous Substances

Hazardous substances are known to some state and federal agencies to be carcinogenic and cause reproductive harm. Hazardous substances that may be encountered during service events are listed below.

### Diesel Engine Exhaust

- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes.

- Protect skin. In case of contact with skin, wash with soap and water.
- Avoid inhalation.

**Lubricating Oil**

- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes.
- Protect skin. In case of contact with skin, wash with soap and water.
- Do **not** ingest. If ingested, contact a physician immediately..
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.
- Do **not** allow water droplets to enter a container of hot oil. A violent reaction can result.

**Mercury**

- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes.
- Protect skin. In case of contact with skin, wash with soap and water.
- Do **not** ingest. If ingested, contact a physician immediately.
- Proper disposal is required. Dispose of in accordance with local and environmental regulations.

**Vanadium Pentoxide**

- Can be found in some selective catalytic reduction (SCR) catalysts.
- Protect eyes. In case of contact with eyes, flush with water for a minimum of 15 minutes.
- Protect skin. In case of contact with skin, wash with soap and water.
- Do **not** ingest. If ingested, contact a physician immediately.
- Avoid inhalation of vapors or airborne particles.

- Proper disposal is required. Dispose of in accordance with local and environmental regulations.

## Electrical Components

Follow these recommended practices when interacting with electrical components.

**Batteries**

- Protect eyes. Wear safety glasses or goggles. In case of battery acid contact with eyes, flush with water for a minimum of 15 minutes. Receive medical attention immediately.
- Protect skin. Wear rubber gloves and a chemical apron. In case of battery acid contact with skin or clothing, rinse with water for several minutes. Avoid spreading the acid. Receive medical attention immediately.
- Do **not** open the battery caps with your face over or near the battery.
- Remove rings, watches, long jewelry, or metallic items when working with or near batteries.
- Ventilate the battery compartment before servicing the battery.
- Work in a well-ventilated area.
- Avoid sparks, arcing switches and equipment, cigarettes, pilot lights, flames, and other sources of ignition.
- Use insulated or non-conducting tools.
- Neutralize static buildup by contacting the nearest ground surface before working on a battery.
- Do **not** lift batteries by the posts.
- Do **not** touch both battery terminals with your bare hands at the same time.
- Disconnect the negative ( - ) battery cable first.
- Attach the negative ( - ) battery cable last.

## Common Hazards

Follow these recommended practices when interacting with equipment as the following hazards may exist.

**High Temperature Area**

Be alert for high temperature areas which may cause severe burns. High temperature areas may be encountered in the following situations.

- On products that have just been turned off.
- On or around exhaust related components (turbocharger, aftertreatment systems, etc).
- In exhaust gas flow paths.
- Contacting hot fluid lines, tubes, or compartments.

**Recommended Practices:**

- Allow components to cool before servicing. Verify the temperature of the component. Utilize an infrared gun, temperature sensor, temperature gauge, or other reliable method to determine component temperature. Take appropriate precautions before starting work.
- Protect eyes.
- Protect skin. Wear insulated gloves.
- Ensure surrounding items do not come in contact with hot components or exhaust. Contact may ignite or melt those materials.

**Heavy Objects**

Be alert when working with heavy objects.

- Do **not** lift components that weigh 23 kg [ 50 lb ] or more. Use mechanical help or seek assistance.

- Use mechanical help to move items whenever possible. Make sure the load is securely fastened to the equipment.
- Make sure lifting devices, like chains, hooks, slings, etc., are in good condition and are rated for the correct capacity before use.
- Make sure lifting devices are positioned correctly before use.
- Use a spreader bar when necessary.
- If the item can be lifted manually, squat to lift and lower the item. Do **not** bend at the waist.
- Maintain balance when lifting items by keeping feet apart or staggered if possible.
- If the item must be carried, make sure the path is clear when carrying the item to, and placing the item in, the desired location.

**Pressurized Areas**

Be alert for pressurized areas. Pressurized areas may be encountered in the following situations.

- Air, Oil, Fuel, and Cooling systems.
- When disconnecting or removing lines, fittings, or related items.
- When disconnecting a device from a pressurized system.
- When removing or loosening caps on tanks or pressurized systems.

Injuries that may result when interacting with pressurized areas are listed below.

- High pressure spray can penetrate the skin. Serious injury or death may result.
- Hot fluid spray can cause burns. See "High Temperature Area."

**Recommended Practices:**

- Protect skin. Wear impervious gloves. If skin penetration from high pressure spray occurs, it is a medical emergency. Receive medical attention immediately.
- Check for pressure leaks as instructed. **Never** check for pressure leaks with your hand.
- Allow product to cool before accessing pressurized areas.
- Relieve system pressure as instructed.
- Slowly loosen fill caps to relieve pressure before servicing.

## Job Safety Assessment

Completing a Job Safety Assessment (JSA) prior to performing work helps identify job safety hazards and prevent incidents. Use the guidelines below to assess if a situation is safe or at risk prior to performing designated work. If deteremined to be at risk, take appropriate precautions to prepare for, or eliminate, the hazard. If the risks are uncontrollable, consult a knowledgeable resource to find a safe practice solution. A knowledgeable resource may include, but is not limited to, one of the following:

- Site supervisor
- Customer
- Work supervisor

**Always** check with the site where work is being performed to determine if safety assessment documentation is required.

**Work Practices**

Job Safety Analysis.

- Assess the job to identify safety hazards that may occur during the repair event.

Ascending or Descending

- Maintain 3 points of contact when using steps, ladders, or entering and exiting a unit.

Communication

- When working with others, make sure you understand what each other is doing to safely complete the task.

Eyes On Hands and Work.

- Confirm if you will be able to maintain an unobstructed view of your hands at all times while performing the task.

Eyes On Path

- Watch for hazards in your path to avoid trip or slip hazards. Examples are pits, platform edges, etc.

Line Of Fire

- Position yourself so that you avoid striking against, or being struck by, anything that can swing, fall, or roll.

Pinch Point

- Prevent exposure of all parts of your body to a nip hazard or pinch point.

Rushing

- Take adequate time to safely perform the job. Do **not** rush or take short cuts.

Follow Procedures

- Utilize QuickServe® Online or other standard procedures when available.
- Make sure the procedures are correct and safe.

**Ergonomics**

Back-Bending and Twisting

- Avoid bending forward more than 45 at your waist.
- Avoid working with your back twisted with loads over 23 kg [ 50 lb ].

Knee

- Avoid bending your knee more than 90.
- Avoid kneeling for more than 4 hours per day.

Lifting and Lowering

- Squat to pick up parts.
- Keep loads close to the body when lifting or carrying.
- Use a team lift or a lifting device if the object is more than 23 kg [ 50 lb ].

Pulling or Pushing

- Pull with your arms.
- Push with your legs.
- Avoid exerting more force than necessary.
- Avoid moving heavy load(s) too quickly.

**Tools and Equipment**

Selection

- Select the correct tool or equipment to perform the task.

Condition

- Confirm the tool or equipment is free of defects before use.

- Confirm that safety devices are in place before use.

Use

- Use the tool or equipment as directed.
- Follow the manufacturer's instructions.

**Personal Protective Equipment (PPE)**

Eye, Face, and Head Protection

- Confirm the eye, face, or head protection you plan to use are adequate for performing the task at hand.

Foot Protection

- Confirm the foot protection you plan to use is adequate for performing the task at hand in the current environment.

Fall Protection

- Fall protection should be used if you are working more than 1.2 m [ 4 ft ] above the floor.
- Use fall protection if you have been properly trained to do so. If you are not trained to use fall protection, allow someone who has received proper training to perform the task.

Hand Protection

- Avoid exposing hands to cuts or burns while completing the task.
- Confirm the proper glove type is being used for the task at hand. Examples are cut-resistant, chemical-resistant, electric shock-resistant, electric arc flash, welding, etc.

Hearing Protection

- Hearing protection should be worn when required or recommended.

Body Protection

- Body parts should be protected from work hazards.
- Avoid contact with sharp edges, hot surfaces, etc.

**Work Prcedures**

Training

- Confirm if you have received task and safety training for the job being performed.

Working Alone

- Avoid working alone.
- Avoid working where you are **not** able to be seen or heard by another person.
- If you **must** work alone, notify others of your location and schedule check-in times.

Lockout and Tagout

- Lock out or tag out energy sources before work. Examples are electrical, mechanical, hydraulic, and pneumatic.

Barricades and Warnings

- Mark overhead work areas with barricade tape or signs.
- Mark open floor hazards with barricade tape, signs, or cones.

Confined Space

- Confirm if a confined space entry permit is required.
- If required, confirm the permit is posted, signed, and dated correctly.

Hot Work

- Confirm a functional fire extinguisher is readily available.

- Maintain separation between ignition sources and fuel sources.

Place Wheel Chocks

- Place wheel chocks at either the front or back tire of the unit prior to starting the task.

Spotter

- Use a spotter when moving a customer's unit.
- Confirm the driver can see and hear the spotter when moving.

Housekeeping (The 5 S's - Scrap or Segregate, Set to Order, Spotless, Standardize, and Sustain)

- Remove parts, extension cords, air hoses, and liquids from the work area that may cause trip, slip, or fall hazards.

# Acronyms and Abbreviations

## General Information

The following list contains some of the acronyms and abbreviations used in this manual.

| | |
|---|---|
| **ANSI** | American National Standards Institute |
| **API** | American Petroleum Institute |
| **ASTM** | American Society of Testing and Materials |
| **ATDC** | After Top Dead Center |
| **bhp** | Brake Horsepower |
| **BTU** | British Thermal Unit |
| **BTDC** | Before Top Dead Center |
| **°C** | Celsius |
| **CAN** | Controller Area Network |
| **CO** | Carbon Monoxide |
| **CCA** | Cold Cranking Amperes |
| **CARB** | California Air Resources Board |
| **CES** | Cummins Engineering Standard |
| **C.I.B.** | Customer Interface Box |
| **C.I.D.** | Cubic Inch Displacement |
| **CNG** | Compressed Natural Gas |
| **CPL** | Control Parts List |

| | |
|---|---|
| **cSt** | Centistokes |
| **DEF** | Diesel Exhaust Fluid |
| **DOC** | Diesel Oxidation Catalyst |
| **DPF** | Diesel Particulate Filter |
| **ECM** | Engine Control Module |
| **EFC** | Electronic Fuel Control |
| **EGR** | Exhaust Gas Recirculation |
| **EPA** | Environmental Protection Agency |
| **ESN** | Engine Serial Number |
| **°F** | Fahrenheit |
| **ft-lb** | Foot-Pound Force |
| **FMI** | Failure Mode Indentifier |
| **GVW** | Gross Vehicle Weight |
| **Hg** | Mercury |
| **hp** | Horsepower |
| **$H_2O$** | Water |
| **inHg** | Inches of Mercury |
| **in $H_2$ 0** | Inches of Water |
| **ICM** | Ignition Control Module |
| **IEC** | International Electrotechnical Commission |
| **km/l** | Kilometers per Liter |

| | |
|---|---|
| **kPa** | Kilopascal |
| **LNG** | Liquefied Natural Gas |
| **LPG** | Liquefied Petroleum Gas |
| **LTA** | Low Temperature Aftercooler |
| **MCRS** | Modular Common Rail System |
| **MIL** | Malfunction Indicator Lamp |
| **MPa** | Megapascal |
| **mph** | Miles Per Hour |
| **mpq** | Miles Per Quart |
| **N•m** | Newton-meter |
| **NOx** | Nitrogen Oxides |
| **NG** | Natural Gas |
| **O2** | Oxygen |
| **OAT** | Organic Acid Technology |
| **OBD** | On-Board Diagnostics |
| **OEM** | Original Equipment Manufacturer |
| **OSHA** | Occupational Safety and Health Administration |
| **PID** | Parameter Identification Descriptions |
| **PPE** | Personal Protective Equipment |
| **ppm** | Parts Per Million |
| **psi** | Pounds Per Square Inch |

| | |
|---|---|
| **PTO** | Power Takeoff |
| **QSOL** | QuickServe® Online |
| **REPTO** | Rear Engine Power Takeoff |
| **RGT** | Rear Gear Train |
| **rpm** | Revolutions Per Minute |
| **SAE** | Society of Automotive Engineers |
| **SCA** | Supplemental Coolant Additive |
| **SCR** | Selective Catalytic Reduction |
| **STC** | Step Timing Control |
| **SID** | Subsystem Identification Descriptions |
| **TDC** | Top Dead Center |
| **TSB** | Technical Service Bulletin |
| **ULSD** | Ultra Low Sulfur Diesel |
| **VDC** | Volts of Direct Current |
| **VGT** | Variable Geometry Turbocharger |
| **VS** | Variable Speed |
| **VSS** | Vehicle Speed Sensor |

# Section E - Engine and System Identification

## Section Contents

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# Engine Identification

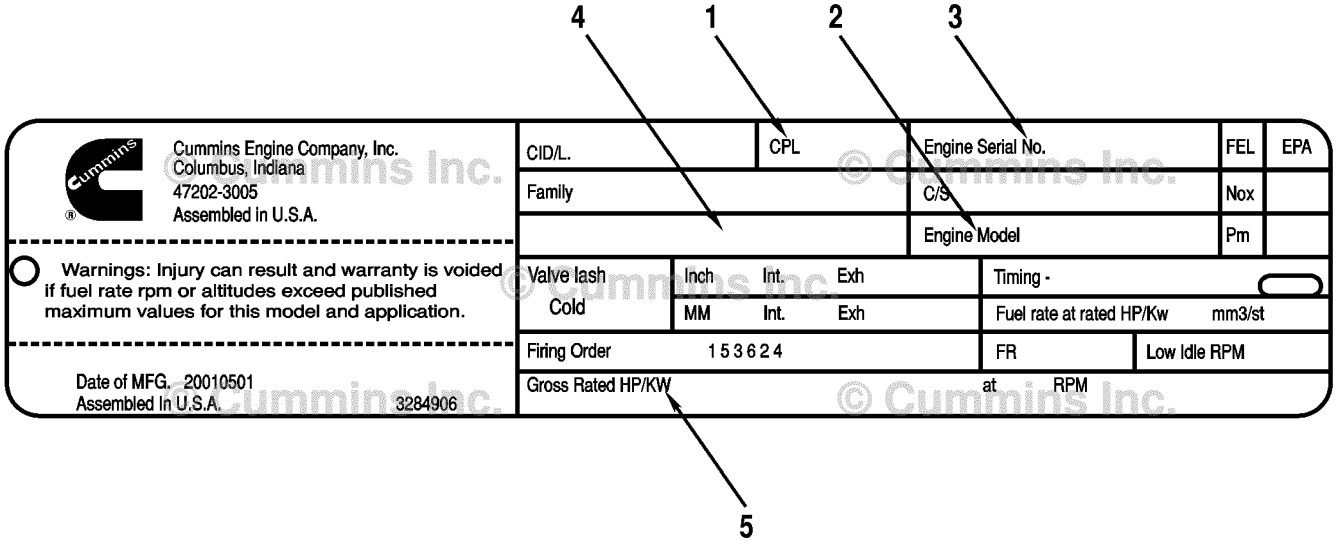
## Engine Dataplate

### Marine and Industrial Applications

The engine dataplates show specific information about your engine. The engine serial number and control parts list (CPL) provide information for ordering parts and service manuals.

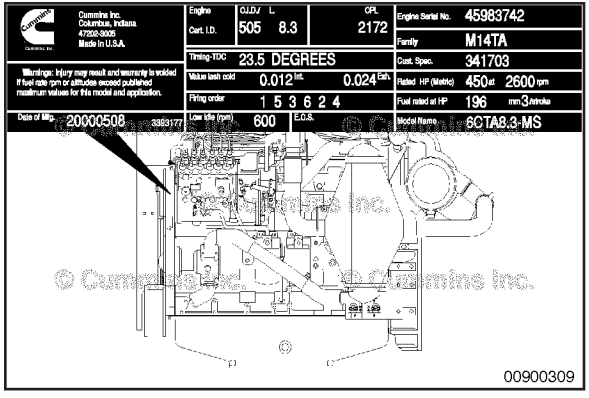
**NOTE:** The engine dataplate **must not** be changed unless approved by Cummins.

The industrial engine dataplate is located on the top side of the gear housing. Have the following engine data available when communicating with a Cummins Authorized Repair Location. The information on the dataplate is **mandatory** when sourcing service parts.

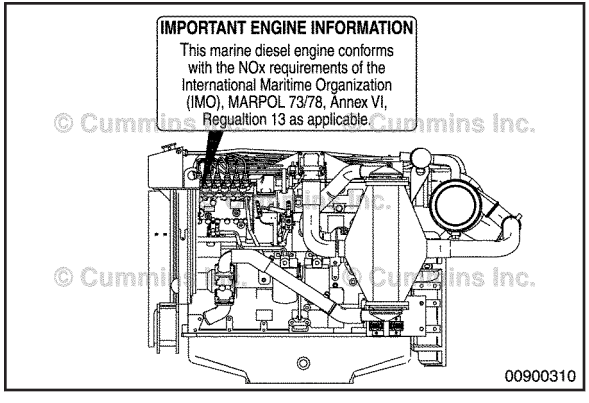



1 Control parts list (CPL)
2 Model
3 Engine serial number
4 Emissions certification
5 Horsepower and rpm rating.

Marine dataplate location.




**NOTE:** This marine diesel engine conforms to the NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78, Annex VI, Regulation 3 as applicable.

