



Installation, operation, and maintenance manual

**C1000N6B and C1300N6
Natural gas generator sets (GenSets)**

Manufactured in De Pere, Wisconsin

This manual contains proprietary information to equipment produced by Cummins Inc. and is being supplied solely for the purpose of installing the natural gas generator set purchased from the Cummins facility in De Pere, Wisconsin.

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.





Commercial generator set base limited warranty statement

Models manufactured by the
Cummins Custom Design and Upfit Center
(CDUC) in De Pere, Wisconsin

A042E778 Rev. 8
August 2021



PLEASE KEEP FOR YOUR RECORDS

Generator Set model: _____

Generator Set serial number or product identifier: _____

Generator Set data in-service: _____

NOTES:



This base limited warranty statement applies to the following commercial generator set (GenSet) models:

Table 1-1. Natural gas GenSets							
C55N6C	C55N6CB	C70N6C	C95N5C				
C115N6C	C150N5C	C175N6	C185N6C				
C200N6	C225N6	C225N6B	C230N6	C250N6	C250N6C	C250N6CB	C275N6C
C300N6	C350N6						
C400N5C	C400N6	C450N6	C485N6				
C500N6	C500N6B	C550N6	C550N5C	C580N6			
C600N6	C635N6	C650N6	C690N6				
C750N6	C760N6						
C815N6							
C1000N6B	C1300N6						

Table 1-2. Diesel GenSets	
C80D6B	
C110D6B	C130D6B
C275D6D	
C400D6B	



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Cummins commercial generator set (GenSet) base limited warranty

This base limited warranty applies to all Cummins Inc. branded commercial GenSets identified herein and associated accessories ("Product"). This base limited warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Product rating definitions:

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a GenSet is capable of delivering in the event of a reliable utility power outage or under test conditions for up to 500 hours of operation per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP rating. For applications supporting an unreliable utility service, the Prime Power (PRP) rating should be used.

Prime Power (PRP) is defined as the maximum power which a GenSet is capable of delivering continuously while supplying a variable electrical load when operated for an unlimited number of hours per year. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP. For applications requiring permissible average output higher than stated, a Continuous Power (COP) rating should be used. Total operating time at 100% PRP rating shall not exceed 500 hours/year.

Continuous Power (COP) is defined as the maximum power which the GenSet is capable of delivering continuously while supplying a constant electrical load (supplying utility power at a constant 100 percent load) when operated for an unlimited number of hours per year. No overload capability is available for this rating.

Demand Response Power (DRP) - is defined as the maximum power which a spark-ignited GenSet is capable of delivering electrical power *in parallel* with commercially-available power in variable and non-variable load applications. DRP is intended for use in situations where there are contracted power outages, such as utility power curtailment. A DRP GenSet may be operated in parallel to the public utility **up to 500 hours per year**, with an average load factor no greater than 80% of the DRP rating. DRP GenSets with ESP ratings can be run in emergency standby applications up to their ESP rating for up to 50 hours per year. The customer should be aware, however, that the life of any DRP GenSet will be reduced by constant high load operation (running at ESP).

Environmental Protection Agency - Stationary Emergency (EPA-SE) is defined as being the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generator set is capable of delivering in the event of a utility power outage or under test conditions and used in strict accordance with the EPA NSPS for stationary engines, 40 CFR part 60, subparts IIII and JJJJ, where a reliable utility must be present. The permissible average power output over 24 hours of operation shall not exceed 70% of the EPA-SE.



Base limited warranty period

The base limited warranty start date is the date of initial startup, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The warranty period is as follows:

Base limited warranty period (whichever occurs first)

Rating	Months	Maximum hours
Continuous Power (COP)	12	Unlimited
Demand Response Power (DRP)	12	500
Emergency Standby Power (ESP)	24	1000
Environmental Protection Agency - Stationary emergency (EPA-SE)	24	Unlimited
Prime Power (PRP)	12	Unlimited

Cummins responsibilities

In the event of a failure of the Product during the base limited warranty period due to defects in material or workmanship, Cummins will be responsible for only the following:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner responsibilities

The owner will be responsible for the following:

- Notifying the Cummins distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins' published policies and guidelines.
- Providing evidence for the date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and re-installation resulting from difficult or non-standard installations.
- Costs associated with rental of a GenSet used to replace the Product being repaired.



- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, applicable taxes, damages, and other losses resulting from a warrantable failure.

Base limited warranty limitations

This base limited warranty does **not cover** Product failures resulting from:

- Inappropriate use relative to designated power rating or application guidelines.
- Inappropriate use of an EPA-SE application GenSet relative to EPA's standards
- Normal wear and tear or corrosion.
- Negligence, accidents or misuse.
- Improper and/or unauthorized installation.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins manual, published guideline, or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before or after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; over-fueling; over-speeding; lack of maintenance to lubricating, cooling or air intake systems; delayed/late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices; or progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the GenSet.
- Unusual or special operating environments.

This base limited warranty does **not cover**:

- Costs of maintenance, adjustments, installation, commissioning or start-up.
- Starting batteries, battery chargers, cooling packages, heating elements, exhaust system or after-treatment components, or trailers. (These components shall be covered by the respective manufacturer's warranty, if applicable.)
- Components added to the Product after shipment from Cummins.
- Costs associated with gaining access to the Product.



- Damage to customer property.
- Repair of cosmetic damage to an enclosure after shipment from Cummins.

Cummins right to failed components

Failed components claimed under this base limited warranty remain the property of Cummins. Cummins has the right to reclaim any failed component that has been replaced under this base limited warranty.

Limitation on warranties

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

Limitation on liabilities

IN NO EVENT SHALL CUMMINS BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This base limited warranty shall be enforced to the maximum extent permitted by applicable law. This base limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.



This product has been manufactured under the controls established by a Bureau Veritas Certification approved management system that conforms with ISO 9001:2015.

Cummins contact information

Any questions regarding this base limited warranty statement may be directed to CSSNAPGWarranty@cummins.com.



Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

1-800-CUMMINS™ (1-800-286-6467)
cummins.com

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Commercial generator set

Extended warranty statement - Feature Code L189

Models manufactured by the
Cummins Custom Design and Upfit Center
(CDUC) in De Pere, Wisconsin



PLEASE KEEP FOR YOUR RECORDS

Generator Set model: _____

Generator Set serial number or product identifier: _____

Generator Set data in-service: _____

NOTES:



This extended limited warranty statement applies to the ***emergency standby ratings*** (only) of the following commercial generator set (GenSet) models:

C175N6			
C200N6	C250N6		
C300N6	C350N6		
C400N6	C450N6		
C500N6	C500N6B	C550N6	
C600N6	C635N6	C650N6	C690N6
C750N6	C760N6		
C815N6			
C1000N6B	C1300N6		



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Cummins commercial GenSet extended limited warranty

Feature code L189

“5 year or 2,500 hour Parts + Labor + Travel Extended Warranty”

This extended limited warranty (Feature code L189 - “5 year or 2,500 hour Parts + Labor + Travel Extended Warranty”) applies to all Cummins Inc. branded commercial GenSet models identified herein and associated accessories (“Product”). This extended limited warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Extended limited warranty period

The extended limited warranty start date is the date of initial startup, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The extended limited warranty coverage duration is five years or 2500 hours, whichever occurs first.

Cummins responsibilities

In the event of a failure of the Product during the extended limited warranty period due to defects in material or workmanship, Cummins will be responsible for only the following:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner responsibilities

The owner will be responsible for the following:

- Notifying the Cummins distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins’ published policies and guidelines.
- Providing evidence for the date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.
- Incremental costs and expenses associated with Product removal and re-installation resulting from difficult or non-standard installations.
- Costs associated with rental of a GenSet used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, applicable taxes, damages, and other losses resulting from a warrantable failure.



Extended limited warranty limitations

This extended limited warranty does **not cover** Product failures resulting from:

- Inappropriate use relative to designated power rating or application guidelines.
- Inappropriate use of an EPA-SE application relative to EPA's standards
- Normal wear and tear or corrosion.
- Negligence, accidents or misuse.
- Improper and/or unauthorized installation.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins manual, published guideline, or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before or after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins.
- Use of Battle Short Mode.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; over-fueling; over-speeding; lack of maintenance to lubricating, cooling or air intake systems; delayed/late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices; or progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the GenSet.
- Unusual or special operating environments.

This extended limited warranty does **not cover**:

- Costs of maintenance, adjustments, installation, commissioning or start-up.
- Starting batteries, battery chargers, cooling packages, heating elements, exhaust system or after-treatment components, trailers, or enclosures. (These components shall be covered by the respective manufacturer's warranty, if applicable.)
- Components added to the Product after shipment from Cummins.
- Costs associated with gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to an enclosure after shipment from Cummins.



Cummins right to failed components

Failed components claimed under this extended limited warranty remain the property of Cummins. Cummins has the right to reclaim any failed component that has been replaced under this extended limited warranty.

Limitation on warranties

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

Limitation on liabilities

IN NO EVENT SHALL CUMMINS BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This extended limited warranty shall be enforced to the maximum extent permitted by applicable law. This extended limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

Cummins contact information

Any questions regarding this extended limited warranty statement may be directed to CSSNAPGWarranty@cummins.com.



Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

1-800-CUMMINS™ (1-800-286-6467)
cummins.com

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1 - Safety

1.1 Introduction

Cummins Generator Set (GenSet) manuals should be considered part of the equipment. Keep the manuals with the equipment. If the equipment is traded or sold, give the manuals to the new owner.

The GenSet has been carefully designed to provide safe and efficient service when properly installed, maintained, and operated. However, the overall safety and reliability of the complete system is dependent on many factors outside the control of the GenSet manufacturer. To avoid possible safety hazards, make all mechanical and electrical connections to the GenSet as specified in this manual.

All systems external to the generator (fuel, electrical, etc.) must comply with all applicable codes. Make certain all required inspections and tests have been completed and all code requirements have been satisfied before certifying the installation is complete and ready for service. All personnel responsible for operation and maintenance of the equipment should read and thoroughly understand this manual.

SAVE THESE INSTRUCTIONS.

Safe and efficient operation can be achieved only if the equipment is properly operated and maintained. Many accidents are caused by failure to follow fundamental rules and precautions.

1.2 Use of advisory and cautionary statements

1.2.1 Advisory statements

Advisory statements are used throughout this manual to call attention to special information and correct operating procedures. Throughout this manual, these Advisory Statements are delineated by the terms "NOTE" and "IMPORTANT" in uppercase letters:

NOTE: *A general advisory statement relating to equipment operation and maintenance procedures.*

IMPORTANT: *A specific advisory statement intended to prevent damage to the equipment or its associated components.*

1.2.2 Cautionary statements

Cautionary statements highlight safety precautions pertaining to personal injury and/or damage to the equipment. Cautionary Statements are always preceded by the following symbols:



This symbol warns of immediate hazards which WILL result in severe personal injury or death.



This symbol refers to a hazard or unsafe practice which COULD result in severe personal injury or death.



This symbol indicates the presence of a hazard or unsafe practice which can result in minor or moderate personal injury.

1.3 Emergency stop procedure

All operators of the GenSet must become familiar with the external **Emergency Stop** button for emergency shutdown of the GenSet. The **Emergency Stop** button stops the GenSet immediately and prevents starting of the GenSet. The **Emergency Stop** button on the GenSet control panel and the (optional) secondary **Emergency Stop** button are installed in parallel so that either **Emergency Stop** button will immediately stop the GenSet.

IMPORTANT: *It is imperative to properly shut down the GenSet in order to achieve life-safety starting capabilities on the next start attempt. Use of the **Emergency Stop** button does not allow for proper cooldown (where the lubricating oil and engine coolant carry the heat away from the engine combustion chamber and bearings) of the GenSet in a safe manner. Make sure the cause of the emergency stop is fully investigated and remedied before resetting the fault(s) and restarting the GenSet.*

*If the GenSet is stopped via the **Emergency Stop** button or while a fault is present, it is imperative that the operator:*

- 1. Reset the **Emergency Stop** button(s);*
- 2. Restart the GenSet;*
- 3. Clear the fault; and*
- 4. Shut down the GenSet (without using the **Emergency Stop** button).*

IMPORTANT: *Do not use an **Emergency Stop** button to shut down an engine unless a serious fault develops.*

NOTE: *Use of an **Emergency Stop** button to shut down the engine may result in some loss of Electronic Control Module (ECM) data.*

NOTE: *If the engine is not running, an activated **Emergency Stop** button will prevent the starting of the engine, regardless of which **Emergency Stop** button is pressed.*



1.3.1 Stopping the GenSet at the GenSet

To activate the **Emergency Stop** button on the GenSet, press the large red knob located near the Operator Panel (shown in [Figure 1-1](#)).

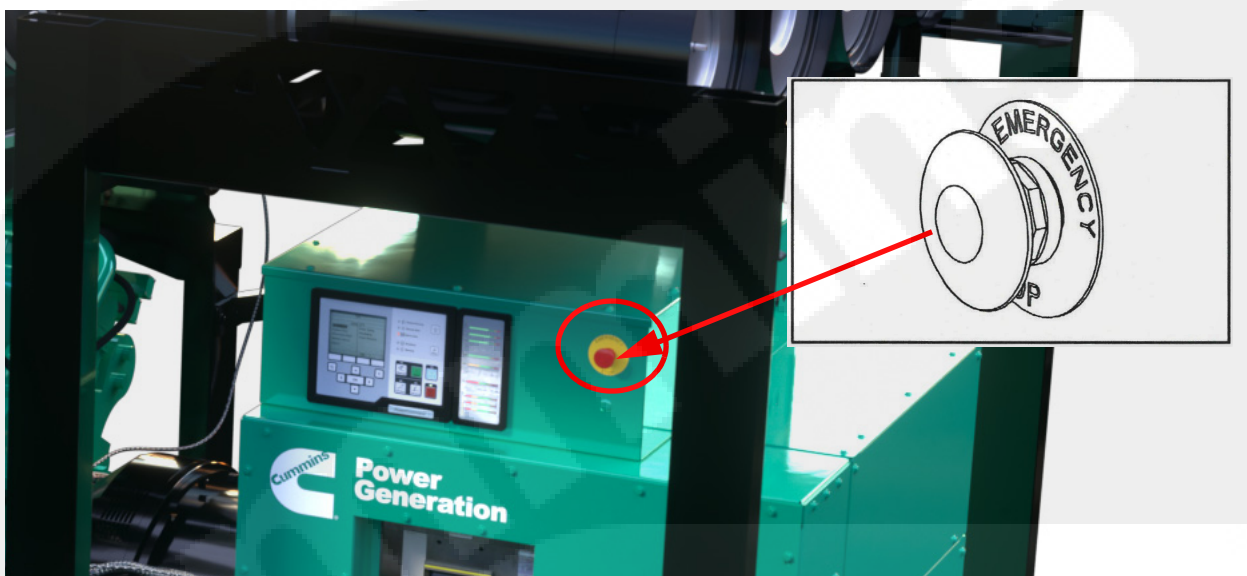


Figure 1-1 Emergency Stop button on the control panel

1.3.2 Stopping the GenSet using the optional secondary Emergency Stop button

Alternately, the GenSet can be immediately stopped from a secondary **Emergency Stop** button. To activate the secondary **Emergency Stop** button, break open the secondary **Emergency Stop** enclosure (shown in [Figure 1-2](#)) and press the large red knob.



Figure 1-2 Optional secondary Emergency Stop button

1.3.3 Resetting the GenSet after an emergency stop

After an emergency stop, reset the **Emergency Stop** and press the **RESET** button on the GenSet Operator Panel or the remote HMI Operator Panel.

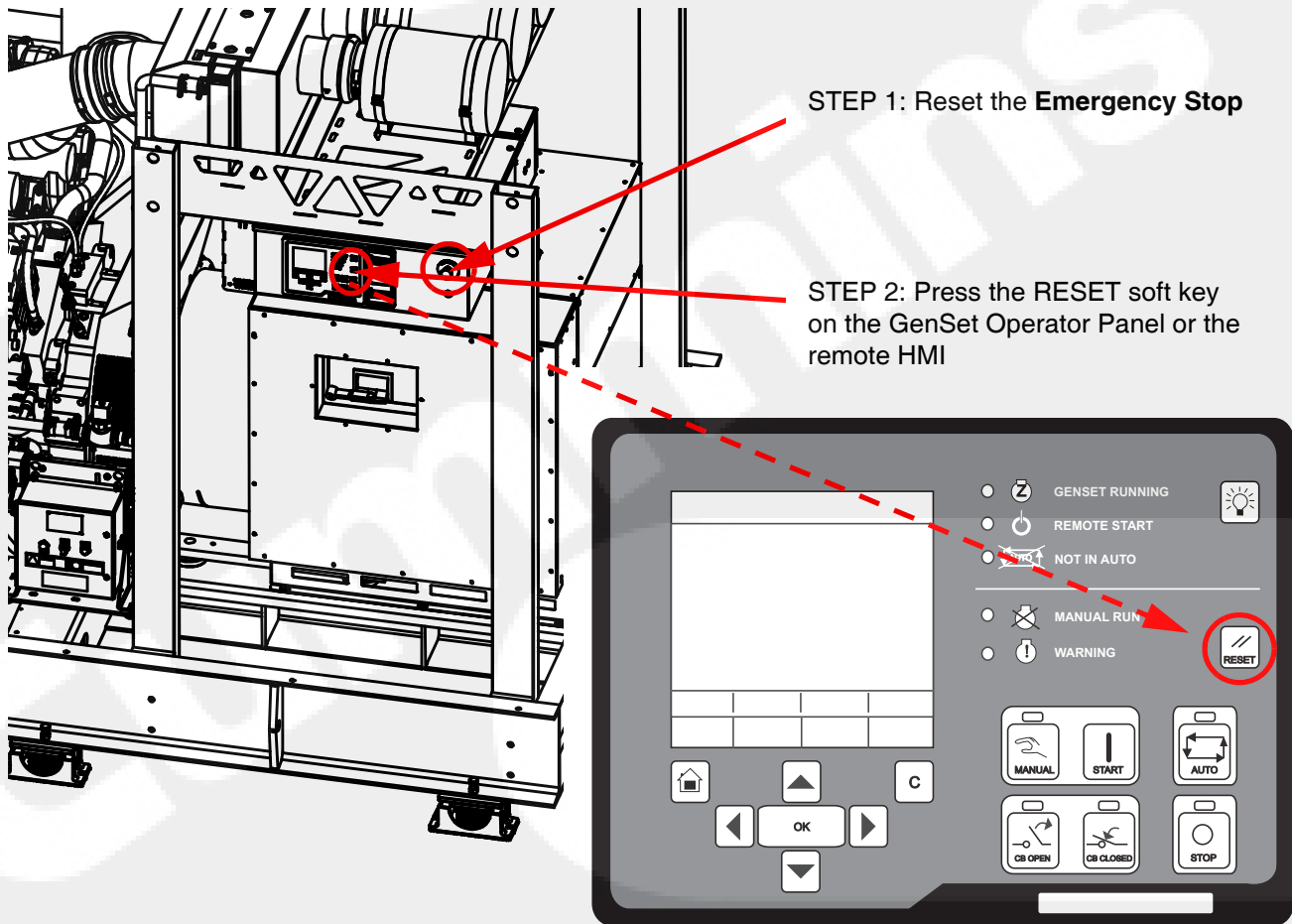


Figure 1-3 Operator Panel RESET soft key

1.4 General safety precautions

Read and understand all the safety precautions and warnings before performing any repair. Special safety precautions are included in the procedures when they apply. Perform a walk around inspection and alert all area personnel that the equipment will be starting before manual operation.

IMPORTANT: Read and follow all Safety Precautions, Warnings, and Cautions throughout this manual and the documentation supplied with the GenSet.

This list contains the general safety precautions that must be followed to provide personal safety:

WARNING

Contact with hot liquid can cause severe burns. Do not open the pressure cap while the engine is running. Let the engine cool down before removing the cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

DANGER

Moving parts can cause severe personal injury. Use extreme caution around moving parts. All guards must be properly fastened to prevent unintended contact.

WARNING

Used engine oils have been identified by some state and federal agencies to cause cancer or reproductive toxicity. Do not ingest, breathe the fumes, or contact used oil when checking or changing engine oil. Wear protective gloves and a face guard.

WARNING

Incorrect operation can cause severe personal injury or death. Do not operate equipment when fatigued, or after consuming any alcohol or drug. Ensure that only suitably trained and experienced service personnel perform electrical and/or mechanical services.

WARNING

Substances in exhaust gases have been identified by some state and federal agencies to cause cancer or reproductive toxicity. Do not breathe in exhaust gases.

WARNING

GenSets in operation emit noise, which can cause hearing damage. Always wear appropriate ear protection.

WARNING

GenSets in operation have combustible gases under pressure, which if ignited can cause eye and ear damage. Always wear appropriate eye and ear protection.

 WARNING

Contact with hot surfaces can cause severe burns. The unit is to be installed so that the risk of hot surface contact by people is minimized. Wear appropriate personal protective equipment (PPE) when working on hot equipment and avoid contact with hot surfaces.

 WARNING

Ethylene glycol, used as an engine coolant, is toxic to humans and animals. Wear appropriate PPE. Clean up coolant spills and dispose of used coolant in accordance with local environmental regulations.

 DANGER

Ignition of combustible liquids is a fire or explosion hazard which can cause severe burns or death. Do not store fuel, cleaners, oil, etc., near the GenSet. Do not use combustible liquids like ether.

 WARNING

GenSets in operation have combustible gases under pressure, which if ignited can cause severe injury. Do not operate the GenSet with any doors open.

 WARNING

Materials drawn into the GenSet, as well as accumulated grease and oil, are a fire hazard. Fire can cause severe burns or death. Keep the GenSet and the surrounding area clean and free from obstructions. Make sure the GenSet is mounted in a manner to prevent combustible materials from accumulating under the unit.

 DANGER

Accidental or remote starting of the GenSet can cause severe personal injury or death. Isolate all auxiliary supplies and use an insulated wrench to disconnect the starting battery cables (negative [-] first).

IMPORTANT: Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth. Class B fires involve combustible and flammable liquid fuels and gaseous fuels. Class C fires involve live electrical equipment. (Refer to NFPA No. 10 in the applicable region.)

IMPORTANT: Before performing maintenance and service procedures on enclosed GenSets, make sure the service access doors are secured open.

NOTE: Stepping on the GenSet can cause parts to bend or break, leading to electrical shorts, or to fuel, coolant, or exhaust leaks. Avoid stepping on the GenSet when performing maintenance or inspections.

1.4.1 Moving parts

Moving parts can cause severe personal injury or death. When operating the GenSet, follow these guidelines:

- Do not wear loose clothing or jewelry in the vicinity of moving parts or while working on the GenSet. Loose clothing and jewelry can become caught in moving parts.
- Before starting work on the GenSet, disconnect the battery charger from its AC source, then disconnect the starting batteries using an insulated wrench, negative (-) cable first. This will prevent accidental starting.

- Make sure that fasteners on the GenSet are secure. Tighten supports and clamps; keep guards in position over fans, drive belts, etc.
- If any adjustments must be made while the unit is running, use extreme caution around hot exhaust system components, moving parts, etc.

 DANGER

Debris ejected during catastrophic failure can cause serious injury or death by impact, severing or stabbing.

To prevent injury while operating the GenSet:

- Keep away from the air inlet and air outlet when the GenSet is running.
- Do not cause overheating by running the GenSet outside of the rating plate parameters.
- Do not overload the GenSet.
- Do not run a GenSet with excessive vibration.
- Do not synchronize parallel GenSets outside the specified parameters.
- Always wear suitable PPE when working directly in-line with any air inlet/outlet.

1.4.2 Batteries

Batteries can explode, causing severe skin and eye burns and can release toxic electrolytes. Practice good safety regarding batteries:

- Wear safety glasses.
- Do not smoke.
- Do not charge frozen batteries.
- Do not open or mutilate the battery.
- Make sure the battery area has been well-ventilated prior to servicing near it. Lead-acid batteries emit a highly explosive hydrogen gas that can be ignited by arcing, sparking, smoking, etc.

 WARNING

Do not dispose of the battery in a fire, because it can explode.

 WARNING

A battery presents a risk of electrical shock and high short circuit current. The following precautions are to be observed when working on batteries:

- ***Remove watches, rings, or other metal objects.***
- ***Use tools with insulated handles.***

- **Wear rubber gloves and boots.**
- **Do not lay tools or metal parts on top of batteries.**
- **Disconnect the charging source prior to connecting or disconnecting battery terminals.**
- **Determine if the battery is inadvertently grounded. When inadvertently grounded, remove the source of the ground. Contact with any part of a grounded battery is capable of resulting in electrical shock. The risk of such shock is reduced when such grounds are removed during installation and maintenance (applicable to a generator not having a grounded supply circuit).**

 WARNING

Only personnel knowledgeable of batteries and the required precautions may service batteries. Keep unauthorized personnel away from batteries.

 DANGER

Lead-acid batteries present a risk of fire because they generate hydrogen gas. Ignition of explosive battery gases can cause severe personal injury or death. Arcing at battery terminals, light switch or other equipment, flame, pilot lights and sparks can ignite battery gas. Do not smoke, or switch trouble light ON or OFF near battery. Discharge static electricity from body before touching batteries by first touching a grounded metal surface.

 CAUTION

Disconnect the battery charger from the AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes that could damage the DC control circuits of the set.

To prevent dangerous arcing, always properly immobilize the GenSet and then disconnect the negative (-) battery cable from the battery before working on any part of the electrical system or the engine.

When replacing the GenSet battery, always replace it with a battery as specified in this manual.

1.4.3 Electrical shock

GenSet voltage is deadly. GenSet output connections must be made by a trained and experienced electrician in accordance with all applicable codes.

 CAUTION

Improper connections can lead to electrocution of utility workers and damage to equipment. Make sure that the connections are installed properly by a trained technician.

It is the policy of Cummins to perform all electrical work in a de-energized state. However, employees or suppliers may be permitted to occasionally perform work on energized electrical equipment only when qualified and authorized to do so and when troubleshooting, or if de-energizing the equipment would create a greater risk or make the task impossible, and all other alternatives have been exhausted.

Guidelines to follow when working on de-energized electrical systems:

- Use proper PPE. Do not wear jewelry. Ensure that any conductive items are removed from pockets, as these items can fall into equipment and the resulting short circuit can cause shock or burning. Refer to standard NFPA 70E for PPE standards.
- Lockout/tag-out electrical systems prior to working on them. Lockout/tag-out is intended to prevent injury due to unexpected start-up of equipment or the release of stored energy.
- Lockout/tag-out all circuits and devices before removing any protective shields or making any measurements on electrical equipment.
- Follow all applicable regional electrical and safety codes.



Voltages and currents present an electrical shock hazard that can cause severe burns or death. Contact with exposed energized circuits with potentials of 50 Volts AC or 75 Volts DC or higher can cause electrical shock and electrical arc flash. Refer to standard NFPA 70E or equivalent safety standards in corresponding regions for details of the dangers involved and for the safety requirements.

Guidelines to follow when working on energized electrical systems:

- Do not tamper with or bypass interlocks unless you are authorized to do so.
- Understand and assess the risks - use proper PPE. Do not wear jewelry. Ensure that any conductive items are removed from pockets, as these items can fall into equipment and the resulting short circuit can cause shock or burning. Refer to standard NFPA 70E for PPE standards.
- Ensure that an accompanying person who can undertake a rescue is nearby.

1.4.4 Alternating current (AC) supply

It is the sole responsibility of the customer to provide AC power conductors for connection to load devices and the means to isolate the AC input to the terminal box; these must comply with local electrical codes and regulations. Safety may require the installation of a disconnect means for the GenSet, either on the GenSet or where the GenSet conductors enter a facility.

The disconnecting device is not provided as part of the GenSet, and Cummins accepts no responsibility for providing the means of isolation.

IMPORTANT: *The AC supply must have the correct over current and earth fault protection according to local electrical codes and regulations. This equipment must be earthed (grounded).*

1.4.5 Fuel and fumes

Fire, explosion, and personal injury or death can result from improper practices. Do not fill fuel tanks while the engine is running unless the tanks are outside the engine compartment. Fuel contact with a hot engine or exhaust is a potential fire hazard. Do not permit any flame, cigarette, pilot light, spark, arcing equipment, or other ignition source near the GenSet.

Fuel lines must be adequately secured and free of leaks. Fuel connections should be made with an appropriate flexible line. Do not use copper piping on flexible lines, as copper will become brittle if continuously vibrated or repeatedly bent.

Ensure all fuel supplies have a positive shutoff valve.

Any spillage that occurs during coolant fill, oil top-off, or oil change must be cleaned up before starting the GenSet.

 DANGER

Fire, explosion, and personal injury or death can result from improper practices. Do not permit any flame, cigarette, pilot light, spark, arcing equipment, or other ignition source near the GenSet.

Flammable vapor can cause an engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury, and death. Do not operate a GenSet where a flammable vapor environment can be created, unless the GenSet is equipped with an automatic safety device to block the air intake and stop the engine. The owners and operators of the GenSet are solely responsible for operating the GenSet safely.

1.4.6 Exhaust gases

Exhaust gases are deadly. Position the GenSet so that exhaust gases are discharged away from enclosed or sheltered areas, and areas where individuals are likely to congregate. Check the exhaust system for corrosion, obstruction, and leaks every time you start the GenSet and every eight hours when you run it continuously. Make sure that exhaust manifolds are secured and not warped. Do not use exhaust gases to heat a compartment. Make sure the unit is well-ventilated.

 WARNING

Contact with hot exhaust gases can cause severe burns. Wear PPE when working on equipment and avoid contact with hot surfaces.

 WARNING

Inhalation of exhaust gases can cause asphyxiation and death. Pipe exhaust gases outside and away from windows, doors, or other inlets to buildings. Do not allow exhaust gases to accumulate in habitable areas.

 DANGER

Contaminated insulation is a fire hazard. Fire can cause severe burns or death. Remove any contaminated insulation and dispose of it in accordance with local regulations.

Position the exhaust away from flammable materials. Make sure that the exhaust outlet is not obstructed. Make sure that vegetation is removed from the vicinity of the exhaust. Personnel using this equipment must be made aware of the exhaust position.

IMPORTANT: *To minimize the risk of fire, ensure the engine is cool thoroughly before performing maintenance or operation tasks.*

The exhaust pipes may have some fitted insulating covers. If these covers become contaminated, they must be replaced before the GenSet is run.

1.4.7 Carbon monoxide

Carbon monoxide (CO) is hazardous. CO is an odorless, colorless, tasteless and non-irritating gas. You cannot see it or smell it. Red blood cells, however, have a greater affinity for CO than for oxygen. Therefore, exposure even to low levels of CO for a prolonged period can lead to asphyxiation (lack of oxygen) resulting in death. Mild effects of CO poisoning include eye irritation, dizziness, headaches, fatigue and the inability to think clearly. More extreme symptoms include vomiting, seizures and collapse.

Engine-driven GenSets produce harmful levels of carbon monoxide that can injure or kill you.

WARNING

CO gas can cause nausea, fainting, or death. Depending on air temperature and wind, CO can accumulate in the vicinity. To protect yourself and others from the dangers of CO poisoning, it is recommended that reliable, approved, and operable CO detector alarms are installed in proper locations as specified by their manufacturer.

To protect yourself from CO poisoning:

- Locate the GenSet in an area where there are no windows, doors, or other access points into an occupied area.
- Make sure all CO detectors are installed and working properly.
- Pay attention for signs of CO poisoning.