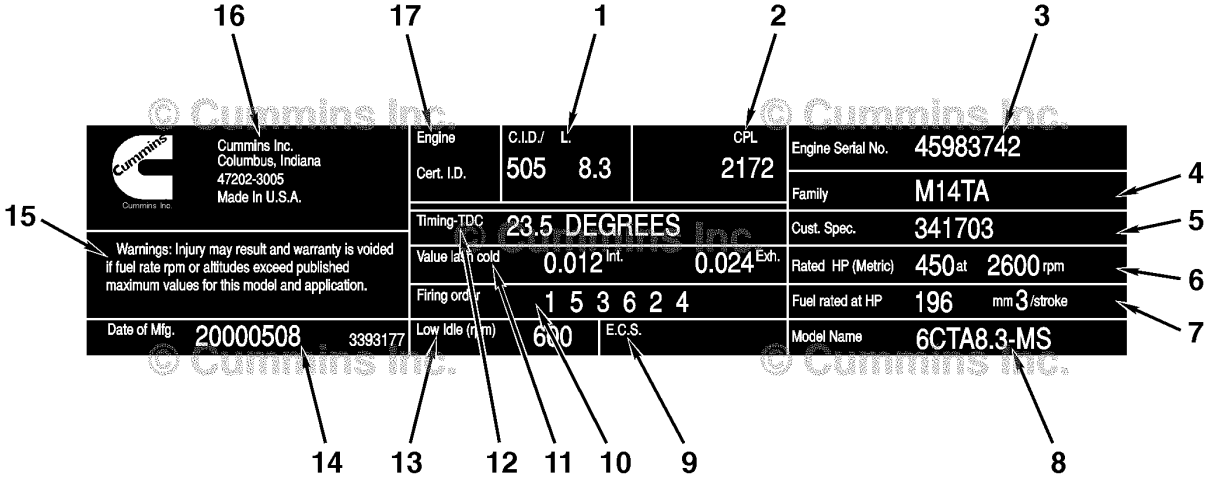


# Engine Identification

## Engine Dataplate

### Marine and Industrial Applications

Use the information from the marine engine dataplate when discussing service or the source of parts for your engine.




00900311

1 Cubic inch displacement and liter displacement
2 Control Parts List Number
3 Engine serial number
4 Emission family identification
5 Customer specification - base engine part number
6 Rated horsepower at rpm
7 Fuel rated at horsepower
8 Model name
9 Emission control system (currently **not** used on marine)
10 Firing order
11 Valve lash cold
12 Timing - top dead center
13 Low idle (rpm)
14 Date of manufacturing
15 Warning tag
16 Cummins address:

- Cummins Incorporated
- Columbus, Indiana
- 47202-3005

- Made in U.S.A.

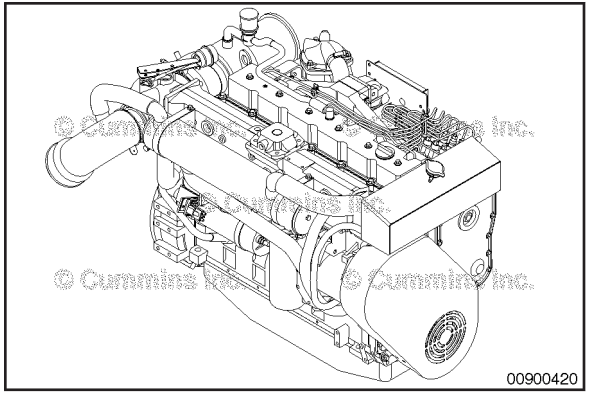
21 Engine certification identification (currently **not** used on marine).

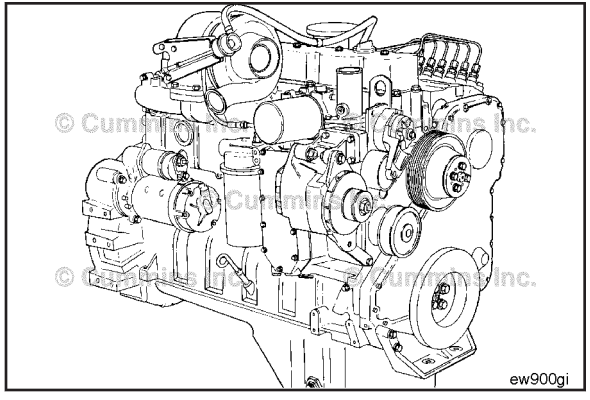
# Cummins® Engine Nomenclature

## Marine Applications

6CTA8.3M2 Marine Applications

- 6 = number of cylinders
- C = engine series
- T = turbocharged
- A = aftercooled
- 8.3 = displacement in liters
- M = marine
- 3 = design phase

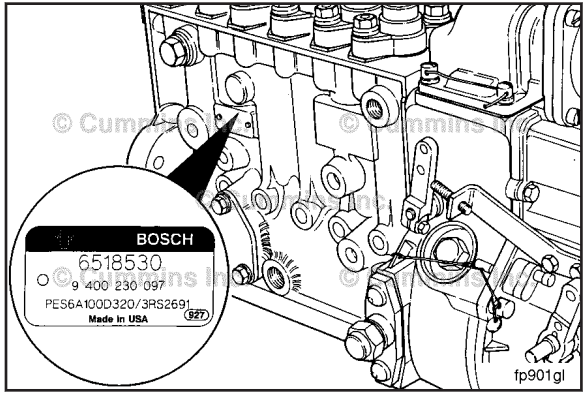





### Industrial Applications

6CTAA8.3 Industrial Applications

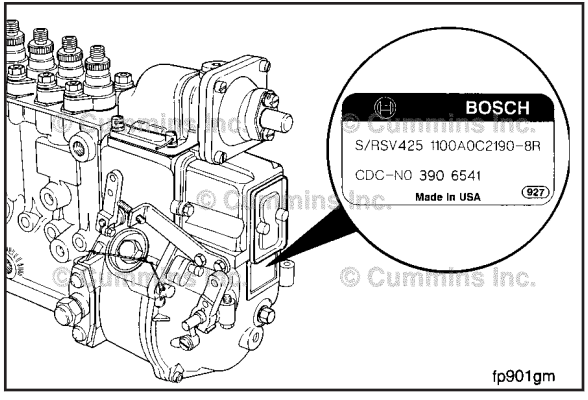
- 8.3 = displacement in liters
- AA = charge air aftercooled
- T = turbocharged
- C = engine series
- 6 = number of cylinders




## Fuel Injection Pump Dataplate

The Bosch® fuel injection pump dataplate is located on the side of the injection pump. It provides information for fuel pump calibration.

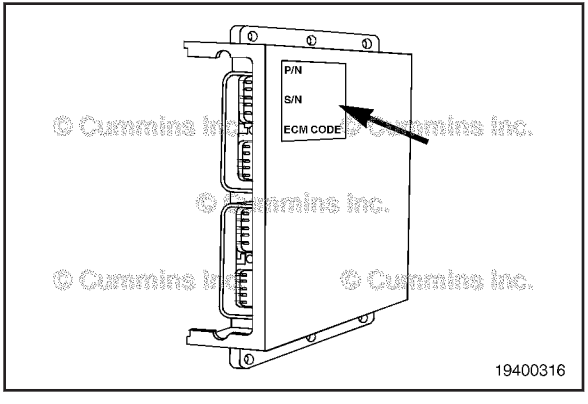
The Cummins part number for the fuel pump-governor combination is located on the governor dataplate.

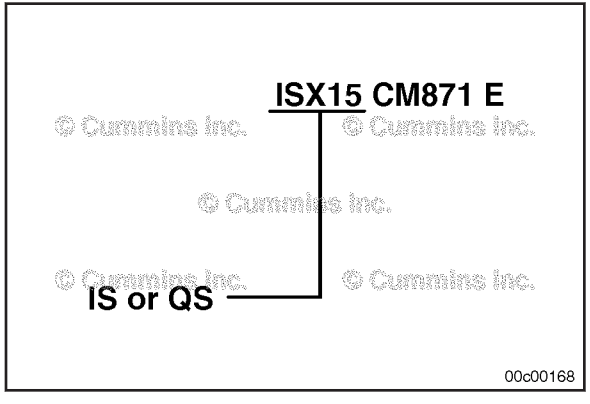



## ECM Dataplate

The external ECM dataplate is located on top of the ECM.

The dataplate contains the ECM part number (P/N), the ECM serial number (S/N), the manufacturing date code (D/C), the engine serial number (ESN), and the ECM code.



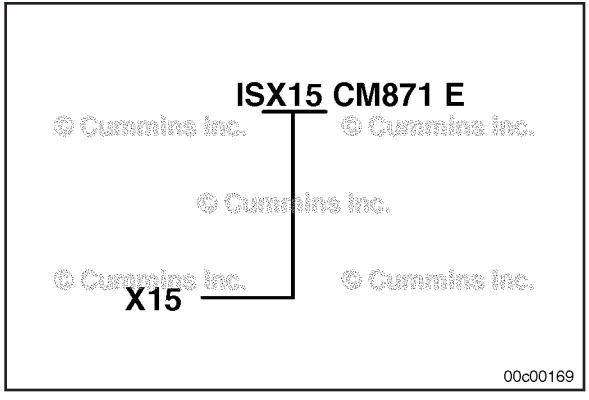

# Cummins® Service Engine Model Product Identification

## General Information

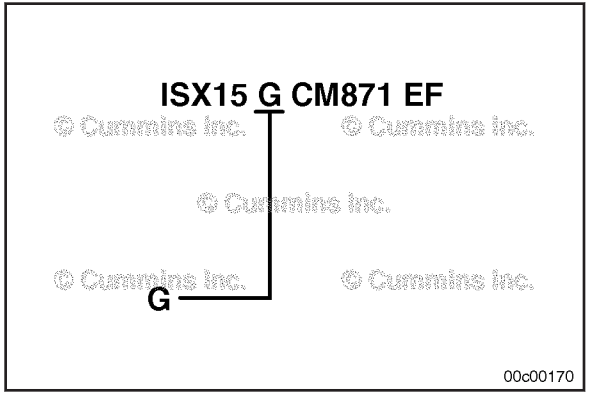
The Cummins® Service Engine Model Nomenclature procedure describes how engines are identified within Cummins service organization. This method was introduced for models after and including manufacture year 2007.

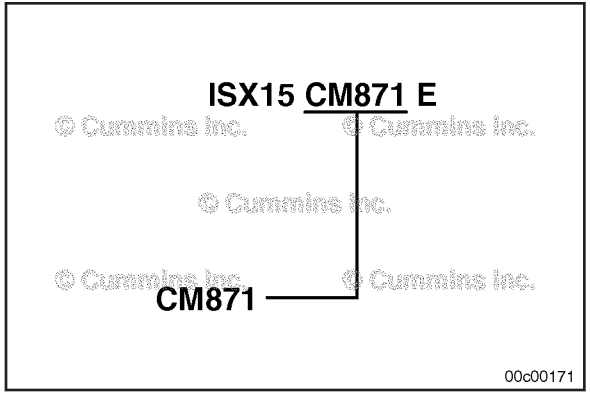
Electronic engines are identified by the first two letters, either an "IS" for On-Highway automotive or "QS" for Off-Highway industrial market applications.

The third letter is the engine platform designation followed by the engine liter size.

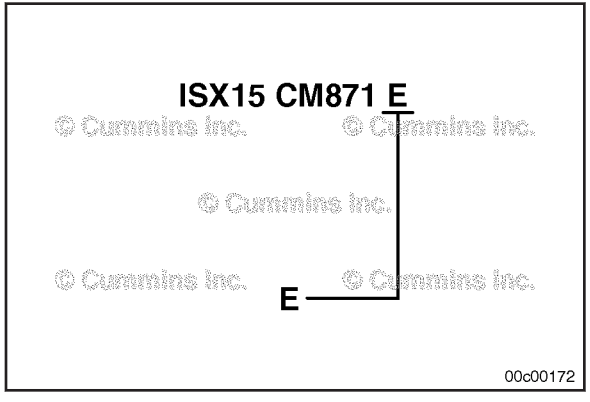



If the engine operates on a fuel type other than diesel, the type will be identified after the liter size.






The control system is identified with the letters "CM" followed by the control system model number.



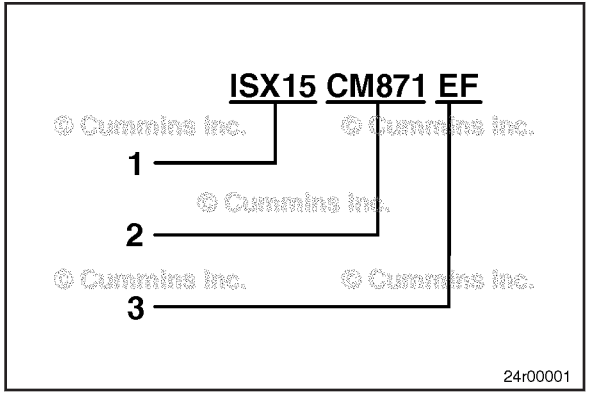

The technology identifier after the control system designates the prevailing technology used with the engine. (See table in this procedure for letter designations.)

Example:

1 On-Highway automotive "X" 15 liter engine

2 Control system number 871

3 Technology supported; Electric EGR and Diesel Particulate Filter



| Technology | Name | Suffix |
|---|---|---|
| Exhaust Gas Recirculation | Not used | None |
| | Pneumatic | P |
| | Electric | E |
| Diesel Particulate Filter (DPF) | Not used | None |
| | Full Flow DPF | F |
| | Partial Flow DPF | F2 |
| Diesel Oxidation Catalyst | Not used | None |
| | DOC | C |
| 3-Way Oxidation Catalytic Converter | Not used | None |
| | 3-Way Catalyst | J |
| Selective Catalytic Reduction System | Not used | None |
| | Air Driven | S |
| | Airless | A |
| Nox Sensor | Not used | None |
| | Nox Sensor | N |
| Modular Common Rail System | Used only on QSK19, 38, 50 , 60 HHP Engines | MCRS |
| Integrated Dosing Control Unit | Not Used | None |
| | Integrated | I |

| Technology | Name | Suffix |
|---|---|---|
| Urea Quality Sensor | Not Used | None |
| | UQS | Q |

# Notes

# Section 1 - Operating Instructions

## Section Contents

# Operating Instructions - Overview

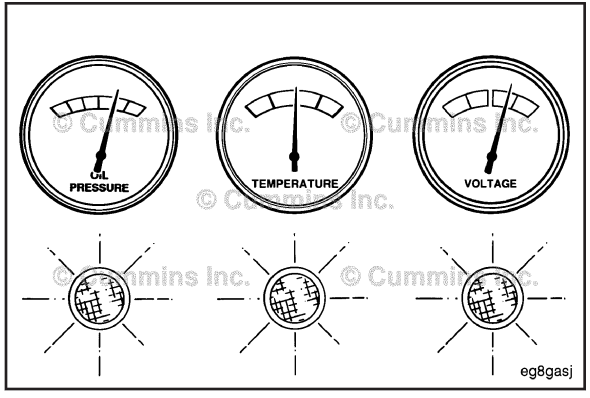
## General Information

Correct care of your engine will result in longer life, better performance, and more economical operation.

Follow the daily maintenance checks listed in Maintenance Guidelines (Section 2).

The new Cummins® engine associated with this manual does **not** require a "break-in" procedure. This section of the manual provides all of the necessary information required for proper engine operation.

U.S. legislation requires that stationary compression ignition internal combustion engines designated for emergency use are limited to emergency operations and required maintenance and testing.




Check the oil pressure indicators, temperature indicators, warning lights, and other gauges daily to make sure they are operational.

Check the oil pressure, coolant temperatures DEF level, and other engine parameters daily via the OEM front panel to make sure they are operational. Check the panel regularly for any alarm messages. Take appropriate action to rectify the alarm condition or contact your nearest Authorized Cummins® Distributor.

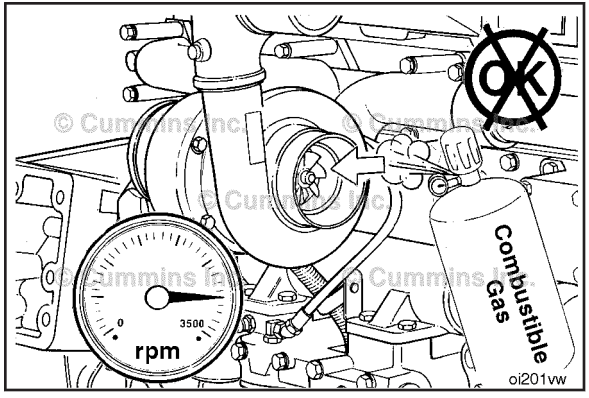
**⚠WARNING⚠**

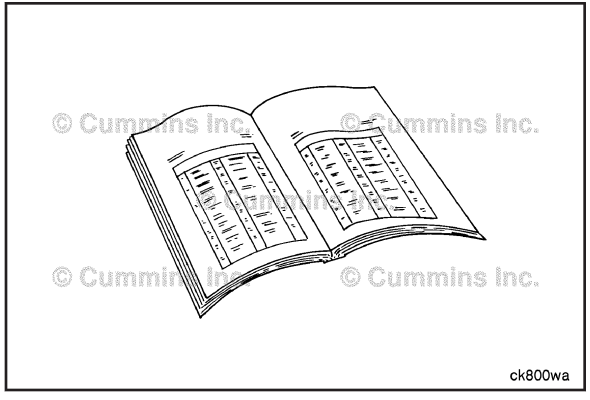
**Do not operate a diesel engine where there are or can BE COMBUSTIBLE vapors. These vapors can be sucked through the air intake system and cause engine acceleration and over speeding that can result in a fire, an explosion, and extensive property damage. Numerous safety devices are available, such as air intake shutoff devices, to minimize the risk of over speeding where an engine, due to its application, is operating in a combustible environment, such as due to a fuel spill or gas leak. Remember, Cummins Inc. has no way of knowing the use you have for your engine. The equipment owner and operator ARE responsible for safe operation in a hostile environment. Consult A Cummins® Authorized Repair Location for further information.**

**△CAUTION△**

**Do not expose the engine to corrosive chemicals. Corrosive chemicals can damage the engine.**

Cummins recommends the installation of an air intake shutoff device or a similar safety device to minimize the risk of overspeeding when an engine is operating in a combustible environment, such as due to a fuel spill or gas leak.






# Normal Starting Procedure

## General Information

### Industrial Applications

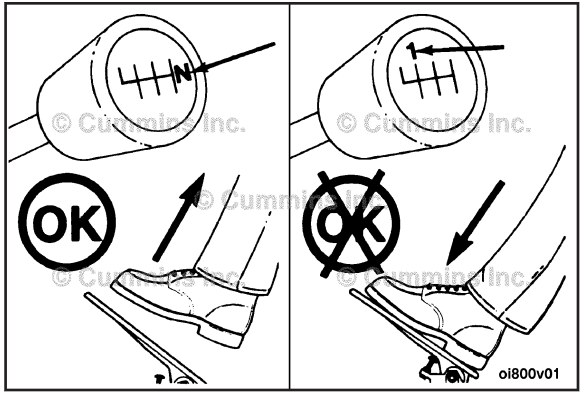
If ambient temperature is below 16°C [60°F], reference the following procedure. Refer to Procedure 101-004 in Section 1.

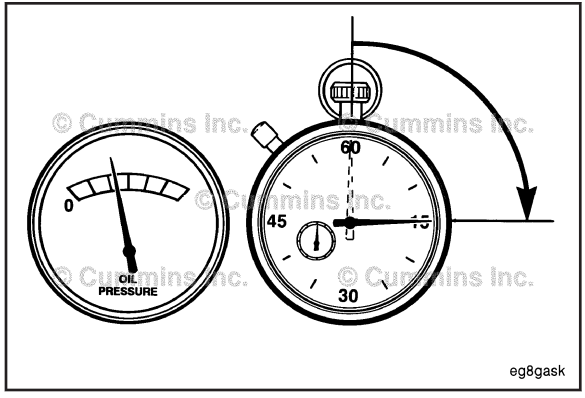
**⚠CAUTION⚠**

**To reduce the possibility of damage to the starting motor, do not engage the starting motor for more than 30 seconds. Wait 2 minutes between each attempt to start (electrical starting motors only).**

**NOTE:** Engines equipped with air starting motors require a minimum of 480 kPa [70 psi].

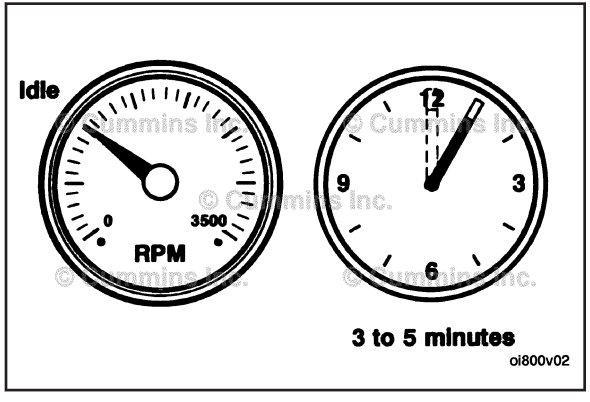
- Disengage the driven unit, or if equipped, put the transmission in neutral.
- With the accelerator pedal or lever in the idle position, turn the key switch to the ON position, and wait for the WAIT-TO-START lamp to go out; then, turn the key to the START position.
- Full throttle is applied after engaging the starter, after 5 seconds release to idle throttle.
- If the engine does **not** start after three attempts, check the fuel supply system. Absence of blue or white exhaust smoke during cranking indicates no fuel is being delivered.





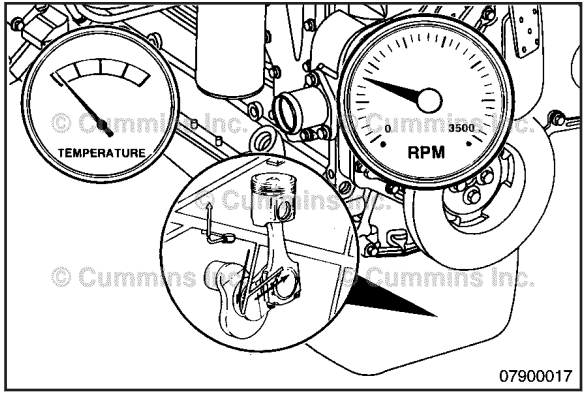

**CAUTION**

**The engine must have adequate oil pressure within 15 seconds after starting. If the WARNING lamp indicating low oil pressure has not gone out or there is no oil pressure indicated on a gauge within 15 seconds, shut off the engine immediately to avoid engine damage. The low oil pressure troubleshooting procedure is located in Troubleshooting Symptoms (Section TS).**




Idle the engine 3 to 5 minutes before operating with a load.

After starting a cold engine, increase the engine speed (rpm) slowly to provide adequate lubrication to the bearings and to allow the oil pressure to stabilize.



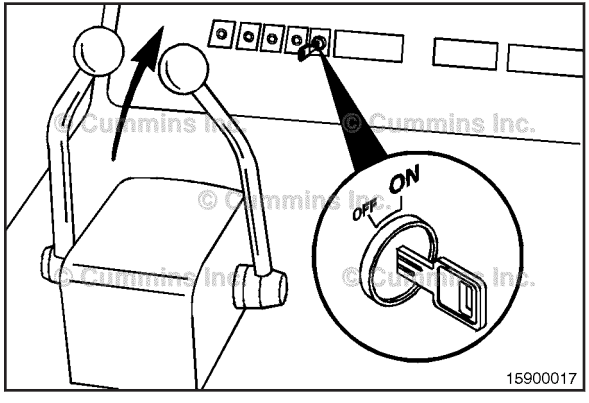

## Marine Applications

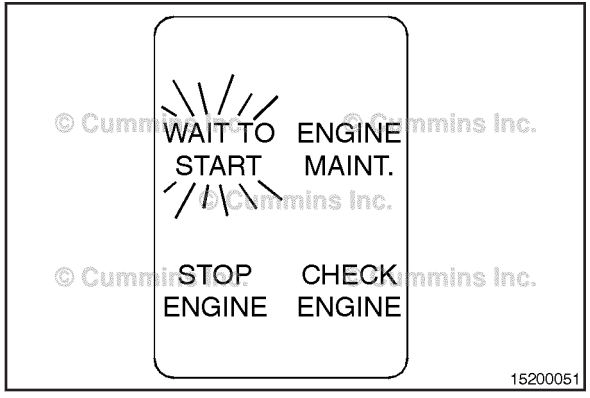
**⚠CAUTION⚠**

**To reduce the possibility of damage to the starting motor, do not engage the starting motor for more than 30 seconds. Wait 2 minutes between each attempt to start (electrical starting motors only).**

**NOTE:** There is a separate keyswitch wired to the primary panel. It will be installed in the helm at the boat manufacturer's or installer's desired location. The keyswitch **must** be in the ON or RUN position to crank-start the engine.

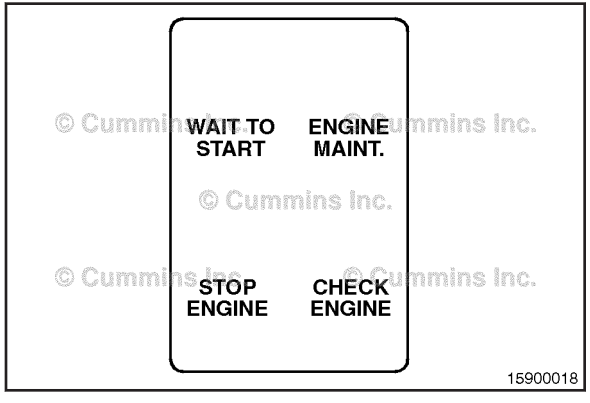
Disengage the drive unit.






Turn the key switch to the ON or RUN position. When the key is in this position, the WAIT TO START lamp will be illuminated for a maximum of 20 seconds. The engine should **not** be cranked until the WAIT TO START lamp shuts off.

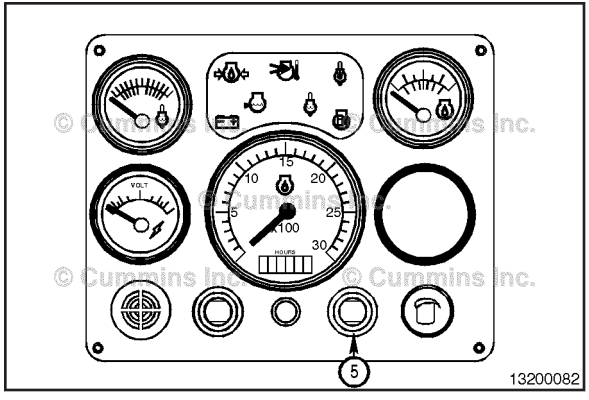
**NOTE:** The controller is reset each time the ignition is turned off and the cycle will start over.




When the WAIT TO START lamp goes out, the preheat cycle is complete.

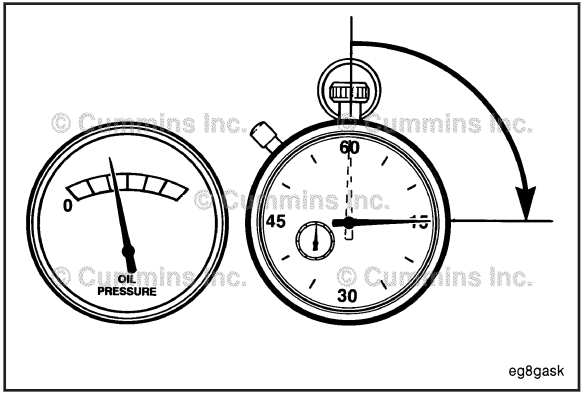
Start the engine with the throttle in the IDLE position.

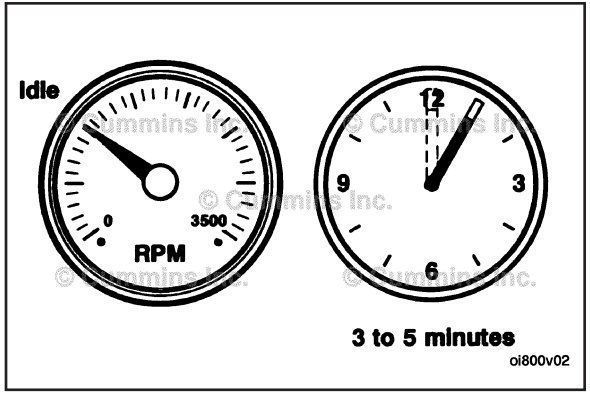
This black push button (5) is used to engage the starter motor.



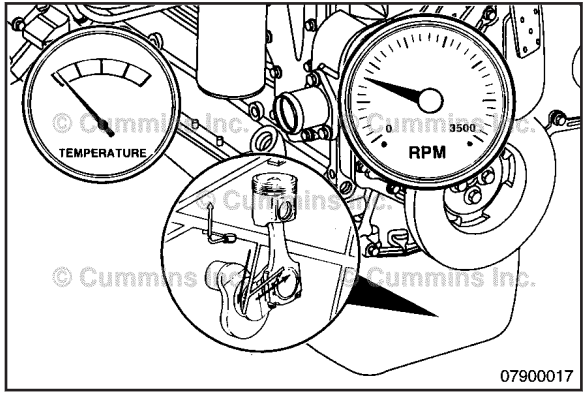

**⚠CAUTION⚠**

**The engine must have adequate oil pressure within 15 seconds after starting. If the WARNING lamp indicating low oil pressure has not gone out or there is no oil pressure indicated on a gauge within 15 seconds, shut off the engine immediately to avoid engine damage. The low oil pressure troubleshooting procedure is located in Troubleshooting Symptoms (Section TS).**






Idle the engine 3 to 5 minutes before operating with a load.

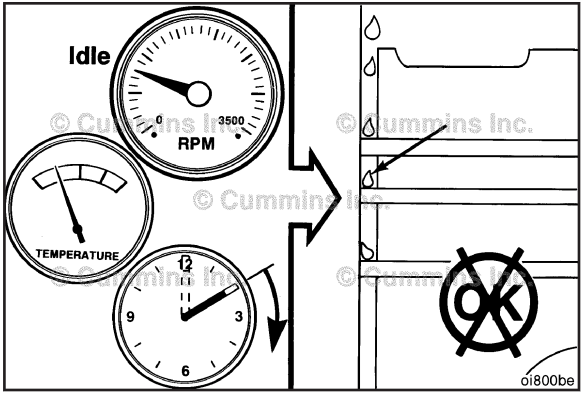


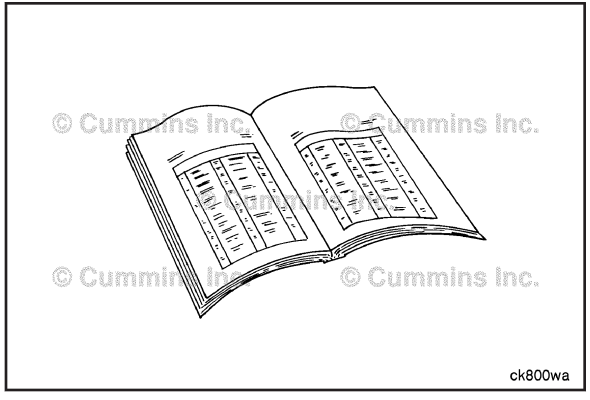

After starting a cold engine, increase the engine speed (rpm) slowly to provide adequate lubrication to the bearings and to allow the oil pressure to stabilize.

**⚠CAUTION⚠**

**Do not operate engine at low idle for long periods with engine coolant temperature below the minimum specification in Maintenance Specifications in this manual. This can result in the following:**

- Fuel Dilution of the lubricating oil
- Carbon build up in the cylinder
- Cylinder head valve sticking
- Reduced performance.






## Jump Starting

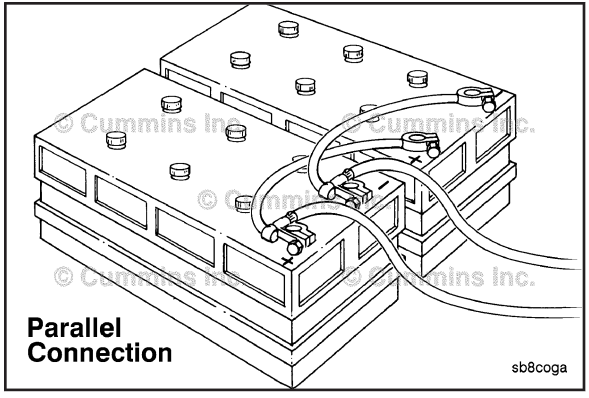
**⚠WARNING⚠**
**Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries. To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.**

**△CAUTION△**
**When using jumper cables to start the engine, make sure to connect the cables in parallel: Positive (+) to positive (+) and negative (-) to negative (-). When using an external electrical source to start the engine, turn the disconnect switch to the OFF position. Remove the key before attaching the jumper cables.**

**△CAUTION△**
**To avoid damage to engine parts, do not connect jumper starting or battery charging cable to any fuel system or electronic component.**

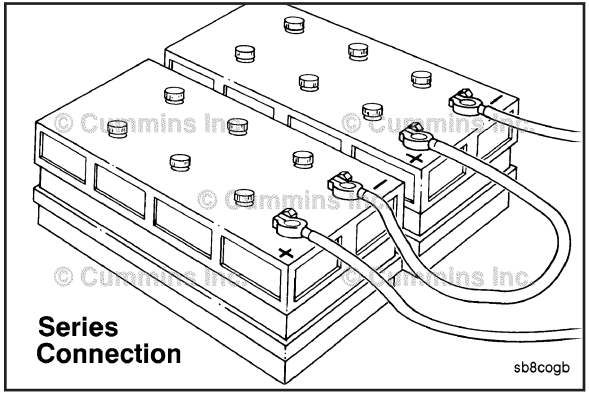
This illustration shows a typical parallel battery connection. This arrangement doubles the cranking amperage.

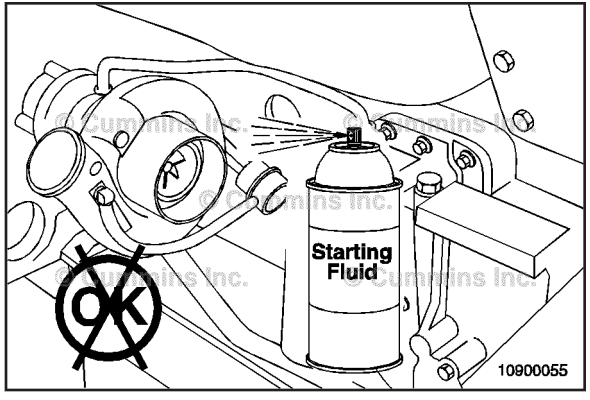
**NOTE: Always** reference the relevant OEM literature for jump starting procedures. Failure to follow correct procedures can result in damage to the ECM and other electrical equipment.




This illustration shows a typical series battery connection. This arrangement, positive (+) to negative (-), doubles the voltage.