1.5 Earth ground connection

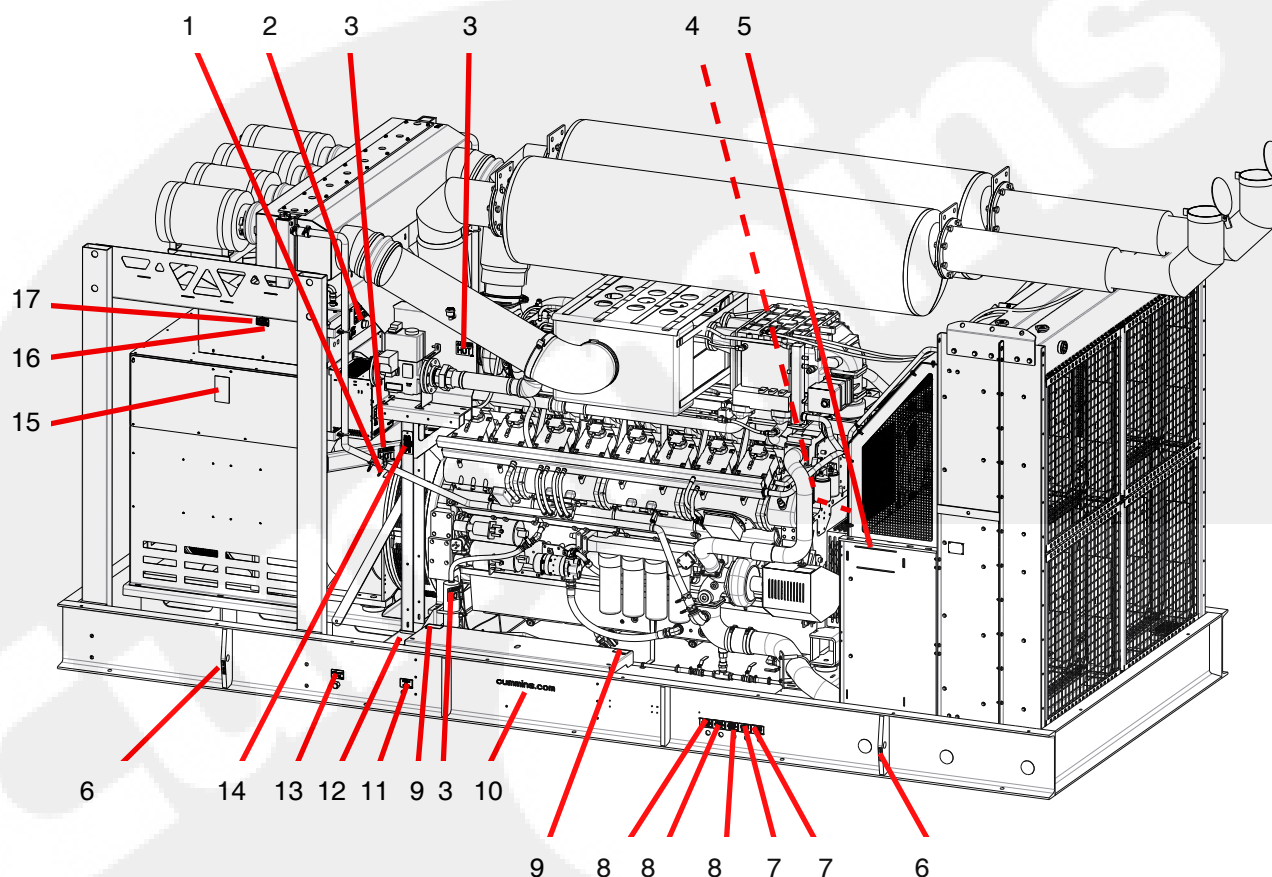
The neutral of the GenSet may be required to be bonded to earth ground at the GenSet location, or at a remote location, depending on the system design requirements. Consult the engineering drawings for the facility or a qualified electrical design engineer for proper installation.

NOTE: *The end user is responsible to make sure that the ground connection point surface area is clean and free of rust before making a connection.*



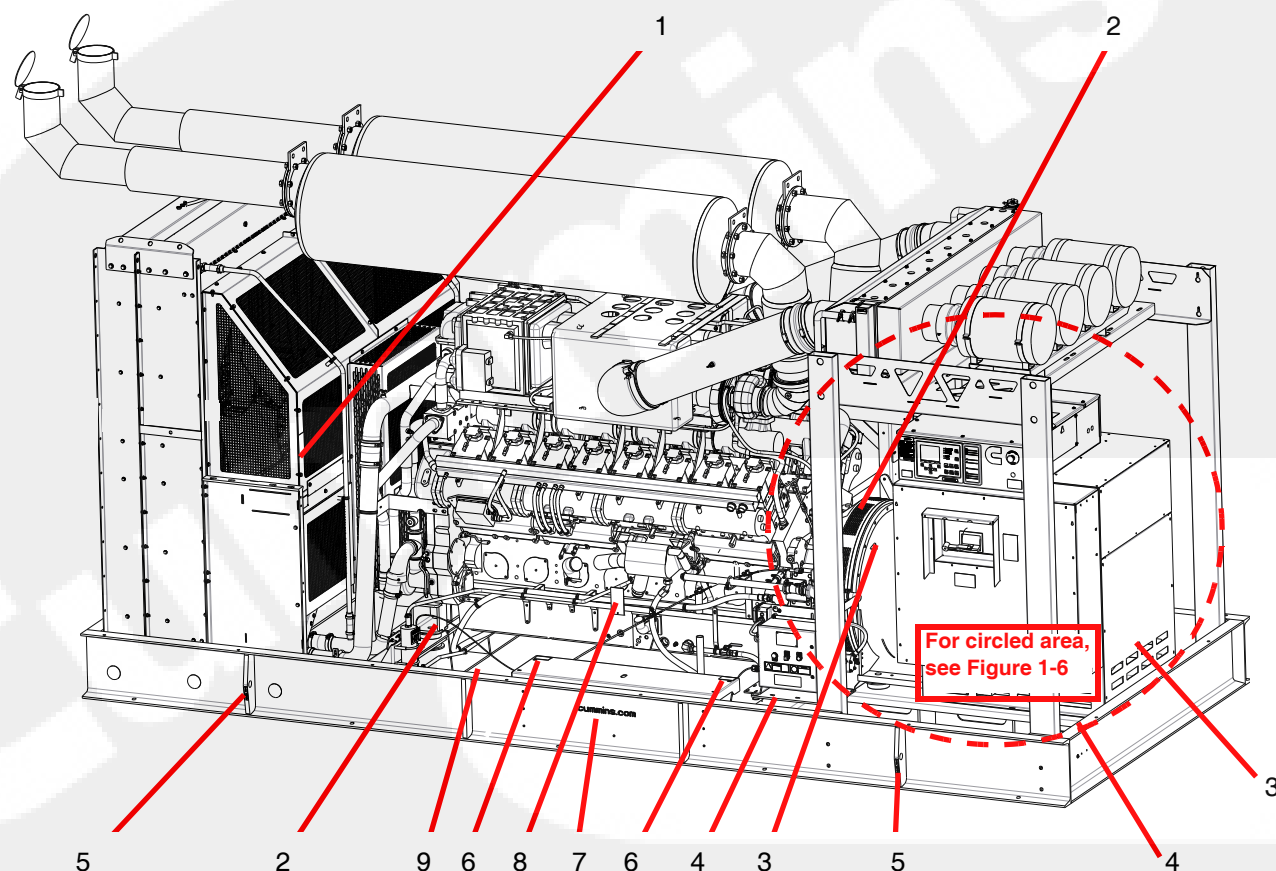
1.6 C1000N6B/C1300N6 safety decals

1.6.1 Open set safety decals



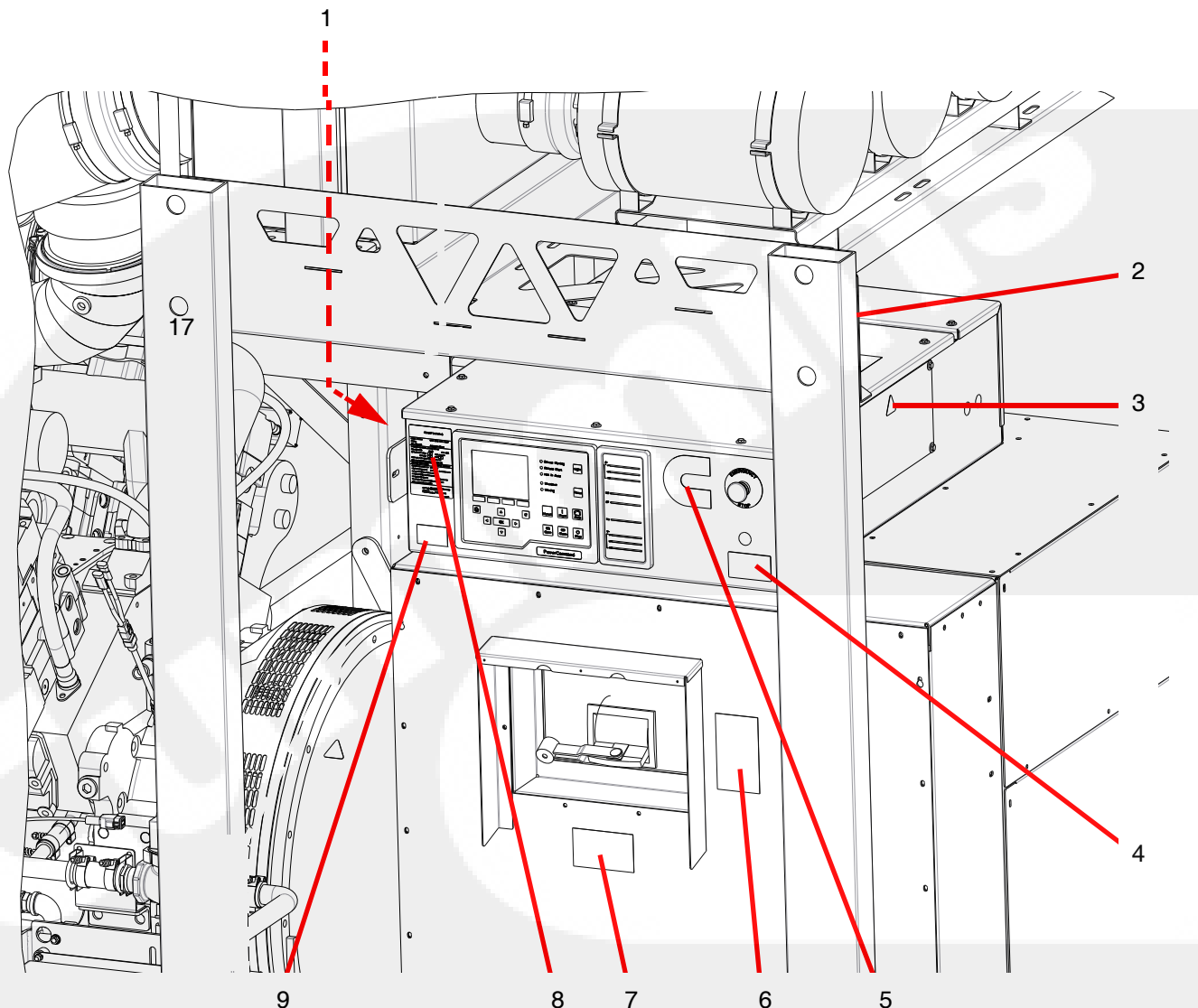
- | | |
|---|---|
| 1. DECAL, WARNING; EXCLAMATION POINT (LABEL_C) (1 of 3) | 10. DECAL, WEBSITE; GENSETS (A058N801) (1 of 2) |
| 2. DECAL, SERVICE & INSTALLATION (6940-50) | 11. DECAL, ENGINE OIL DRAIN LABEL (16565) |
| 3. DECAL, CAUTION HOT (6940-13) (3 of 5) | 12. DECAL, GROUND (9526-07) (1 of 3) |
| 4. DECAL, WARNING; ROTATING FAN (6940-06) (1 of 2) | 13. DECAL, COOLANT DRAIN (A042G370) |
| 5. TAG, FLUIDS (6940-17) (1 of 2) | 14. TAG, WARNING; NG CONTAMINATES (11071) |
| 6. DECAL, LIFTING POINT (9526-13) (2 of 4) | 15. LABEL, WARNING; EQUIPMENT VOLTAGE (A042E925) (1 of 2) |
| 7. DECAL, JACKET WATER (JW) DRAIN LABEL (16564) (2 of 2) | 16. DECAL, FLOATING NEUTRAL (A042F978) |
| 8. DECAL, LOW-TEMPERATURE AFTER-COOLER (LTA) DRAIN LABEL (16563) (3 of 3) | 17. DECAL, INTERFACE CONNECTIONS (A042E982) |
| 9. LABEL, WARNING; DISCONNECT BATTERY (A042E928) (2 of 5) | |

Figure 1-4 GenSet decal locations (typical) (GenSet right side)



- | | |
|---|---|
| 1. DECAL, WARNING; ROTATING FAN (6940-06) (1 of 2) | 6. LABEL, WARNING; DISCONNECT BATTERY (A042E928) (2 of 5) |
| 2. DECAL, CAUTION HOT (6940-13) (2 of 5) | 7. DECAL, WEBSITE; GENSETS (A058N801) (1 of 2) |
| 3. DECAL, WARNING; EXCLAMATION POINT (LABEL_C) (2 of 3) | 8. TAG, FLUIDS (6940-17) (1 of 2) |
| 4. DECAL, GROUND (9526-07) (2 of 3) | 9. DECAL, SAFETY; ELECTRICAL, WARNING (A065N912) |
| 5. DECAL, LIFTING POINT (9526-13) (2 of 4) | |

Figure 1-5 GenSet decal locations (typical) (GenSet left side)



- | | |
|---|--|
| 1. DECAL, OPERATION, MAINTENANCE & SERVICE (098-6074-02) | 6. DECAL, WARNING; EQUIPMENT VOLTAGE (A042E925) (1 of 2) |
| 2. DECAL, DANGER; REFERENCE MANUAL (LABEL_A) | 7. DECAL, WARNING; EQUIPMENT VOLTAGE (6940-05) |
| 3. DECAL, DANGER; LIGHTNING BOLT (LABEL_B) | 8. TAG, GENSET (A057V874 (UL) or A057V875 (CSA)) |
| 4. LABEL, WARNING; DISCONNECT BATTERY (A042E928) (1 of 5) | 9. DECAL, MAX IMBALANCE (98-8875) |
| 5. CUMMINS LOGO; 4 INCH, BLACK (CUMMINS_LOGO) | |

Figure 1-6 GenSet Operator Panel decal locations (typical) (GenSet left side)



1.6.2 Enclosed set safety decals

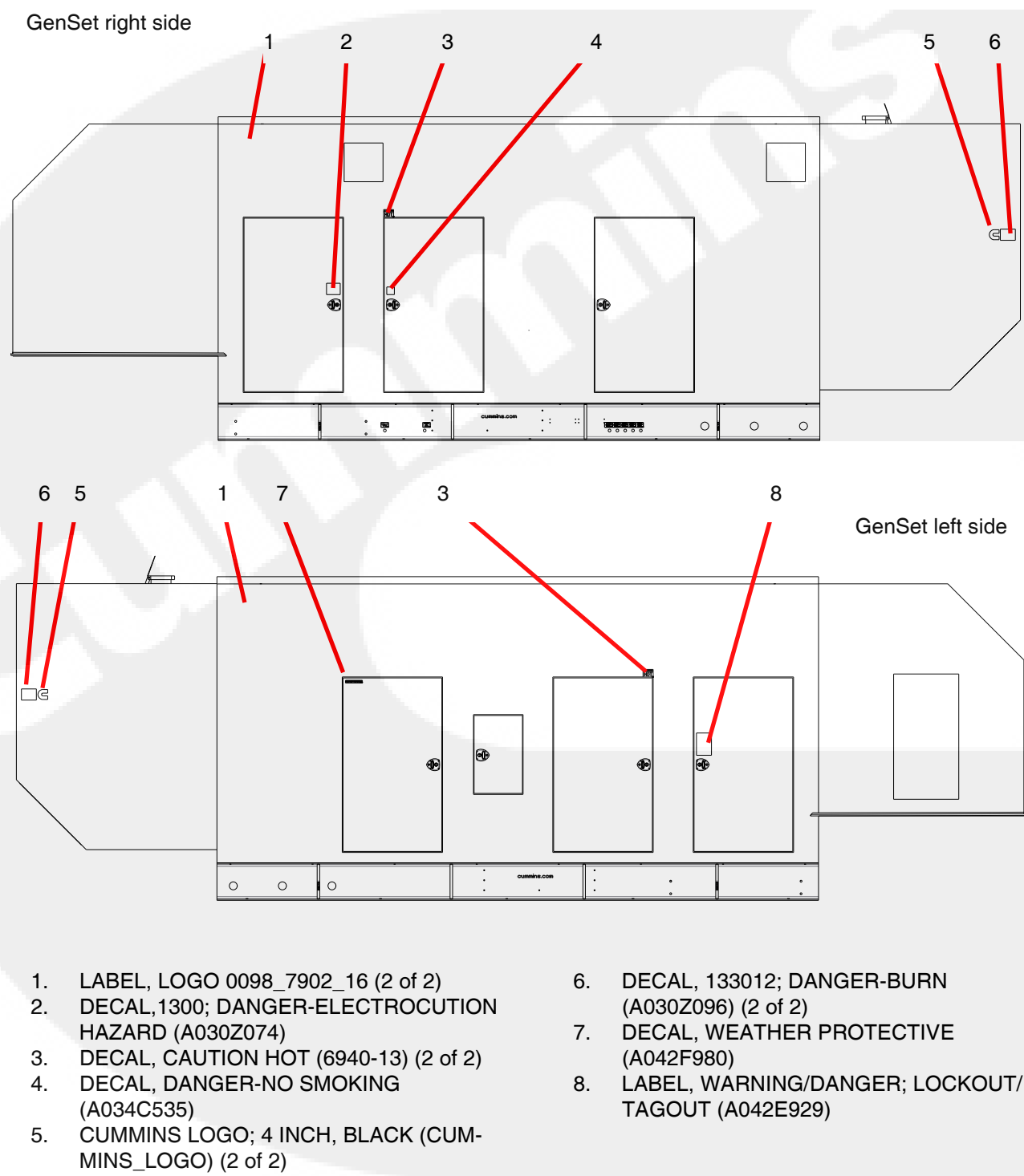


Figure 1-7 GenSet enclosure decal locations (typical)

KEEP THIS MANUAL NEAR THE GENSET FOR EASY REFERENCE



2 - Introduction

2.1 Introduction

The purpose of this manual is to provide the users with sound, general information. It is for guidance and assistance with recommendations for correct and safe procedures. Cummins cannot accept any liability whatsoever for problems arising as a result of following recommendations in this manual. This manual includes:

- Procedures for locating
- Procedures for operation
- Recommendations for optimal operation
- Maintenance schedules
- Troubleshooting charts
- Service information for component parts and specifications

Access to, and the installation and operation of, the GenSet must be restricted to qualified service personnel who have been instructed of the reasons for the restrictions applied to the location of the GenSet and any precautions that must be taken. Access to and operation of the GenSet must be governed by the use of a special tool, or lock and key, or other means of security that is monitored by the authority responsible for that location.

These installation recommendations apply to typical installations with standard model GenSets. However, because of the many variables in any installation, it is not possible to provide specific recommendations for every situation. If there are any questions not answered by this manual, contact your nearest Cummins distributor for assistance. This manual DOES NOT provide application information for selecting a GenSet or designing the complete installation.



DANGER

Improper operation and maintenance can lead to severe personal injury or loss of life and property by fire, electrocution, mechanical breakdown, or exhaust gas asphyxiation. Read and follow the safety precautions in [Section 1 - Safety](#) and carefully observe all instructions and precautions in this manual.

IMPORTANT: *The installer bears sole responsibility for the selection of the appropriate GenSet, for its proper installation, and for obtaining approvals from the authorities (if any) having jurisdiction over its installation and application.*



WARNING

Unauthorized modifications or replacement of fuel, exhaust, air intake, or speed control system components that affect engine emissions are prohibited by law in the State of California.



A power generation system must be carefully planned and correctly installed for proper operation. This involves two essential elements:

- **Application** (as it applies to GenSet installations) refers to the design of the complete power generation system that usually includes power distribution equipment, transfer switches, ventilation equipment, and mounting pads, as well as cooling, exhaust, and fuel systems. Each component must be correctly designed so the complete system will function as intended. Application and design is an engineering function generally done by specifying engineers or other trained specialists. Specifying engineers or other trained specialists are responsible for the design of the complete system and for selecting the materials and products required.
- **Installation** refers to the actual set-up and assembly of the power generation system. The installers set up and connect the various components of the system as specified in the system design plan. The complexity of the system normally requires the special skills of qualified electricians, plumbers, sheet metal workers, etc. to complete the various segments of the installation. This is necessary so all components are assembled using standard methods and practices.



Contact with high voltages can cause severe electrical shock, burns, or death. Make sure that only a trained and experienced electrician makes generator electrical output connections, in accordance with the installation instructions and all applicable codes.



Faulty electrical generating equipment can cause severe personal injury or death. GenSets must be installed, certified, and operated by trained and experienced person in accordance with the installation instructions and all applicable codes.

For further assistance, contact your authorized Cummins dealer.

2.2 Related literature

The information contained within this manual is based on information available at the time of going to print. In line with Cummins policy of continuous development and improvement, information may change at any time without notice. The users should therefore ensure that - before commencing any work - they have the latest information available which is located on Cummins QuickServe Online (QSOL) (<https://quickserve.cummins.com/info/index.html>) and Cummins PowerSuite (<https://powersuite.cummins.com>).

All GenSet specification information is located on Cummins PowerSuite (<https://powersuite.cummins.com>). For convenience, the C1000N6B and C1300N6 specification sheet and data sheets are included in [Section 9 - C1000N6B and C1300N6 specifications](#).

Technical specification documents for the C1000N6B and C1300N6 include:

- C1000N6B and C1300N6 specification sheet (NAS-C1000N6B-C1300N6) (included in [Section 9 - C1000N6B and C1300N6 specifications](#))
- C1000N6B and C1300N6 data sheet (NAD-C1000N6B-C1300N6) (included in [Section 9 - C1000N6B and C1300N6 specifications](#))
- C1000N6B cooling data sheet (MCP-2120)

- C1300N6 cooling data sheet (MCP-2121)
- C1000N6B sound data sheet (MSP-4070)
- C1300N6 sound data sheet (MSP-4071)
- C1000N6B prototype summary test sheet (PTS-701)
- C1300N6 prototype summary test sheet (PTS-702)
- C1000N6B general arrangement drawing - open set (A065Z573) (included in [Section 10 - C1000N6B and C1300N6 drawings](#))
- C1300N6 general arrangement drawing - open set (A065Z574) (included in [Section 10 - C1000N6B and C1300N6 drawings](#))
- C1000N6B general arrangement drawing - level 2 enclosure (A066M380) (included in [Section 10 - C1000N6B and C1300N6 drawings](#))
- C1300N6 general arrangement drawing - level 2 enclosure (A066M381) (included in [Section 10 - C1000N6B and C1300N6 drawings](#))

Users are respectfully advised that, in the interests of good practice and safety, it is their responsibility to employ competent persons to carry out any installation work. It is essential that the utmost care is taken with the application, installation, and operation of any engine due to their potentially hazardous nature. A GenSet must be operated and maintained properly for safe and reliable operation. Careful reference should also be made to other Cummins literature. Related literature for the C1000N6B and C1300N6 GenSet models includes:

- Health and Safety manual - General Information (GenSets) (0908-0110)
- Commercial generator set base limited warranty statement (A042E778) (included at the front of this document)
- Commercial generator set extended warranty statement - Feature code L189 (A065P280) (included at the front of this document)
- Cummins Sales and Service Customer/Contractor Pre-commissioning inspection form (contact your local Cummins Sales and Service distributor)
- GenSet start-up and Encompass registration form (A057W135)
- Generator commissioning checklist (NA GCC) (contact your local Cummins Sales and Service distributor)

IMPORTANT: *The GenSet start-up and Encompass registration form OR the Generator commissioning checklist must be completed and submitted to register (activate) the GenSet warranty. (See [2.4.4 Warranty](#).)*

- All Engines Worldwide Generator Drive (QSK60 G8 engine and emissions warranty statement) (Cummins service bulletin 3381307)
- Generator Drive QSK60 G CM700 K103 Operation and Maintenance Manual (4325991)
- Generator Drive QSK60 G CM700 K103 Owners Manual (4325992)

- PowerCommand® 3300 controller operator manual (A029M414)
- Stamford P7 and S7 (PI734A) alternator owner manual (A040J850)

For accepted design practices, refer to NFPA 37 Stationary Combustion Engines and Gas Turbines (on the NFPA website) and follow the recommendations given in Cummins Application Manual T-030 Liquid-cooled Generator Sets. To access the T-030 manual on-line:

1. Go to <https://powersuite.cummins.com>
2. Click on **Login** at the top of the Home page and enter login credentials.
3. Scroll down to **Application Manuals** on the left column and select **T-030**.

For engineering data specific to the GenSet, refer to the Specification and Data Sheets on Cummins Power-Suite:

1. Go to <https://powersuite.cummins.com>
2. Click on **Login** at the top of the **Home** page and enter login credentials.
3. Select **Library** from the top task bar and choose **Generator Sets** from the dropdown menu.
4. Follow the search techniques to locate the appropriate GenSet model.

2.3 C1000N6B/C1300N6 datatag

Each GenSet is labeled with a datatag that provides its unique information. As shown in [Figure 2-1](#), the GenSet datatag is located on the GenSet control panel. When contacting technical service support personnel, use the datatag to provide the model and serial numbers. A typical GenSet datatag is shown in [Figure 2-2](#).

Be ready to provide the model, specification, and serial numbers on the GenSet datatag when contacting Cummins for information, parts, and service. Record these numbers so that they are easy to reference when needed. Each character in these numbers is significant for obtaining the correct parts. Genuine Cummins replacement parts are recommended for best results.



Improper service or replacement of parts can lead to severe personal injury or death and to damage to equipment and property. Make sure service personnel are qualified to perform electrical and mechanical service.

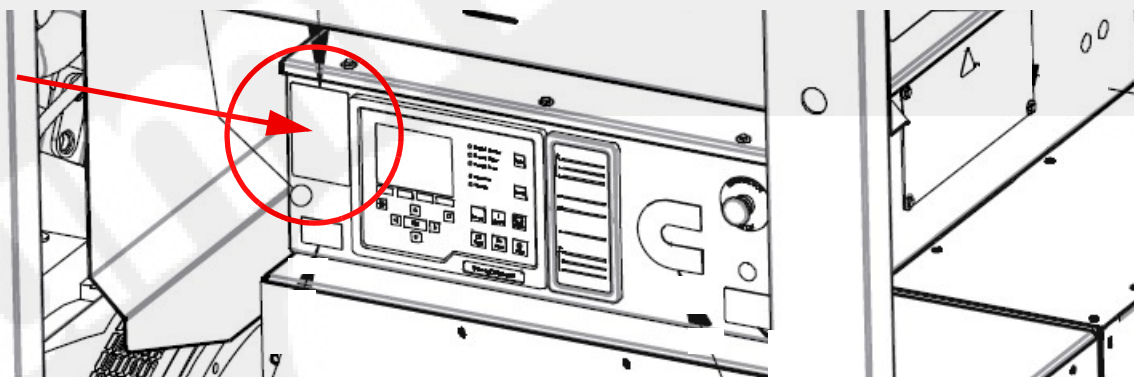


Figure 2-1 Location of the datatag (on the GenSet Operator Panel)

**GENSET DATATAG**

MODEL: C1000N6B	MFG. DATE: MM/YYYY
SPEC:	
PSN: XXXXXX	S/O#: SOF7 XXXXX
ENGINE MAKE / MODEL: QSKG60	
ESN: XXXXXXXX	HZ: 60 RPM: 1800
SERVICE DUTY: PRIME ☐	FUEL: NATURAL GAS
STANDBY ☒	DRP ☐
MAX FUEL FLOW RATE: 13510000	BTU/HR
FUEL INLET PRESS (MIN - MAX):	3.6-6 PSI
CONTROL TYPE: PCC3300 CAPTURE FILE: A083T266	
RATING: 1000 KW	KVA PF: 0.8
VOLTAGE: 480	PH: 3 FLA: 1504
ALT MAKE / MODEL: PI734A	
ALTERNATOR SN: XXXXXXXXXX	
WINDING: 311-12 WIRE	CONFIG: WYE
TEMP RISE: 120/40 DEG C @ RATED VOLTAGE	
INSULATION: NEMA CLASS H	
CONTACT:	CUMMINS SALES & SERVICE DE PERE, WI
CONTACT PHONE NUMBER:	1 800 CUMMINS

A068H725

Figure 2-2 GenSet datatag (sample)

2.4 After sales assistance

Cummins has a worldwide service network of more than 5,000 distributors and dealers who have been trained to provide sound advice, expert service, and complete parts support.

2.4.1 Installation

A Cummins certified technician will work with the customer to ensure the GenSet installation is ready for safe operation. Prior to GenSet commissioning, the customer shall contact the local Cummins authorized dealer and complete the Cummins Sales and Service Customer/Contractor Pre-commissioning inspection form. The Cummins technician shall then perform the required commissioning steps and complete the Generator Commissioning Checklist (NA GCC) and file the NA GCC with Cummins as part of the warranty registration process. [See 2.4.4 Warranty.](#)



2.4.2 Maintenance

Cummins offers a full range of maintenance and warranty services. For assistance, contact your local Cummins sales or service representative. To identify the nearest Cummins location, visit <https://www.cummins.com/locations>.

Maintenance tasks should only be undertaken by trained and experienced technicians provided by your Cummins service provider. Cummins strongly recommends that the owner/operator document all maintenance activities on the Maintenance Record form included in the Maintenance section of this manual.

WARNING

Incorrect service or parts replacement can result in severe personal injury, death, and/or equipment damage. Make sure service personnel are qualified to perform electrical and mechanical service.

2.4.3 Service

For parts, service, and product information, contact the nearest authorized Cummins dealer. To easily locate the nearest certified distributor/dealer for Cummins GenSets in your area, or for more information, contact us at 1-800-CUMMINS (1-800-286-6467) or visit <http://www.cummins.com/support>.

2.4.3.1 Ordering replacement parts

Replacement parts for the Cummins equipment are manufactured to the same quality standards and specifications as the original equipment. Unapproved substitution may result in poor performance, reduced service life, lost production, or unsafe operation.

Cummins relies on the best and most cost-effective shipping methods, unless specific instructions or requirements are requested by the customer. When ordering parts, please refer to the GenSet datatag (see [Figure 2-2](#)) and be prepared to provide the following information:

- Product model.
- Engine serial number and/or product serial number.
- Part description by name or number.
- Quantity required.

2.4.3.2 Recommended spare parts inventory

To minimize downtime and increase productivity, Cummins recommends maintaining a stock of spare parts critical to uninterrupted engine operation. Shipping costs can be lower using ground transportation rather than overnight or next day air freight. For this reason, Cummins can provide a list of recommended spare parts. For assistance, contact your local Cummins sales or service representative. To identify the nearest Cummins location, visit <https://www.cummins.com/locations>.

2.4.3.3 Emergency service

The Cummins Customer Assistance Center provides a 24-hour, toll-free telephone number to aid in technical and emergency services when a Cummins Authorized Repair Location cannot be reached or is unable to resolve an issue with a Cummins product. If assistance is required, call toll-free: 1-800-CUMMINS (1-800-286-6467) for all 50 states, Bermuda, Puerto Rico, the Virgin Islands, and the Bahamas. Outside of North America, contact your Regional Office. Telephone numbers and addresses are listed in the International Directory on the Cummins website at: cummins.com.

In the event of a breakdown, a Cummins trained service technician can provide prompt assistance for all minor and many major repairs to the GenSet on site. For assistance, contact your local Cummins sales or service representative. To identify the nearest Cummins location, visit <https://www.cummins.com/locations>.