**NOTE: Always** reference the relevant OEM literature for jump starting procedures. Failure to follow correct procedures can result in damage to the ECM and other electrical equipment.






# Cold Weather Starting

## With Flame Start System

**⚠WARNING⚠**

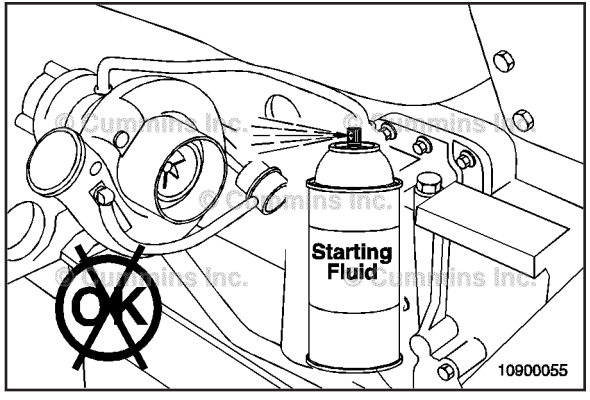
**Do not use starting fluids with this engine. This engine is equipped with a flame start system; use of starting fluid can cause an explosion, fire, personal injury, severe damage to the engine and property damage.**

The **only** recommended cold weather starting aids for industrial applications with grid a flame start system, are engine coolant preheaters and oil pan immersion heaters. Contact a Cummins® Authorized Repair Location for more information

Cold weather starting aids are available for your engine. Contact a Cummins® Authorized Repair Location for more information.

In cold weather, the WAIT-TO-START lamp will stay on longer.

If ambient temperature is below 16° C [60° F], fully depress the throttle after engaging the stater. Full throttle on the VE pump makes sure there is sufficient start fuel delivery and helps keep the engine operating once started. The in-line pumps with RQV and RQV-K governors require full throttle position and hold the rack in the start fuel position. The throttle **must** be depressed after engaging the starter to allow the shutoff lever to move to the run position before moving the throttle.




## Grid Heater

### Industrial Applications

**⚠WARNING⚠**

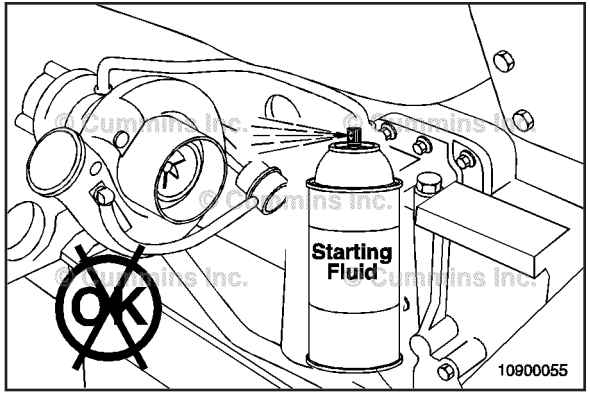
**Do not use starting fluids with this engine. This engine is equipped with an intake air heater; use of starting fluid can cause an explosion, fire, personal injury, severe damage to the engine and property damage.**

The **only** recommended cold weather starting aids for marine or industrial applications with grid a heater or air intake heater, are engine coolant preheaters and oil pan immersion heaters. Contact a Cummins® Authorized Repair Location for more information

Cold weather starting aids are available for your engine. Contact a Cummins® Authorized Repair Location for more information.

In cold weather, the WAIT-TO-START lamp will stay on longer.

If ambient temperature is below 16° C [60° F], fully depress the throttle after engaging the stater. Full throttle on the VE pump makes sure there is sufficient start fuel delivery and helps keep the engine operating once started. The in-line pumps with RQV and RQV-K governors require full throttle position and hold the rack in the start fuel position. The throttle **must** be depressed after engaging the starter to allow the shutoff lever to move to the run position before moving the throttle.




## Ether Starting Aids

**Industrial Applications**

**⚠ WARNING ⚠**
**Because of the potential for an explosion, do not use volatile cold starting aids in underground mine or tunnel operations. Ask the local U.S. Bureau of Mines inspector for instructions.**

**⚠ WARNING ⚠**
**Starting fluid is highly flammable and explosive. Keep flames, sparks, and arcing switches away from starting fluid.**

**⚠ WARNING ⚠**
**To reduce the possibility of personal injury, avoid inhalation of starting fluid vapors.**

**△ CAUTION △**
**Do not use excessive amounts of starting fluid when starting an engine. The use of too much starting fluid will cause damage to the engine.**

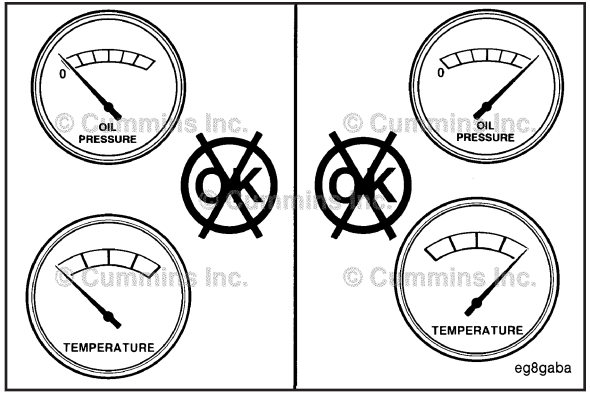
If ambient temperature is below 16° C [60° F], fully depress the throttle after engaging the stater. Full throttle on the VE pump makes sure there is sufficient start fuel delivery and helps keep the engine operating once started. The in-line pumps with RQV and RQV-K governors require full throttle position and hold the rack in the start fuel position. The throttle **must** be depressed after engaging the starter to allow the shutoff lever to move to the run position before moving the throttle.

Spray starting fluid into the air cleaner intake while another person cranks the engine.

# Starting Procedure After Extended Shutdown or Oil Change

## General Information

Follow the Normal Starting Procedure in this section. The engine will **not** start until the minimum cranking oil pressure is detected by the ECM. It can take more cranking time to start the engine after an extended shut down or oil change.



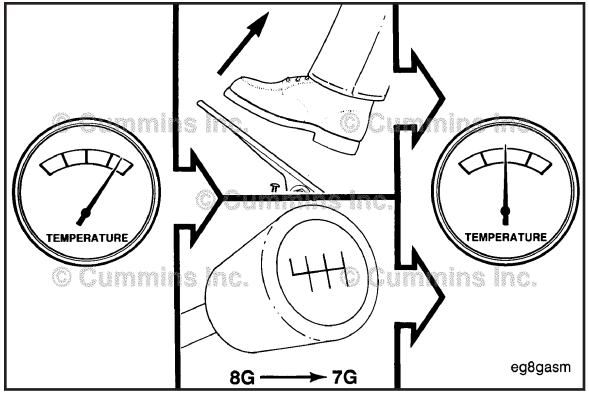

# Operating the Engine

## Normal

If equipped, monitor the oil pressure and coolant temperature gauges frequently. Refer to Lubricating Oil System specifications and Cooling System specifications, in Maintenance Specifications (Section V) for recommended operating pressures and temperatures. Shut off the engine if any pressure or temperature does **not** meet the specifications.

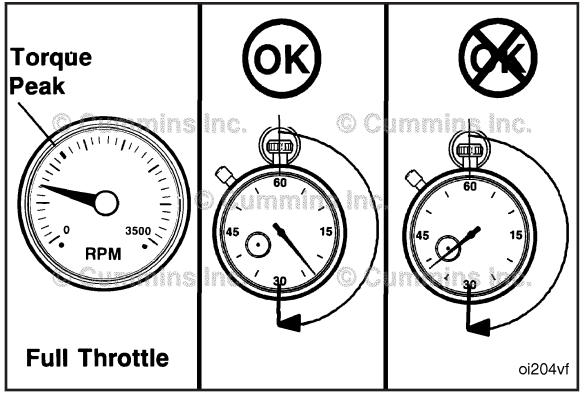
Continuous operation with engine coolant temperature above or below the engine coolant temperature specifications listed in Maintenance Specifications (Section V) can damage the engine.

If an overheating condition starts to occur, reduce the power output of the engine by releasing the accelerator pedal or lever or shifting the transmission to a lower gear, or both, until the temperature returns to the normal operating range. If the engine temperature does **not** return to normal, shut off the engine, and refer to Troubleshooting Symptoms (Section TS), or contact a Cummins® Authorized Repair Location.




## Winterfronts and Shutters

Winterfronts and shutters can be used on a vehicle or equipment to reduce air flow through the radiator core into the engine compartment. This can reduce the time required to warm the engine and help maintain the engine coolant temperature. The engine coolant temperature specifications are in the Maintenance Specification (Section V).




# Engine Operating Range

## General Information

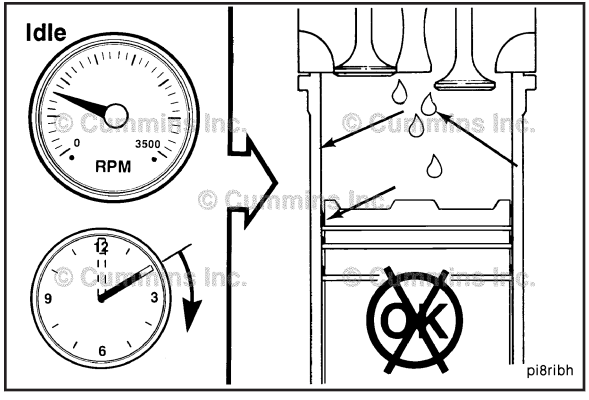
**⚠CAUTION⚠**
**Do not operate the engine at full throttle below peak torque rpm (refer to engine dataplate for peak torque rpm) for more than 30 seconds. Operating the engine at full throttle below peak torque will shorten engine life to overhaul, can cause serious engine damage, and is considered engine abuse.**

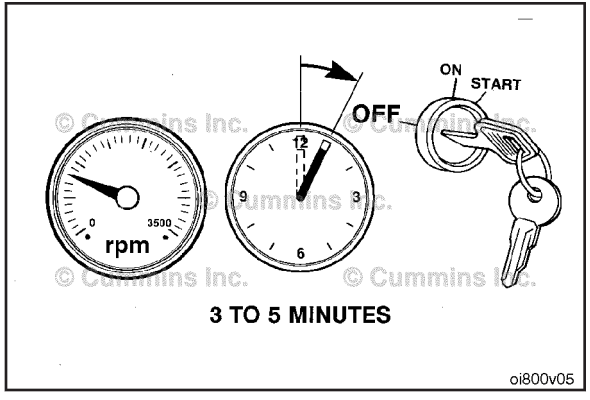
**⚠CAUTION⚠**
**Do not operate the engine beyond the maximum engine speed. Operating the engine beyond the maximum engine speed can cause severe engine damage. Use proper operating techniques for the vehicle, vessel, or equipment to prevent engine overspeed. The maximum engine speed specification is listed in Maintenance Specifications (Section V).**

Cummins® engines are designed to operate successfully at full throttle under transient conditions down to peak torque engine speed. This is consistent with recommended operating practices.

**⚠CAUTION⚠**

**Do not idle the engine for excessively long periods. Long periods of idling, more than 10 minutes, can cause poor engine performance.**






# Engine Shutdown

## General Information

**⚠CAUTION⚠**

**Failure to follow the correct shutdown procedure may result in damage to the turbocharger and shorten the turbocharger life.**

**NOTE:** For engines equipped with an electronic control module (ECM) ensure the keyswitch is turned off for a minimum of 100 seconds prior to disconnecting the continuous (unswitched) battery power supply. If the unswitched battery power supply is disconnected in less than 100 seconds after the keyswitch is turned off active fault codes and incorrect ECM information can occur.

Turn the ignition switch to the OFF position. If the engine does **not** shut down, refer to Troubleshooting Symptom (Section TS) in appropriate Operation and Maintenance manual.

# Electromagnetic Interference (EMI)

## General Information

Some applications utilize accessories such as (CB radios, mobile transmitters, etc.) if not installed and used correctly the radio frequency energy generated by these accessories can cause electromagnetic interference (EMI) conditions to exist between the accessory and the Cummins electronically controlled systems. Cummins is **not** liable for any

performance problems with either the electronically controlled systems or the accessory due to EMI. EMI is **not** considered by Cummins to be a system failure and therefore is **not** warrantable.

## System EMI Susceptibility

Your Cummins product has been designed and tested for minimum sensitivity to incoming electromagnetic energy. Testing has shown that there is no performance degradation at relatively high energy levels; however, if very high energy levels are encountered, then some noncritical diagnostic fault code logging can occur. The electronically controlled systems EMI susceptibility level will protect your systems from most, if **not** all, electromagnetic energy-emitting devices that meet the legal requirements.

## System EMI Radiation Levels

Your Cummins product has been designed to emit minimum electromagnetic energy. Electronic components are required to pass various Cummins and industry EMI specifications. Testing has shown that when the systems are properly installed, they will not interfere with onboard communication equipment or with the vehicle's, equipment's, or vessel's ability to meet any applicable EMI standards and regulated specifications.

If an interference condition is observed, follow the suggestions below to reduce the amount of interference:

1 Locate the transmitting antenna as far away from the electronically controlled systems and as high as possible.

2 Locate the transmitting antenna as far away as possible from all metal obstructions (e.g., exhaust stacks)

3 Consult a representative of the accessory supplier in your area to:

- Accurately calibrate the device for proper frequency, power output, and sensitivity (both base and remote site devices **must** be properly calibrated)
- Obtain antenna reflective energy data measurements to determine the optimum antenna location
- Obtain optimum antenna type and mounting arrangement for your application

- Make sure your accessory equipment model is built for maximum filtering to reject incoming electromagnetic noise.

# Section 2 - Maintenance Guidelines

## Section Contents

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# Maintenance Guidelines - Overview

## General Information

Cummins Inc. recommends that the system be maintained according to the Maintenance Schedule in this section.

If the system is operating in ambient temperatures below -18°C [0°F] or above 38°C [100°F], perform maintenance at shorter intervals. Shorter maintenance intervals are also required if the system is operated in a dusty environment or if frequent stops are made. For gas fueled generator sets, shorter maintenance intervals are also required, if operating at loads below 70% for prolonged periods. Contact your local Cummins® Authorized Repair Location for recommended maintenance intervals.

Some of these maintenance procedures require special tools or must be completed by qualified personnel. Contact your local Cummins® Authorized Repair Location for detailed information.

If your system is equipped with a component or accessory not manufactured or supplied by Cummins Inc., refer to the component manufacturer's maintenance recommendations.

OEM supplied equipment and components can impact on the performance and reliability of the engine if they are not correctly maintained.

Use the chart provided in this section as a convenient way to record maintenance performed.

# Maintenance Schedule

## General Information

### Industrial Applications

Perform maintenance at whichever interval occurs first. At each scheduled maintenance interval, perform all previous checks that are due for scheduled maintenance.

**Maintenance Procedures at Daily Interval[4]**

- Crankcase Breather Tube - Check
- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Fan, Cooling - Check
- Coolant Level - Check
- Air Intake Piping - Check[4]
- Air Tanks and Reservoirs - Drain[4]
- Drive Belts - Check

**Maintenance Procedures at 250 Hours, or 3 Months[1, 2, 4]**

- Fuel Filter (Spin-On Type) - Change
- Lubricating Oil and Filters - Change[1]
- Charge-Air Cooler - Check[4]

- Charge-Air Piping - Check[4]
- Air Cleaner Restriction - Check[4]
- Air Compressor - Check[4]
- Radiator Pressure Cap - Check

**Maintenance Procedures at 500 Hours, or 6 Months[2, 3, 4]**

- Coolant Filter, if equipped - Change
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check[2, 3]
- Air Compressor Discharge Lines - Check[4]

**Maintenance Procedures at 1000 Hours, or 1 Year[4]**

- Overhead Set - Adjust
- Cooling Fan Belt Tensioner - Check
- Air Cleaner Assembly (Engine-Mounted) - Change[4]

**Maintenance Procedures at 2000 Hours, or 2 Years[2, 3, 4, 5]**

- Vibration Damper, Rubber - Inspect for Reuse
- Vibration Damper, Viscous - Inspect for Reuse
- Cooling System - Flush[2, 3, 5]
- Air Compressor Discharge Lines - Check[4]

1 The lubricating oil and lubricating oil filter interval can be adjusted based on fuel consumption, gross vehicle weight, and idle time. Refer to Oil Drain Intervals in this section.

2 Test the SCA concentration level every 6 months unless concentration is over three units; then check at every oil drain interval until concentration is below three units.

3 Antifreeze check interval is every oil change or 500 hours or 6 months, whichever occurs first. The operator **must** use a heavy-duty year-round antifreeze that meets the chemical composition of ASTM D6210. The antifreeze change interval is 2 years. Antifreeze is essential for freeze, overheat, and corrosion protection.

4 Follow the manufacturer's recommended maintenance procedures for the starter, alternator, generator, batteries, electrical components, engine brakes, exhaust brake, charge-air cooler, air compressor, refrigerant compressor, and fan clutch.