2.4.4 Warranty

The warranty statement is included at the front of this manual and also located on QSOL (<https://quick-serve.cummins.com/info/index.html>). Extended warranty coverage is also available. The GenSet warranty must be registered with Cummins prior to making a warranty claim. To register the GenSet warranty, the customer must complete and submit the GenSet start-up and Encompass registration form (A057W135) or the Generator Commissioning Checklist (NA GCC). The customer will incur late fees if the GenSet warranty is not registered within 12 months of the GenSet in-service date.

For more information regarding warranty, please visit <https://www.cummins.com/support/warranty> or contact your authorized Cummins dealer.

NOTE: *Damage caused by failure to follow Cummins recommendations will not be covered by the warranty.*

2.5 Pre-installation considerations

2.5.1 Post-delivery storage prior to installation

Upon receipt of delivery of the C1000N6B/C1300N6 GenSet, the customer should take necessary precautions to ensure that the GenSet will be ready for installation. When the GenSet will be stored or removed from operation for an extended period of time, preventative maintenance must be performed to avoid rust accumulation, corrosion of bearing surfaces within the engine, and gum formation in the fuel system.

To prepare the GenSet for storage:

1. Disconnect the two sets of batteries (negative [-] first) and store the batteries in a cool, dry place. Connect the batteries to a charger every 30 days to maintain them at full charge.
2. Drain the engine oil and refill with new oil recommended for the GenSet. Attach a tag indicating the type of oil used. Change the engine oil every two months, if necessary. See [9.5 C1000N6B/C1300N6 oil specification](#) and [7.5.1.2 Changing the engine oil and oil filter](#).
3. Drain the cooling system, including the engine block. See [7.5.2.6 Draining and flushing the coolant](#).
4. Remove the spark plugs and pour two ounces of rust preventative oil into each spark plug opening. Barr engine over to complete three to four rotations of the crank shaft to distribute the oil on the cylinder walls and then reinstall the spark plugs.
5. Grease the radiator fan drive shaft bearings. Use an NLGI #2 Lithium-base or Lithium complex-base grease suitable for roller bearings. A slight showing of grease at the seals indicates proper lubrication.
6. Remove the air cleaners and seal off the air cleaner openings to prevent the entrance of moisture, bugs, dirt, etc. See [7.5.4 Air filter replacement](#).
7. Plug the exhaust outlets to prevent the entrance of moisture, bugs, dirt, etc.
8. Clean and wipe the entire unit. Coat parts susceptible to rust with a light coat of oil.
9. Cover the entire GenSet loosely.
10. Close the fuel supply valve (if so equipped).

To return the GenSet to service:

1. Remove the protective cover.
2. Remove the exhaust plugs.
3. Replace the air cleaners. See [7.5.4 Air filter replacement](#).
4. Check the oil tag on the GenSet and change the oil if the viscosity indicated is not appropriate for the temperatures expected. See [9.5 C1000N6B/C1300N6 oil specification](#).
5. Check the oil dipstick to make sure the crankcase is full. See [7.5.1.1 Checking the engine oil level](#).
6. Refill the cooling system per model specifications provided with the unit. See [9.6 C1000N6B/C1300N6 coolant specification](#). See also [7.5.2.3 Adding coolant to the JW radiator](#), [7.5.2.4 Adding coolant to the LTA radiator](#), and [7.5.2.5 Adding coolant to the intake air warmer, if equipped](#).
7. Reconnect the battery (positive [+] cable first) and check the specific gravity.
8. Reset the **Emergency Stop** button.
9. Open the fuel supply valve (if so equipped).
10. Reconnect the starting battery (negative [-] cable last).
11. Inspect the GenSet. See [5.2.1 Pre-start checklist](#).
12. Push the GenSet line circuit breaker ON when the GenSet is ready to power appliances.
13. Follow the instructions outlined in [4 - Installation](#) to properly install the GenSet at the site.

2.5.2 Required items for installation

Along with this manual, the following documents and loose parts were included in the GenSet shipment:

Table 2-1. C1000N6B/C1300N6 packing slip (sample)

Shipped item	Item part number	Item quantity
<u>C1000N6B/C1300N6 installation, operation, and maintenance manual</u>	A068H725	1
<u>Generator Drive QSK60 G CM700 K103 Operation and Maintenance Manual</u>	4325991	1
<u>Generator Drive QSK60 G CM700 K103 Owners Manual</u>	4325992	1
<u>Stamford P7 and S7 (PI734A) alternator owner manual</u>	A040J850	1
<u>PowerCommand® 3300 controller operator manual</u>	A029M414	1
Exhaust flex, flange (open set, only)	0541-1321	2
Gasket kit (nuts and bolts (open set, only)	23580-800	4
Fuel strainer (if purchased)	A059G917	1
Flexible fuel line (if purchased)	22837-07	1
Remote annunciator (if purchased)	300-5929-02	1
Vibration isolators and bolts (if purchased)	CK-4-6	10
External emergency stop (if purchased)	A067X909	1
Remote HMI 320 (if purchased)	300-6315-03	1

The C1000N6B/C1300N6 GenSet installation will require customer-supplied (and specified) connection components. See Section [4 - Installation](#) for more information.

NOTE: Refer to local codes and standards, which may affect the material requirements.



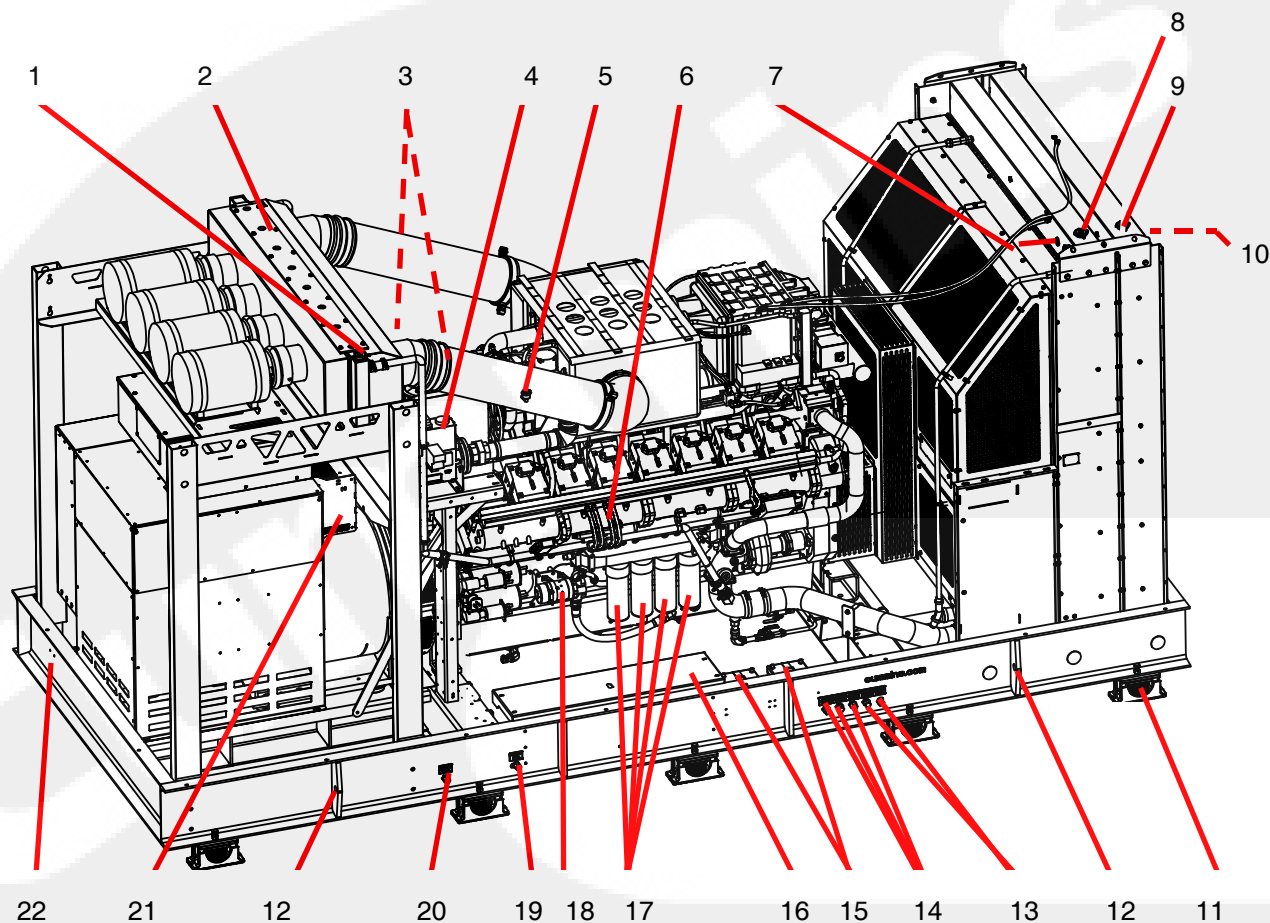
3 - GenSet overview

3.1 Introduction

This section provides an overview of the C1000N6B and C1300N6 GenSet models. All C1000N6B and C1300N6 GenSets are equipped with a coolant heater, an oil heater, a periodic pre-lube pump, and a battery charger. The C1000N6B and the C1300N6 may be optionally equipped with an intake air warming system.

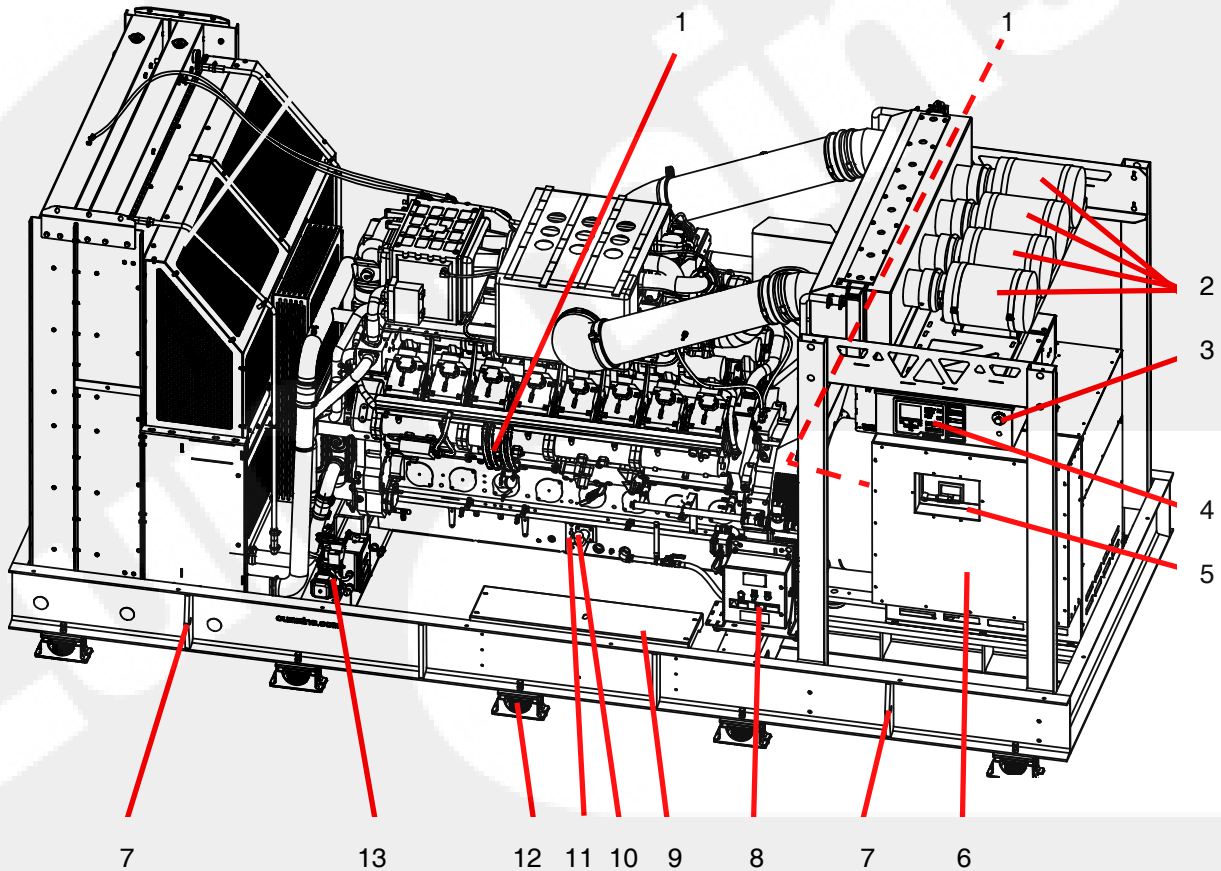
3.2 GenSet components

The main components of a typical C1000N6B and C1300N6 are shown in [Figure 3-1](#), [Figure 3-2](#), and [Figure 3-3](#).



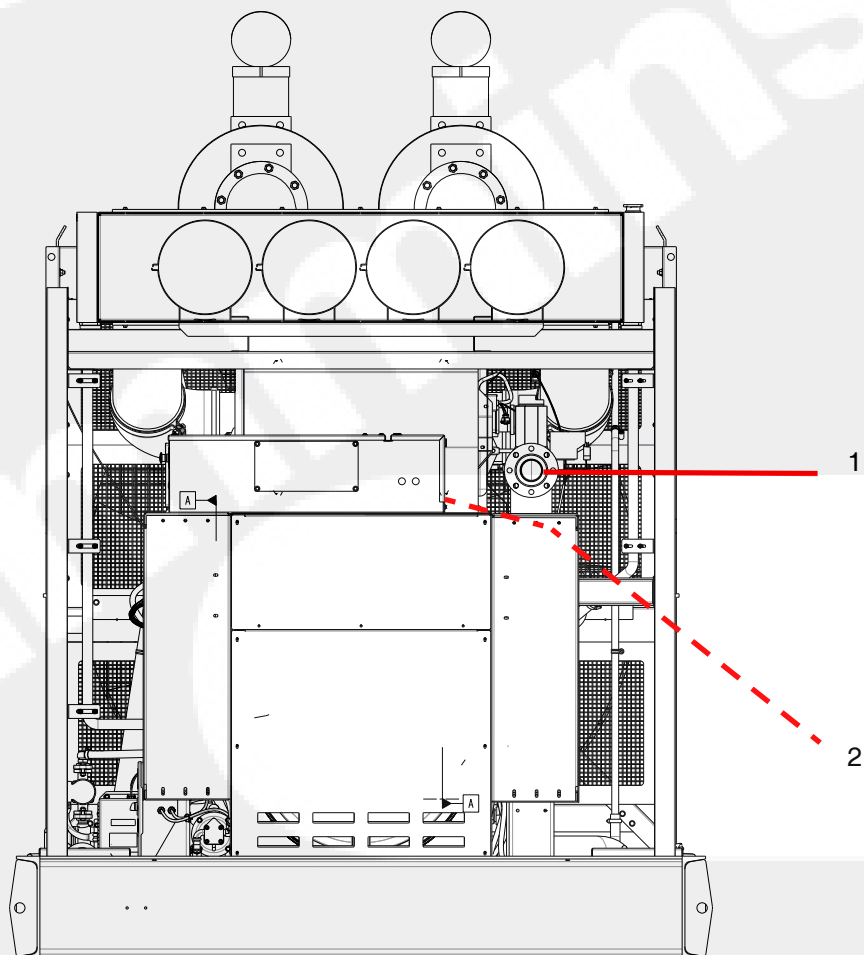
- | | |
|---|---|
| 1. Intake air warmer coolant fill (if equipped) | 13. JW coolant drain (2 of 2) |
| 2. Intake air warmer (if equipped) | 14. LTA coolant drain (3 of 3) |
| 3. Exhaust outlet (2 of 2) | 15. Control batteries (2 of 2) |
| 4. Fuel shutoff valve | 16. Engine cranking batteries (1 of 2 sets - supplied by Cummins or the customer) |
| 5. Air filter restriction indicator (typical) | 17. Engine oil filter (4 of 4) |
| 6. Electronic control module (ECM) (1 of 3) | 18. Periodic pre-lube pump |
| 7. Low temperature after-cooler (LTA) coolant sight glass | 19. Engine oil drain |
| 8. LTA coolant fill | 20. Intake air warming system coolant drain (if equipped) |
| 9. Jacket water (JW) coolant fill | 21. Battery charger |
| 10. JW coolant sight glass | 22. GenSet ground |
| 11. Isolators (5 of 10 - optional) | |
| 12. Lift points (2 of 4) | |

Figure 3-1 GenSet components - right side (typical)



- | | |
|----------------------------|--|
| 1. ECM (2 of 3) | 9. Engine cranking batteries (1 of 2 sets - supplied by Cummins or the customer) |
| 2. Air filters (4 of 4) | 10. Oil fill port |
| 3. Emergency stop | 11. Oil dip stick |
| 4. Operator panel | 12. Isolators (5 of 10 - optional) |
| 5. Breaker box | 13. Coolant heater |
| 6. Terminal connection box | |
| 7. Lift points (2 of 4) | |
| 8. Oil heater | |

Figure 3-2 GenSet components - left side (typical)



1. Fuel connection
2. Customer AC connections

Figure 3-3 GenSet components - back side (typical)

3.3 GenSet ratings

The C1000N6B and C1300N6 GenSets are specifically designed for emergency standby and non-emergency peaking applications not to exceed 500 hours per year. The C1000N6B and C1300N6 models have two ratings:

Emergency Standby Power (ESP): Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power is in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Demand Response Power Rating - Spark Ignited Gas (DRP): Applicable for supplying electrical power in parallel with commercially available power in variable and non-variable load applications. This fuel rating is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engine operation is limited to a total of 500 hours per year. Engines may be operated in parallel to the public utility for up to 500 hours per year, with an average load factor no greater than 80% of rated Demand Response Power. Engines with Standby Power ratings available can be run in Emergency Standby applications up to the Standby Power rating for up to 50 hours per year. The customer should be aware, however, that the life of any engine will be reduced by constant high load operation.

3.4 Engine

The QSK60 G8 twin turbocharger engine powers the C1000N6B and C1300N6. The engine used in this GenSet differs from the standard QSK60G8 in that it includes a reduced capacity oil pan and an engine-mounted battery charging alternator (see [9 - C1000N6B and C1300N6 specifications](#)). For engine specific information, please refer to the engine manual. See [2.2 Related literature](#).

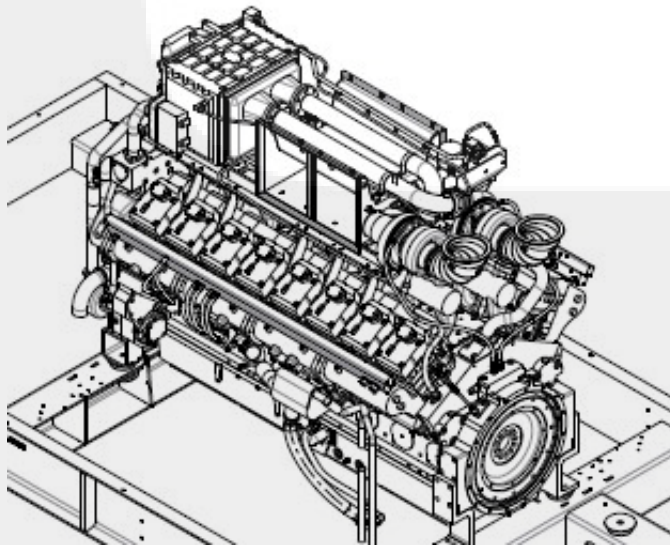


Figure 3-4 QSK60 twin turbocharger engine

3.5 PowerCommand Control (PCC) panel

The PCC is used to start and stop the GenSet from the Operator Panel (or HMI Operator Panel) in either **Manual** or **Auto** mode. The PCC provides full GenSet monitoring capability (temperature, oil pressure, and speed) and is suitable for paralleling GenSets. The PCC also provides voltage and current metering.

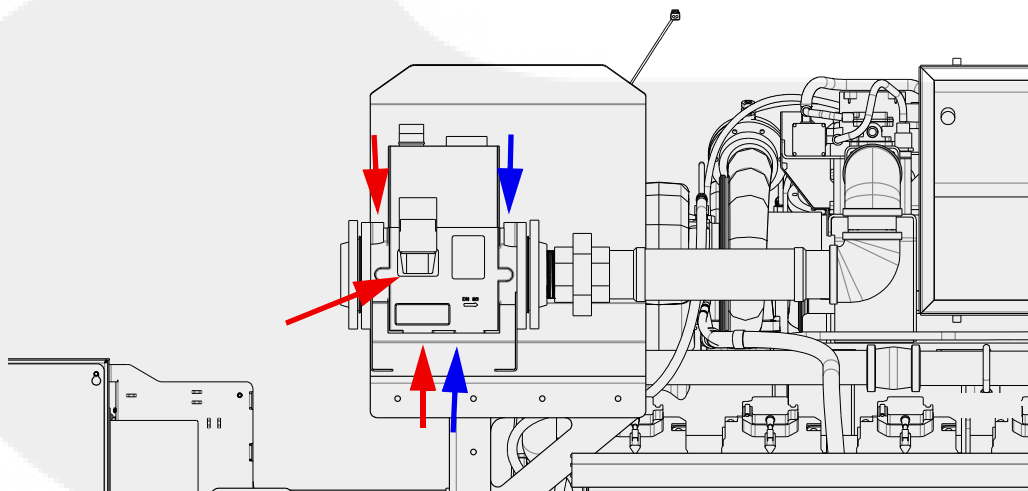
For detailed information on the PCC control panel, see the PCC 3300 manual that shipped with the GenSet. See [2.2 Related literature](#).



Figure 3-5 PCC 3300 control panel

3.6 Fuel system

Figure 3-6 shows a typical C1000N6B and C1300N6 natural gas fuel system. The fuel shutoff valve assembly is mounted on the GenSet as standard. The installation engineer is responsible for connecting appropriate strainers and a regulated fuel supply to the inlet of the fuel shutoff valve.

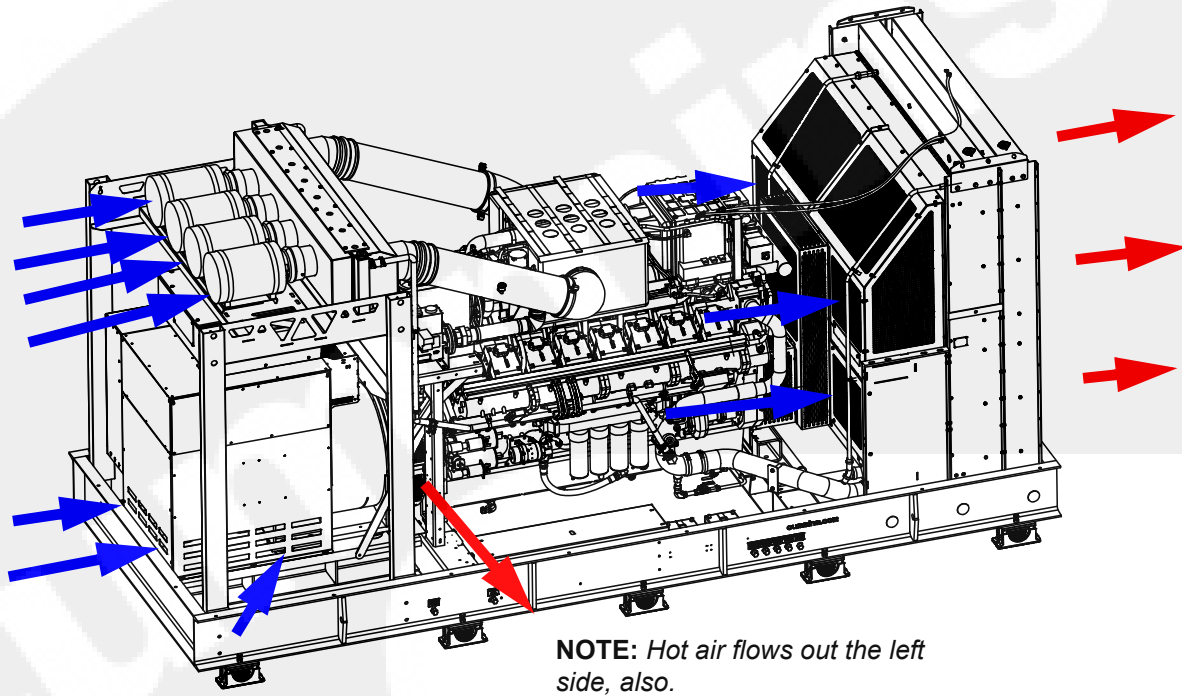


Red arrows - upstream fuel pressure test ports
Blue arrows - downstream fuel pressure test ports

Figure 3-6 Natural gas fuel system (typical) (GenSet right side)

3.7 Cooling system

The C1000N6B/C1300N6 GenSet is equipped with a set-mounted, engine-driven cooling package. Figure 3-7 depicts a typical cooling system airflow.



Red line - warmed/tempered discharge air
Blue line - cold/non-tempered intake air

Figure 3-7 GenSet cooling system flow (typical) (GenSet right side)

Figure 3-8 shows the coolant fill ports and the coolant drains for the GenSet JW and LTA radiators.

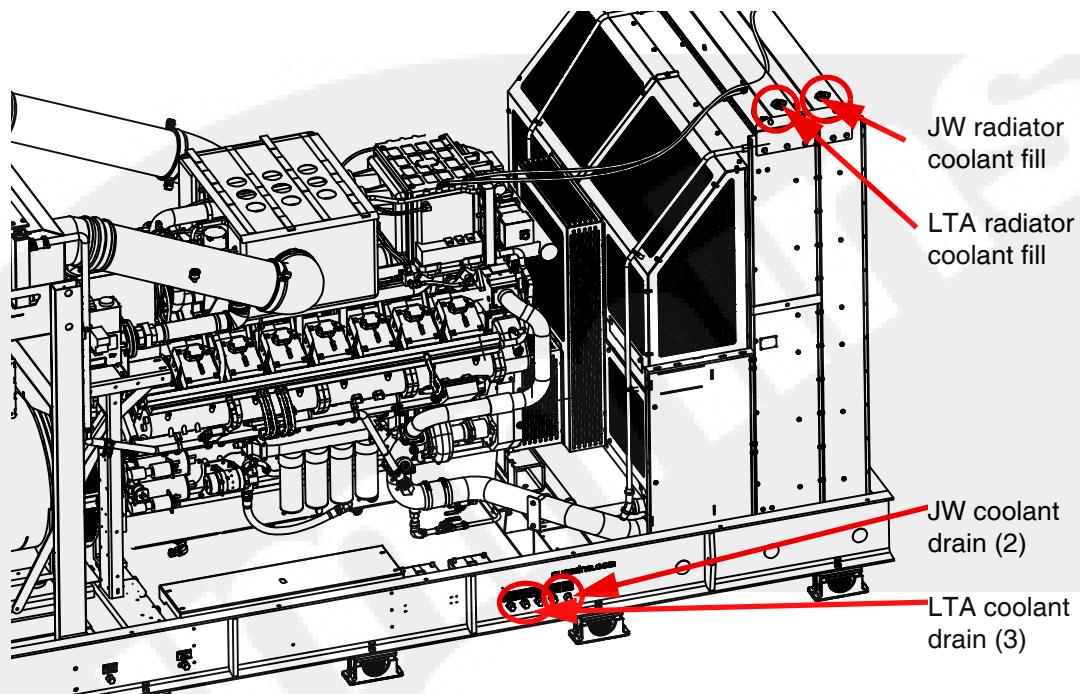


Figure 3-8 GenSet JW and LTA radiator coolant fill ports and drains (GenSet right side)

3.8 Coolant heater

As shown in [Figure 3-9](#), the C1000N6B and C1300N6 models come standard with a coolant heater (and circulating pump) in selectable voltages. A coolant heater keeps the engine coolant warm when the engine is in standby mode. Electrically powered, it heats the coolant within the engine. This reduces start-up time and lessens engine wear caused by cold starts. A utility power supply is required for the operation of the engine coolant heater. While the GenSet is running, the heater will receive a run signal from the GenSet control that will de-energize the heater.

IMPORTANT: Operating the coolant heater when the coolant system has been drained or there is a suspicion that the coolant is frozen can result in equipment damage. Always make sure the coolant is not frozen and the radiator is filled to the recommended level before energizing the heater.

NOTE: Prior to performing service, maintenance, or troubleshooting on the GenSet, ensure the coolant heater is cool and de-energized.

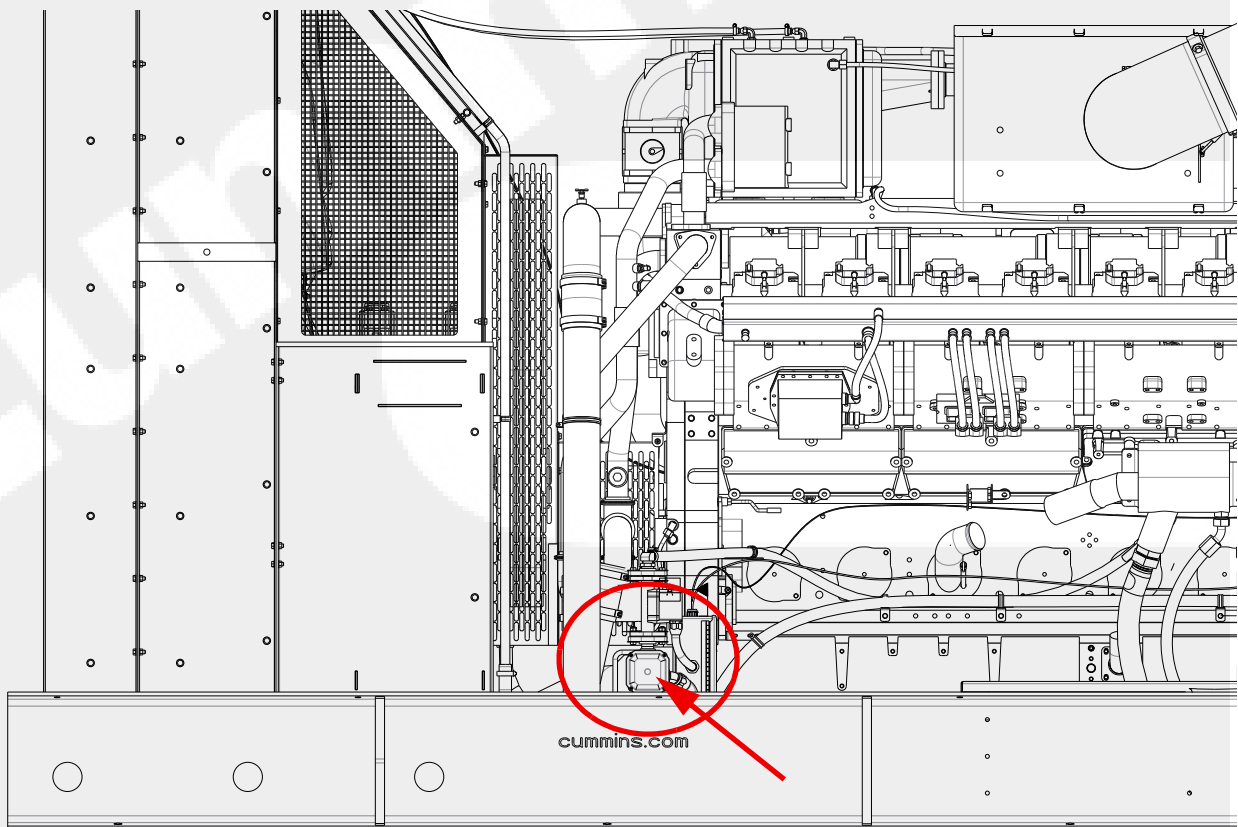


Figure 3-9 Coolant heater (GenSet left side)

3.9 Exhaust system

Figure 3-10 depicts a typical GenSet exhaust system.

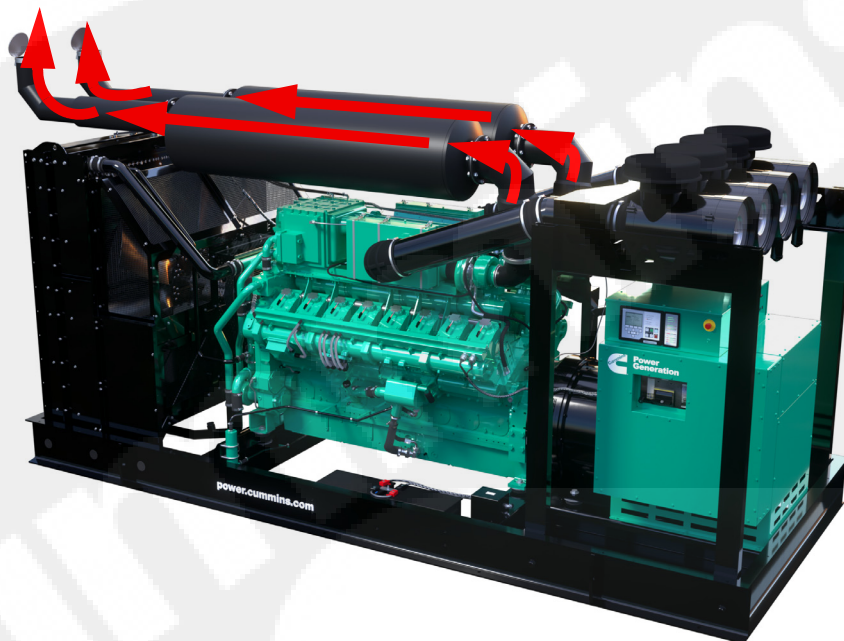


Figure 3-10 GenSet exhaust system flow (typical) (GenSet left side)

3.10 Lube oil heater

As shown in Figure 3-11, all C1000N6B and C1300N6 GenSets are equipped with an electric oil heater available in selectable voltages. A utility power supply is required for the operation of the oil heater which maintains a set temperature range of 100-120 °F. While the GenSet is running, the heater will receive a run signal from the GenSet control that will de-energize the heater.

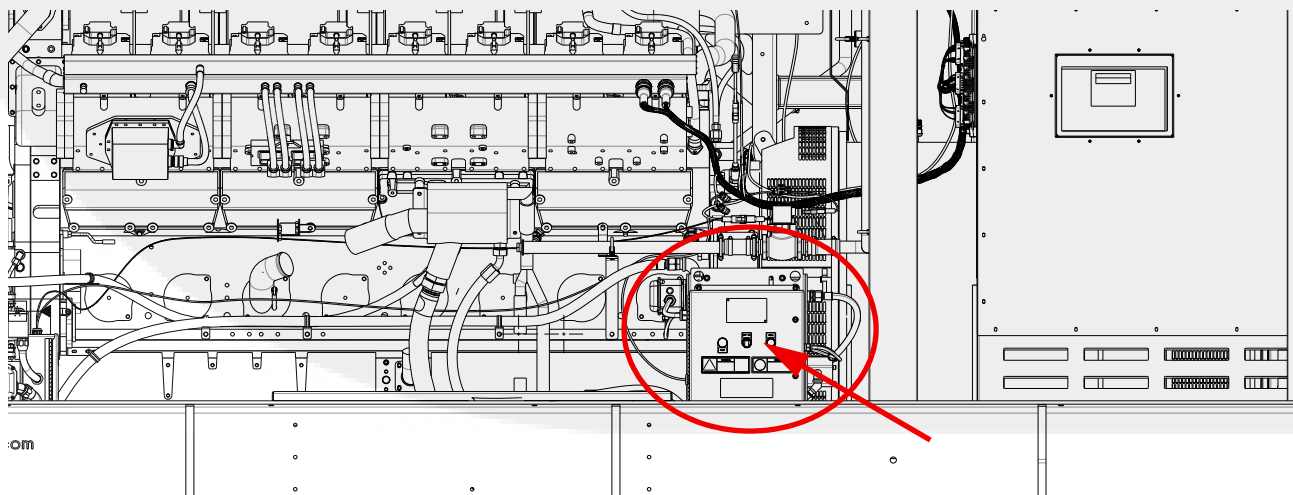


Figure 3-11 Oil heater (GenSet left side)

3.11 Periodic pre-lube pump

As shown in [Figure 3-12](#), all C1000N6B and C1300N6 GenSets are equipped with a periodic pre-lube pump. To reduce engine wear at start-up, the periodic pre-lube pump primes the engine oil system once every day. Additionally, the periodic pre-lube pump will cycle during GenSet start and when the GenSet is keyed on. The pump is powered by the DC battery bank (24VDC) and will run until it detects adequate oil pressure and then it will turn off. This function is controlled by the engine ECM and there is no action required by the operator.

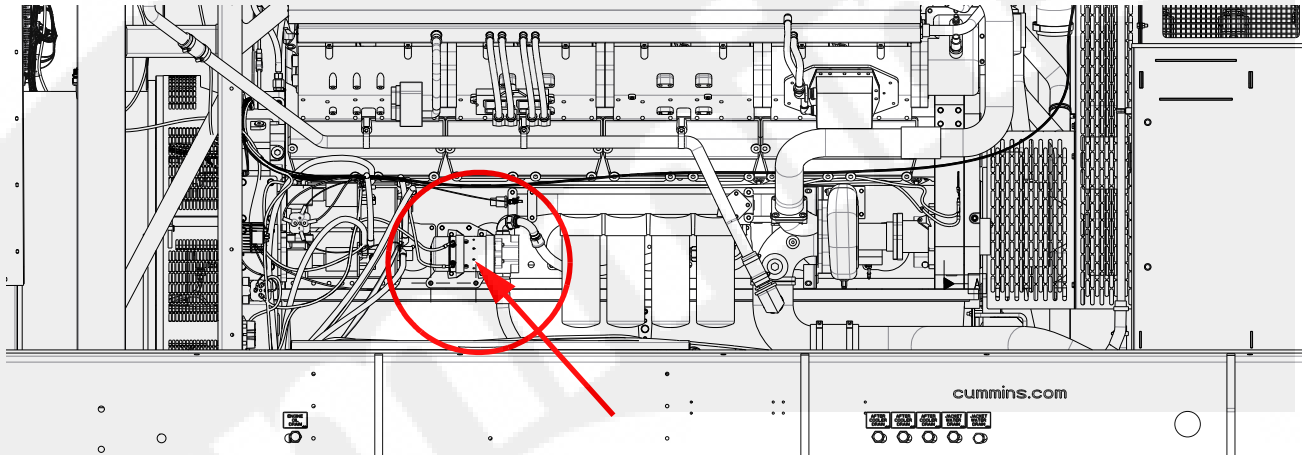


Figure 3-12 Periodic pre-lube pump (GenSet right side)

3.12 Batteries

As shown in [Figure 3-13](#), the C1000N6B and C1300N6 GenSets require two banks of batteries – one for engine cranking and one for maintaining control voltage. The engine-driven battery charging alternator and battery charger maintain both banks of batteries and alarm accordingly to diagnose low or weak battery state of charge.

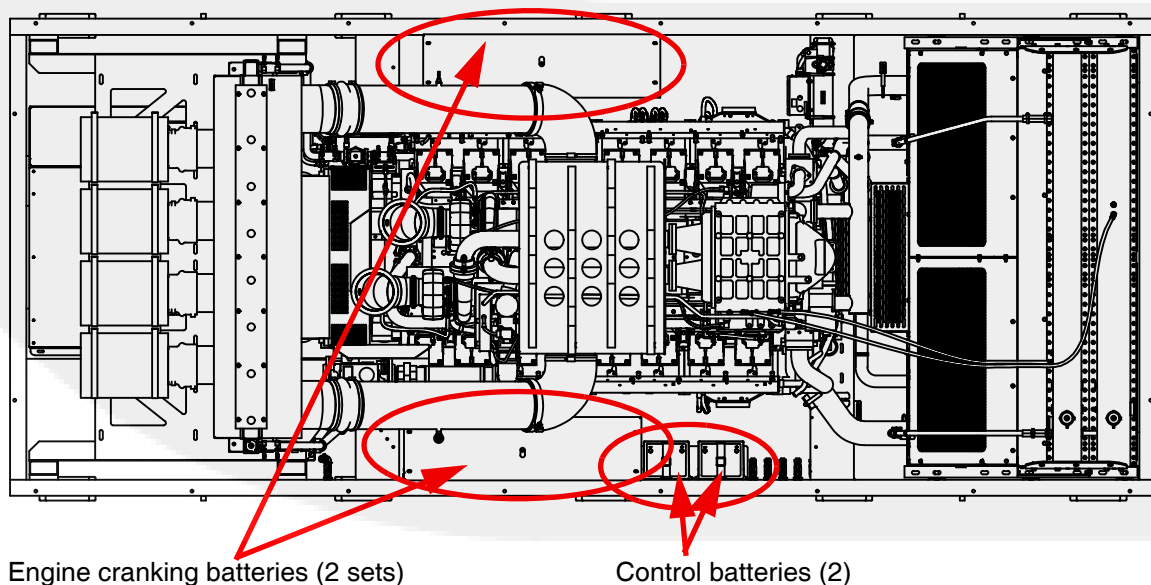


Figure 3-13 GenSet batteries (shown from the top view of the GenSet)

3.13 Battery charger

As shown in [Figure 3-14](#), the C1000N6B and C1300N6 GenSets are equipped with a battery charger to meet NFPA 110 requirements. The battery charger maintains the batteries in a fully-charged condition without over-charging. A utility power supply is required for the operation of the battery charger. The utility power supply for the battery charger must be 110 VAC and wired in accordance with all applicable codes and standards.

IMPORTANT: *The battery charger must be connected to a power source that is protected by a ground fault circuit interrupter (GFCI).*

The battery charger's electronic control circuit allows the charger to be connected to the GenSet during engine operation and to operate in parallel with the engine alternator. The charger will supply current to the battery system until the battery terminal voltage becomes equal to the set float voltage, at which point only a trickle charge current is present. When the battery becomes discharged due to a load being present and the terminal voltage falls, the charger will again supply current to restore the voltage of the battery to the float voltage.

CAUTION

Disconnect the battery charger from the utility before isolating the battery. Failure to disconnect the battery charger before isolating the battery can result in voltage spikes high enough to cause equipment damage and personal injury.

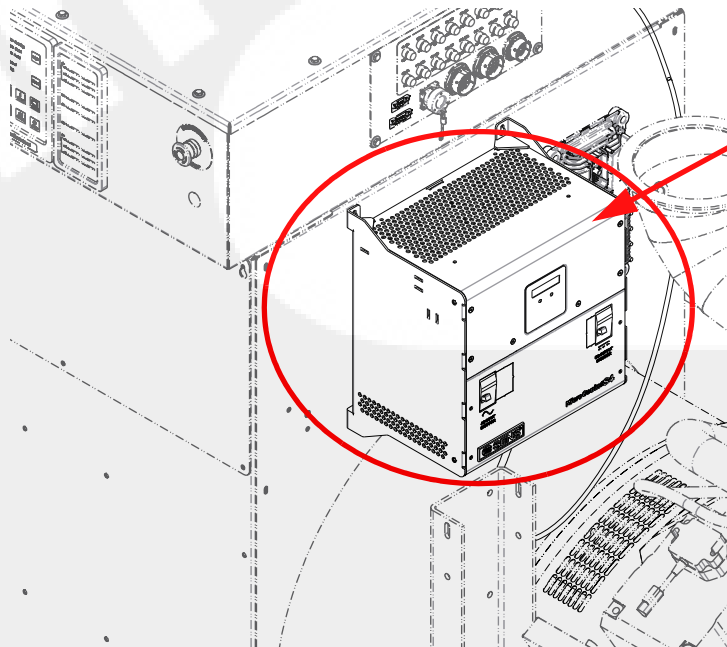


Figure 3-14 Battery charger (GenSet right side)

3.14 AC connection access

Figure 3-15, shows the location of the customer AC electrical conduit. Refer to Section 10 - C1000N6B and C1300N6 drawings

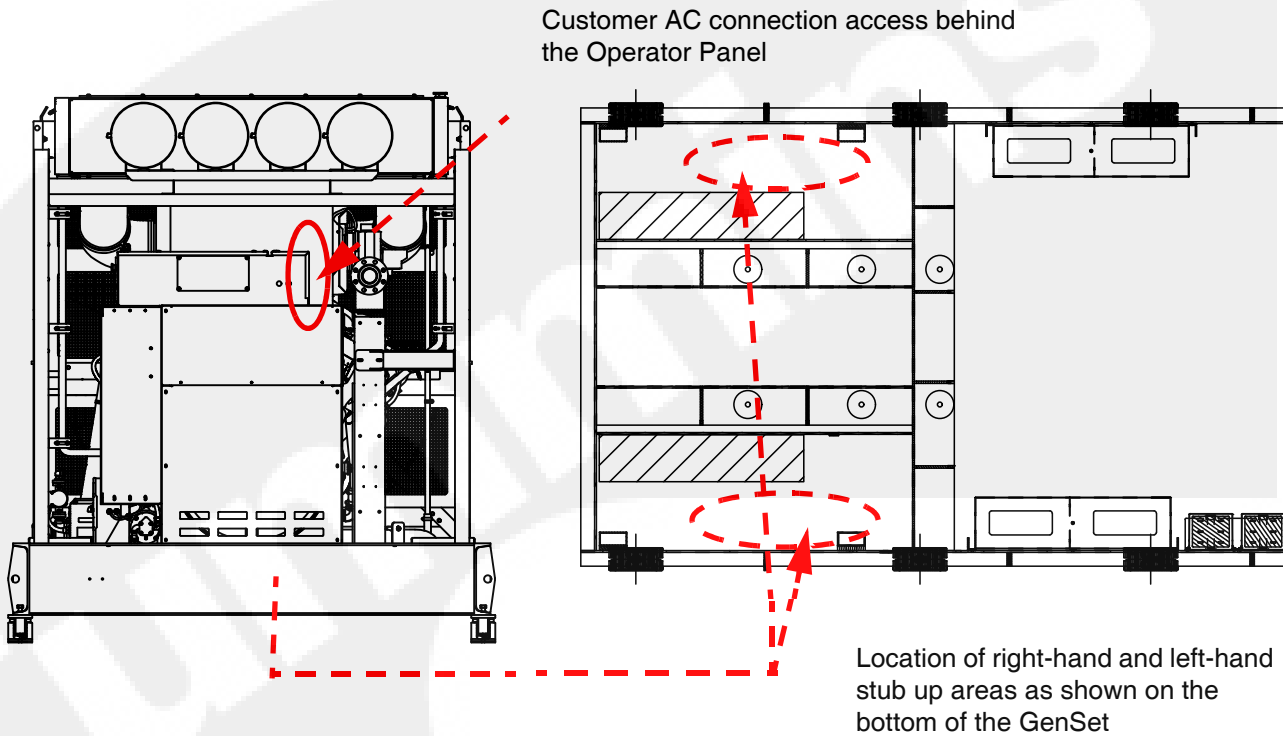


Figure 3-15 C1000N6B/C1300N6 AC connection access

3.15 Lift points

The four GenSet lifting connections are clearly marked on the GenSet base. Lifting the C1000N6B/C1300N6 GenSet requires professional crane lifting and rigging supplied by the customer. The C1000N6B/C1300N6 lifting diagram is included in the general arrangement drawing (see Section 10 - C1000N6B and C1300N6 drawings). A typical GenSet lifting configuration is shown in Figure 3-16.

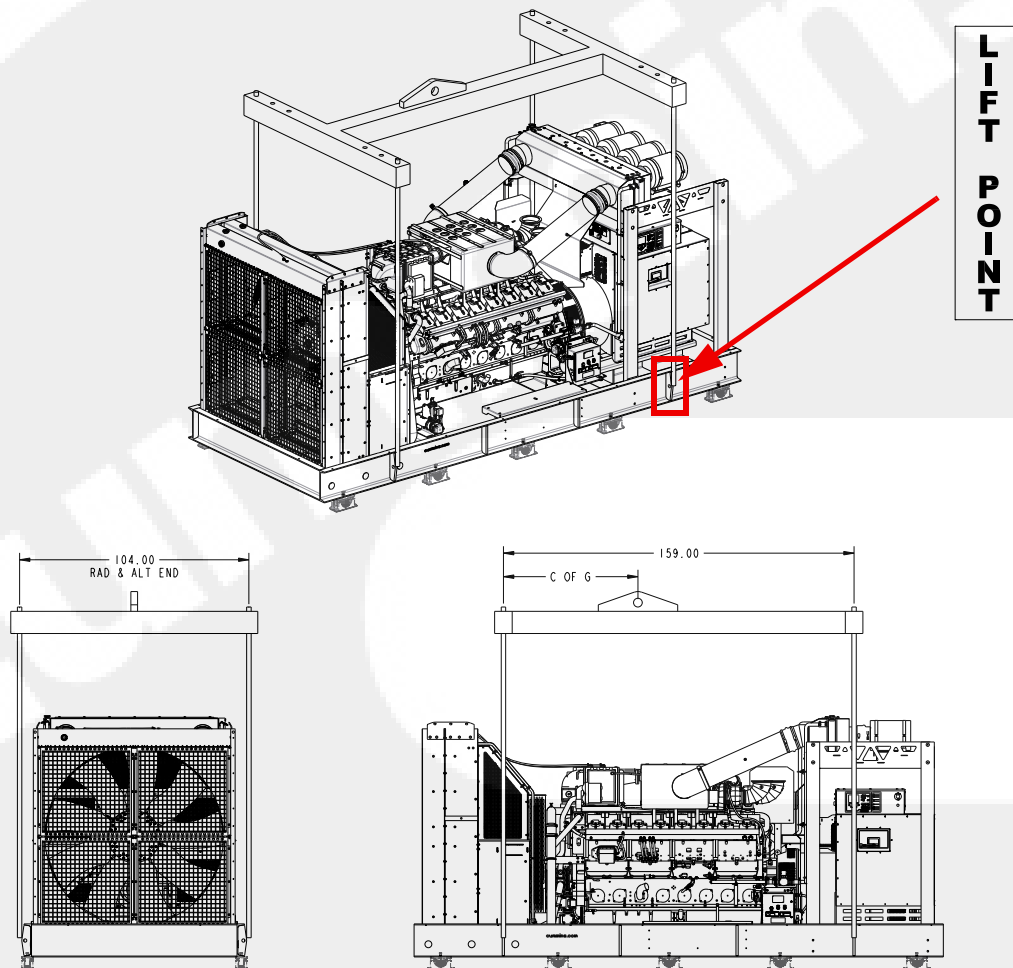


Figure 3-16 GenSet lifting diagram

3.16 Circuit breaker(s) (optional)

A circuit breaker is used to prevent the GenSet from being overloaded or to prevent a short circuit on the GenSet or load terminals. For the C1000N6B/C1300N6 GenSets, an optional single (or multiple) GenSet breaker can be mounted on the alternator control housing either on the right or left side of the GenSet.

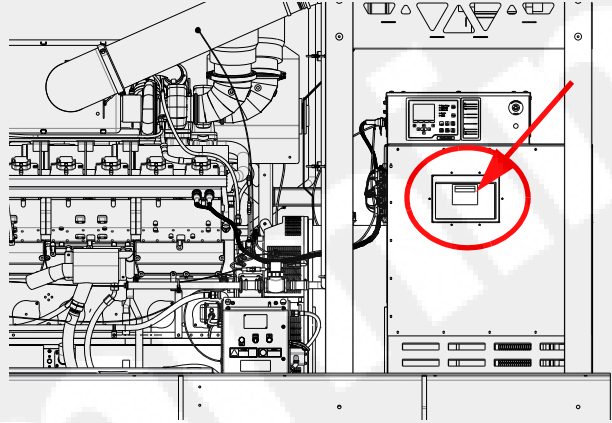
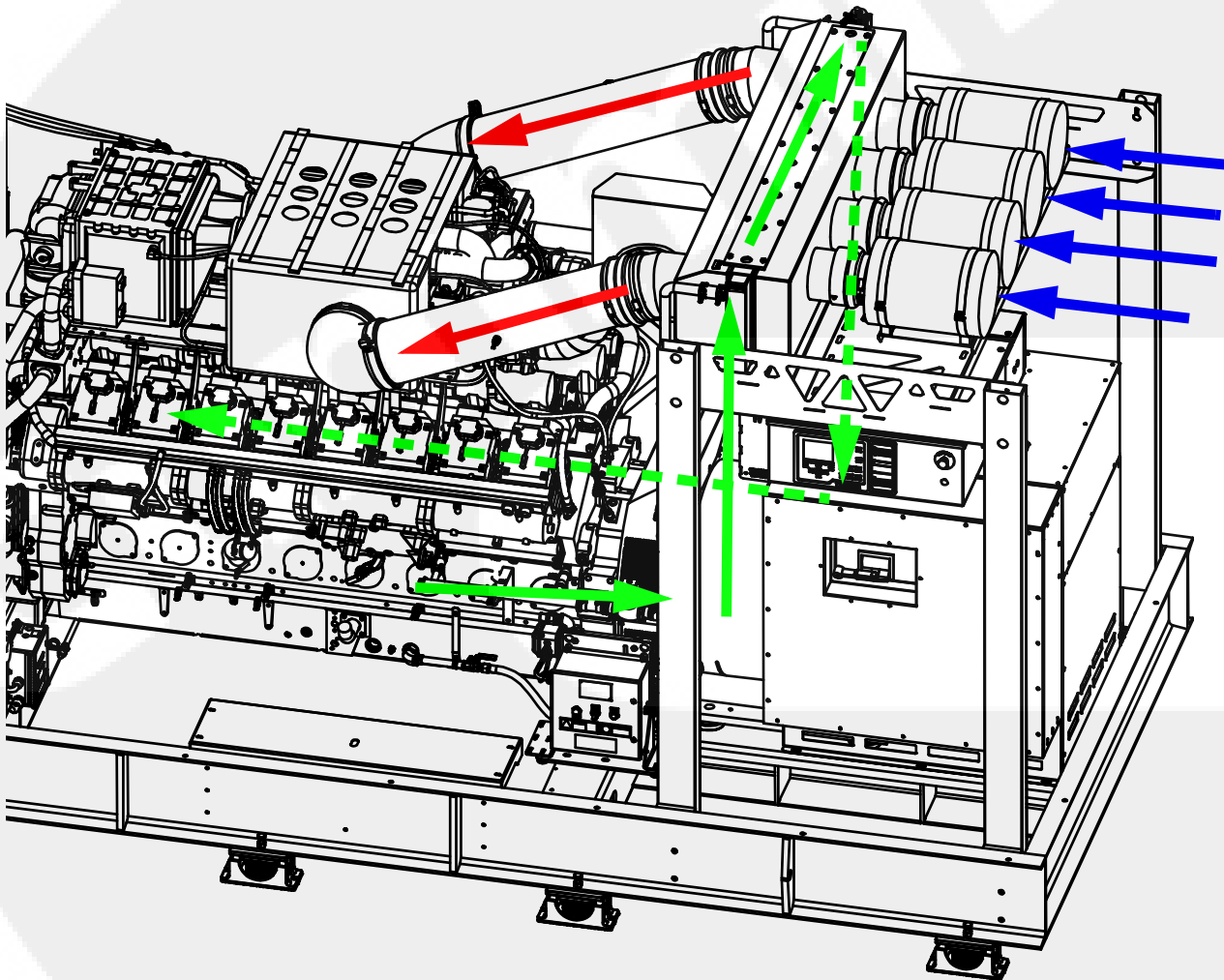


Figure 3-17 Circuit breaker (example)

3.17 Intake air warming system (optional)

The C1000N6B and the C1300N6 may be optionally equipped with an intake plenum that warms the combustion air to assist the engine load acceptance in colder climates. If equipped, this intake air warming system is built into the plenum between the air filters and engine.

This intake air warming system is *required* when ambient operating temperatures fall below 30 °F. This intake air warming system is *recommended* for ambient operating conditions where the combustion intake air temperature may be between 30 °F and 40 °F.



Blue line - cold/non-tempered intake air
 Red line - warmed/tempered discharge air
 Green line - coolant flow from engine block (also flows on the right side of the GenSet)

Figure 3-18 Intake air warmer cooling system air flow (typical) (GenSet left side)

Figure 3-19 shows the components of the GenSet intake air warmer.

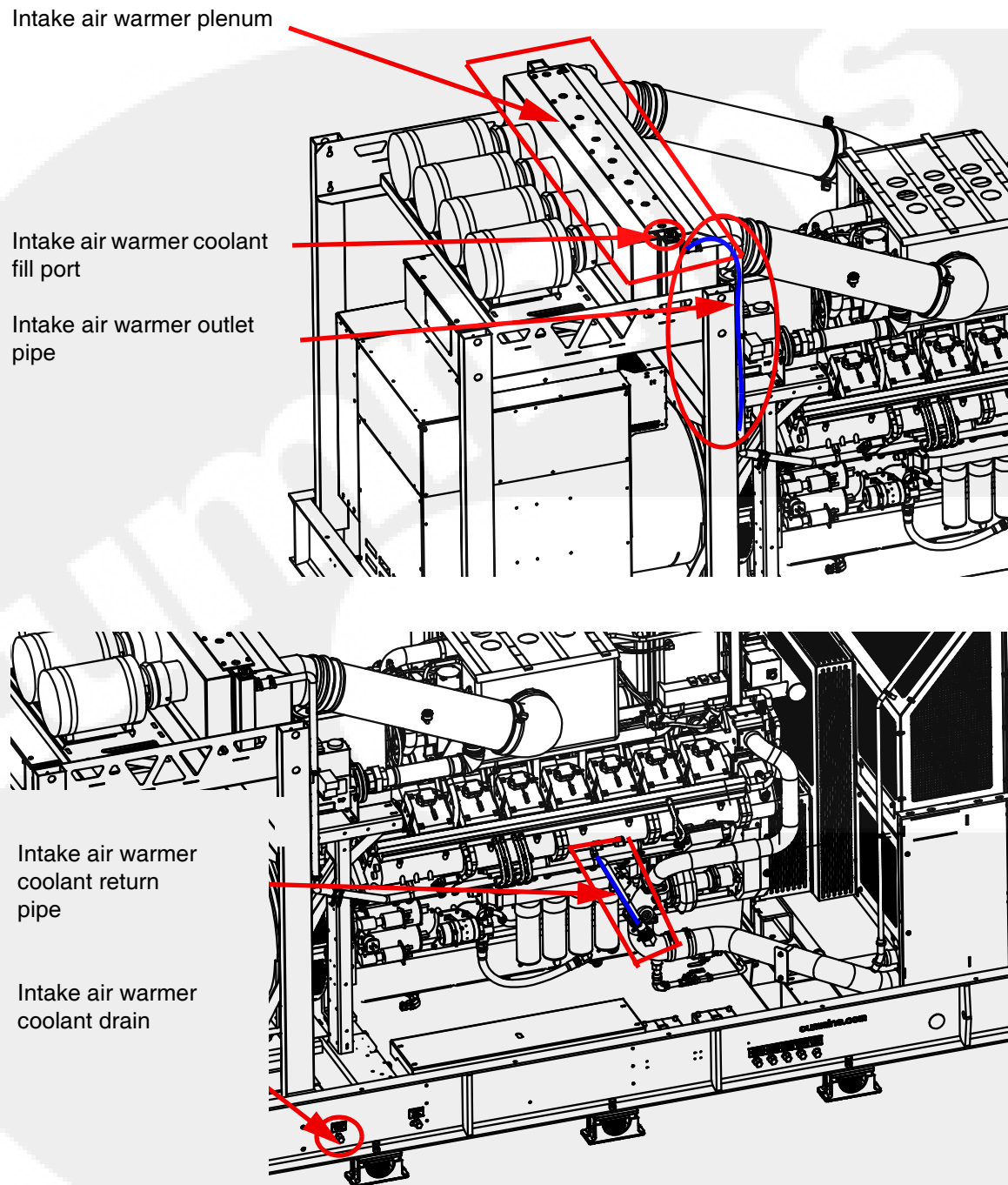


Figure 3-19 GenSet intake air warmer (GenSet right side)

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4 - Installation

4.1 Introduction

This section provides detailed instructions for locating, providing access to, mounting and ventilating the generator set (GenSet). Users are respectfully advised that, in the interests of good practice and safety, it is their responsibility to employ competent persons to carry out any installation work.

GenSet installations must be engineered so the GenSet will function properly under the expected load conditions. Use these instructions as a general guide only. Follow the instructions of the consulting engineer when locating or installing any components. The complete installation must comply with all local and state building codes, fire ordinances, and other applicable regulations. Consider these requirements before installation:

- Level mounting surface
- Adequate cooling air
- Adequate fresh induction air
- Discharge of GenSet air
- Non-combustible mounting surface
- Discharge of exhaust gases
- Electrical connections
- Accessibility for operation and servicing
- Noise levels
- Vibration isolation



4.2 Installation codes and standards for safety

The following list of codes and standards may apply to the installation and operation of the GenSet. This list is for reference only and not intended to be inclusive of all applicable codes and standards. The address of each agency is listed so that copies of the codes may be obtained for reference. Installation codes and recommendations are subject to change, and may vary by location or over time.

Table 4-1. INSTALLATION CODES AND STANDARDS FOR SAFETY RECOMMENDATIONS

Code title	Organization
California Administrative Code - Title 25 Chapter 3	State of California Documents Section P.O.Box1015 North Highlands, CA 95660
IMPORTANT: Unauthorized modifications or replacement of fuel, exhaust, air intake, or speed control system components that affect engine emissions are prohibited by law in the State of California.	
Code of Federal Regulations, Title 49: Chapter III and Chapter V	Superintendent of Documents P.O. Box 371954 Pittsburgh, PA 15250-7954
CSA 22.1 Canadian Electrical Code	Canadian Standards Association Housing and Construction Materials Section 178 Rexdale Blvd. Rexdale, Ontario, Canada M9Q 1R3
IEC60364-7-708: Electrical Installations in Caravan Parks & Caravans	International Electrotechnical Commission 3, Rue de Varembe Geneva, Switzerland
NFPA 70 - National Electrical Code	National Fire Protection Association 1 Battery March Park Quincy, MA 02169
UL 2200 Standard for Stationary Engine Generator Assemblies	See ul.com

NOTE: The GenSet installer bears sole responsibility for following all applicable local codes and regulations.



WARNING

Improper installation can result in severe personal injury, death and damage to equipment. The installation must comply with all applicable building codes (including project permits and inspections). The installer should be properly trained and licensed to perform electrical and mechanical equipment installations.



WARNING

This GenSet is not a life support system. It can stop without warning. Children, persons with physical or mental limitations, and pets could suffer personal injury or death. A personal attendant, redundant power, or an alarm system must be used if generator set (GenSet) operation is critical.

4.3 Location assessment and preparation

Figure 4-1 outlines a typical GenSet installation. Refer to this drawing when reviewing the following installation guidelines.