5 This cooling system requirement to Flush at this scheduled maintenance includes Drain, Flush, and Fill.

**Marine Applications**

**Maintenance Procedures at Daily Interval[1]**

- Fuel-Water Separator - Drain
- Lubricating Oil Level - Check
- Coolant Level - Check
- Sea Water Strainer - Clean
- Marine Gear - Check[1]
- Drive Belts - Check

**Maintenance Procedures at 75 Hours or 3 Months[3]**

- Zinc Anode - Check[3]
- Cooling System Hoses - Check
- Sea Water Hoses - Check
- Air Cleaner Restriction - Check
- Batteries - Check
- Battery Cables and Connections - Check
- Component Connector and Pin Inspection - Check

**Maintenance Procedures at 300 Hours or 1 Year[1, 2]**

- Fuel Filter (Spin-On Type) - Change
- Fuel-Water Separator Element - Replace
- Lubricating Oil and Filters - Change[2]
- Coolant Filter, if equipped - Change
- Engine Coolant Heater - Check
- Marine Gear Oil Cooler - Flush[1]
- Supplemental Coolant Additive (SCA) and Antifreeze Concentration - Check[2]
- Heat Exchanger - Flush
- Sea Water Pump - Replace
- Aftercooler Assembly (Sea Water) - Flush
- Air Cleaner Assembly (Engine-Mounted) - Check

- Air Intake Piping - Check
- Marine Gear Oil - Check[1]
- Radiator Pressure Cap - Check
- Engine Wiring Harness - Check

**Maintenance Procedures at 600 Hours or 2 Years**

- Vibration Damper, Rubber - Inspect for Reuse
- Vibration Damper, Viscous - Inspect for Reuse
- Overhead Set - Adjust
- Cooling System - Flush[4]
- Cooling Fan Belt Tensioner- Check

1 Consult the marine gear manufacturer operator's manual for specifications and recommendations.

2 Refer to Refer to Procedure 018-024 in Section V.

3 Depending upon the quality of electrical bonding and water conditions, increased maintenance is sometimes necessary.

4 This cooling system requirement to Flush at this scheduled maintenance includes Drain, Flush, and Fill.

## Oil Drain Intervals

Refer to the following flowchart to determine the maximum recommended oil change and filter change intervals in kilometers, miles, hours, or months, whichever comes first.

Is the vehicle one of those listed below?

- Truck crane/yard spotter
- Paver/crane/backhoe
- Dozer/scrape/skipper

If Yes -

- Select the correct oil drain interval from Table 1.

If No -

- Is the vehicle one of those listed below?
- Tractor/combine/irrigation equipment
- Generator set/air compressor/fire equipment

If Yes -

- Select the correct oil drain interval from Table 2.

If No -

- Select the correct oil drain interval from Table 3.

**Table 1, Oil Drain Intervals***

| Vehicle/Equipment | Kilometers | Miles | Hours | Months |
|---|---|---|---|---|
| Truck crane/yard spotter | 10,000 | 6,000 | 250 | 3 |
| Paver/crane/backhoe | N/A | N/A | 250 | 3 |
| Dozer/scraper/skidder | N/A | N/A | 250 | 3 |

| Table 2, Oil Drain Intervals* | | | | |
|---|---|---|---|---|
| **Vehicle/Equipment** | **Kilometers** | **Miles** | **Hours** | **Months** |
| Tractor/combine/ irrigation equipment | N/A | N/A | 250 | 3 |
| Generator set/air compressor/fire pump | N/A | N/A | 250 | 3 |

| Table 3, Oil Drain Intervals* | | | | |
|---|---|---|---|---|
| **Vehicle/Equipment** | **Kilometers** | **Miles** | **Hours** | **Months** |
| All others | 10,000 | 6,000 | 250 | 3 |

*Units equipped with a 26.5 liter [28 qt] high capacity oil pan can extend intervals to 500 hours.

# Maintenance Record Form

## Maintenance Data

| Maintenance Record | |
|---|---|
| Product Serial No.: | Product Model: |
| Owner's Name: | Equipment Model/Number: |

| **Key to table headings:** |
|---|
| A = Date |
| B = Schedule km [Miles], Hours or Time Interval |
| C = Actual km [Miles] Hour or Time |
| D = Maintenance Check Performed |
| E = Check Performed By |
| F = Comments |

| A | B | C | D | E | F |
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# Section L - Service Literature

## Section Contents

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# Additional Service Literature

## General Information

The following publications can be purchased by contacting the nearest local distributor.

| Bulletin Number | Title of Publication |
|---|---|
| 3666003 | C Series Troubleshooting and Repair Manual |
| 3666008 | C Series Engine Shop Manual |
| 3666021 | C Series Specifications Manual |
| 3379001 | Fuel for Cummins Engines Bulletin |
| 3666132 | Coolant Requirements and Maintenance Bulletin |
| 3379009 | Operation, Cold Weather |
| 3810340 | Cummins Engine Oil Recommendations Bulletin |
| 3666109 | Alternative Repair Manual, B and C Series Engines |
| 3379000 | Air for Your Engines |
| 3381700 | Worldwide Service Locations |
| 3666109 | C Series Alternative Repair Manual |

# Service Literature Ordering Location

## Contact Information

| Region | Ordering Location |
|---|---|
| United States and Canada | Cummins Distributors or Credit Cards at https://store.cummins.com |
| All Other Countries | Cummins Distributors or Dealers |

# Cummins Customized Parts Catalog

## General Information

Cummins is pleased to announce the availability of a parts catalog compiled specifically for you. Unlike the generic versions of parts catalogs that support general high volume parts content; Cummins Customized catalogs contain only the new factory parts that were used to build your engine.

The catalog cover, as well as the content, is customized with you in mind. You can use it in your shop, at your worksite, or as a coffee table book in your RV or boat. The cover contains your name, company name, address, and telephone number.

This new catalog was designed to provide you with the exact information you need to order parts for your engine. This will be valuable for customers that do not have easy access to Cummins QuickServe Online.

Additional Features of the Customized Catalog include:

- Engine Configuration Data
- Table of Contents
- Separate Option and Parts Indexes
- Service Kits (when applicable)
- ReCon Part Numbers (when applicable)

## Ordering the Customized Parts Catalog

### Ordering by Telephone

- North American Distributors, Original Equipment Manufacturers and Cummins Factory personnel order by calling Iron Mountain Fulfillment Services (IMFS) at 1-800-646-5609.

- International Distributors and Original Equipment Manufacturers order the CPC from their regional Cummins Parts Distribution Centers (PDC).
- International PDC orders are called into Iron Mountain at (++) 630-283-2420.
- Retail Credit Card Orders require a 2 step ordering process.

**Ordering On-Line**

Access the Cummins QSOL store at https://store.cummins.com

- Find the Customized Parts Catalog button located on the left of the homepage
- Select format. Your Price is also shown here
- Finalize Shopping Cart and Check Process as described on the website

North America call Iron Mountain Fulfillment Services (IMFS) at 800-646-5609, International customers call (++) 630-283-2420. Provide IMFS the catalog detail as described on the website. This step is required until we have our On Line form available.

Required information needed for your Customized Parts Catalog Order.

- Customer Name
- Street Address
- Company Name (optional)
- Telephone no.
- Credit Card No.
- Cummins Engine Serial Number (located on the engine data plate)

Unfortunately not all Cummins Engines can be supported by Customized Parts Catalogs. Engines older than 1984 or newer than 3 months may not have the necessary parts information to compile a catalog. We will contact you if this occurs and explain why we are unable to fill your order.

Customized Parts Catalogs are produced specifically for a single customer. This means they are not returnable for a refund. If we make an error and your catalog is not useable, we will correct that error by sending you a new catalog.

# Notes

# Section V - Maintenance Specifications

## Section Contents

# General Engine

## Specifications

### Industrial

Bore....114 mm [4.49 in]
Stroke....135 mm [5.32 in]
Displacement....8.27 liters [504.7 C.I.D.]
Engine Weight (dry) with Standard Accessories....603 to 612 kg [1330 to 1350 lb]
Wet Weight....635 to 658 kg [1400 to 1450 lb]
Firing Order....1-5-3-6-2-4
**Valve Clearances:**
- Intake....0.30 mm [0.012 in]
- Exhaust....0.61 mm [0.024 in]

Rotation, Viewed from the Front of the Engine.... **Clockwise**
**Compression Ratio:**
- Naturally Aspirated....16.4:1
- Turbocharged....17.3:1
- Turbocharged/Aftercooled....16.5:1
- Charge Air Cooled....18.0:1

### Marine

Type.... Four cycle, in-line, six cylinder
Bore and Stroke....114 mm [4.49 in] x 135 mm [5.32 in]
Displacement....8.3 liters [504.5 C.I.D.]
**Engine Mounting:**
- Maximum Allowable Bending Moment at Rear Face of Block....1356 N•m [1000 ft-lb]
- Minimum/Maximum Static Installation Angle for In-line Drives (front up)....0 degrees/12 degrees

Minimum/Maximum Static Installation Angle for V-Drives (front up).....3 degrees/12 degrees

**NOTE:** “Front up” refers to front of engines. In V-drives it faces the back of the boat.

# Lubricating Oil System

## Specifications

### Industrial Applications

**Oil Pressure**

At Idle Speed - Minimum.....69 kPa [10 psi]
Normal Operating Speed.....205 kPa to 517 kPa [30 psi to 75 psi]
Regulated Pressure.....517 kPa [75 psi]
Maximum Allowable Temperature.....120°C [250°F]

**Maximum Operational Angularity of Oil Pan (see engine mounting)**

Front Down.....45 degrees
Front Up.....35 degrees
Side to Side.....45 degrees

**Oil Capacity of Standard Engine:**

Standard Oil Pan (Pan **Only**).....18.9 liters [20 qt]
Standard Oil Pan with Cylinder Block Stiffener Plate (Pan **Only**).....19.9 liters [21 qt]

**Oil Pan Low to High:**

Standard Oil Pan.....15.1 to 18.9 liters [16 to 20 qt]
Standard Oil Pan with Cylinder Block Stiffener Plate.....16.1 to 19.9 liters [17 to 21 qt]
Total System Capacity.....19.9 liters [21 qt]
Total System Capacity (excluding bypass Filter).....21.9 liters [23.2 qt]

**NOTE:** Some applications have a slightly different oil pan capacity. Contact the local Cummins Distributor if there are any questions.

### Marine Applications

**Oil Pressure**

At Idle Speed - Minimum.....55 kPa [8 psi]

Normal Operating Range.....205 to 517 kPa [30 to 75 psi]
Maximum Allowable Oil Temperature.....120°C [250°F]
Oil Pan Capacity High/Low.....17/13 liters [18/14 qt]
Total System Capacity (excluding bypass filter).....21.9 liters [23.2 qt]

# Cooling System

## Specifications

### Industrial

Coolant Capacity (engine **only**).....10.9 liters [11.5 qt]
Standard Modulating Thermostat - Range.....84 to 91°C [184 to 195°F]
Maximum Allowable Operating Temperature.....100°C [212°F]
Minimum Recommended Operating Temperature.....70°C [158°F]
Minimum Recommended Pressure Cap.....50 kPa [7 psi]

### Marine

Coolant Capacity — Engine **Only** .....12.3 liters [13 qt]
Coolant Capacity - Engine with Heat Exchanger.....28.9 liters [30.5 qt]
Maximum External Pressure Loss in Cooling System.....35 kPa [5 psi]
Maximum Static Pressure of Coolant (exclusive of pressure cap).....103 kPa [15 psi]
Standard Thermostat (modulating) Range.....71 to 83°C [160 to 181°F]
Maximum Coolant Temperature.....96°C [205°F]
Minimum Allowable Coolant Expansion Space.....5 percent of System Capacity
Minimum Coolant Makeup Capacity.....2.5 liters [2.6 qt]
Maximum Sea Water Pressure.....172 kPa [25 psi]
Maximum Sea Water Inlet Restriction..... − 127 mm Hg [− 5 in Hg]

# Cummins/Fleetguard® Filter Specifications

## General Information

Fleetguard is a subsidiary of Cummins Inc. Fleetguard® filters are developed through joint testing at Cummins and Fleetguard®. Fleetguard® filters are standard on new Cummins engines. Cummins Inc. recommends their use.

Fleetguard products meet all Cummins Source Approval Test standards to provide the quality filtration necessary to achieve the engine's design life. If other brands are substituted, insist on products that the supplier has tested to meet Cummins high-quality standards.

Cummins can **not** be responsible for problems caused by nongenuine filters that do **not** meet Cummins performance or durability requirements.

### Fuel Filters

Fuel Filter:

- Cummins Part Number 3931063
- Fleetguard® Part Number FF5052.

Fuel-Water Separator:

- Cummins Part Number 3930942
- Fleetguard® Part Number FS1280.

### Lubricating Oil Filter

- Cummins Part Number 3401544
- Fleetguard® Part Number LF9009.

# Fuel Recommendations and Specifications

## Fuel Recommendations

**WARNING**

**Do not mix gasoline, alcohol, or gasohol with diesel fuel. This mixture can cause an explosion.**

**CAUTION**

**Due to the precise tolerances of diesel injection systems, it is extremely important that the fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the fuel pump and the fuel injectors.**

**CAUTION**

**Lighter fuels can reduce fuel economy and can possibly damage the fuel injection pump.**

Cummins recommends the use of ASTM Number 2D fuel. The use of Number 2D fuel will result in optimum engine performance.

At operating temperatures below 0°C [32°F], acceptable performance can be obtained by using blends of Number 2D and Number 1D.

The viscosity of the fuel **must** be kept above 1.3 cSt at 40°C [104°F] to provide adequate fuel system lubrication.

The following chart lists acceptable alternate fuels for C8.3 Series engines.

| Acceptable Substitute Fuels - Cummins C8.3 Fuel System | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Number 1D Diesel(1)(2) | Number 2D Diesel | Number 1K Kerosene | Jet-A | Jet-A1 | JP-5 | JP-8 | Jet-B | JP-4 | CITE |
| OK | OK | OK | OK | OK | OK | OK | **NOT** OK | **NOT** OK | **NOT** OK |

| |
|---|
| Any adjustment to compensate for reduced performance with a fuel system using alternate fuel is **not** warrantable. |
| Winter blend fuels, such as those found at commercial fuel dispensing outlets, are combinations of Number 1D and Number 2D diesel fuel and are acceptable. |

Additional information for fuel recommendations and specifications can be found in Fuel for Cummins Engines, Bulletin Number 3379001. See the ordering information in the back of this manual.

# Lubricating Oil Recommendations and Specifications

## New Engine Break-in Oils

**⚠CAUTION⚠**

**A sulfated ash limit of 1.85 percent has been placed on all engine lubricating oils recommended for use in Cummins® engines. Higher ash oils can cause valve and/or piston damage and lead to excessive oil consumption.**

**⚠CAUTION⚠**

**The use of a synthetic-based oil does not justify extended oil change intervals. Extended oil change intervals can decrease engine life due to factors such as corrosion, deposits, and wear.**

Special break-in engine lubricating oils are **not** recommended for new or rebuilt Cummins® engines. Use the same type of oil during the break-in as used in normal operation.

Additional information regarding lubricating oil availability throughout the world is available in the Lubricating Oils Data Book for Heavy-Duty Automotive and Industrial Engines. It can be ordered from: Engine Manufacturers Association (EMA), Two North LaSalle Street, Chicago, IL 60602; (www.engine-manufacturers.org)

### Precautions and Instructions for Proper Kit Use

If an engine is operated in ambient temperatures consistently below -23°C [-9°F], and there are no provisions to keep the engine warm when it is **not** in operation, use a synthetic CE/SF or higher American Protroleum Institute (API) classification engine oil with adequate low-temperature properties such as 5W-20 or 5W-30.

The oil supplier is responsible for meeting the performance service specification represented with its product.

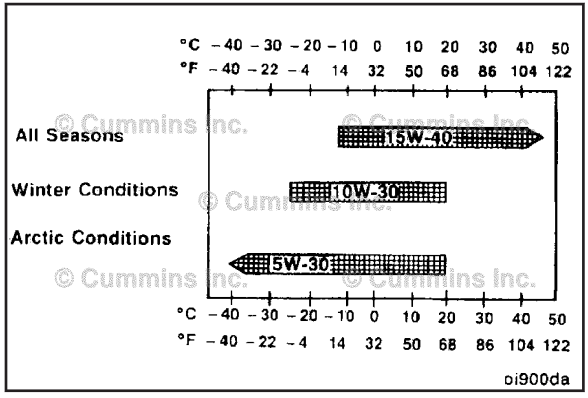
## General Information

The use of quality engine lubricating oils, combined with appropriate oil drain and filter change intervals, are critical factors in maintaining engine performance and durability.

Cummins® recommends the use of a high-quality SAE 15W-40 multiviscosity heavy-duty engine oil, such as Cummins Premium Blue®, that meets the requirements of Cummins® Engineering Specification CES20071 or CES20076, or the American Petroleum Institute (API) performance classification CG-4 or CH-4.

A sulfated ash limit of 1.0 mass percent is suggested for optimum valve and piston deposit and oil consumption control. The sulfated ash **must not** exceed 1.85 mass percent.

For further details and discussion of engine lubricating oils for Cummins® engines, refer to Cummins® Engine Oil Recommendations, Bulletin Number 3810340, or a Cummins® Authorized Repair Location.