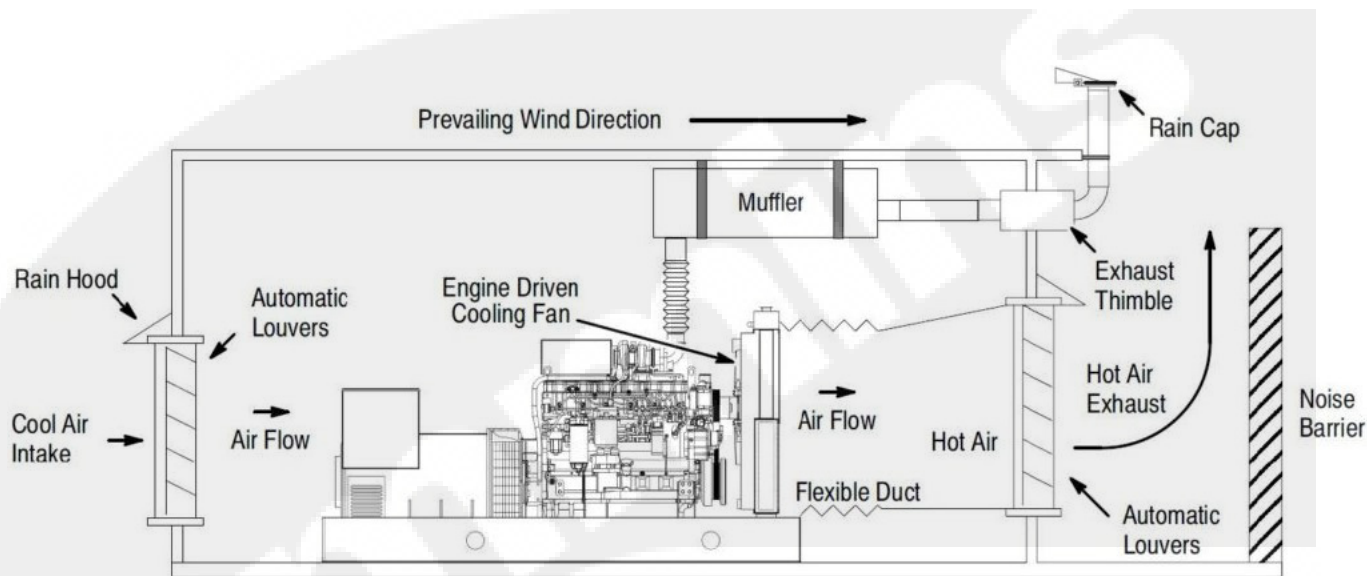


Figure 4-1 Typical GenSet installation

4.3.1 Preparing for cooling, ventilation, and combustion airflow

NOTE: Depending on the location and the intended use, federal, state, or local laws and regulation may require the customer to obtain an air quality emissions permit before beginning installation of the GenSet. Be sure to consult local pollution control or air quality authorities before completing construction plans.

The GenSet location is decided mainly by related systems such as ventilation, wiring, fuel, and exhaust. The GenSet should be located as near as possible to the main power service entrance.

Indoor installations need properly sized and positioned vents for required airflow. Refer to the GenSet Specification Sheet for the airflow requirements and restrictions. Unrestricted air flow for cooling, ventilation, and combustion is essential for proper GenSet performance and service life. The GenSet uses a “pusher” fan – fresh air is drawn from the engine-side of the radiator and exits the face of the radiator, which is the “front”.

Do not block the air inlet and outlet openings with additional screens, expanded metal, etc.; they restrict air flow and could cause the GenSet to overheat. The room layout should be such that fresh cooling air is drawn past the control end of the GenSet. Install the air outlet higher than the air inlet to allow for convection air movement. Wind will restrict free airflow if it blows directly into the air outlet vent. Locate the outlet vent so the effects of wind are eliminated (or install a wind barrier). As a general rule, the room inlet vent opening should be 1½ times larger than the radiator area.

GenSets in factory-mounted housings (enclosures) for outdoor installation are designed for proper cooling and ventilation. With the optional enclosure, the intake hood has an opening facing down and exhaust hood upward. Keep the intake area below and around the intake hood clear of debris or landscaping that may be ingested or restrict air flow.

GenSets expel heat and fumes that must be removed by proper cooling and ventilation. Exhaust must not be able to enter or accumulate around inhabited areas. Build the exhaust system according to the code requirements in effect at the installation site. For accepted design practices, refer to NFPA 37 Stationary Combustion Engines and Gas Turbines and follow recommendations given in Cummins Application Manual T-030 Liquid-cooled Generator Sets (see [2.2 Related Literature](#)). Alternatively, to obtain a copy of this manual, contact your local service representative.

DANGER

Inhalation of exhaust gases can cause asphyxiation and death. Use extreme care during installation to provide a tight exhaust system. Terminate exhaust pipes away from enclosed or sheltered areas, windows, doors, and vents. Do not use exhaust heat to warm a room, compartment, or storage area.

In cooler climates, discharge dampers may be used to maintain the temperature in the equipment room. The installation may be designed such that dampers allow the air to be recirculated back to the equipment room. This enables the equipment room to be heated while the GenSet engine is still cold, increasing the engine efficiency. It is not advisable to use the discharge air to warm other areas or structures.

WARNING

The equipment room should not be warmed excessively. Discharge air can be very warm (160 °F or higher).

Locate the cooling air outlet directly in front of the radiator and as close as possible. The radiator is rigidly attached to the frame and does not move relative to it. A flexible connector is recommended for noise control and thermal expansion. The duct should be removable for maintenance purposes. The outlet opening must be at least as large as the radiator area. The length and shape of the air outlet duct should offer minimum restriction to airflow. A closed duct is suggested to control the recirculation of heated air. Before installing the duct, remove the radiator core guard. Site installers can purchase a duct flange (part number A071V103) from Cummins if the site installers do not wish to fabricate one.

Position an open GenSet with adequate surrounding space and on a level surface. The area immediately around the GenSet must be free of any flammable material. Provide a location away from extreme ambient temperatures and protect the GenSet from adverse weather conditions.

Use the following information to locate the GenSet for optimal operating conditions:

Surface: Poured concrete. Follow recommendations given in Cummins Application Manual T-030 Liquid-cooled Generator Sets (see [2.2 Related Literature](#)).

Leveling: Level the GenSet from side-to-side within +1.38 in. (35 mm), and end-to-end within +.98 in. (25 mm).

Placement:

- Allow for adequate access to entry doors.
- Make sure that the air inlets are not obstructed by surrounding trees, buildings, or other obstructions.
- Make sure that noise distribution (to prevent echoing) is kept to a minimum.
- Consider exhaust output location that may affect immediate neighbors.

- Take into consideration the prevailing wind direction so that the engine combustion air inlet is upwind and the exhaust discharge is downwind.
- Evaluate the immediate area around the location of the mounting surface for proper drainage so that moisture runoff is sufficient to prevent ponding around the GenSet.

 WARNING

Incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. Service personnel must be trained and experienced to perform electrical and mechanical component installation.

4.3.2 Providing for clearance

Generally, at least 3.3 ft. (1 meter) of clearance should be provided on all sides of the GenSet for maintenance and service access. If the GenSet is in an enclosure, increase the perimeter clearance to 3.5 ft. (1.1 m) minimum on all sides.

Lighting should be adequate for operation, maintenance, and service operations and should be connected on the load side of the transfer switch so that it is available at all times.

4.3.3 Lifting and moving the GenSet

Careful consideration must be taken prior to and during lifting the GenSet. Lifting equipment can be very dangerous and must be operated properly to prevent damage to the GenSet. All heavy equipment operators involved with lifting the GenSet should:

- Always wear proper personal protective equipment (PPE).
- Be trained on the proper procedures to safely operate all pieces of equipment used to lift and move the GenSet.
- Have a clear understanding of lifting loads and load capacity for the equipment they will be working on.
- Be mindful of the area they are working in and any obstacles they may encounter. Cordon off the area with barriers to keep workers from accidentally getting in close proximity to the operating equipment.
- Be aware of the swing radius, especially when working in tighter spaces, to avoid hitting other workers, bystanders, or other vehicles or equipment in the vicinity.
- Visually inspect heavy equipment before each use to ensure it is in good operating condition. Make sure all attachments are securely locked into place.
- Ensure all riggings are properly secured.

The GenSet lifting connections are clearly marked on the GenSet base.

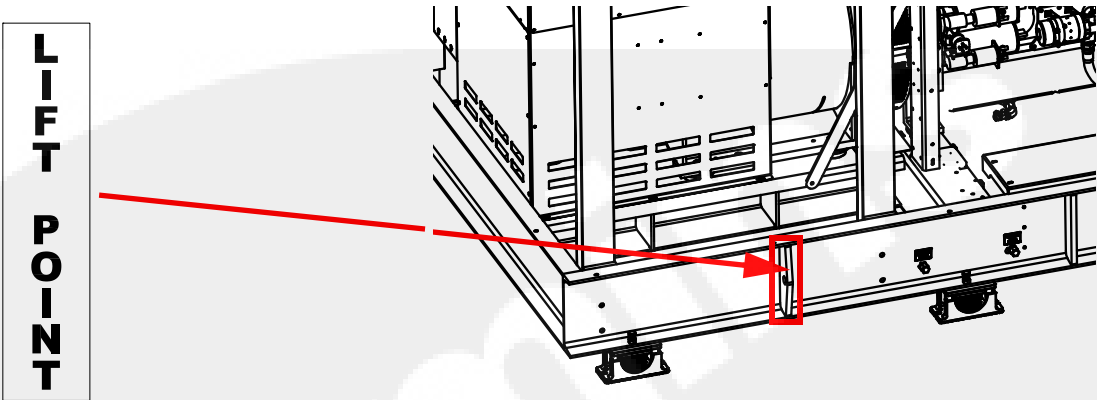


Figure 4-2 GenSet lift point decal

Figure 4-3 shows the proper lifting configuration for the GenSet. For the correct center of gravity, see the general arrangement drawing in Section 10 - C1000N6B and C1300N6 drawings.

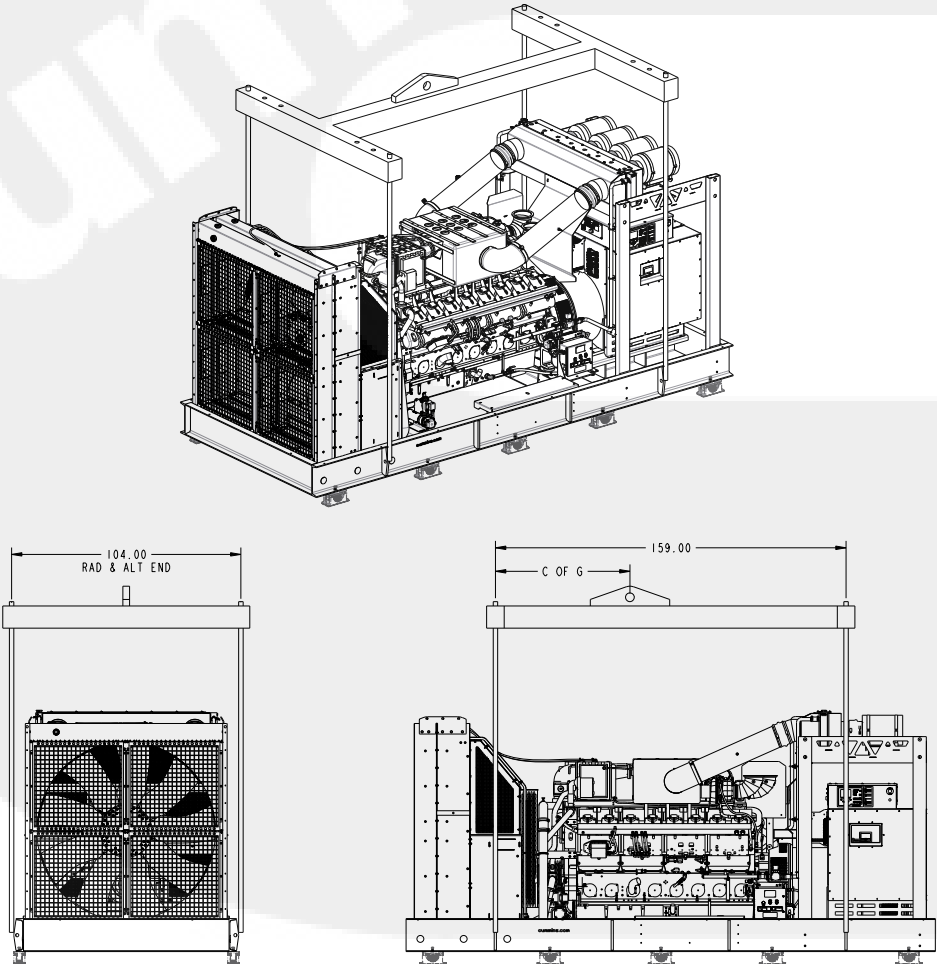


Figure 4-3 GenSet lifting configuration

4.3.4 Mounting the GenSet

Mount the GenSet according to the code requirements in effect at the installation site. For accepted design practices, refer to NFPA 37 Stationary Combustion Engines and Gas Turbines and follow recommendations given in Cummins Application Manual T-030 Liquid-cooled Generator Sets (see [2.2 Related literature](#)). Alternatively, to obtain a copy of this manual, contact your local service representative.

GenSets (and their enclosures) are mounted on a steel skid that provides proper support. As shown in [Figure 4-4](#), there are five mounting holes on each side of the GenSet skid. The engine-generator assembly is isolated from the skid frame by rubber mounts that provide adequate vibration isolation for normal installations. Where required by building codes or special isolation needs, GenSets may be mounted on rubber pads or mechanical spring isolators. The use of unapproved isolators may result in harmful resonances and may void the GenSet warranty.

Support the GenSet on a structure able to resist the dynamic weight of the GenSet: ± 3 g-force vertical and ± 3 g-force horizontal. Mount the GenSet on a substantial and level base such as a concrete pad. A non-combustible material must be used for the pad. The GenSet skid may be optionally equipped with a floor. The floor is intended to impede entry of debris, persons, or animals to the interior of an enclosed GenSet if mounted on spring isolators, a dunnage, or other raised structure. The floor (if equipped) is not intended to contain fluids.

Use 3/4 in. (19 mm) anchored mounting bolts to secure the GenSet skid to the floor/pad to prevent movement.

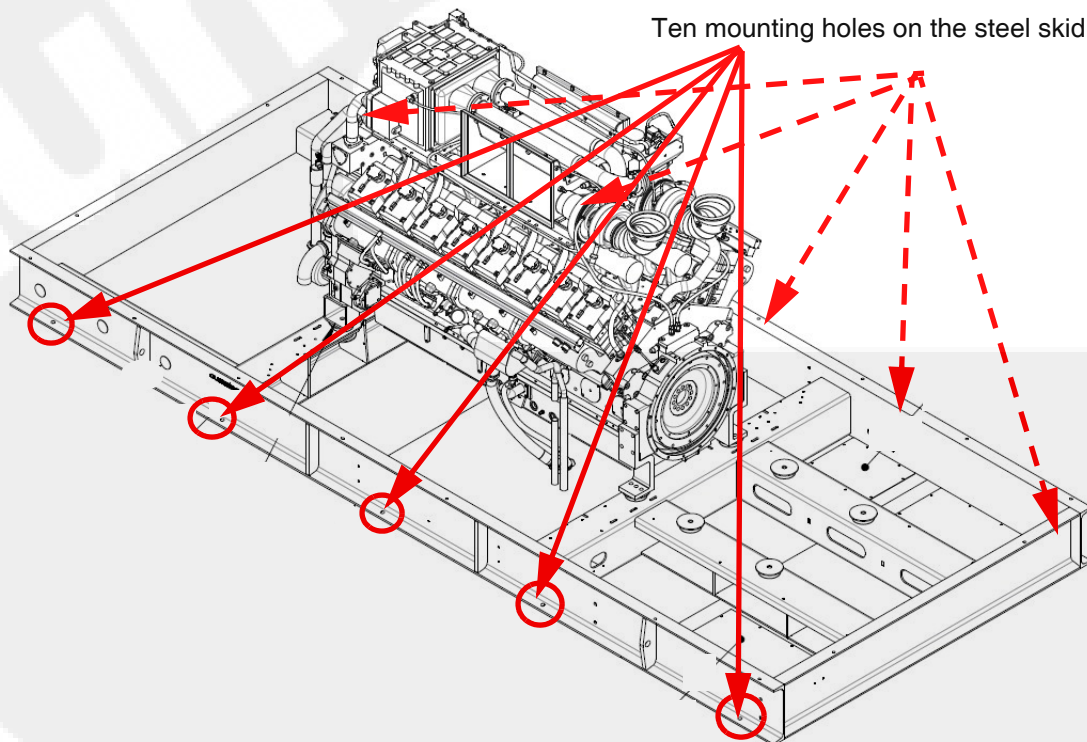


Figure 4-4 GenSet mounting holes

4.4 Exhaust connections

Figure 4-5 depicts a typical GenSet exhaust configuration.

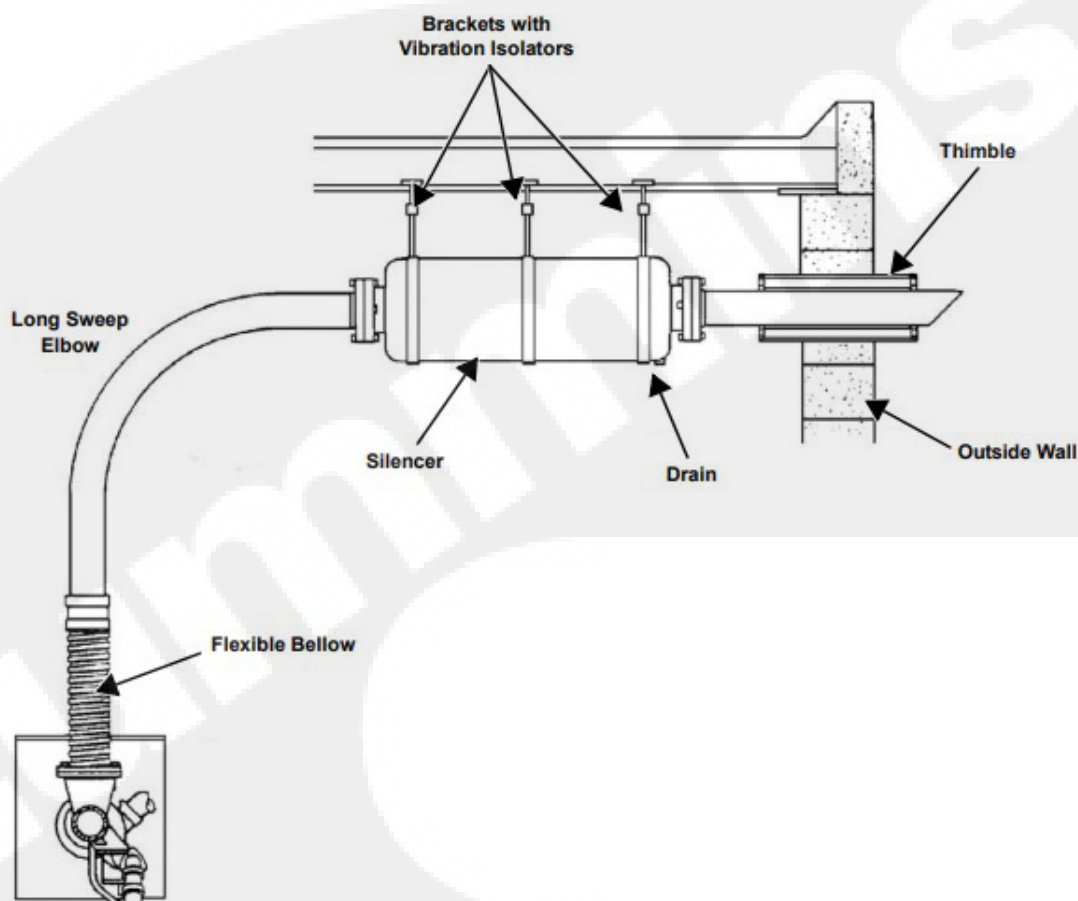


Figure 4-5 GenSet exhaust installation configuration (typical)

To properly install the GenSet exhaust system:

- Ensure that the exhaust outlet is not obstructed.
- Position the exhaust away from flammable materials.
- Ensure that the exhaust system design meets federal, state, and local code requirements.
- Pipe all exhaust gases to the outside of any enclosure or structure. Do not use exhaust heat to warm a room, compartment or storage area.
- Locate the exhaust outlets away from any air inlets to avoid gases re-entering any enclosure or structure.



Inhalation of exhaust gases can result in severe personal injury or death. Use extreme care during installation to provide a tight exhaust system. Terminate the exhaust pipe away from enclosed or sheltered areas, windows, doors and vents.

For indoor installation, use sealed joint type fittings (for example, National Pipe Thread (NPT) fittings) to provide a tighter exhaust system. Use of slip type fittings (secured with a muffler clamp) may allow leakage of exhaust gases into the building. The contractor is responsible for procuring and installing all necessary exhaust piping and fittings, including a rain cap, if required.

Use an approved thimble where exhaust pipes pass through walls or partitions. Insulated wall/roof thimbles are used where exhaust pipes pass through a combustible roof or wall (e.g., wood framing or insulated steel decking, etc.). Uninsulated wall/roof thimbles are used where exhaust pipes pass through a non-combustible wall or roof, such as concrete. Build the exhaust system according to the code requirements in effect at the installation site. Refer to NFPA 37 Stationary Combustion Engines and Gas Turbines and follow recommendations given in Cummins Application Manual T-030 Liquid-cooled Generator Sets for accepted design practices (see [2.2 Related literature](#)).

 WARNING

Hot exhaust pipes can start a fire and cause severe injury or death if improperly routed through walls. Use an approved thimble where exhaust pipes pass through walls or partitions.

 CAUTION

Weight applied to the engine exhaust components can result in damage. Support the muffler and exhaust piping so that no weight or stress is applied to engine exhaust.

IMPORTANT: Liability for injury, death, damage, and warranty expense due to the use of unapproved mufflers or modifications to the exhaust system becomes the responsibility of the person installing the unapproved muffler or performing the modification. Contact a Cummins Sales and Service distributor for approved exhaust system parts.

Pitch a horizontal run of exhaust pipe DOWNWARD (away from the engine) to allow any moisture condensation to drain away from the engine. If an exhaust pipe must be turned upward, install a condensation trap at the point where the rise begins.

If there is danger of personal contact, shield or insulate the exhaust lines. If the pipes pass close to a combustible wall or partition, allow at least 305 mm (12 in.) of clearance. Before installing insulation on the exhaust system components, check the exhaust system for leaks while operating the GenSet under full load. Correct all leaks, as necessary.

 WARNING

Exhaust pipes are very hot and they can cause severe personal injury or death from direct contact or from fire hazard. Shield or insulate exhaust pipes if there is danger of personal contact or when routed through walls or near other combustible materials.

As shown in [Figure 4-6](#), GenSets with an (optional) enclosure are shipped with a rain cap. Rain caps are attached to the discharge end of vertical exhaust pipes. The rain cap clamps onto the end of the pipe and opens due to exhaust discharge force from the GenSet. When the GenSet is stopped, the rain cap automatically closes, protecting the exhaust system from rain, snow, etc.

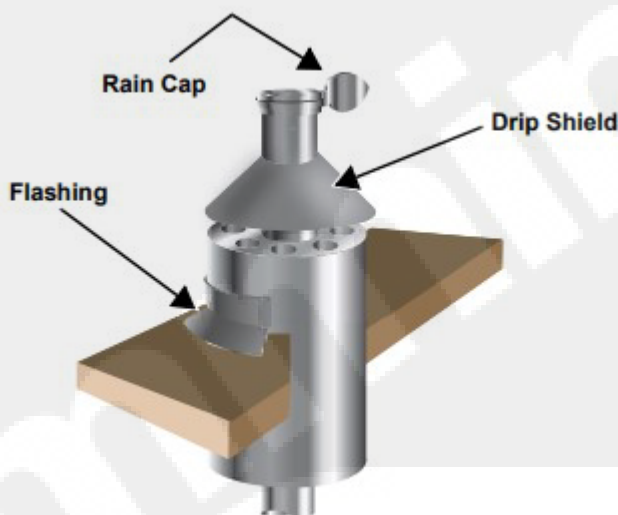


Figure 4-6 GenSet mounting exhaust thimble and rain cap (optional)

The C1000N6B and C1300N6 models do not require the installation of any additional exhaust system sensors.

4.5 Fuel connection

Before starting any type of fuel installation, all pertinent state and local codes must be complied with and the installation must be inspected before the unit is put in service.

In all fuel system installations, cleanliness is of the utmost importance. Make every effort to prevent the entrance of moisture, dirt, or contaminants of any kind. Clean all fuel system components before installing.

IMPORTANT: *All pipe-threaded fuel system fittings, including container fittings, must be assembled using a pipe joint sealing compound designed for use with natural gas or propane, as applicable per industry standards.*

The gaseous-fuel supply system design, materials, components, fabrication, assembly, installation, testing, inspection, operation, and maintenance must comply with applicable codes. (Refer to authorities having jurisdiction (AHJs) and reference NFPA No. 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA No. 54 National Fuel Gas Code, and NFPA No. 58 Liquefied Petroleum Gas Code.) Follow recommendations given in Cummins Application Manual T-030 Liquid-cooled Generator Sets (see [2.2 Related literature](#)) in regard to fuel supply system pipe sizes, manual shut-off valves, fuel filters, and gas pressure regulators.

The GenSet fuel connection is isolated from the engine and the fuel supply line must be a dedicated supply line from the utility. Cummins recommends that a flexible fuel hose or a section of flexible fuel hose be used between the GenSet's fuel connection and the fuel supply line to protect the fuel system from damage caused by vibration, and expansion, and contraction. A flexible fuel hose *must* be used if the GenSet is set on isolators. The flexible hose used must be approved by the hose manufacture for use with the GenSet fuel type and

product application. Support the fuel hose to restrain movement and prevent chaffing or contact with sharp edges, electrical wiring, and hot exhaust parts. [Figure 4-7](#) shows the fuel line connection.

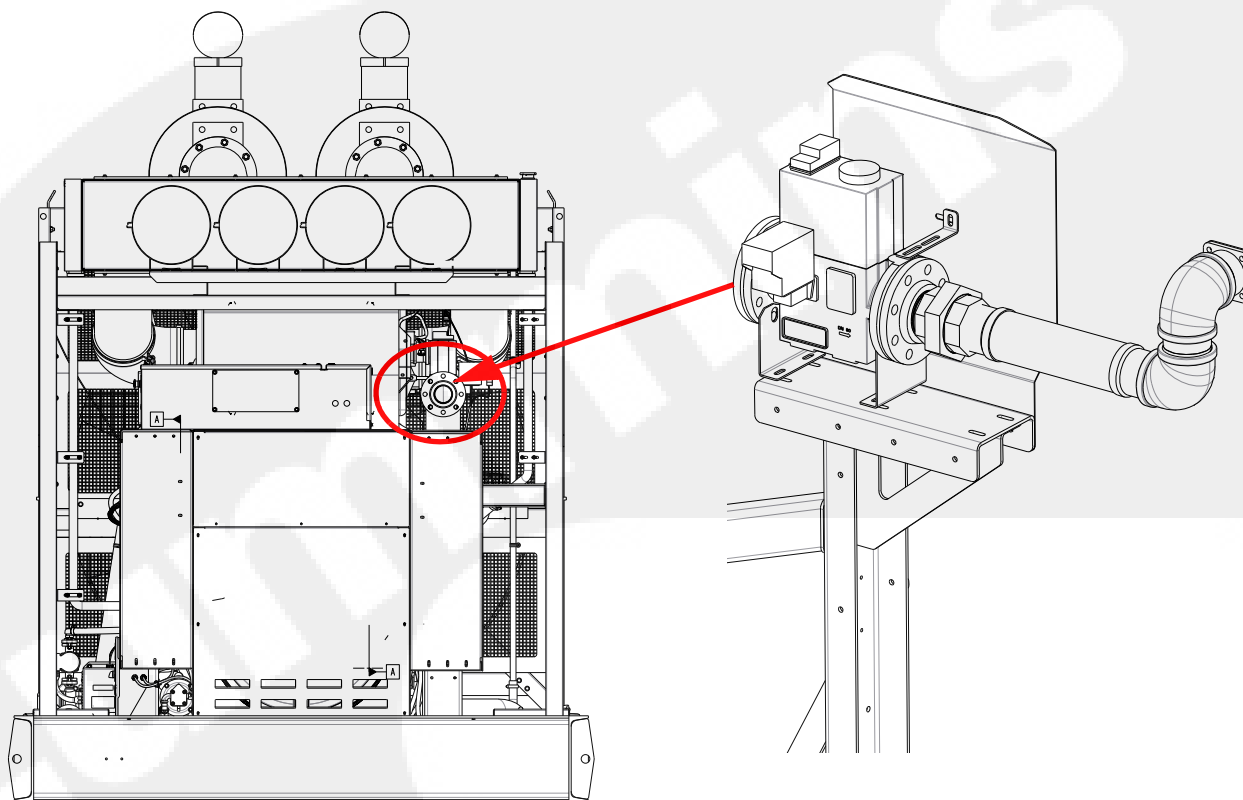


Figure 4-7 GenSet fuel line connection (typical)

! WARNING

Fuel leaks create fire and explosion hazards which can result in severe personal injury or death. Always use flexible tubing between the engine and the fuel supply to avoid line failure and leaks due to vibration. The fuel system must meet applicable codes.

! WARNING

Sparks and hot surfaces can ignite fuel, leading to severe personal injury or death. Do not route fuel lines near electrical wiring or hot exhaust parts.

! WARNING

Gaseous fuels are flammable and explosive and can cause severe personal injury or death. Do not smoke if you smell gas or are near fuel tanks or fuel-burning equipment or are in an area sharing ventilation with such equipment. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other sources of ignition well away from the GenSet and areas sharing ventilation.

Install a dry-type fuel filter ahead of the service pressure regulator to protect the sensitive pressure regulating components and orifices downstream from rust, scale, and other solid substances carried along in the gas stream.

If an automatic safety shut-off valve with visual indicators or leak test valves are required, then it shall be the responsibility of the customer or contractor to provide them. Most codes require both manual and electric (battery-powered) shutoff valves ahead of the flexible fuel hose(s). The manual valve should be of the indicating type. The electric valve should be wired so that the valve is closed when the GenSet is off.

4.6 Electrical connections

The GenSet electrical system involves connecting standard and optional AC equipment (e.g., coolant heater, oil heater, battery charger, etc.) and connecting the batteries.

The customer must provide the AC power conductors for connection to load devices and the means to isolate the AC input to the terminal box and these must comply with local electrical codes and regulations. Local regulations often require that wiring connections be made by a licensed electrician and that the installation be inspected and approved before operation. Refer to NFPA 70 (or the local electrical code) to ensure:

- Electrical conductors and connectors are the appropriate size and rating.
- All connections, wire sizes, materials used, etc., conform to code.
- Other installation features (e.g., strain relief, bending space, raceway) conform to code.

DANGER

Each of the operations described in this section should be done only by persons trained and experienced in electrical maintenance. Improper procedures may result in property damage, bodily injury or death. Only technically-qualified personnel should open the control housing. Voltages are present which can cause electrical shock, resulting in personal injury. Even with the power removed, improper handling of components can cause electrostatic discharge and damage circuit board components.

WARNING

Backfeed to a utility system can cause electrocution or property damage. Do not connect to any building electrical system except through an approved device and after the building main switch is opened.



Contractor guidelines for appropriate conduit and wire sizing for this GenSet can be found by referring to [Table 4-2](#).

Table 4-2. Conduit and wire size suggestions for electrical contractor's consideration

MAX BREAKER AMPS	Wire (Copper)		Conduit	
	QTY	SIZE	QTY	SIZE
2500A	6	600 MCM	6	4"
2000A	5	500 MCM	5	3½"
1600A	5	350 MCM	5	3½"
1200A	3	500 MCM	3	3½"
1000A	3	400 MCM	3	3½"
800A	2	500 MCM	2	3½"
600A	2	300 MCM	2	3"
400A	1	500 MCM	1	3½"
225A	1	4/0	1	2½"
150A	1	1/0	1	2"

[Table 4-3](#), and [Table 4-4](#), specify the nominal value of tightening torque to be applied to the clamping screws of the terminal connectors.