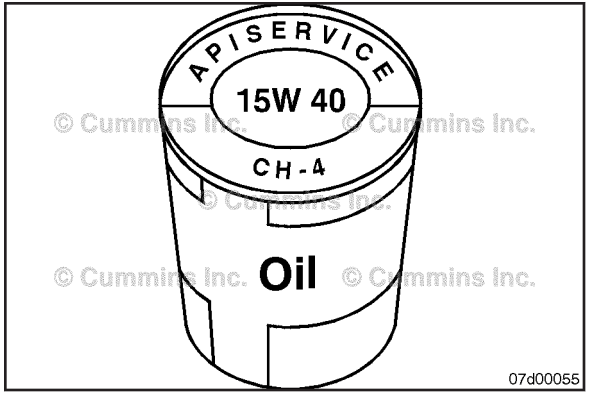


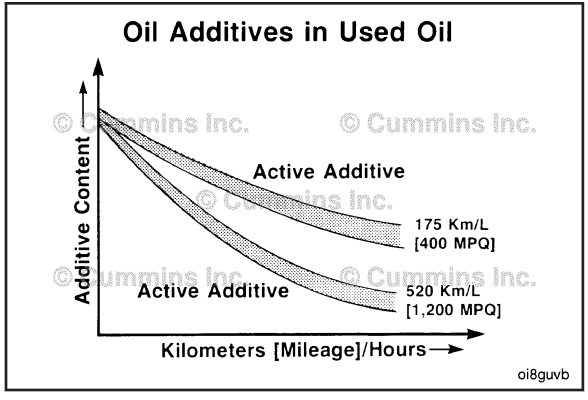

The use of low-viscosity oils, such as 10W or 10W-30, can be used to aid in starting the engine and in providing sufficient oil flow at ambient temperatures below -5°C [23°F]. However, continuous use of low-viscosity oils can decrease engine life due to wear. Reference the accompanying chart.

The API service symbols are shown in the accompanying illustration. The upper half of the symbol displays the appropriate oil categories.

The lower half can contain a description of oil energy conserving features.

The center section identifies the SAE oil viscosity grade.






As the engine oil becomes contaminated, essential oil additives are depleted. Lubricating oils protect the engine as long as these additives are functioning properly. Progressive contamination between oil and filter change intervals is normal. The amount of contamination will vary depending on the operation of the engine, kilometers or [miles] on the oil, fuel consumed, and new oil added.

Extending oil and filter change intervals beyond the recommendations will decrease engine life due to factors such as corrosion, deposits, and wear.

Use the following procedure to determine which oil drain interval to use for an application.

For C8.3 Industrial:

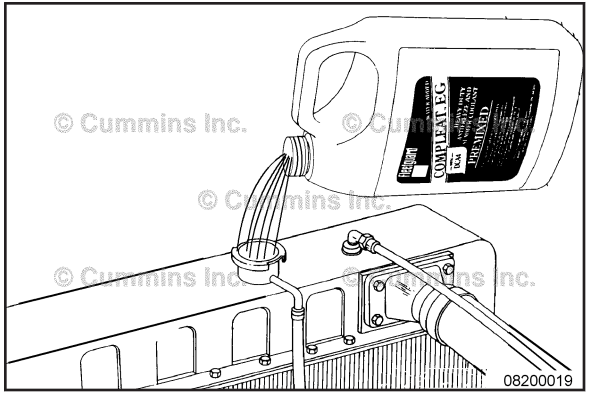
See the C8.3 Industrial and Generator Drive Operation and Maintenance Manual, 2883407. Refer to Procedure 018-003 in Section V.

For C8.3 Commercial Marine:

See the C8.3 Commercial Marine and Industrial Operation and Maintenance Manual, 4021330. Refer to Procedure 018-003 in Section V.

# Coolant Recommendations and Specifications

## Fully Formulated Coolant/Antifreeze

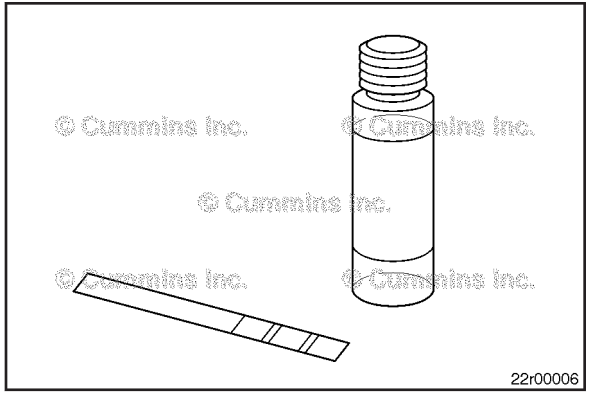



For new vehicles, check with the original equipment manufacturer (OEM) on the type of coolant (ethylene glycol, propylene glycol, organic acid technology, glycerin, etc.) used for the first fill. This will assist in understanding how to maintain the coolant properly.

Cummins Inc. recommends using either a 50/50 mixture of good quality water and fully formulated antifreeze or fully formulated coolant when filling the cooling system. The fully formulated antifreeze or coolant **must** meet CES14603 specifications.

Most coolants which meet ASTM D6210 also meet CES14603.

However, some organic acid technology coolants such as Shell™ Rotell ELC, Chevron™ Texaco™ Delo ELC, and their private label counterparts meet ASTM D6210, but do **not** meet the elastomer compatibility test of CES14603. These coolants are acceptable for use, assuming the OEM added silicate at initial fill. Refer to Bulletin 3666132, Cummins® Coolant Requirements and Maintenance, Section 3, Extended Service Interval, for more details.



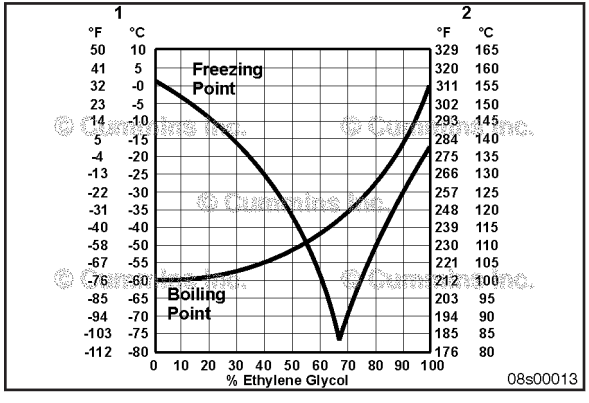

Good quality water is important for cooling system performance. Excessive levels of calcium and magnesium contribute to scaling problems and excessive levels of chlorides and sulfates cause cooling system corrosion.

Use Fleetguard® Water-Chek™ test strips, CC2609, to check the water quality. Instructions are included with the test kit.

| **Water Quality** | |
|---|---|
| **Calcium Magnesium (hardness)** | **Maximum 170 ppm as ($CaCO_3$ + $MgCO_3$)** |
| Chloride | Maximum 40 ppm as (Cl) |
| Sulfate | Maximum 100 ppm as ($SO_4$) |

Cummins Inc. recommends Cummins Filtration™ antifreeze coolants including Compleat ES™ containing DCA4 Plus, Fleetcool™ EX containing DCA2 Plus, and ES Optimax™ organic acid technology, which meet the requirements of Cummins® Engineering Standard 14603.

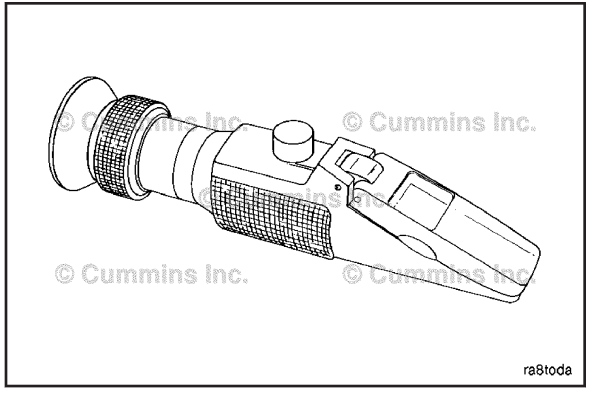

Fully formulated antifreeze **must** be mixed with good quality water at a 50/50 ratio (40 to 60 percent working range). A 50/50 mixture of antifreeze and water gives a -36°C [-33°F] freezing point and a 108°C [226°F] boiling point, which is adequate for locations in North America. The actual lowest freezing point of ethylene glycol antifreeze is at 68 percent. Using higher concentrations of antifreeze will raise the freezing point of the solution and increase the possibility of a silica gel problem.




**Legend**

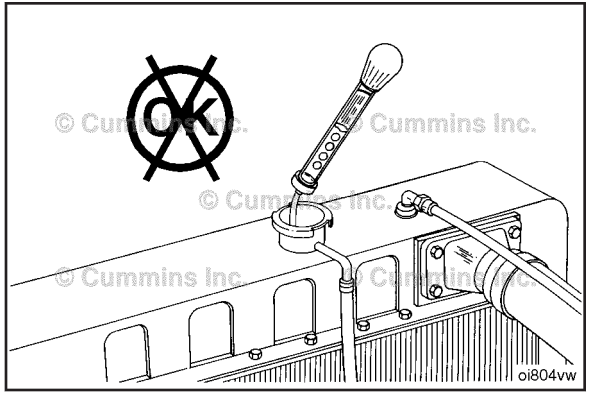
1 Freezing Point Temperature Scale

2 Boiling Point Temperature Scale




A refractometer is the preferred tool for measuring the freezing point of ethylene glycol and propylene glycol coolants. Use Fleetguard® refractometer, Part Number CC2800 or CC2806. For glycerin coolants, use Part Number CC36049.

**NOTE:** Fleetguard® coolant test strips, Part Number CC2602, can also be used to check the freezing point.

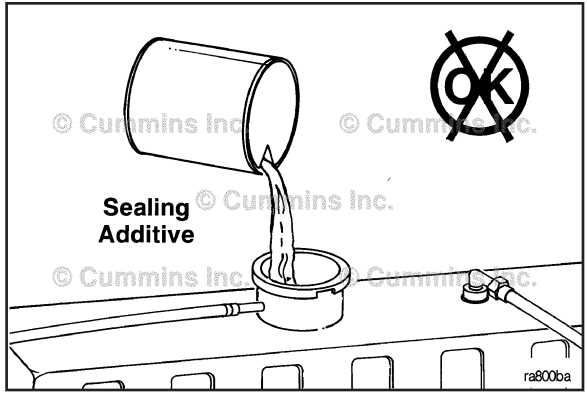



Do **not** use a floating ball hydrometer. The use of a floating ball hydrometer can give incorrect readings.

## Cooling System Sealing Additives

Do **not** use sealing additives in the cooling system. The use of sealing additives will:

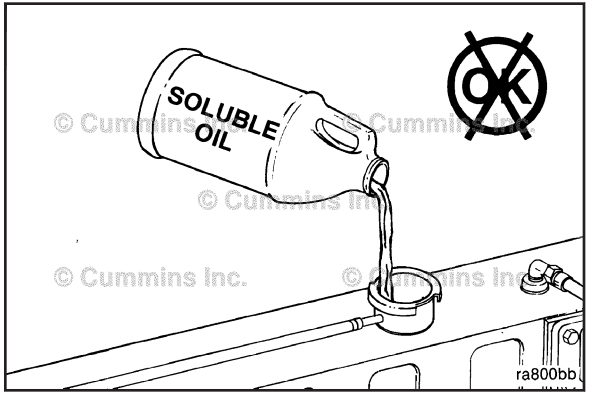
- Build up in coolant low-flow areas
- Clog coolant filters, if equipped
- Plug radiators and oil coolers
- Possibly damage the water pump seal.

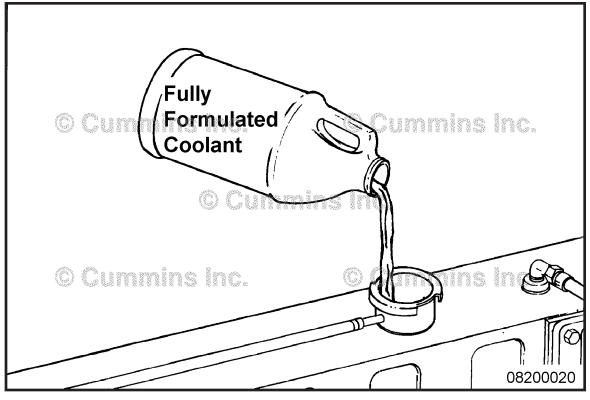



## Cooling System Soluble Oils

Do **not** use soluble oils in the cooling system. The use of soluble oils will:

- Allow cylinder liner pitting
- Corrode brass and copper
- Damage heat transfer surfaces
- Damage seals and hoses.






## Supplemental Coolant Additive (SCA)

**⚠CAUTION⚠**

**Improper coolant, concentration of coolant additives, and maintenance will likely result in liner pitting and engine failure.**

Fully formulated products contain SCAs and are required to protect the cooling system from scale and fouling, solder corrosion, and general corrosion.

**⚠ WARNING ⚠**

**Do not remove the pressure cap from a hot engine. Wait until coolant temperature is below 50°C [120°F] before removing the pressure cap. Heated coolant spray or steam can cause personal injury.**

Measuring the chemical protection in the engine's cooling system is essential for protection against liner pitting, corrosion, and coolant dilution.

**NOTE:** Some organic acid technolgoy coolants use high levels of organic acids for liner pitting protection and do **not** use nitrite and/or molybdate. Therefore, these coolants do **not** have SCA numbers. See the coolant manufacturer for proper maintenance instructions.

Testing is especially recommended if the operator is **not** sure of the cooling system condition due to leaks, uncontrolled topping off of the system, or major coolant loss.

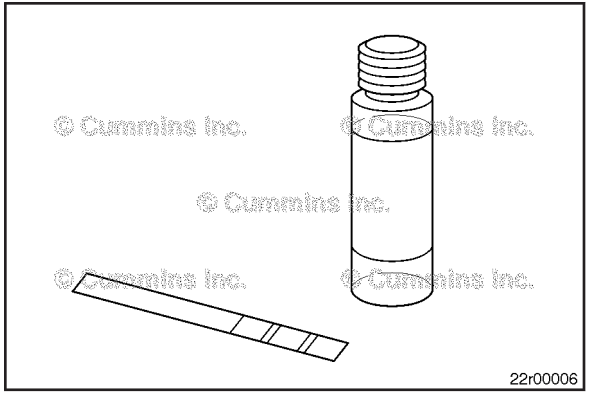
If the SCA concentration is below 1.2 units per gallon, the supplemental coolant additives need to be replenished.

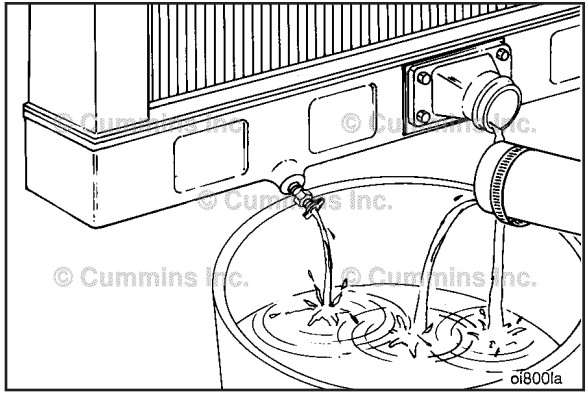
Check the SCA concentration level at least every 6 months, and anytime the coolant condition is unknown or corrosion is apparent within the cooling system.

Use Fleetguard® coolant test strips, Part Number CC2602, to check the concentration level. Instructions are included with the test kit.

Call the following numbers to get answers to any questions about cooling system maintenance:

| Cummins Inc. | Fleetguard® |
|---|---|
| 1-800-DIESELS | 1-800-22FILTER |
| 1-800-343-7357 | 1-800-223-4583 |








## Coolant Replacement Requirements

**⚠WARNING⚠**
**Coolant is toxic. Keep away from children and pets. If not reused, dispose of inaccordance with local environmental regulations.**

Replace the coolant **only** if the replacement limits are exceeded.

Fleetguard® Quik-Chek™ test strips, Part Number CC2718, will detect contamination levels that indicate replacement of the coolant is required.

Fleetguard® also offers laboratory coolant testing with the use of Monitor Coolant Testing kits, Part Numbers CC2700 and CC2706.

**NOTE:** Dispose of used coolant or antifreeze in accordance with federal, state, and local laws and regulations.

# Section W - Warranty

## Section Contents

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# All Engines United States And Canada Industrial (Off-Highway) Coverage

## Products Warranted

This Warranty applies to new Engines sold by Cummins and delivered to the first user on or after April 1, 1999, that are used in Industrial (Off-Highway) applications in the United States* and Canada, except for Engines used in marine, generator drive, QSK95 T4 locomotive and certain defense applications, for which different Warranty Coverage is provided.

## Base Engine Warranty

This Warranty covers any failures of the Engine, under normal use and service, which result from a defect in material or factory workmanship (Warrantable Failures).

Coverage begins with the sale of the Engine by Cummins. Coverage continues for two years or 2,000 hours of operation, whichever occurs first, from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first. If the 2,000 hour limit is exceeded during the first year, Coverage continues until the end of the first year.

Engine aftertreatment components included in the Cummins Critical Parts List (CPL) and marked with a Cummins part number are covered under Base Engine Warranty.

Additional Coverage is outlined in the Emission Warranty section.

## Extended Major Components Warranty

The Extended Major Components Warranty covers Warrantable Failures of the Engine cylinder block, camshaft, crankshaft and connecting rods (Covered Parts).

Bushing and bearing failures are not covered.

This Coverage begins with the expiration of the Base Engine Warranty and ends three years or 10,000 (3,000 hours for A Series Engines) hours of operation from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or from when the Engine has been operated for 50 hours, whichever occurs first.

**Consumer Products**

The Warranty on Consumer Products in the United States* is a LIMITED Warranty. **CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Any implied Warranties applicable to Consumer Products in the United States* terminate concurrently with the expiration of the express Warranties applicable to the product. In the United States*, some states do not allow the exclusion of incidental or consequential damages, or limitations on how long an implied Warranty lasts, so the limitations or exclusions herein may not apply to you.

**These Warranties are made to all Owners in the chain of distribution and Coverage continues to all subsequent Owners until the end of the periods of Coverage.**

# Cummins Responsibilities

**During The Base Engine Warranty**

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Warrantable Failure.

Alternators, starters, and fans ARE covered for the duration of the Base Engine Warranty on A Series and B3.3 Engines.

Alternators and starters are covered for the duration of the Base Engine Warranty on QSK23 Engines.

Cummins will pay for the lubricating oil, antifreeze, filter elements and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay reasonable costs for mechanics to travel to and from the equipment site, including meals, mileage and lodging, when the repair is performed at the site of the failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

**During The Extended Major Components Warranty**

Cummins will pay for the repair or, at its option, replacement of the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

## Owner Responsibilities

**During The Base Engine Warranty**

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items provided during Warranty repairs unless such items are not reusable due to the Warrantable Failure.

**During The Extended Major Components Warranty**

Owner is responsible for the cost of all labor needed to repair the Engine, including the labor to remove and reinstall the Engine. When Cummins elects to repair a part instead of replacing it, Owner is not responsible for the labor needed to repair the part.

Owner is responsible for the cost of all parts required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during repair of a Warrantable Failure.

**During The Base Engine And Extended Major Components Warranties**

Owner is responsible for the operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable Warranty, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Warrantable Failure and make the Engine available for repair by such facility. Service locations are listed on the Cummins Worldwide Service Locator at cummins.com.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

## Limitations

Engines with an emissions certification listed below must be operated using only diesel fuel having no more than the corresponding maximum sulfur content. Failure to use the specified fuel as listed in the Cummins Fuel Bulletin #3379001 Table 1 (Cummins Inc. Required Diesel Fuel Specifications) can damage the Engine and aftertreatment system within a short period of time. This damage could cause the Engine to become inoperable and failures attributable to the use of incorrect fuels will be denied Warranty Coverage. Fuel specifications also need to comply with local fuel regulations (EN590 for Europe and ASTM D975 for North America) for Warranty eligibility.

| **Maximum sulfur levels by emissions certification level as listed on the Engine's dataplate are:** | |
|---|---|
| EPA 2007/2010/2013 | max. 15 parts per million |
| EPA Tier 4 Interim / Final | max. 15 parts per million |
| EU Stage IIIB 2011 | max. 15 parts per million |
| Euro 4/5 | max. 50 parts per million |
| Euro 6 | max. 10 parts per million |

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil, fuel or diesel exhaust fluid or by water, dirt or other contaminants in the fuel, oil or diesel exhaust fluid.

For power units and fire pumps (package units), this Warranty applies to accessories, except for clutches and filters, supplied by Cummins which bear the name of another company.

Cummins Compusave units are covered by a separate Warranty.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that consumption exceeds Cummins published standards.

Failures of belts and hoses supplied by Cummins are not covered beyond the first 500 hours or one year of operation, whichever occurs first.

Parts used to repair a Warrantable Failure may be new Cummins parts, Cummins approved rebuilt parts or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins approved rebuilt part used to repair a Warrantable Failure assumes the identity of the part it replaced and is entitled to the remaining Coverage hereunder.

For all A Series Applications, including Industrial, travel reimbursement for non-transportable equipment will be limited to 4.0 hours, $0.25/mile and 250 miles maximum. Any costs beyond this limit are the customer's responsibility.

**CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.**

**CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

**THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THESE ENGINES. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

# Emission Warranty

### Products Warranted

This Emission Warranty applies to new Engines marketed by Cummins that are used in the United States* and Canada in vehicles designed for Industrial Off-Highway use. This Warranty applies to Engines delivered to the ultimate purchaser on or after April 1, 1999, for Engines up to 750 horsepower and on or after January 1, 2000, for Engines 751 horsepower and over.

### Coverage

Cummins warrants to the ultimate purchaser and each subsequent purchaser that the Engine is designed, built and equipped so as to conform at the time of sale by Cummins with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within the longer of the following periods: (A) **Five years or 3,000 hours of operation for industrial applications, five years or 3,500 hours of operation for industrial spark-ignited Engines (GTA855, G855, G5.9C, G8.3-C, GTA8.9E, QSK19G) and five years or 2,500 hours of operation for industrial spark-ignited Engines (GKTA19-GC), whichever occurs first, as measured from the date of delivery of the Engine to the ultimate purchaser, or (B) The Base Engine Warranty.

If the vehicle in which the Engine is installed is registered in the state of California, a separate California Emission Warranty also applies.

**Limitations**

Engines with an emissions certification listed below must be operated using only diesel fuel having no more than the corresponding maximum sulfur content. Failure to use the specified fuel as listed in the Cummins Fuel Bulletin #3379001 Table 1 (Cummins Inc. Required Diesel Fuel Specifications) can damage the Engine and aftertreatment system within a short period of time. This damage could cause the Engine to become inoperable and failures attributable to the use of incorrect fuels will be denied Warranty Coverage. Fuel specifications also need to comply with local fuel regulations (EN590 for Europe and ASTM D975 for North America) for Warranty eligibility.

| **Maximum sulfur levels by emissions certification level as listed on the Engine's dataplate are:** | |
|---|---|
| EPA 2007/2010/2013 | max. 15 parts per million |
| EPA Tier 4 Interim / Final | max. 15 parts per million |
| EU Stage IIIB 2011 | max. 15 parts per million |
| Euro 4/5 | max. 50 parts per million |
| Euro 6 | max. 10 parts per million |

Failures, other than those resulting from defects in materials or workmanship, are not covered by this Warranty.

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil, fuel or diesel exhaust fluid or by water, dirt or other contaminants in the fuel, oil or diesel exhaust fluid.

Cummins is not responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all business costs or other losses resulting from a Warrantable Failure.

**CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

* United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico and the U.S. Virgin Islands.

** Emissions Warranty for BLPG Industrial Off-Highway Engines is 5 years / 3,500 hours.

# All Engines International Industrial (Off-Highway)

## Coverage

### Products Warranted

This Warranty applies to new Engines sold by Cummins and delivered to the first user on or after April 1, 1999, that are used in Industrial (Off-Highway) applications anywhere in the world where Cummins approved service is available, except the United States and Canada. Different Warranty Coverage is provided for Engines used in marine, generator drive, QSK95 T4 locomotive and certain defense applications.

### Base Engine Warranty

This Warranty covers any failures of the Engine, under normal use and service, which result from a defect in material or factory workmanship (Warrantable Failure).

Coverage begins with the sale of the Engine by Cummins. Coverage continues for two years or 2,000 hours of operation, whichever occurs first, from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first. If the 2,000 hour limit is exceeded during the first year, Coverage continues until the end of the first year.

Engine aftertreatment components included in the Cummins Critical Parts List (CPL) and marked with a Cummins part number are covered under Base Engine Warranty.

### Extended Major Components Warranty

The Extended Major Components Warranty covers Warrantable Failures of the Engine cylinder block, camshaft, crankshaft and connecting rods (Covered Parts).

Bushing and bearing failures are not covered.

This Coverage begins with the expiration of the Base Engine Warranty and ends three years or 10,000 hours (3,000 hours for A Series Engines) of operation, from the date of delivery of the Engine to the first user, or from the date the unit is first leased, rented or loaned, or when the Engine has been operated for 50 hours, whichever occurs first.

**These Warranties are made to all Owners in the chain of distribution, and Coverage continues to all subsequent Owners until the end of the periods of Coverage.**

# Cummins Responsibilities

**During The Base Engine Warranty**

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Warrantable Failure.

Alternators, starters, and fans ARE covered for the duration of the Base Engine Warranty on A Series and B3.3 Engines.

Alternators and starters are covered for the duration of the Base Engine Warranty on QSK23 Engines.

Cummins will pay for the lubricating oil, antifreeze, filter elements and other maintenance items that are not reusable due to a Warrantable Failure.

Cummins will pay reasonable costs for mechanics to travel to and from the equipment site, including meals, mileage and lodging, when the repair is performed at the site of the failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

**During The Extended Major Components Warranty**

Cummins will pay for the repair or, at its option, replacement of the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

# Owner Responsibilities

**During The Base Engine Warranty**

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during Warranty repairs unless such items are not reusable due to the Warrantable Failure.

**During The Extended Major Components Warranty**

Owner is responsible for the cost of all labor needed to repair the Engine, including the labor to remove and reinstall the Engine. When Cummins elects to repair a part instead of replacing it, Owner is not responsible for the labor needed to repair the part.

Owner is responsible for the cost of all parts required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during repair of a Warrantable Failure.

**During The Base Engine Warranty And Extended Major Components Warranties**
Owner is responsible for the operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable Warranty, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Warrantable Failure and make the product available for repair by such facility. Service locations are listed in the Cummins Worldwide Service Locator at cummins.com.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

## Limitations

Engines with an emissions certification listed below must be operated using only diesel fuel having no more than the corresponding maximum sulfur content. Failure to use the specified fuel as listed in the Cummins Fuel Bulletin #3379001 Table 1 (Cummins Inc. Required Diesel Fuel Specifications) can damage the Engine and aftertreatment system within a short period of time. This damage could cause the Engine to become inoperable and failures attributable to the use of incorrect fuels will be denied Warranty Coverage. Fuel specifications also need to comply with local fuel regulations (EN590 for Europe and ASTM D975 for North America) for Warranty eligibility.

**Maximum sulfur levels by emissions certification level as listed on the Engine's dataplate are:**

| | |
|---|---|
| EPA 2007/2010/2013 | max. 15 parts per million |
| EPA Tier 4 Interim / Final | max. 15 parts per million |
| EU Stage IIIB 2011 | max. 15 parts per million |
| Euro 4/5 | max. 50 parts per million |
| Euro 6 | max. 10 parts per million |

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil, fuel or diesel exhaust fluid or by water, dirt or other contaminants in the fuel, oil or diesel exhaust fluid.

For power units and fire pumps (package units) the Warranty applies to accessories, except for clutches and filters supplied by Cummins which bear the name of another company.

Cummins Compusave units are covered by a separate Warranty.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that consumption exceeds Cummins published standards.

Failures of belts and hoses supplied by Cummins are not covered beyond the first 500 hours or one year of operation, whichever occurs first.

Parts used to repair a Warrantable Failure may be new Cummins parts, Cummins approved rebuilt parts or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins approved rebuilt part used to repair a Warrantable Failure assumes the identity of the part it replaced and is entitled to the remaining Coverage hereunder.

For all A Series Applications, including Industrial, travel reimbursement for non-transportable equipment will be limited to 4.0 hours, $0.25/mile and 250 miles maximum. Any costs beyond this limit are the customer's responsibility.

**CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.**

**CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

**THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THESE ENGINES. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

In the case of consumer sales, in some countries, the Owner has statutory rights which cannot be affected or limited by the terms of this Warranty.

Nothing in this Warranty excludes or restricts any contractual rights the Owner may have against third parties.

# All Engines Less Than 10L Worldwide New Engine Parts

## Coverage

### Products Warranted

This Warranty applies to new Parts sold by Cummins when used on or with its Engines less than 10L which are purchased by the first user on or after January 1, 2013. It applies anywhere in the world where Cummins approved service is available through a Cummins distributor. Additionally, this warranty applies to starters and alternators sold for use on non-Cummins engines.

### Coverage

This Warranty covers any failures of the Parts, under normal use and service, which result from defects in material or factory workmanship (Warrantable Failures). The Coverage duration is for one year, 100,000 miles or 3,600 hours of operation or specified maintenance interval, whichever occurs first, after the date of first installation.

**This Warranty is made to all Owners in the chain of distribution and Coverage continues to all subsequent Owners until the end of the periods of Coverage.**

## Cummins Responsibilities

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from the Warrantable Failure.

Cummins will pay for the lubricating oil, antifreeze, filter elements, belts, hoses and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

## Owner Responsibilities

At the time when the Parts are installed, Owner is responsible for the preparation of a written record containing the following: (1) the date of installation of the Parts; (2) the Engine serial number; (3) the Engine miles, hours or

kilometers of operation; (4) the Parts installed; and (5) the location of the Parts in the Engine. The purpose of this record is to protect Owner's interests and support any claim for a Warrantable Failure.

Owner is responsible for the operation and maintenance of the Engine as specified in Cummins Operation and Maintenance Manuals. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before expiration of the applicable Warranty, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Warrantable Failure and make the Engine available for repair by such facility. Owner must also deliver the Engine to the repair facility. Locations in the United States and Canada are listed in the United States and Canada Sales and Service Directory; other locations are listed in the Cummins International Sales and Service Directory.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items provided during Warranty repairs unless such items are not reusable due to a Warrantable Failure.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred by Owner as a result of a Warrantable Failure.

Owner is responsible for non-Engine repairs and for "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

## Limitations

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or air intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel.

Except for fuel pumps, Cummins does not warrant parts supplied by Cummins which bear the name of another company. This category of parts includes, but is not limited to: hydraulic pumps, alternators, starters, fans, air

conditioning compressors, clutches, filters, power steering pumps, transmissions, torque converters, marine gears, air cleaners, non-Cummins air compressors and Engine compression brakes.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that consumption exceeds Cummins published standards.

Parts used to repair a Warrantable Failure may be new Cummins parts, Cummins ReCon® parts or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins ReCon® part used to repair a Warrantable Failure assumes the identity of the part it replaced and is entitled to the remaining Coverage hereunder.

This Warranty does not apply to parts furnished by Cummins at no charge to the Owner.

Cummins Inc. reserves the right to interrogate Electronic Control Module (ECM) data for purposes of failure analysis.

**CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.**

**CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGE.**

**THIS WARRANTY IS THE SOLE WARRANTY MADE BY CUMMINS IN REGARD TO THESE PARTS. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state or from province to province.

# CMD Commercial Application Marine Propulsion(B/C/N14)

## Coverage

### Engines Included in this Coverage

| Marine Propulsion |
|---|
| 4B |
| 6B |
| 6C |
| N14 |

### Products Warranted

This Warranty applies to new Cummins Engines sold by Cummins MerCruiser Diesel, herein after “CMD”, that are used in Marine propulsion applications anywhere in the world where CMD approved service is available*, and delivered to the first user on or after April 29, 2002. The 'Product' consists of a new Cummins Engine, as well as accessories which are approved and supplied by CMD and which are either installed by CMD or a CMD authorized distributor. These Products have the following designation:

### MARINE PROPULSION - Intermittent Rating

This power rating is intended for intermittent use in variable load applications where full power is limited to two hours out of every eight hours of operation. Also, reduced power operations must be at or below 200 RPM or the maximum rated RPM. This rating is an ISO3046 Fuel Stop Power Rating and is for applications that operate less than 1,500 hours per year.

### MARINE PROPULSION - Medium Continuous Rating

This power rating is intended for continuous use in variable load applications where full power is limited to six hours out of every twelve hours of operation. Also, reduced power operations must be at or below 200 RPM of the maximum rated RPM. This rating is an ISO3046 Fuel Stop Power Rating and is for applications that operate less than 3,000 hours per year.

**MARINE PROPULSION - Heavy Duty Rating**
This power rating is intended for continuous use in variable load applications where full power is limited to eight hours out of every ten hours of operation. Also, reduced power must be at least 200 RPM below the maximum rated RPM. This rating is an ISO3046 Fuel Stop Power Rating and is for applications that operate less than 5,000 hours per year.

**MARINE PROPULSION - Continuous Rating**
This power rating is intended for continuous use in applications requiring uninterrupted service at full power. This rating is an ISO3046 Standard Power Rating.

**Base Engine Warranty**
This Warranty covers any failures of the Product, under normal use and service, which result from a defect in CMD material or factory workmanship (Warrantable Failure). Coverage begins with the sale of the Engine by CMD and continues for the duration stated in the following table. The duration commences on either the date of delivery of the Product to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 50 hours, whichever occurs first.

| | Duration Whichever Occurs First | |
|---|---|---|
| **Rating** | **Years** | **Hours** |
| Intermittent | 1 | 1,500 |
| Medium Continuous | 1 | 3,000 |
| Heavy Duty | 1 | 5,000 |
| Continuous | 1 | Unlimited |

**Extended Major Components Warranty**
The Extended Major Components Warranty applies to Engines other than B and C Series. It covers Warrantable Failures of the Engine cylinder block, camshaft, crankshaft and connecting rods (Covered Parts). Bushing and bearing failures are not covered. This Coverage begins with the expiration of the Base Engine Warranty and ends after three

years or 10,800 hours of operation, whichever occurs first, from the date of delivery to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 50 hours, whichever occurs first.

**Consumer Products**

The Warranty on Consumer Products in the United States is a limited Warranty. **CMD IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.** Any implied Warranties applicable to Consumer Products terminate concurrently with the expiration of the express Warranties applicable to the Product. In the United States, some states do not allow the exclusion of incidental or consequential damages, or limitations on how long an implied Warranty lasts, so the limitations or exclusions herein may not apply to you.

**These Warranties are made to all Owners in the chain of distribution, and Coverage continues to all subsequent Owners until the end of the periods of Coverage.**

## Cummins MerCruiser Diesel Responsibilities

**During the Base Engine Warranty**

CMD will pay for all parts and labor needed to repair the damage to the Product resulting from a Warrantable Failure when performed during normal business hours. All labor costs will be paid in accordance with CMD published Standard Repair Time guidelines.

When it is necessary for mechanics to make on-site Warranty repairs, CMD will pay up to six hours total travel expenses, including meals, mileage and lodging, for mechanics to travel to and from the repair dock.

CMD will pay for the lubricating oil, antifreeze, filter elements and other maintenance items that are not reusable due to the Warrantable Failure.