Table 4-3. Tightening torque for pressure wire connectors having internal socket head screws

Socket Size Across Flats		Tightening Torque	
inch	mm	lb inches	N-m
1/8	3.2	45	5.1
5/32	4.0	100	11.4
3/16	4.8	120	13.8
7/32	5.6	150	17.0
1/4	6.4	200	22.6
5/16	7.9	275	31.1
3/8	9.5	375	42.4
1/2	12.7	500	56.5
9/16	14.3	600	67.8

Table 4-4. Tightening torque for pressure wire connectors having screws

Size of wire that is to be used for connection of the unit		Tightening torque, lb-in (N-m)			
		Slotted head - no. 10 (4.7 mm) and larger *		Hexagonal head - external drive socket wrench	
AWG/kcmil	mm ²	Slot width - 0.047 inch (1.2 mm) or less; and slot length - 1/4 inch (6.4 mm) or less	Slot width - over 0.047 inch (1.2 mm); and slot length - over 1/4 inch (6.4 mm)	Split-bolt Connectors	Other Connections
18 - 10	.82 - 5.3	20 (2.3)	35 (4.0)	80 (9.0)	75 (8.5)
8	8.4	25 (2.8)	40 (4.5)	80 (9.0)	75 (8.5)
6 - 4	13.3 - 21.2	35 (4.0)	45 (5.1)	165 (18.6)	110 (12.4)
3	26.7	35 (4.0)	50 (5.6)	275 (31.1)	150 (16.9)
2	33.6	40 (4.5)	50 (5.6)	275 (31.1)	150 (16.9)
1	42.4	-	50 (5.6)	275 (31.1)	150 (16.9)
1/0 - 2/0	53.5 - 67.4	-	50 (5.6)	385 (43.5)	180 (20.3)
3/0 - 4/0	85 - 107.2	-	50 (5.6)	500 (56.5)	250 (28.2)
250 - 350	127 - 177	-	50 (5.6)	650 (73.4)	325 (36.7)
400	203	-	50 (5.6)	825 (93.2)	325 (36.7)
500	253	-	50 (5.6)	825 (93.2)	375 (42.4)
600 - 750	304 - 380	-	50 (5.6)	1000 (113.0)	375 (42.4)
800 - 1000	406 - 508	-	50 (5.6)	1100 (124.3)	500 (56.5)
1250 - 2000	635 - 1016	-	50 (5.6)	1100 (124.3)	600 (67.8)

NOTE - Connectors having a clamping screw with multiple tightening means (for example, a slotted, hexagonal head screw) are to be tested using both values of torque.

*For values of slot width or length not corresponding to those specified, select the largest torque value associated with the conductor size. Slot width is the nominal design value. Slot length is to be measured at the bottom of the slot.

4.6.1 AC electrical connections and configuration

4.6.1.1 Installing the transfer switch

A transfer switch must be used for switching the load from the normal power source to the GenSet. Follow the instructions provided with the transfer switch when connecting the load and control wiring.

4.6.1.2 Connecting the coolant heater

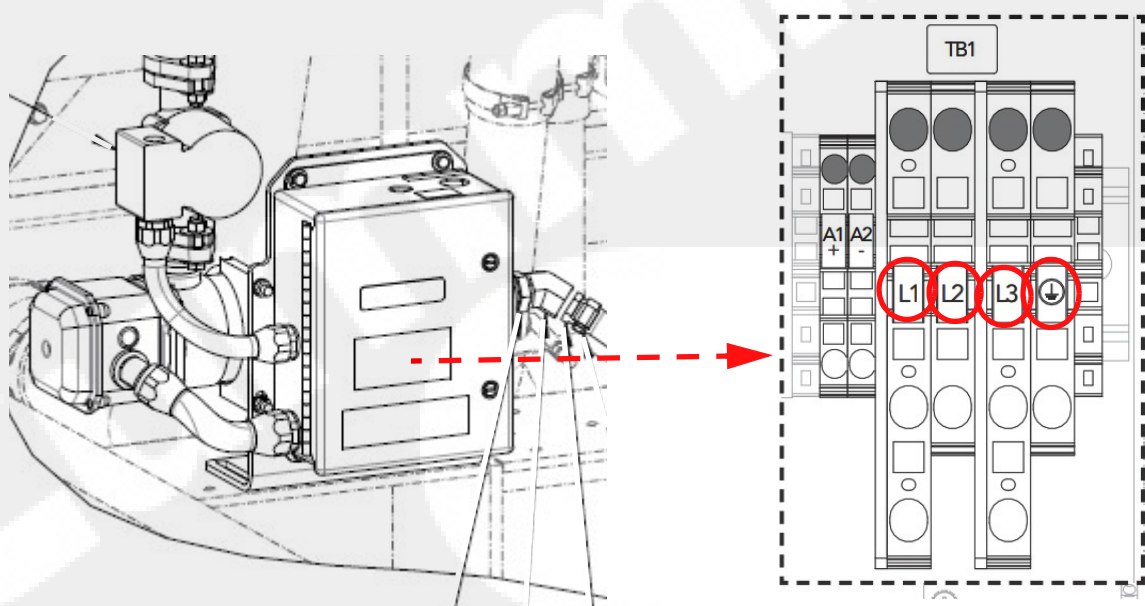


CAUTION

The coolant heater must not be operated while the cooling system is empty or damage to the heater will occur.

See [Figure 3-9 Coolant heater \(GenSet left side\)](#).

The coolant heater is electrically operated. Connect the coolant heater to a source of power that will be on during the time the engine is not running. Be sure the voltage rating is correct for the heater element rating. [Figure 4-8](#) shows the coolant heater terminal board. Make the electrical connections according to [Table 4-5](#).



Coolant heater terminal box TB1

Figure 4-8 Coolant heater installation (GenSet left side)

Table 4-5. Coolant heater utility power connections

Utility power wire	Coolant heater terminal block 1 (TB1) connection	
	1-phase	3-phase
Line 1	L1	L1
Line 2	-	L2
Line 3 or N	N	L3
Ground	Ground terminal or lug	

4.6.1.3 Connecting the oil heater

See [Figure 3-11 Oil heater \(GenSet left side\)](#).

The oil heater is electrically operated. Connect the oil heater to a source of power that will be on during the time the engine is not running. Be sure the voltage rating is correct for the heater element rating. [Figure 4-9](#) shows the oil heater terminal board. Make the electrical connections according to [Table 4-6](#).

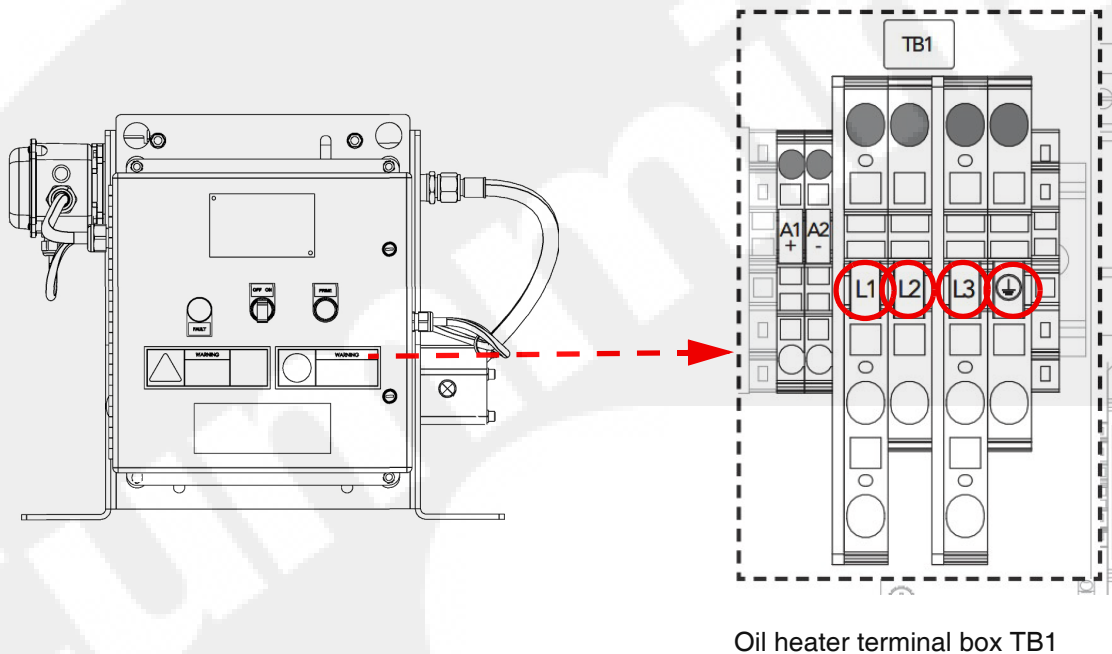


Figure 4-9 Oil heater installation (GenSet left side)

Table 4-6. Oil heater utility power connections

Utility power wire	Oil heater terminal block 1 (TB1) connection	
	1-phase	3-phase
Line 1	L1	L1
Line 2	-	L2
Line 3 or N	N	L3
Ground	Ground terminal or lug	

4.6.2 Battery and battery accessory connections

Batteries can be very dangerous. Prior to working with the GenSet batteries and/or battery accessories, read through and adhere to the following safety statements:

WARNING

A battery presents a risk of electrical shock and high short circuit current. The following precautions are to be observed when working on batteries:

- ***Remove watches, rings, or other metal objects.***
- ***Use tools with insulated handles.***
- ***Wear rubber gloves and boots.***
- ***Do not lay tools or metal parts on top of batteries.***
- ***Disconnect the charging source prior to connecting or disconnecting battery terminals.***
- ***Determine if the battery is inadvertently grounded. When inadvertently grounded, remove the source of the ground. Contact with any part of a grounded battery is capable of resulting in electrical shock. The risk of such shock is reduced when such grounds are removed during installation and maintenance (applicable to a generator not having a grounded supply circuit).***
- ***Only personnel knowledgeable of batteries and the required precautions may service batteries. Keep unauthorized personnel away from batteries.***
- ***LEAD-ACID batteries present a risk of fire because they generate hydrogen gas. Ignition of explosive battery gases can cause severe personal injury or death. Arcing at battery terminals, light switches or other equipment, flame, pilot lights and sparks can ignite battery gas. Do not smoke, or switch trouble light ON or OFF near the battery. Discharge static electricity from your body before touching batteries by first touching a grounded metal surface.***
- ***Disconnect the battery charger from the AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes that could damage the DC control circuits of the set.***
- ***In case of accidental physical contact, immediately wash skin with soap and water. In case of contact, immediately flood the eyes with large amounts of water for a minimum of fifteen minutes. IMMEDIATELY CALL A PHYSICIAN.***
- ***Electrolyte or explosion of a battery can cause severe personal injury or death. Do not burn the battery in a fire for disposal. Do not open or mutilate batteries. Damage to the battery case will release electrolyte which is harmful to the skin and eyes and is also toxic. Burning of a battery may cause an explosion.***

CAUTION

DO NOT connect battery charging cables to any electronic control system component. This can damage the electronic control system.

 WARNING

The electrolyte is a dilute sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following safety precautions are to be observed when replacing or replenishing electrolyte solution in the batteries:

- ***Wear full eye protection and protective clothing.***
- ***Where electrolyte contacts the skin, wash it off immediately with water.***
- ***Where electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention.***
- ***Spilled electrolyte is to be washed down with an acid neutralizing agent. A common practice is to use a solution of 1 lb. (500 grams) bicarbonate of soda to 1 gal. (4 L) of water. The bicarbonate of soda solution is to be added until the evidence of reaction.***

 WARNING

Batteries can emit explosive gases during charging. Always ventilate the compartment before servicing the batteries. Remove sources of spark or open flame. To avoid arcing, remove the negative (-) battery cable first and attach the negative (-) cable last. DO NOT connect battery charging cables to any electronic control system component. This can damage the electronic control system. Ventilate the battery area before working on or near battery. Wear goggles.

 WARNING

Ignition of explosive battery gases can cause severe personal injury or death. Always connect negative (-) battery cable last to prevent arcing.

The minimum recommended reserve capacity (RC) and cold cranking amperes (CCA) values for a particular engine can be found on the model-specific GenSet data sheet. See Section [9 - C1000N6B and C1300N6 specifications](#). RC and CCA definitions can be found in Society of Automotive Engineers (SAE) Standard J537 [Storage Batteries](#). All battery information is for lead/acid batteries.

4.6.2.1 Installing the batteries

Ventilate the charge battery areas prior to working on or near the charge batteries. Protect the battery areas from extremes of temperature and weather and wear appropriate personal protective equipment (PPE) prior to installing the batteries. To install the batteries:

1. Place the batteries on the GenSet frame and secure each battery with hold-down bolts that are tight, but not over-tight.
2. Fit the vents firmly in position and ensure that each battery is clean and dry. Smear the terminals with petroleum jelly, if necessary.
3. Verify the correct polarity when connecting battery cables to the GenSet. Even momentary incorrect connection can cause damage to the electrical system.

4. As shown in [Figure 4-10](#), ensure that the batteries are configured properly for 24 VDC standard operations.

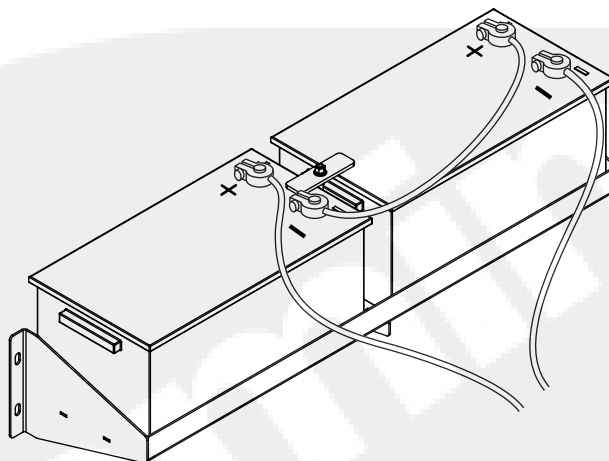


Figure 4-10 Proper series battery connection - 24 VDC

5. Check the battery cables and connections to ensure they are installed correctly and in good condition. Terminal connections must be tight, but not over-tight.
6. Coat the battery terminals with NOCO/Anti-OX to prevent corrosion.

4.6.2.2 Connecting the battery charger

NOTE: The battery charger must be connected to a power source that is protected by a ground fault circuit interrupter (GFCI).

See [Figure 3-14 Battery charger \(GenSet right side\)](#).

The battery charger is electrically operated. Connect the battery charger to a source of AC power that will be on during the time the engine is not running. The battery charger is rated to operate on any AC input within the range of 90-265 VAC (47-63 Hz). The battery charger AC Input Current and Breaker Ratings are:

- Charger Rated Output Current: 30 amps
- AC Input Current: 8 amps
- Optional AC Breaker Rating: 15 amps
- Optional AC Breaker Interrupt Rating: 10 KAIC

To install the battery charger:

1. Ensure that the AC input power supply is de-energized.
2. Connect the AC line and neutral conductors to the AC input terminal block/breaker in the charger (see [Figure 4-11](#)). If there is an identified grounded circuit conductor (neutral), attach it to the terminal marked "L2/N." Route the AC wiring at least ¼ inch (6 mm) away from DC wiring, alarm wiring, and the circuit board. Tighten the electrical connections to the specifications shown in the figure.

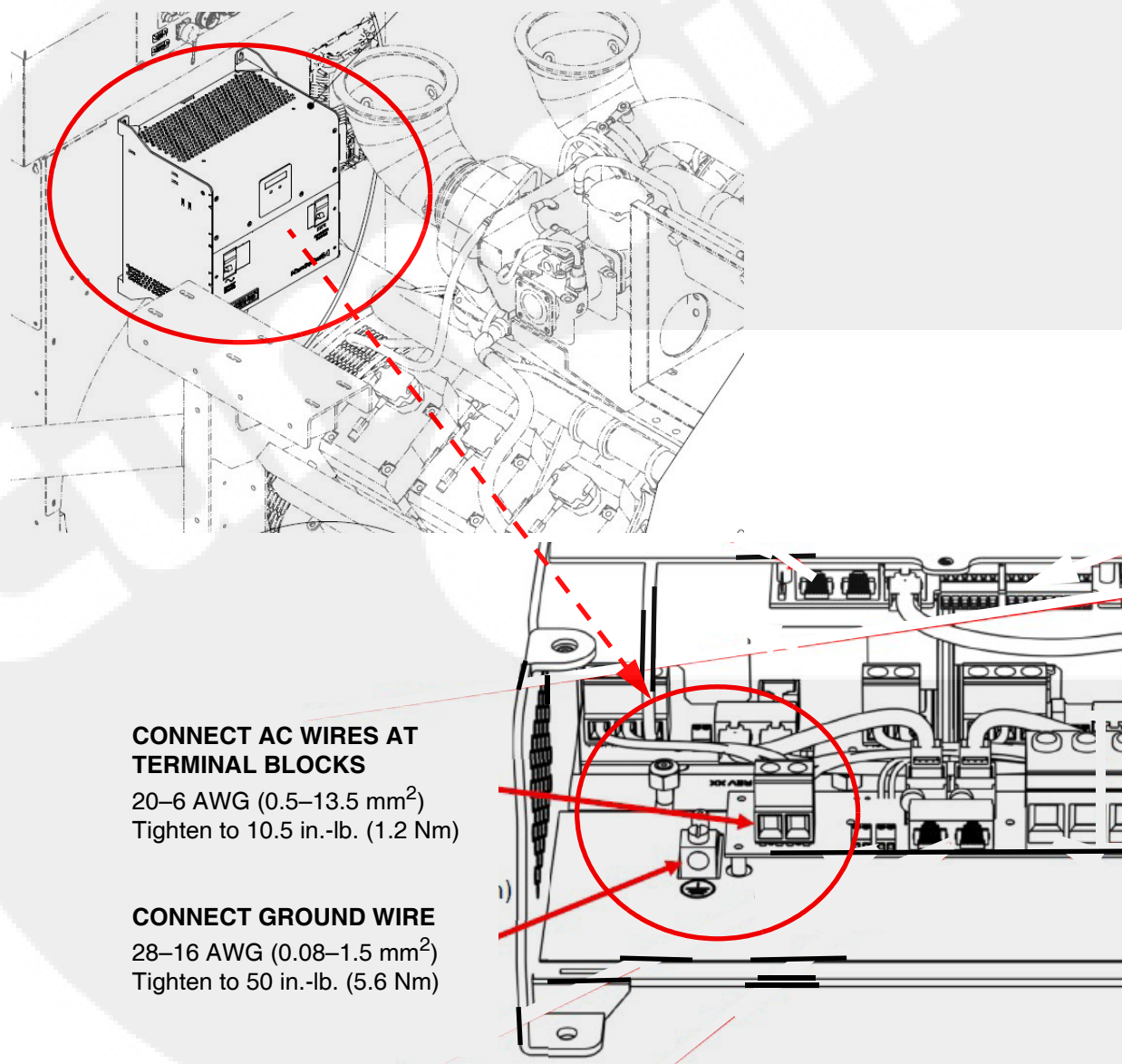


Figure 4-11 Battery charger installation (behind the back of the GenSet)

4.6.3 Other control wiring connections and configuration (optional)

The PowerCommand (PCC) controls the starting and stopping sequence of the engine through the Electronic Control Module (ECM) mounted on the engine. All GenSet control functions are contained on one circuit board (base board). The base board provides engine speed governing (optional), main generator voltage output regulation, and complete GenSet monitoring. The operating firmware provides control of the GenSet and its performance characteristics and displays performance information on a digital display panel. It accepts menu-driven control and set-up input from the push button switches on the Operator Panel (HMI).

It may be necessary to configure the PCC for site-specific commands (e.g., language, start/stop time delays, cycle crank, customer fault 1 and 2, etc.). Refer to the model-specific PCC manual for programming instructions.

The GenSet control panel contains connection points for remote control and monitor options. Customer monitor/control connections are attached to terminal block TB-2. Optional equipment such as a remote annunciator panel, sensing devices used to monitor GenSet operation, remote start/stop switches, etc. are attached to TB-2. Refer to the customer connections diagram in [Section 10 - C1000N6B and C1300N6 drawings](#). For more information, refer also to the specific PCC Installation Manual.

Prior to making any GenSet wiring connections, ensure that the circuit breaker(s) is in the **OFF** position. When installing electrical connections to the GenSet control housing:

- Use flexible conduit for all wiring connections. Always run circuit wiring in a separate metal conduit from AC power cables to avoid inducing currents that could cause problems within the control.
- Route appropriate wires through the PCC control housing access holes. Use the access holes that correspond to where the wires are terminated inside the control box.
- Use a compression type strain-relief connector to prevent dust, insects, etc. from entering the control box.
- Use cable ties to keep the wiring away from sharp edges and AC power cables within the control housing.
- Use stranded copper wire for all customer connections. (Solid copper wire may break due to GenSet vibration.) *NOTE: Due to the wide variety of devices that can be attached to the outputs of TB-2, the electrical contractor must determine the gauge of the stranded copper wire that is used at this installation site.*
- Use class 1 wiring methods for field wiring connections to terminals of a class 2 circuit.



Other wiring connection considerations include:

Table 4-7. Wiring connection considerations

Connection type	Connection specifications	
Network RS485 connection 18 ga twisted pair wire or Cat 5 cable	Up to 20 nodes can be connected to the network	Total network length cannot exceed 4000 feet
Switched B+ (SW B+)	Fused at 5 amps	See Section 10 - C1000N6B and C1300N6 drawings
Customer B+ (Cust B+)	Fused at 10 amps	See Section 10 - C1000N6B and C1300N6 drawings
Digital connections other than relayed outputs, network, switched B+, and B+ to terminal strip TB-2	For less than 1000 ft. (305 m), use 20 gauge stranded copper wire	For 1000 to 2000 ft. (305 to 610 m), use 18 gauge stranded copper wire

4.6.3.1 Connecting the remote Operator Panel (optional)

As shown in [Figure 4-12](#), an optional HMI remote operator panel can be connected to the back of the GenSet control panel for remote operation. The remote HMI Operator Panel will ship loose; the customer is responsible for wiring and mounting the HMI. The customer shall use the 4-position plug connector and 15-position plug connector at the back of the remote HMI to connect to the GenSet terminal block through the two holes on the back of the GenSet control panel. For more details, see [Section 10 - C1000N6B and C1300N6 drawings](#).

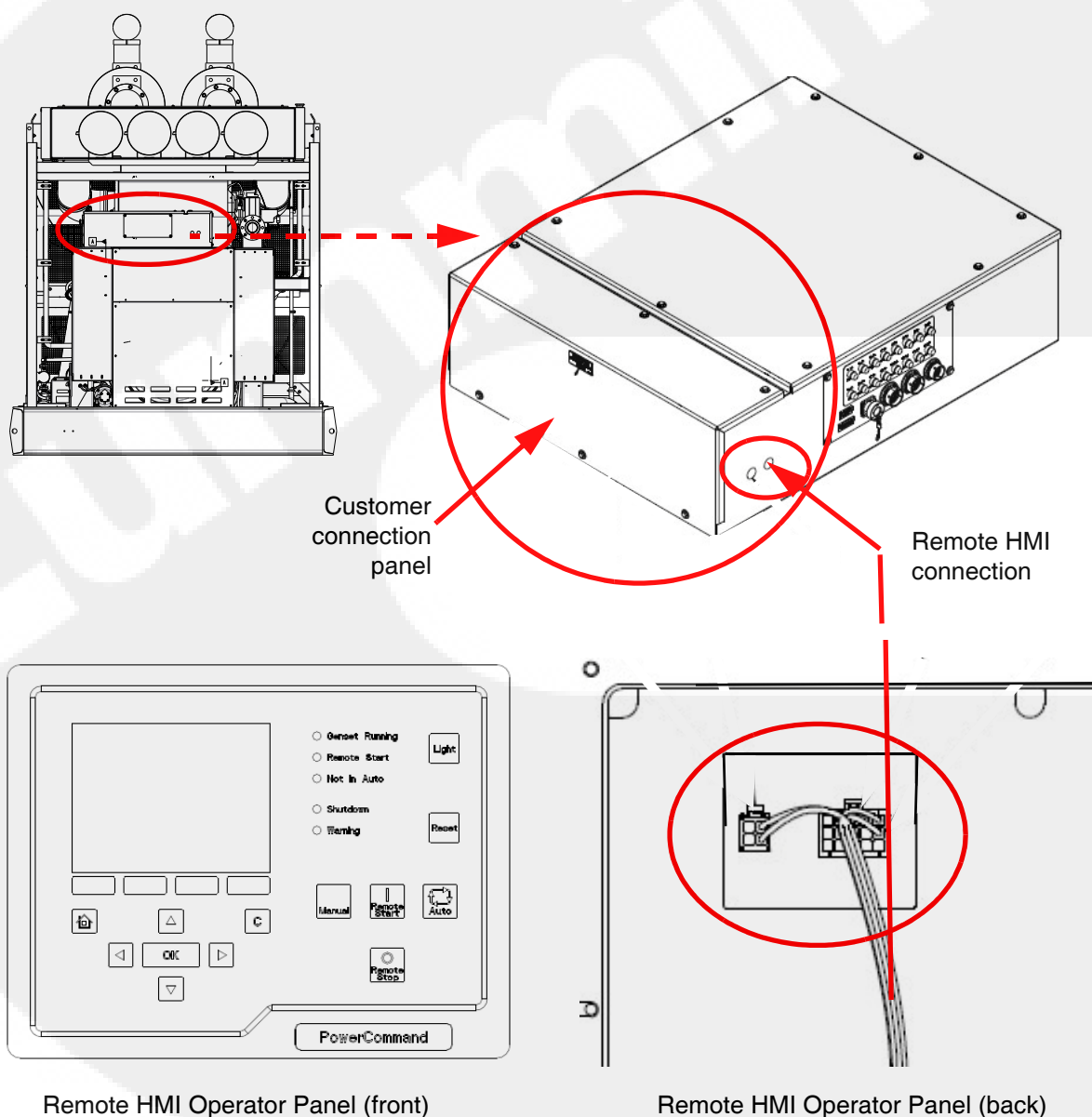


Figure 4-12 Remote HMI Operator Panel connection (optional)

4.6.3.2 Connecting the remote emergency stop (optional)

If purchased with the GenSet, the remote emergency stop will be shipped loose with the GenSet. When the GenSet is shipped without a factory-installed enclosure, the installer is responsible for mounting and wiring the remote emergency stop to the control panel customer interface terminal block. Refer to the customer connections diagram in Section 10 - C1000N6B and C1300N6 drawings.

For the C1000N6B and C1300N6 models shipped from the factory in an enclosure, the factory will provide cabling and terminate the wires to the controller. The installer is responsible for mounting the emergency stop in the designated area and terminating the wiring to the remote emergency stop.

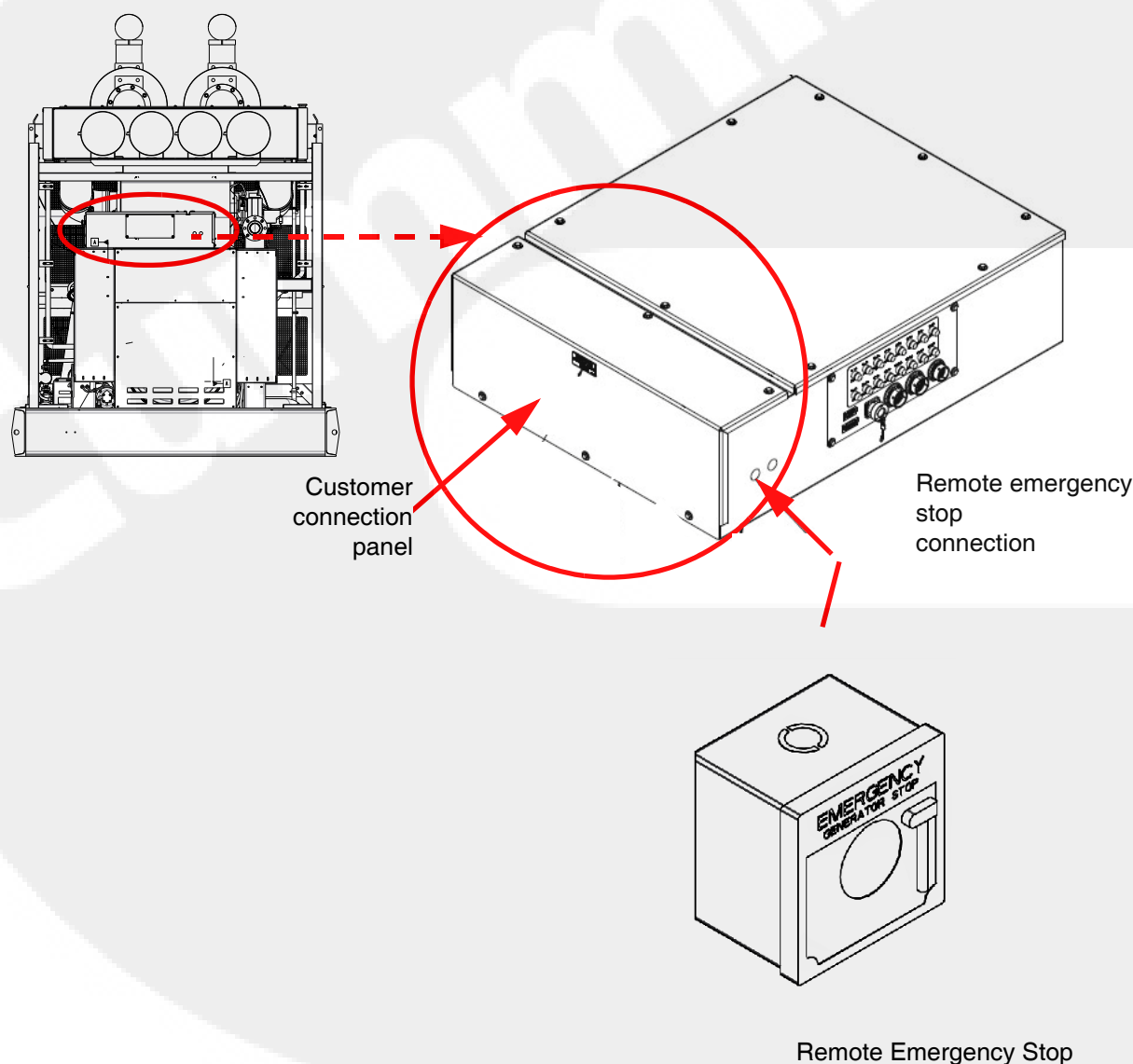


Figure 4-13 Remote Emergency Stop connection (optional)

5 - Startup

5.1 Introduction

Only trained and experienced personnel should carry out GenSet operations. Before operating the system, the operator should become familiar with all health and safety procedures, warnings, cautions, precautions, and documentation supplied with the GenSet (see [1 - Safety](#)). Observe all the warnings and cautions at all times. Before operating the GenSet become familiar with the equipment and how it is operated (including the controls and the coolant heater). Safe and efficient operation can only be achieved if the GenSet is operated correctly.

Become familiar with stopping the GenSet in an emergency from the local and (if applicable) remote location(s). It is imperative that the operator read [1.3.1 Stopping the GenSet at the GenSet](#), [1.3.2 Stopping the GenSet using the optional secondary Emergency Stop button](#) (if applicable), and [1.3.3 Resetting the GenSet after an emergency stop](#).

The GenSet has been carefully designed to provide safe and efficient service when properly installed, maintained, and operated. However, the overall safety and reliability of the complete system is dependent on many factors outside the control of the GenSet manufacturer. Cummins does not know how the GenSet will be used. The equipment owner and operator, therefore, is responsible for safe operation in a hostile environment. For assistance, contact your local Cummins sales or service representative. To identify the nearest Cummins location, visit <https://www.cummins.com/locations>.



Inhalation of exhaust gases can cause asphyxiation and death. Exhaust pipes should be faced away from enclosed or sheltered areas, windows, doors, and vents. Do not use exhaust heat to warm a room, compartment, or storage area.



Contact with high voltages can cause severe electrical shock, burns, or death. Do not open the GenSet output box while the GenSet is running. Read and observe all warnings and cautions in the GenSet manuals. Make sure that only suitably trained and experienced service personnel perform electrical and/or mechanical service. Even with the power removed, improper handling of components can cause electrostatic discharge.

The GenSet may be operated manually using the GenSet operator panel or using the remote start signal from the operator panel of the remote operator panel. See [6.5.1 Starting from the operator panel \(manual mode\)](#) and [6.5.2 Starting from a remote location \(auto mode\)](#).

5.2 Startup

Access to, and installation and operation of, the GenSet must be restricted to qualified service personnel who have been instructed of the reasons for the restrictions applied to the location of the GenSet and any precautions that must be taken. Access to and operation of the GenSet must be governed by the use of a special tool, or lock and key, or other means of security that is monitored by the authority responsible for that location.

Before starting the GenSet, check to make sure that all electrical connections are secure, and that all wiring is complete. Replace and secure any access panels that have been removed during installation. Check that the load cables from the GenSet are properly connected.



5.2.1 Pre-start checklist

Complete the pre-start checklist below prior to starting the GenSet for the first time.

Table 5-1. Pre-start checklist

Tick	
General items	
	All operating personnel have read and are familiar with the GenSet operator manual, all health and safety procedures, warnings, cautions, precautions, and the other documentation supplied with the GenSet.
	All operators have been thoroughly briefed on preventative maintenance procedures.
	All operators have read and understand all important safety instructions.
Fuel System	
	The fuel line is properly installed, supported, and protected against damage.
	An approved flexible fuel line is installed between the main fuel supply and the GenSet's fuel system near the GenSet to protect it against damage caused by vibration, expansion, and contraction.
	Lockable fuel supply shutoff valves are installed to prevent fuel flow in case of leaks and for ease of maintenance.
	No fuel leaks are found in the supply line or the engine fuel system.
	The primary fuel regulator specifications have been verified.
	The fuel system is purged.
	The auxiliary fuel system is properly connected (if equipped).
	All valves required for operation are open. The gas regulator vent cap (if applicable) has been removed.
Cooling air inlet/outlets	
	The cooling air inlets/outlets are unobstructed.
	Proper ducting material (sheet metal, canvas) is used between the radiator and the air outlet.
Exhaust System	
	Operators are thoroughly briefed on the dangers of carbon monoxide gas.
	Areas around GenSet are well ventilated. Gases are discharged away from building openings. There is no possibility of exhaust fumes entering building doors, windows, or intake fans.
	Exhaust gases are piped safely outside and away from doors, windows, and openings. The exhaust outlet is unobstructed.
	The correct length of approved rigid pipe is connected to the GenSet flexible pipe using approved securing methods with no weight resting on the engine exhaust components. There are no bends in the flex section.
	Exhaust piping is insulated to guard against burns to personnel.

Table 5-1. Pre-start checklist

Tick	
Exhaust System (cont'd.)	
	Exhaust piping passing through walls or ceilings have approved fire-proof materials and are in compliance with all codes. The exhaust system has adequate clearance to any combustible materials.
	Exhaust piping is large enough in diameter to prevent excessive back pressure on the engine.
	The exhaust components are secure and not warped. There are no leaks and all fittings are tight.
AC and DC Wiring	
	Wire sizes, insulation, conduits and connection methods all meet applicable codes.
	AC and DC wires are separated in their own conduit to prevent electrical induction.
	All load, line, and GenSet connections are well made and correct.
	Flexible conduit is used between the GenSet and the building or surrounding structure.
GenSet Pre-Start	
	The GenSet engine is properly serviced with oil and coolant.
	The GenSet batteries are charged and all connections are correct, tight, and free of corrosion.
	The Emergency Stop button has been reset.
	The engine coolant heater, oil heater, and battery charger are connected to an independent utility power supply and are operational.
	All GenSet covers and safety shields are installed correctly.

5.2.2 Checking the GenSet fluids prior to initial start

With the GenSet safely immobilized, check the oil and coolant levels prior to starting the GenSet for the first time.

5.2.2.1 Checking the engine oil level and adding oil, if necessary

Prior to starting the GenSet, check the engine oil level. The oil fill port and oil dip stick are located on the left side of the GenSet as shown in [Figure 5-1](#).

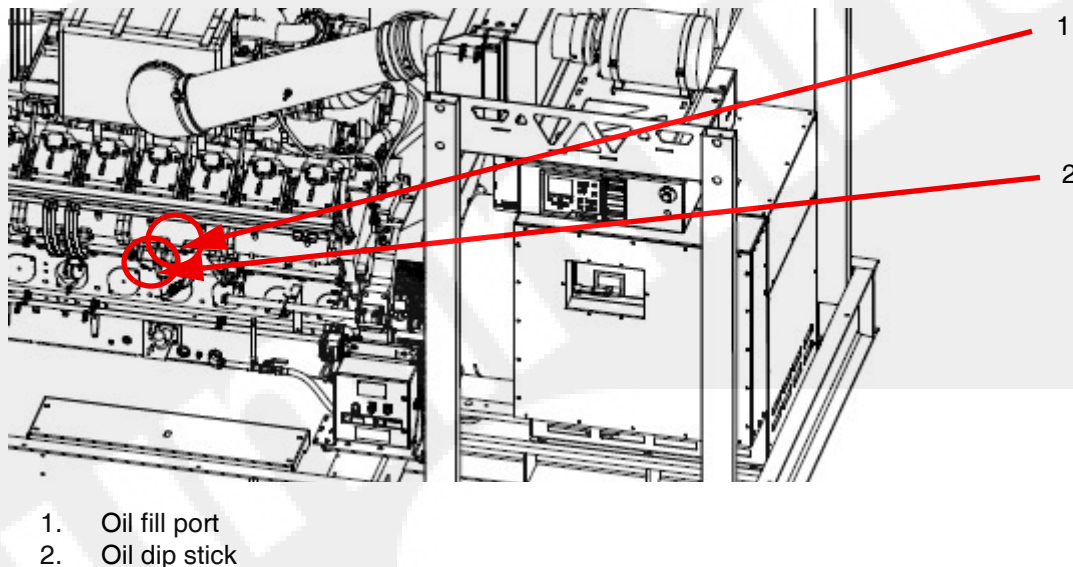


Figure 5-1 Oil fill port and dip stick (GenSet left side)

To properly check the GenSet oil level:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Remove the dipstick, wipe it clean and reinstall it. Take the dipstick out again, and check the oil level. As shown in [Figure 5-2](#), the oil level should be maintained at **halfway** between the UPPER and LOWER marks on the dipstick.

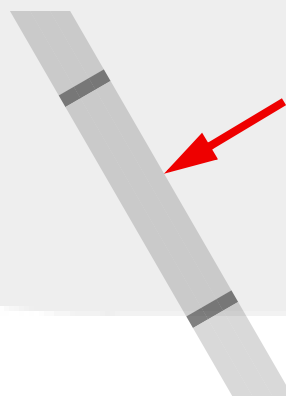


Figure 5-2 Normal oil level (cold engine) on the dipstick

3. If the oil level is found to be insufficient, oil must be added. Prior to removal, ensure that the oil fill cap area is clean to prevent debris from entering the engine.
4. Add the appropriate amount of oil based on the engine oil level check performed beforehand.
5. Wait 5 minutes and recheck the engine oil level.
6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

5.2.2.2 Checking the JW radiator coolant level and adding coolant, if necessary

To check that the GenSet JW radiator coolant level is sufficient for operation:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Check that the coolant level is visible in the JW radiator sight glass.

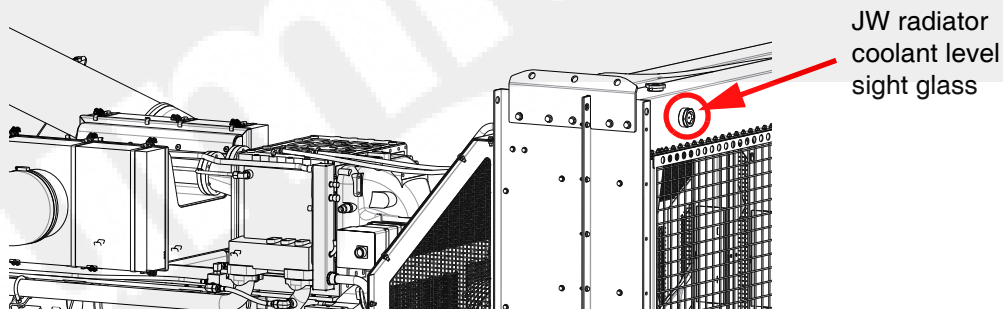


Figure 5-3 JW coolant level sight glass (GenSet front)

3. If the coolant is visible in the JW sight glass, then skip to Step 10. If the coolant is not visible in the JW sight glass, then add coolant.
4. As shown in [Figure 5-4](#), check that the JW radiator coolant drain valves are closed. The JW shut-off valves are located *directly behind the JW drain holes* on the right side of the GenSet. Make sure the tee handle is perpendicular to the drain line.

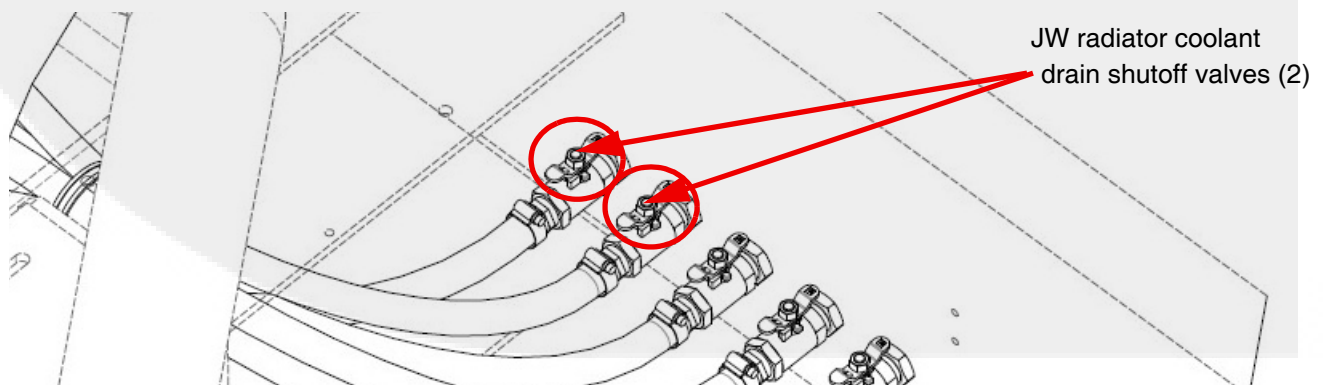


Figure 5-4 GenSet JW radiator coolant drain shut-off valves (GenSet right side)

5. As shown in [Figure 5-5](#), twist open the JW petcock on top of the JW crossover tube.

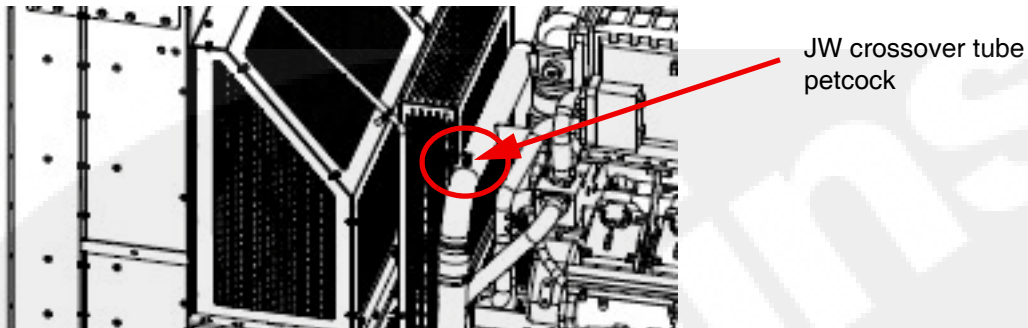


Figure 5-5 JW crossover tube petcock (GenSet left side)

6. As shown in [Figure 5-6](#), twist the JW fill cap counter-clockwise and open the JW radiator fill port.

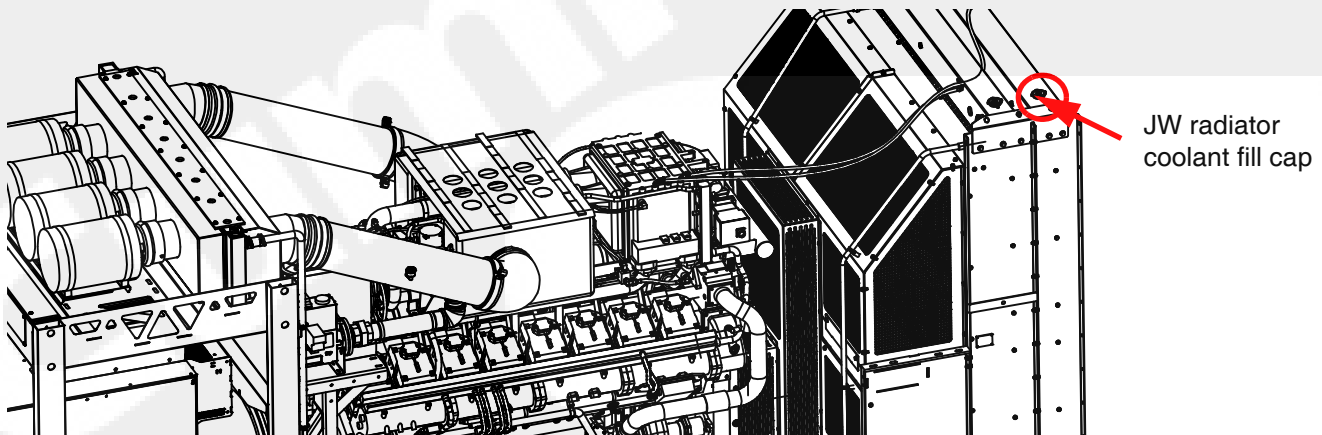


Figure 5-6 JW radiator coolant fill cap (GenSet right side)

7. To select the proper coolant, see [9.6 C1000N6B/C1300N6 coolant specification](#). Slowly add engine coolant until the coolant spits from the JW crossover tube petcock and then close the petcock.
8. Continue to add engine coolant until the coolant shows in the JW coolant sight glass.
9. Install the JW radiator fill cap by pushing down and twisting clockwise until the cap lip hits the tank stop flange.
10. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

5.2.2.3 Checking the LTA radiator coolant level and adding coolant, if necessary

To check that the GenSet LTA radiator coolant level is sufficient for operation:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Check that the coolant level is visible in the LTA radiator sight glass.

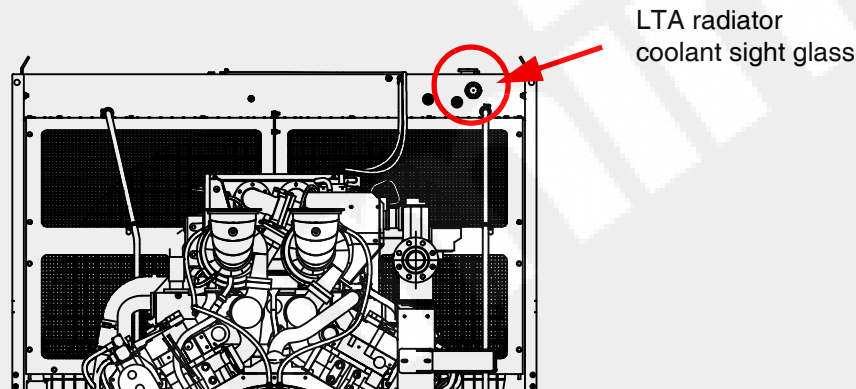


Figure 5-7 LTA radiator coolant sight glass (GenSet back of radiator)

3. If the coolant is visible in the LTA sight glass, then skip to Step 8. If the coolant is not visible in the LTA sight glass, then add coolant.
4. As shown in [Figure 5-8](#), check that the LTA radiator coolant drain valves are closed. The LTA shut-off valves are located *directly behind the LTA drain holes* on the right side of the GenSet. Make sure the tee handle is perpendicular to the drain line.

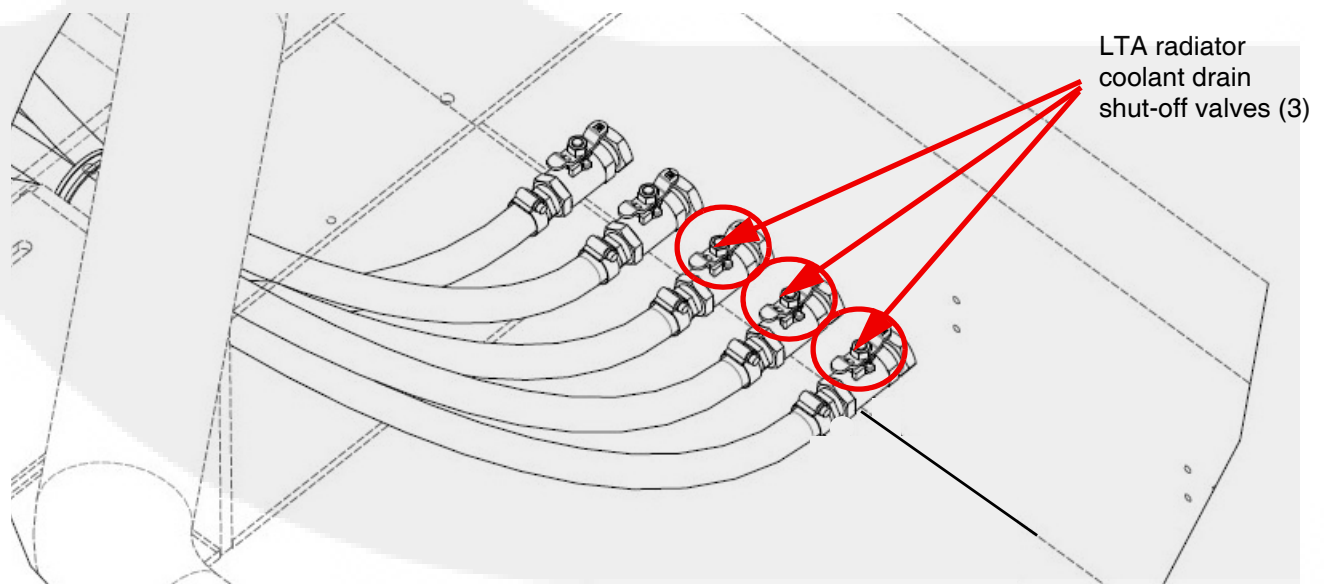


Figure 5-8 LTA radiator coolant drain shut-off valves (GenSet right side)

5. As shown in [Figure 5-9](#), twist the LTA fill cap counter-clockwise and open the LTA radiator fill port.

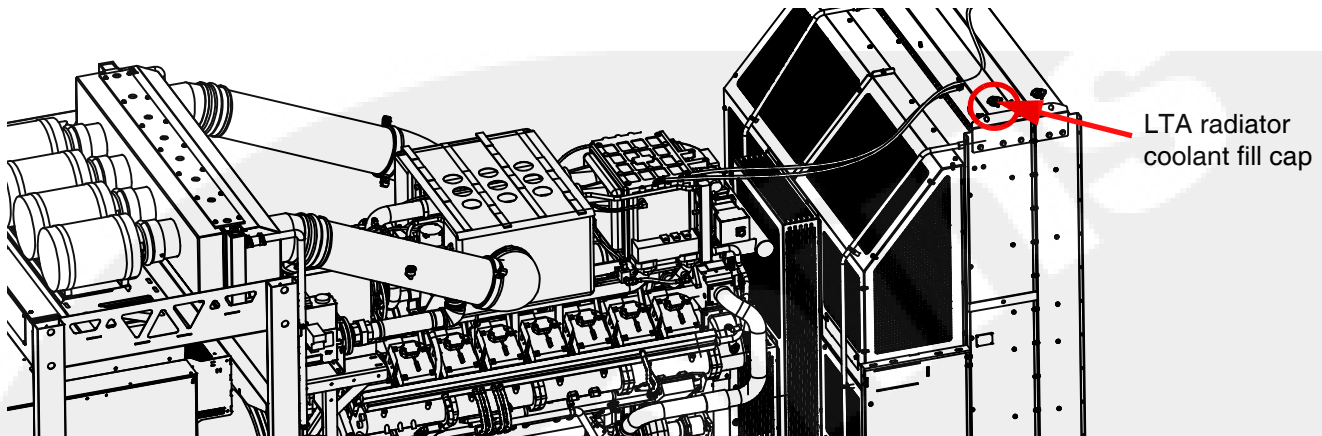


Figure 5-9 LTA radiator coolant fill cap (GenSet right side)

6. For recommended coolant, see [9.6 C1000N6B/C1300N6 coolant specification](#). Slowly add engine coolant until the coolant shows in the LTA coolant sight glass.
7. Install the LTA radiator fill cap by pushing down and twisting clockwise until the cap lip hits the tank stop flange.
8. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

5.2.2.4 Checking the intake air warmer coolant level (if installed) and adding coolant, if necessary

To check the level of coolant in the intake air warmer:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Twist the intake air warmer fill cap counter-clockwise and open the intake air warmer coolant fill port (see [Figure 5-10](#)).

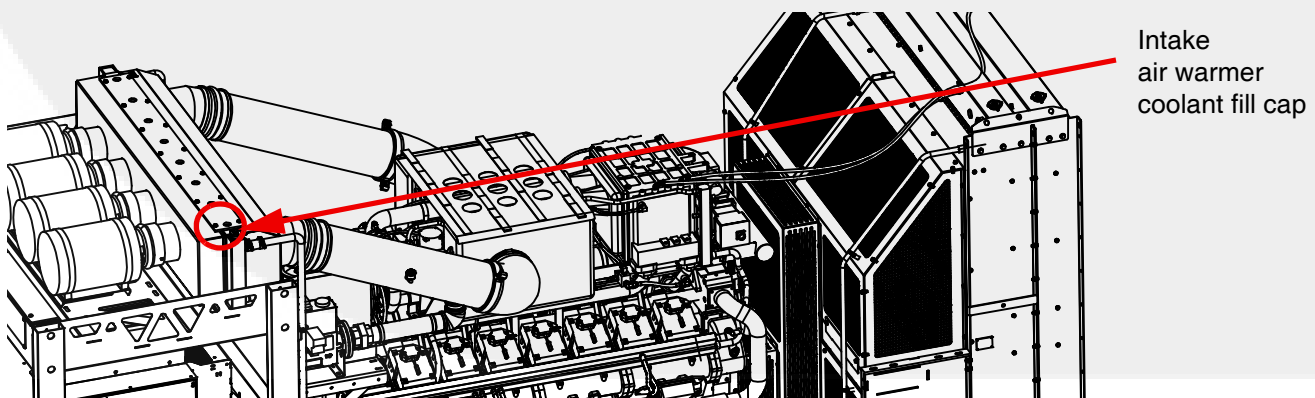


Figure 5-10 Intake air warmer coolant fill cap (GenSet right side)

3. As shown in [Figure 5-11](#), visibly check that the coolant level is at - or just below - the intake air warmer outlet pipe. If the coolant is not visible to the intake air warmer outlet pipe, add coolant. The green section in the figure below indicates the ideal coolant level. It is acceptable to leave some air space in the intake air warmer.

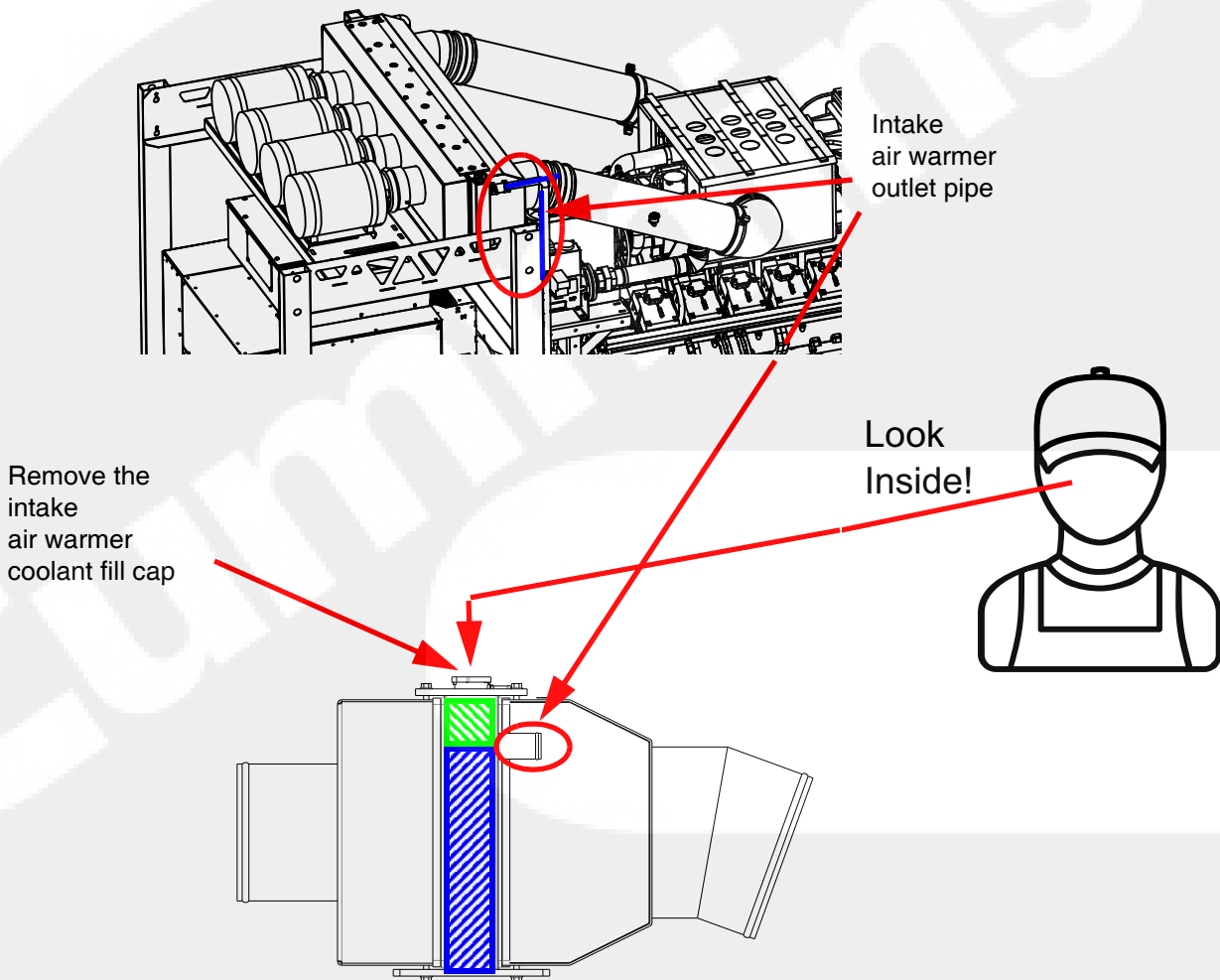


Figure 5-11 Cross-section diagram of the intake air warmer coolant fill port (GenSet right side)

4. If the coolant level is sufficient, install the intake air warmer fill cap by pushing down and twisting clockwise until the cap lip hits the tank stop flange and then skip to Step 8. If the coolant level is low, then add coolant.

5. As shown in [Figure 5-12](#), check that the intake air warmer drain shut-off valve is closed. Turn the tee handle so that it is perpendicular to the drain line. The intake air warmer shut-off valve is *directly behind* the intake air warmer drain (on the right side of the GenSet).

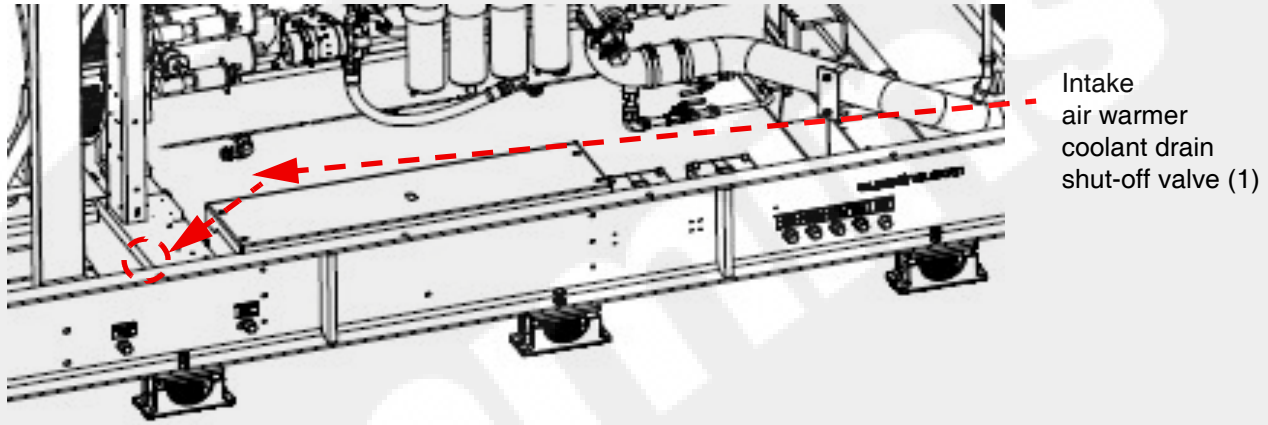


Figure 5-12 GenSet intake air warmer coolant drain shut-off valve (GenSet right side)

6. To select the proper coolant, see [9.6 C1000N6B/C1300N6 coolant specification](#). As shown in [Figure 5-11](#) (above), slowly add engine coolant and watch for when the coolant level begins to cover the intake air warmer outlet pipe. It is acceptable to leave some air space in the intake air warmer.
7. Install the intake air warmer fill cap. Push down and twist clockwise until the cap lip hits the tank stop flange.
8. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

5.2.3 Checking the GenSet fuel and fluids after the initial start

The GenSet fuel pressure may need to be adjusted after the GenSet has been started for the first time. Similarly, the GenSet engine oil and coolant levels may change after running the GenSet for several minutes. Start the GenSet (see [6 - Operation](#)) and measure the fuel pressure and check for gas leaks. After operating the GenSet for several minutes, stop the GenSet and recheck the engine oil and coolant levels.

5.2.3.1 Measuring the fuel pressure

The C1000N6B and C1300N6 models are equipped with one dual closure fuel valve. This valve has functions that are integral to the operation of the unit and must not be substituted. During normal operation, the engine fuel/air ratio is determined by the fuel flow control valve operating in conjunction with the numerous engine sensors.

As part of the startup process, the fuel pressure must be measured during its initial stages of operation. The fuel supply pressure must not exceed 166 in. H₂O (41 kPa) under any condition. Your authorized Cummins distributor can monitor fuel system and engine operation using the Cummins Insite service tool.

Gas supply pressure is specified at the inlet to the GenSet connection. As standard equipment, one fuel shut-off (FSO) valve with dual closure is located upstream from the regulator fuel flow control assembly on this unit. Additional options added to the fuel train for site compliance to CSA or NFPA, and/or flexible fuel connections or strainers, add restriction that must be considered when determining gas supply pressure. Cummins is not responsible for additions upstream of the GenSet connection.

IMPORTANT: *Do not attempt to correct the fuel pressure by adjusting the fuel system before determining that the engine and the ignition system are functioning properly. Especially be sure to check for air cleaner restriction due to dirt accumulation.*



DANGER

High gas supply pressure can cause gas leaks which can lead to fire and severe personal injury or death. Gas supply pressure must be adjusted to proper specifications by qualified personnel.

Figure 5-13 shows the location of the fuel pressure test ports.