CMD will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

**During the Extended Major Components Warranty**

CMD will pay for the repair or, at its option, replacement of the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

# Owner Responsibilities

**During the Base Engine Warranty**

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during Warranty repairs, unless such items are not reusable due to the Warrantable Failure.

**During the Extended Major Components Warranty**

Owner is responsible for the cost of all labor needed to repair the Engines, including the labor cost for Engine removal and reinstallation. When CMD elects to repair a part instead of replacing it, the Owner is not responsible for the labor needed to repair the part.

Owner is responsible for the cost of all parts required for the repair except for the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part. Owner is responsible for the cost of lubricating oil, antifreeze, filter elements and other maintenance items replaced during repair of a Warrantable Failure.

**During the Base Engine and Extended Major Components Warranties**

Owner is responsible for the operation and maintenance of the Product as specified in the applicable CMD Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable Warranty, Owner must notify a CMD distributor, authorized dealer or other repair location approved by CMD of any Warrantable Failure and make the Engine available for repair by such facility.

In the event of any Product failure, Owner is responsible for the cost of towing the boat to the repair dock and for all associated docking and harbor charges.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for maintaining the Engine hourmeter in good working order at all times and to ensure that the hourmeter accurately reflects the total hours of operation of the Product.

Owner is responsible for the costs to investigate complaints, unless the problem is caused by a defect in CMD material or factory workmanship.

Owner is responsible for non-Engine repairs, “downtime” expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Warrantable Failure.

## Limitations

CMD is not responsible for failures or damage resulting from what CMD determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of cooling, lubricating or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications to the Engine. CMD is also not responsible for failures caused by incorrect oil or fuel, or by water, dirt or other contaminants in the fuel or oil.

CMD is not responsible for failure resulting from:

1 Use or application of the Product inconsistent with its rating designation set forth above.

2 Incorrect installation.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that oil consumption exceeds CMD published standards.

CMD is not responsible for failures of maintenance components supplied by CMD beyond 90 days after the Coverage duration start date. Maintenance components include, but are not limited to: sea water pump impellers; zinc plugs; oil filters; fuel filters; air filters; water filters; fuel/water separator filters; expansion tank pressure caps.

Failure of belts and hoses supplied by CMD are not covered beyond 90 days after the date of delivery of the Product to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 50 hours, whichever occurs first.

Except for the accessories noted previously, CMD does not warrant accessories which bear the name of another company.

Parts used in Warranty repairs may be new Cummins parts, Cummins approved rebuilt parts or repaired parts. CMD is not responsible for failures resulting from the use of parts not supplied by Cummins.

A new Cummins or Cummins approved rebuilt part used to replace a Warranted Part assumes the identity of the Warranted Part it replaced and is entitled to the remaining Coverage hereunder.

**CMD DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.**

**CMD IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

**THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CMD IN REGARD TO THESE ENGINES. CMD MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

In the United States** and Canada, this Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Outside the United States** and Canada, in the case of consumer sales, in some countries the Owner has statutory rights which cannot be affected or limited by the terms of this Warranty.

Nothing in this Warranty excludes or restricts any contractual rights the Owner may have against third parties.

**United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

# US Marine (division of Brunswick Corp.) Worldwide Propulsion Products Coverage

## Products Warranted

This warranty applies to new B and C Series Engines and Marine Gears sold by Cummins Inc., herein after 'Cummins', that are installed in Marine (division of Brunswick Corp.) hulls and used in Marine propulsion applications anywhere in the world where Cummins approved service is available* and delivered to the first user on or after May 1, 1995. The 'Product' consists of a new Cummins Engine, as well as accessories approved and installed by Cummins. These Products have the following designation:

## High Output Rating

This power rating is for use in variable load applications where full power is limited to one (1) hour out of every eight (8) hours of operation. Also, reduced power operations must be at or below 200 RPM of the maximum rated RPM. This rating is an ISO3046 Fuel Stop Power Rating and is for pleasure/non-revenue generating applications that operate less than 300 hours per year.

## Base Engine Warranty

This warranty covers any failures of the Product, under normal use and service, which result from a defect in Cummins material or factory workmanship (Warrantable Failure). Coverage begins with the sale of the Engine by Cummins and ends at the time or mileage stated below. The duration commences on either the date of delivery of the Product to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 50 hours, whichever occurs first.

## Extended Major Components Warranty

The Extended Major Components Warranty covers Warrantable Failures of the following Engine parts or castings (Covered Parts):

- Engine Cylinder Block Casting
- Engine Cylinder Head Casting

- Engine Camshaft Forging
- Engine Crankshaft Forging
- Engine Connecting Rods
- Engine Gear Train Gears:
  - Crankshaft Gear
  - Camshaft Gear
  - Camshaft Idler Gear
  - Accessory Drive Gear
  - Fuel Pump Gear
- Engine Gear Cover and Housing
- Flywheel Housing

Bushing and bearing failures are NOT covered.

Extended Major Components Warranty continues beyond the expiration of the Base Engine Warranty and continues for the Duration stated below. The Duration commences on either the date of delivery of the Product to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 50 hours, whichever occurs first.

These warranties are made to all owners in the chain of distribution and coverage continues to all subsequent owners until the end of the periods of coverage.

| Warranty Coverage | | |
|---|---|---|
| | Coverage Duration* | |
| Coverage Category | Months | Hours |
| Base Engine Warranty | 24 | 600 |
| Extended Major Components | 72 | 1800 |
| *Whichever occurs first. | | |

| Warranty Coverage | | | | |
|---|---|---|---|---|
| | Repair Charge Paid by Cummins | | | |
| Coverage Category | Parts | Labor | Removal & Installation Labor | Travel |
| Base Engine Warranty | Yes | Yes | Yes | Yes - Up to 6 hours |
| Extended Major Components | Yes** | Yes | Yes | No |
| **Covered Parts as listed above. | | | | |

# Cummins Responsibilities

**During the Base Engine Warranty**

Cummins will pay for all parts and labor needed to repair the damage to the Product resulting from a Warrantable Failure when performed during normal business hours. All labor costs will be paid in accordance with Cummins published Standard Repair Time guidelines.

When it is necessary for mechanics to make on-site warranty repairs, Cummins will pay up to six (6) hours total travel expenses, including meals, mileage and lodging, for mechanics to travel to and from the repair dock.

Cummins will pay for the lubricating oil, antifreeze, filter elements, and other maintenance items that are not reusable due to the Warrantable Failure.

Cummins will pay for reasonable labor costs for Engine removal and reinstallation when necessary to repair a Warrantable Failure.

**During the Extended Major Components Warranty**
Cummins will pay for the repair or, at its option, replacement of the defective Covered Part and of any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

## Owner Responsibilities

**During the Extended Major Components Warranty**
Owner is responsible for the cost of all parts and associated repair expenses required for the repair labor, the defective Covered Part and any Covered Part damaged by a Warrantable Failure of the defective Covered Part.

**During Both the Base Engine and the Extended Major Components Warranties**
Owner is responsible for the cost of lubricating oil, antifreeze, filter elements, and other maintenance items replaced during warranty repairs unless such items are not reusable due to the Warrantable Failure.

Owner is responsible for the operation and maintenance of the Product as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of the applicable warranty, Owner must notify a Cummins distributor, authorized dealer, or other repair location approved by Cummins of any Warrantable Failure and make the Product available for repair by such

facility. Locations in the United States and Canada are listed in the Cummins U.S. and Canada Sales and Service Directory; other locations are listed in the Cummins International Sales and Service Directory.

In the event of any Product failure, Owner is responsible for the cost of towing the boat to the repair dock and for all associated docking and harbor charges.

Owner is responsible for communication expenses, meals, lodging, and similar costs incurred as a result of a Warrantable Failure.

Owner is responsible for maintaining the Engine hourmeter in good working order at all times and to ensure that the hourmeter accurately reflects the total hours of operation of the Product.

Owner is responsible for the costs to investigate complaints, unless the problem is caused by a defect in Cummins material or factory workmanship.

Owner is responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs, and other losses resulting from a Warrantable Failure.

## Limitations

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of cooling, lubricating or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications to the Engine. Cummins is also not responsible for failures caused by incorrect oil or fuel or by water, dirt or other contaminants in the fuel or oil.

Cummins is not responsible for failures resulting from:

1 Use or application of the Product inconsistent with its rating designation set forth above.

2 Incorrect installation.

Before a claim for excessive oil consumption will be considered, Owner must submit adequate documentation to show that oil consumption exceeds Cummins published standards.

Failure of belts and hoses supplied by Cummins are not covered beyond 90 days after the date of delivery of the Product to the first user, or the date the unit is first leased, rented or loaned, or when the Product has been operated for 50 hours, whichever occurs first.

Parts used in warranty repairs may be new Cummins parts, Cummins approved rebuilt parts, or repaired parts. Cummins is not responsible for failures resulting from the use of parts not supplied by Cummins.

A new Cummins or Cummins-approved rebuilt part used to replace a Warranted Part assumes the identity of the Warranted Part it replaced and is entitled to the remaining coverage hereunder.

Cummins Inc. reserves the right to interrogate Electronic Control Module (ECM) data for purposes of failure analysis.

**CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.**

**CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

**THESE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS IN REGARD TO THESE ENGINES. CUMMINS MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

In the United States* and Canada, this Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Outside the United States* and Canada, in case of consumer sales, in some countries the Owner has statutory rights which cannot be affected or limited by the terms of this warranty.

Nothing in this warranty excludes or restricts any contractual rights the Owner may have against third parties.

* United States includes American Samoa, the Commonwealth of Northern Mariana Islands, Guam, Puerto Rico, and the U.S. Virgin Islands.

# California Emission Control System Warranty, Off-Highway

## Products Warranted

This Emission Control System Warranty applies to off-road diesel engines certified with the California Air Resources Board beginning with the year 1996 for engines up to 750 horsepower, beginning with the year 2000 for 751 horsepower and over, marketed by Cummins, and registered in California for use in industrial off-highway applications.

## Your Warranty Rights and Obligations

The California Air Resources Board and Cummins Engine Company, Inc., are pleased to explain the emission control system warranty on your engine. In California, new off-road diesel engines must be designed, built and equipped to meet the State's stringent anti-smog standards. Cummins must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, Cummins will repair your off-road diesel engine at no cost to you including diagnosis, parts and labor.

## Manufacturer's Warranty Coverage

This warranty coverage is provided for 5 years or 3,000 hours of engine operation, whichever first occurs from the date of delivery of the engine to the first user. If any emission-related part on your engine is defective, the part will be repaired or replaced by Cummins.

# Coverage

This emission control system warranty applies only to the following A series, B3.3, B3.9, B4.5s, B5.9, B6.7s, QSB3.9-30, QSB4.5-30, QSB5.9-30, QSB5.9-44, C8.3, QSC8.3, QSF2.8, QSF3.8, and QSL9 emission control parts:

**EPA Diesel**

| Aftertreatment System<br>Component |
|---|
| Aftertreatment Electrical Connections |
| Aftertreatment Fuel Drain Valve |
| Aftertreatment Fuel Injector/Regulator |
| Aftertreatment Fuel Pressure Sensor |
| Aftertreatment Fuel Shut-Off Valve |
| Aftertreatment Injector Manifold |
| Aftertreatment Inlet and Outlet Modules |
| Aftertreatment Temperature Interface Module |
| Aftertreatment Temperature Sensors |

| Aftertreatment System (cont')<br>Component |
|---|
| Decomposition Tube |

| Base Engine System<br>Component |
|---|
| Camshaft |
| Camshaft Injector Lobe |
| Camshaft Valve Lobe |
| Coolant Temperature Sensor |
| Crankcase Breather |
| Engine Oil Pressure Sensor |
| Engine Speed, Position Sensor, Cam Position Sensor |
| Exhaust Valve |
| Static Cam Timing |

| EGR System<br>Component |
|---|
| EGR Cooler |

**EPA Diesel**

DEF Dosing Controller (DCU)
DEF Dosing Unit (Pump)
DEF Dosing Valve
Diesel Oxidation Catalyst
Diesel Particulate Filter (except for ash maintenance)
Diesel Particulate Filter Differential Pressure Sensor
NH3 Sensor
NOx Sensors
SCR Catalyst

EGR Differential Pressure Sensor
EGR Mixer/Venturi
EGR Temperature Sensor
EGR Valve

| Air Handling Component |
| --- |
| Barometric Air Pressure Sensor |
| Exhaust Gas Pressure Sensor |
| Exhaust Manifold |
| Grid Heater |
| Humidity Sensor |
| Intake Air Throttle Actuator |

| Electronic Control System Component |
| --- |
| Engine Control Module |
| Wiring Harness Circuits Connected at Both Ends to Emissions Warrantable Components |
| Engine Control Module Calibration |
| Engine Control Module Calibration |

## EPA Diesel

Intake Manifold
Intake Manifold Air Temperature Sensor

**Air Handling (cont')**

| Component |
| --- |
| Intake Manifold Temperature/Pressure Sensor |
| Turbocharger Actuator |
| Turbocharger Assembly |
| Turbocharger Compressor Inlet Air Temperature Sensor |
| Turbocharger Speed Sensor |

**Ignition System**

| Component |
| --- |
| Ignition Coils |
| Ignition Control Module |

**Fuel System**

| Component |
| --- |
| Fuel Control Valve |
| Fuel Lines |
| Fuel Pressure Sensor |
| Fuel Pump |
| Fueling/Timing Actuators |

**Fuel System (cont')**

| Component |
| --- |
| Injector |
| Secondary Fuel Pressure/Temperature Sensor |

## Owner's Warranty Responsibilities

As the off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in your Cummins Operation and Maintenance Manual. Cummins recommends that you retain all receipts covering maintenance on your off-road diesel engine, but Cummins cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

You are responsible for presenting your off-road diesel engine to a Cummins dealer as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

As the off-road diesel engine owner, you should also be aware that Cummins may deny you warranty coverage if your off-road diesel engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate on diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements.

If you have any questions regarding your warranty rights and responsibilities, you should contact Cummins Customer Assistance Department at 1-800-343-7357 (1-800-DIESELS) or the California Air Resources Board at 9528 Telstar Avenue, El Monte, CA 91731.

Prior to the expiration of the applicable warranty, Owner must give notice of any warranted emission control failure to a Cummins distributor, authorized dealer or other repair location approved by Cummins and deliver the engine to such facility for repair. Repair locations are listed in Cummins United States and Canada Service Directory.

Owner is responsible for incidental costs such as: communication expenses, meals, lodging incurred by Owner or employees of Owner as a result of a warrantable failure.

Owner is responsible for business costs and losses, "downtime" expenses, and cargo damage resulting from a warrantable failure. CUMMINS IS NOT RESPONSIBLE FOR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDE BUT ARE NOT LIMITED TO FINES, THEFT, VANDALISM OR COLLISIONS.

## Replacement Parts

Cummins recommends that any service parts used for maintenance, repair or replacement of emission control systems be new, genuine Cummins or Cummins approved rebuilt parts and assemblies, and that the engine be serviced by a Cummins distributor, authorized dealer or the repair location approved by Cummins. The owner may elect to have maintenance, replacement or repair of the emission control parts performed by a facility other than a Cummins distributor, an authorized dealer or a repair location approved by Cummins, and may elect to use parts other than new genuine Cummins or Cummins approved rebuilt parts and assemblies for such maintenance, replacement or repair; however, the cost of such service or parts will not be covered under this emission control system warranty.

## Cummins Responsibilities

Repairs and service will be performed by any Cummins distributor, authorized dealer or other repair location approved by Cummins using new, genuine Cummins or Cummins approved rebuilt parts and assemblies. Cummins will repair any of the emission control parts found by Cummins to be defective without charge for parts or labor (including diagnosis which results in determination that there has been a failure of a warranted emission control part).

## Emergency Repairs

In the case of an emergency where a Cummins distributor, authorized dealer, or other repair location approved by Cummins is not available, repairs may be performed by any available repair location using any replacement parts. Cummins will reimburse the Owner for expenses (including diagnosis), not to exceed the manufacturer's suggested retail price for all warranted parts replaced and labor charges based on the manufacturer's recommended time allowance for the warranty repair and the geographically appropriate hourly labor rate. A part not being available within 30 days or a repair not being complete within 30 days constitutes an emergency. Replaced parts and paid invoices must be presented at a Cummins authorized repair facility as a condition of reimbursement for emergency repairs not performed by a Cummins distributor, authorized dealer, or other repair location approved by Cummins.

## Warranty Limitations

Cummins is not responsible for failures resulting from Owner or operator abuse or neglect, such as: operation without adequate coolant, fuel or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or air intake systems; improper storage, starting, warm-up, run-in or shutdown practices.

The manufacturer warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board, and that it is free from defects in materials and workmanship which cause the failure of a warranted part.

Any warranted part which is not scheduled for replacement as required maintenance, or which is scheduled only for regular inspection to the effect of "repair or replace as necessary" is warranted for the warranty period.

Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time prior to the first scheduled replacement point for that part.

The owner will not be charged for diagnostic labor which leads to the determination that a warranted part is defective, if the diagnostic work is performed at a warranty station.

The manufacturer is liable for damages to other engine components caused by the failure under warranty of any warranted part.

Cummins is not responsible for failures resulting from improper repair or the use of parts which are not genuine Cummins or Cummins approved parts.

These warranties, together with the express commercial warranties and emission warranty are the sole warranties of Cummins. There are no other warranties, express or implied, or of merchantability or fitness for a particular purpose.

## Index
## Page X-2

## CALIFORNIA
### Proposition 65 Warning

**Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

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**APPLICABLE ONLY IN U.S.A. AND CANADA**

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