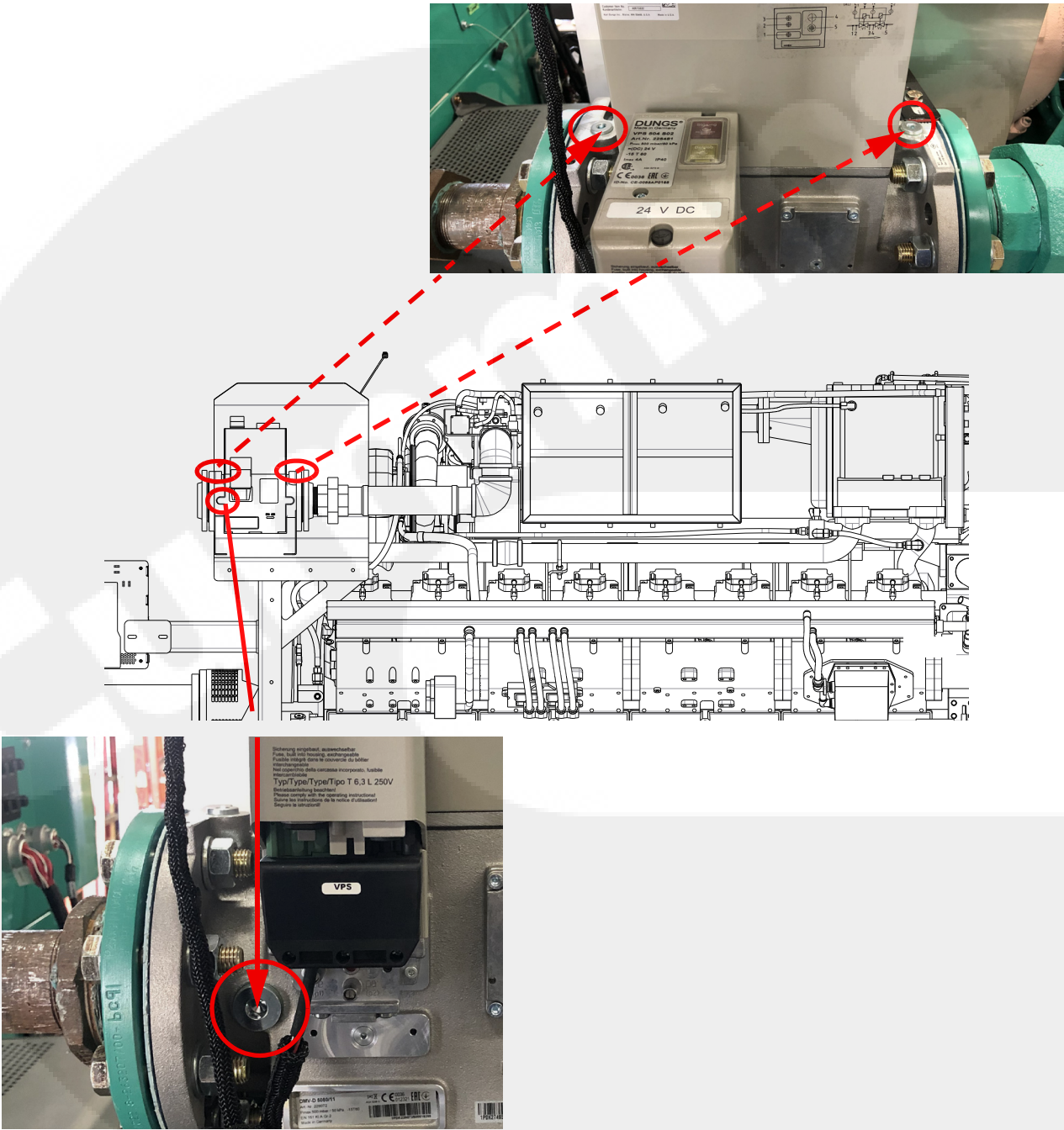


Figure 5-13 Fuel pressure test ports (GenSet right side)

5.2.3.2 Checking for gas leaks

While the system is under pressure, check all fuel-system connections - including the container with associated valves and fittings - for leaks using a soap and water solution or equivalent.



Gaseous fuel leaks into an inadequately ventilated space can lead to explosive accumulations of gas. Natural gas rises when it is released into the air and can accumulate under overhanging hoods and inside housings and buildings. Precautions must be taken to prevent gas leaks and the accumulation of gaseous fuel in the event of a leak.

5.2.3.3 Rechecking the engine oil and coolant levels

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Check the engine oil level - see [5.2.2.1 Checking the engine oil level and adding oil, if necessary](#).
3. Check the JW radiator coolant level - see [5.2.2.2 Checking the JW radiator coolant level and adding coolant, if necessary](#).
4. Check the LTA radiator coolant level - see [5.2.2.3 Checking the LTA radiator coolant level and adding coolant, if necessary](#).
5. Check the intake air warmer (if installed) coolant level - see [5.2.2.4 Checking the intake air warmer coolant level \(if installed\) and adding coolant, if necessary](#).
6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

5.3 Commissioning and warranting the GenSet

The GenSet warranty must be registered with Cummins prior to making a warranty claim. For instructions on how to register the GenSet warranty see Section [2.4.4 Warranty](#).

This GenSet, regardless of the application, is subject to engine exhaust emissions regulations on a local and/or national level. Compliance with emissions regulations usually requires special permits. A natural gas GenSet that is set up at the factory will not be properly set up for the conditions at the final location of the GenSet. To obtain proper engine emissions, the air/fuel ratio value of the engine will need to be adjusted, taking into account the engine rating, fuel quality, and location.



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6 - Operation

6.1 Introduction

IMPORTANT: *This text should be read in conjunction with the **System Overview** section of this manual and the PowerCommand® 3300 controller operator manual (A029M414).*

A standalone application is when the GenSet is not paralleled to any other GenSets. The GenSet can be operated in **Manual** and **Auto** mode in a standalone application. When in **Manual** mode, the operator manually controls the main breaker operation. When in **Auto** mode, the GenSet control automatically controls the breaker operation.

The control system is used to start and stop the GenSet from the operator panel in either **Manual** or **Auto** mode. It monitors the engine for temperature, oil pressure, and speed, and provides voltage and current metering. In the event of a fault, the control indicates the fault type on the display screen and automatically shuts down the GenSet on critical faults. The standard control system operates on DC battery power. The history data is stored in non-volatile memory and is not deleted if battery power is lost. For detailed control panel procedures, refer to the control manual that shipped with the GenSet.

The GenSet can be started or stopped using **Manual** or **Auto** mode. In **Auto** mode the GenSet is remotely started and stopped using the remote start input on the control panel. In **Manual** mode the operator uses buttons on the HMI to start and stop the GenSet. All indicators, control switches/buttons, and graphical display are located on the face of the operator panel and LEDs are provided on the operator panel to indicate the operating mode of the GenSet.

In **Auto** mode, the PCC 3.3 control receives a breaker close signal when synchronization has been achieved, and signals the main breaker to close. In **Manual** mode, the main breaker is closed to connect the GenSet to the busbars by using the breaker **Close** button. The PCC 3.3 control performs a synchronization check in both **Manual** and **Auto** modes before allowing the GenSet circuit breaker to close.

Once the GenSet has achieved nominal voltage and frequency, the set is ready to be paralleled with the busbar supply. Each GenSet is paralleled completely independently of any others by a separate PCC control. The PCC 3.3 control unit monitors both the incoming supply and the busbar voltage and frequency. It adjusts the incoming supply to match the busbar supply over a wide span of busbar parameters. Synchronization is achieved under full control and at the correct phase coincidence.

When in parallel with the busbar supply, the GenSet voltage and frequency are dependent upon the busbar parameters and the control is changed to kW and kVAR load management. Apart from the protection systems, there is no common coupling between GenSets. This allows for any set (or its relevant controls) to be under maintenance without affecting the others. When the control system detects that the GenSet is up to speed and voltage, the load ramps from the mains to the GenSet. The engine governor control system keeps the electrical output within the correct parameters.

A line circuit breaker is mounted in the GenSet PCC Operator Panel. The output leads of the circuit breaker are connected to the distribution panel, which consists of cam locks and bus bars for the load connections. If the load exceeds the circuit breaker current rating, the line circuit breaker opens, preventing the GenSet from being overloaded. If the circuit breaker trips, locate the source of the overload and correct, as necessary. Manually reset the breaker to reconnect the load to the GenSet.

When operating the GenSet in **Manual** mode, the circuit breaker is closed manually and can also be opened manually by using the circuit breaker buttons on the Operator Panel. During fault conditions (overload or short circuit), the circuit breaker opens automatically. Once the faulty condition is cleared, the circuit breaker may be closed manually.

When operating the GenSet in **Auto** mode, the circuit breaker is only operated automatically, as the controller takes charge of opening and closing the circuit breaker. If fault conditions appear (overload or short circuit), the circuit breaker opens automatically.

NOTE: *The circuit breaker does not close if the **Run/Idle** switch is in the idle position, if the AC distribution panel door is open, or if the Bus rotation is not clock-wise "A,B,C". A 5 amp 120VAC charger is required for sites with a utility or master AC Bus.*

In **Manual** mode, the circuit breaker(s) is manually controlled by the GenSet operator. In **Auto** mode, the circuit breaker(s) is automatically controlled (opened and closed) by the GenSet control.

While paralleling, the PowerCommand 3.3 control monitors voltage at the bus bar and cam lock connection on the main AC distribution panel. Synchronization of the connected GenSets is fully controlled by the PowerCommand control. The control automatically adjusts frequency (engine rpm), voltage, and phase rotation to match the other connected GenSets prior to closing the circuit breaker to the bus.

NOTE: *Paralleling can be performed in auto or manual mode.*

6.2 Safety

To ensure maximum performance and reliability from your GenSet, it is essential that certain components are inspected periodically and, where necessary, maintenance procedures are carried out.

Before starting the GenSet, check to make sure that all electrical connections are secure, and that all wiring is complete. Re-install and secure any access panels that have been removed during installation. Check that the load cables from the GenSet are properly connected.

Numerous safety devices may be available - such as air intake shutoff devices - to minimize the risk of over-speeding in which an engine, because of the application, might operate in a combustible environment (from a fuel spill or gas leak, for example). Cummins does not know how the engine will be used. The equipment owner and operator, therefore, is responsible for safe operation in a hostile environment. Consult your authorized distributor for further information.



Engine over speeding can cause component failure, fire, or an explosion which can cause severe personal injury or death. Do not operate an engine where there are or can be combustible vapors.

NOTE: *Cummins recommends the installation of an air intake shutoff device or a similar safety device to minimize the risk of over-speeding where an engine will be operated in a combustible environment.*

IMPORTANT: *Long periods of idling (more than ten minutes) can damage an engine. Do not idle the engine for excessively long periods.*



Inhalation of exhaust gases can cause asphyxiation and death. Exhaust pipes should be faced away from enclosed or sheltered areas, windows, doors, and vents. Do not use exhaust heat to warm a room, compartment, or storage area.





Contact with high voltages can cause severe electrical shock, burns, or death. Do not open the GenSet output box while the GenSet is running. Read and observe all warnings and cautions in the GenSet manuals. Make sure that only suitably trained and experienced service personnel perform electrical and/or mechanical service. Even with the power removed, improper handling of components can cause electrostatic discharge.

Only trained and experienced personnel should carry out GenSet operations. Before operating the system, the operator should become familiar with all health and safety procedures, warnings, cautions, precautions, and documentation supplied with the GenSet. (see [Section 1 - Safety](#)). Observe all the warnings and cautions at all times.

Before operating the GenSet become familiar with the equipment and how it is operated (including all controls, manually operated valves, and alarm devices). Safe and efficient operation can only be achieved if the GenSet is operated correctly.

Become familiar with the **Emergency Stop** button for emergency shutdown of the GenSet. The **Emergency Stop** button stops the GenSet immediately and prevents starting of the GenSet from any location (local or remote). It is imperative that the operator read [6.6.3 Emergency stopping](#).

6.3 Operating recommendations

This GenSet shall only be used in STATIONARY applications - emergency standby and non-emergency demand response up to 500 hours per year. Refer to the C1000N6B-C1300N6 specification sheet in [Section 9 - C1000N6B and C1300N6 specifications](#)

6.3.1 Exercising the GenSet

Regular exercising keeps engine parts lubricated, prevents oxidation of electrical contacts, and in general helps provide reliable engine starting. If GenSet use is infrequent, exercise the GenSet for a minimum of one hour once a month with a minimum load of half-rated power to ensure the engine reaches normal operating temperatures.

6.3.2 Loading the GenSet

When operating the GenSet under unique operating conditions, precautions may need to be taken to help ensure GenSet performance and reliability:

- When operating the GenSet in ambient temperatures below -20 °F (-29 °C), it should be operated with greater than 10% of rated load to ensure proper GenSet performance.
- When operating the GenSet for extended periods of time at loads less than 5% of rated load, it should periodically be loaded for 1-2 hours at greater than 35% of rated load to help ensure GenSet performance.

The engine should not be operated at an idle no load condition for prolonged periods (more than 15 minutes) of time. This can result in the following:

- fuel dilution of the lubricating oil;
- carbon buildup in the cylinder;
- cylinder head valve sticking; and/or
- reduced engine performance.



When operating the GenSet under unique operating conditions, precautions may need to be taken to help ensure GenSet performance and reliability.

IMPORTANT: *Failure to follow published guidelines may result in undesired engine performance unwarranted claims.*

6.3.3 Operating the GenSet at low temperatures

Engines can be difficult to start and operate in ambient temperatures below 32 °F (0 °C). Under low temperature conditions, incomplete combustion will occur, allowing deposits of unburned tars and carbon to buildup on the valve guides and valves and eventually cause valve sticking. To ensure proper starting, operation, and reliability in cold climates, the C1000N6B and C13000N6 GenSets are equipped with a circulating oil heater and a coolant heater (the voltage is selected at the time of the order). These heaters must be wired to power on-site, per the applicable wiring code, to ensure their proper function and the GenSet performance. Although most Cummins GenSets will start in temperatures down to -25 °F (-32 °C) when equipped with heaters, it might take more than ten seconds for the engine to start and accept full load.

A **Low Coolant Temp (code 1435)** message, in conjunction with illumination of the **Warning LED**, will advise the operator of a possible delay in accepting the load. The engine cold sensing logic initiates a warning when the engine water jacket coolant temperature falls below 70 °F (21 °C). In applications where the ambient temperature falls below 40 °F (4 °C), a cold engine may be indicated even though the coolant heaters are connected and functioning correctly. Under these conditions, although the GenSet may start, it may not be able to accept the load within ten seconds. When this condition occurs, check the coolant heaters for correct operation. If the coolant heaters are operating correctly, other precautions may be necessary to warm the engine before applying a load.

In cold climates, it is critical that the following items be appropriately maintained and selected based on ambient operating temperatures:

- the battery is properly sized
- an appropriate mixture of antifreeze is used in the cooling system
- the correct weight of engine oil is being used
- the GenSet engine comes equipped with an engine coolant heater and/or an engine breather heater to help ensure proper operation in cooler climates

As the operating climate becomes colder, an increasing amount of cold weather aids are required for satisfactory performance. Depending on the specific operating conditions some or all of the below items may be required to help ensure proper GenSet starting, operation, and reliability:

- optional battery heaters
- GenSet cooling air inlet and outlet louvers

Contact your local distributor for additional information and guidance on selecting the proper cold weather starting and operating aids for your specific operating conditions.



Do not use ether as a cold-start aid. Using ether could result in damage and/or personal injury.

6.3.4 Operating the GenSet at high temperatures

In high ambient temperatures, when operating at full load, it is normal for the high coolant temperature warning to be given. This indicates that the engine is operating near to its maximum capacity. If operation in high temperature environments is anticipated, increase the frequency of checks for cooling air inlet and outlet obstructions, correct coolant level, and that the radiator is free of debris. Also make sure the appropriate engine oil viscosity is used for the ambient temperatures.

6.4 Operator pre-start checks

IMPORTANT: *Electric arc flash can cause electrical shock, severe burns, or death. Make sure the alternator is dry before the GenSet is operated.*

The GenSet may be operated manually using the GenSet Operator Panel (HMI) buttons or automatically using a remote start signal. Access and operation of the GenSet must be restricted to qualified service personnel who have been instructed of the reasons for the restrictions applied to the location of the GenSet and any precautions that must be taken. Access and operation of the GenSet must be governed by the use of a special tool, or lock and key, or other means of security that is monitored by the authority responsible for that location.

Before attempting to start the GenSet, the operator should read through this entire manual and the specific engine manual. It is essential that the operator be completely familiar with the GenSet and the PCC Control.

CAUTION

Make sure that all pre-start checks are carried out before starting the GenSet. Do not attempt to start the GenSet until it is safe to do so. Cummins recommends regular inspections and cleaning of discharge hoods. Snow buildup on or around the GenSet and other obstructions can cause GenSet failure and possible damage to the equipment. Warn all others in the vicinity that the GenSet is about to start.

LEDs are provided on the Operator Panel to indicate the operating (**Manual** or **Auto**) mode of the GenSet. Authorized personnel must decide whether to choose Manual or Auto mode during the GenSet initial setup. If the GenSet requires an access password for operation, the **Mode Change Access Code** display screen will appear. This access password permission can only be granted or denied by the authorized personnel during operation of the GenSet.

DANGER

Contacting high voltage components can cause severe personal injury or death by electrocution. Do not open the control output box while the GenSet is running. Read and observe all warning and cautions in your manuals.

WARNING

Only technically-qualified personnel should open the control housing. Voltages are present which can cause electrical shock, resulting in personal injury. Even with the power removed, improper handling of components can cause electrostatic discharge and damage circuit board components.

6.5 Starting the GenSet

The PCC control is the interface to starting and stopping the engine. The PCC sends a signal to the ECM to physically activate the starter. During starting, automatic checks are carried out for the integrity of various protection systems. Neither the PCC nor the ECM will allow the GenSet to continue the starting sequence if the integrity of a sensor critical to the proper GenSet operation is considered to be in doubt. If the engine does not start on the first attempt, the system will go through three start cycles composed of fifteen seconds of cranking and fifteen seconds of rest.

If the ECM shuts down the engine, it will send a signal to the PCC which will display **ENGINE WARNING** (fault code **1311**). Each digit of the three digit numerical fault code will be displayed as flashes. There will be a brief pause between digits and a longer pause before the repetition. Refer to the PCC 3300 manual or the engine manual for information on troubleshooting fault codes. See [2.2 Related literature](#).

The following sub-sections cover the procedures used to start and stop the GenSet. Before starting the GenSet, make sure that the proper maintenance and pre-start checks have been performed.

 CAUTION

One operator should be in complete charge, or working under the direction of someone who is in complete charge. Remember that, upon starting the GenSet, cables and switchgear will become energized, possibly for the first time. Furthermore, equipment that does not form part of the GenSet installation may become electronically charged. Only authorized and competent personnel should carry out this work.

 CAUTION

When changing modes, the GenSet may start or stop without warning. Make sure there is no danger to personnel or equipment should the GenSet unexpectedly start or stop when changing modes.

IMPORTANT: Do not perform a hot shutdown under load; a hot shutdown may result in engine damage.

6.5.1 Starting from the operator panel (manual mode)

As shown in [Figure 6-1](#), to start the GenSet in **Manual Run** mode:

1. Press the **Manual** button on the Operator Panel.
2. Then press the **Start** button within ten seconds. (Failure to press the **Start** button within this time will result in the GenSet changing to the **Off** mode.)

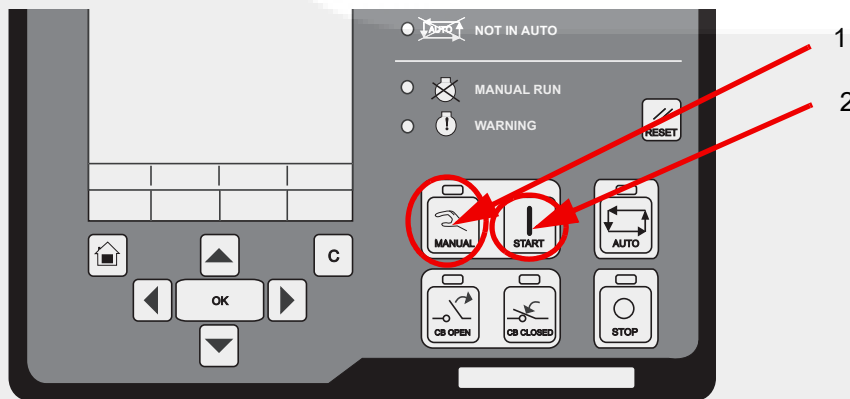


Figure 6-1 PCC 3300 HMI operator panel - MANUAL and START

The PCC will initiate a starter cranking signal and will perform an automatically sequenced manual start under a complete engine protection system combined with full monitoring capability. This will activate the engine control system and the starting procedure. The starter will begin cranking, and after a few seconds the engine will start and the starter will disconnect.

IMPORTANT: *If the engine does not start, the starter disengages after a specified period of time and the controller indicates a **Fail to Start** shutdown fault. See [8.6 Fault codes](#).*

6.5.2 Starting from a remote location (auto mode)

The GenSet is capable of being remotely started while in Auto mode. This can be done through the use of a remote start switch, transfer switch, or other device. While in **Auto** mode, the GenSet control monitors the status of the remote start contacts on the GenSet control panel.

Once the control senses continuity (closed contacts) on the remote start contacts, the control automatically starts the GenSet and closes the breaker at the appropriate time.

Once the remote start signal is removed (open contacts), the control automatically opens the main circuit breaker and shuts down the GenSet.

IMPORTANT: *Do not apply voltage to the remote start contacts. GenSet control system damage will occur.*

IMPORTANT: *The GenSet does not shutdown immediately when the remote start signal is removed. It enters a delay-to-stop countdown timer along with entering a cool down cycle, when applicable.*



Should a remote start signal be received, the GenSet starts automatically. Make sure there is no danger to personnel or equipment should the GenSet start without warning.

The starting/stopping sequence for a remote start is as follows:

1. Ensure that the GenSet is in **Auto** mode at the GenSet operator panel.

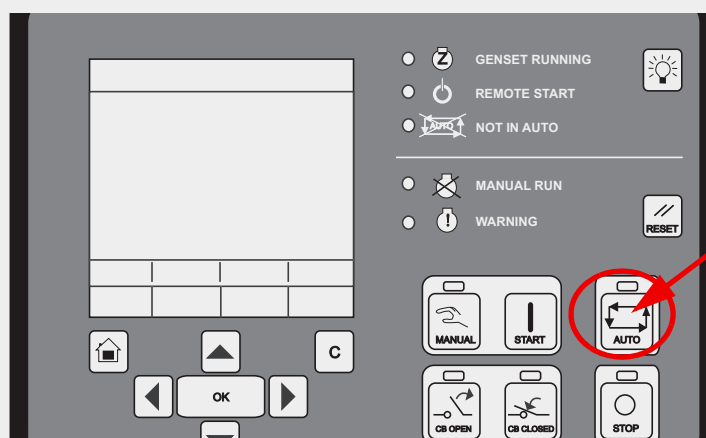


Figure 6-2 PCC 3300 HMI operator panel - AUTO

2. After receiving a remote start signal - from a transfer switch, a remote start switch, etc. - the PCC initiates the start sequence. In response to the remote start, the PCC shows the **Remote Start** indicator LED (shown in [Figure 6-3](#)) and initiates the starting sequence. This start incorporates a **Time Delay to Start** function.

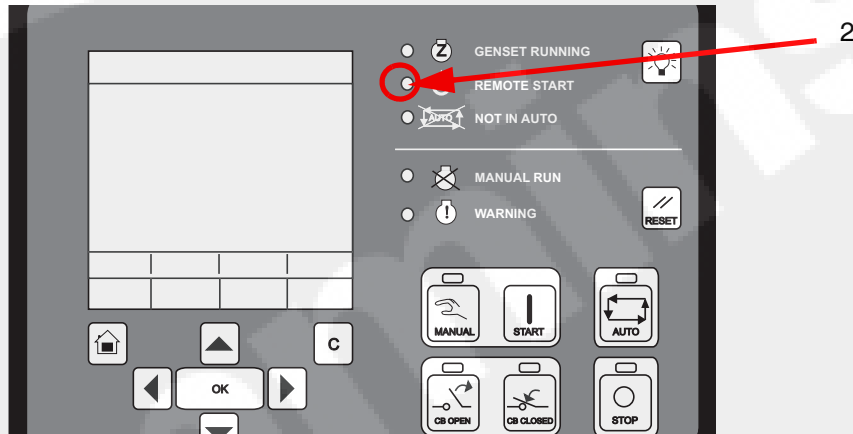


Figure 6-3 PCC 3300 HMI operator panel - REMOTE START LED

3. The **Time Delay to Start** (0-300 seconds) begins.
4. When the **Time Delay to Start** has expired, the engine starts. After the engine has started and reached rated speed, the GenSet circuit breaker automatically closes, allowing the GenSet to power any connected loads.
5. When the remote start signal is removed, a **Time Delay to Stop** (0-600 seconds) begins. This time delay is used to transfer the load (if connected to another power source) and let the engine cool down.
6. When the **Time Delay to Stop** has expired, the engine stops.

NOTE: The **Time Delay to Start** and **Time Delay to Stop** is configurable in the **Advanced Genset Setup** menu. The **Advanced Set Up** menu is intended for qualified and trained service technicians only. Adjustments made within this menu will affect GenSet performance and operation, in some cases negatively. Under most operational conditions there is no need to make any adjustments within this menu. Contact your authorized distributor for assistance.

IMPORTANT: If the engine does not start, the starter disengages after a specified period of time and the controller indicates a **Fail to Start** shutdown fault. See [8.6 Fault codes](#).

6.6 Stopping the GenSet

Halting the GenSet operation can be done manually from the Operator Panel, automatically from a remote location, or immediately from the Operator Panel using the **Emergency Stop** button.

IMPORTANT: It is imperative to properly shut down the GenSet in order to achieve life-safety starting capabilities on the next start attempt. Use of the **Emergency Stop** button does not allow for proper cooldown (where the lubricating oil and engine coolant carry the heat away from the engine combustion chamber and bearings) of the GenSet in a safe manner. Make sure the cause of the emergency stop is fully investigated and remedied before resetting the fault(s) and restarting the GenSet.

If the GenSet is stopped via the **Emergency Stop** button or while a fault is present, it is imperative that the operator:

1. Reset the **Emergency Stop** button(s);
2. Restart the GenSet;
3. Clear the fault; and
4. Shut down the GenSet (without using the **Emergency Stop** button).

IMPORTANT: Be sure to run the GenSet at no load for three to five minutes before stopping. This allows the lubricating oil and engine coolant to carry heat away from the combustion chamber and bearings.

6.6.1 Switching to off from manual mode of operation

To stop operation of the GenSet when it has been running in **Manual** mode:

1. Remove the load.
2. On the Operator Panel, press the **Stop** button once to put the GenSet into a cool down run. The Operator Panel will display the cool down timer.

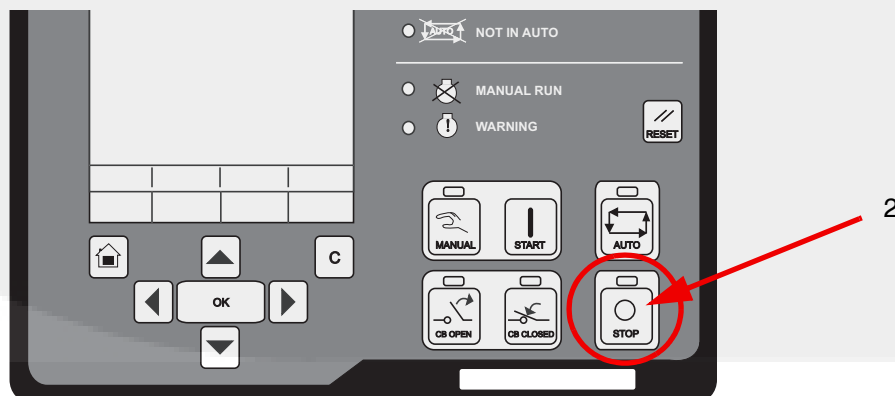


Figure 6-4 PCC 3300 HMI operator panel - STOP

- When the cool down timer expires, the GenSet will then shut off and enter the **Off** mode.

NOTE: Pressing the **Stop** button twice will stop the GenSet immediately - without a cool down run - and the GenSet will immediately enter the **Off** mode. If possible, hot shutdown under load should be avoided to help prolong the reliability of the GenSet. A hot shutdown may result in a **Hot Shutdown Warning**.

6.6.2 Switching to off from auto mode of operation

To **manually** stop operation of the GenSet when it has been running in **Auto** mode:

- Remove the load.
- On the Operator Panel, press the **Stop** button once *at the GenSet* to stop the GenSet immediately (without a cool down run).

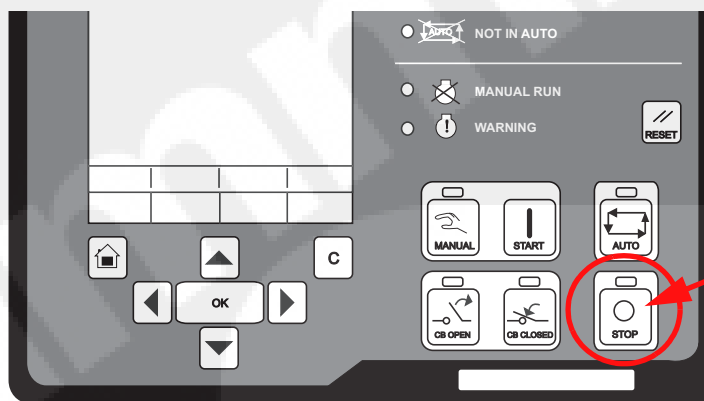


Figure 6-5 PCC 3300 HMI operator panel - STOP

- The GenSet will then enter the **Off** mode.
- If possible, re-start the GenSet in **Manual** mode with the circuit breaker open, and then follow the **Manual** mode procedures to stop the GenSet to allow for the cool down run.

To **remotely** stop operation of the GenSet when it has been running in **Auto** mode:

- Remove the load.
- Open the main circuit breaker.
- Turn off the remote start signal. Once the remote start signal has been turned off, the GenSet starts its shutdown sequence: **Time Delay to Stop** function (zero to 600 seconds) and **Cool down at Idle** (zero to ten minutes, or longer, if necessary to obtain normal operating temperatures prior to shutdown).

NOTE: The GenSet remains in **Auto** mode and can be restarted by a remote start signal unless the **Stop** button on the Operator Panel is pressed. The GenSet will then enter the **Off** mode.



When Masterless Load Demand (MLD) is enabled, stopping a GenSet may cause one or more stopped GenSets to start.

6.6.3 Emergency stopping

The *local* **Emergency Stop** button is located near the rear of the GenSet, in close proximity to the Operator Panel. If the GenSet is equipped with a *remote* **Emergency Stop** button, it will be located in an enclosed box either on the GenSet enclosure or in a remote control room. Either **Emergency Stop** button can be used to unconditionally stop the engine when pressed, bypassing any time delay to stop. Push this button **IN** for emergency shutdown of the engine.

IMPORTANT: *It is imperative to properly shut down the GenSet in order to achieve life-safety starting capabilities on the next start attempt. Use of the **Emergency Stop** button does not allow for proper cooldown (where the lubricating oil and engine coolant carry the heat away from the engine combustion chamber and bearings) of the GenSet in a safe manner. Make sure the cause of the emergency stop is fully investigated and remedied before resetting the fault(s) and restarting the GenSet.*

*If the GenSet is stopped via the **Emergency Stop** button or while a fault is present, it is imperative that the operator:*

- 1. Reset the **Emergency Stop** button(s);*
- 2. Restart the GenSet;*
- 3. Clear the fault; and*
- 4. Shut down the GenSet (without using the **Emergency Stop** button).*

IMPORTANT: *Do not use an **Emergency Stop** button to shut down an engine unless a serious fault develops.*

NOTE: *Use of an **Emergency Stop** button to shut down the engine may result in some loss of Electronic Control Module (ECM) data.*

NOTE: *If the engine is not running, an activated **Emergency Stop** button will prevent the starting of the engine, regardless of which **Emergency Stop** button is pressed.*



6.6.4 Stopping the GenSet at the GenSet

To activate the **Emergency Stop** button on the GenSet, press the large red knob located near the Operator Panel (shown in Figure 6-6).

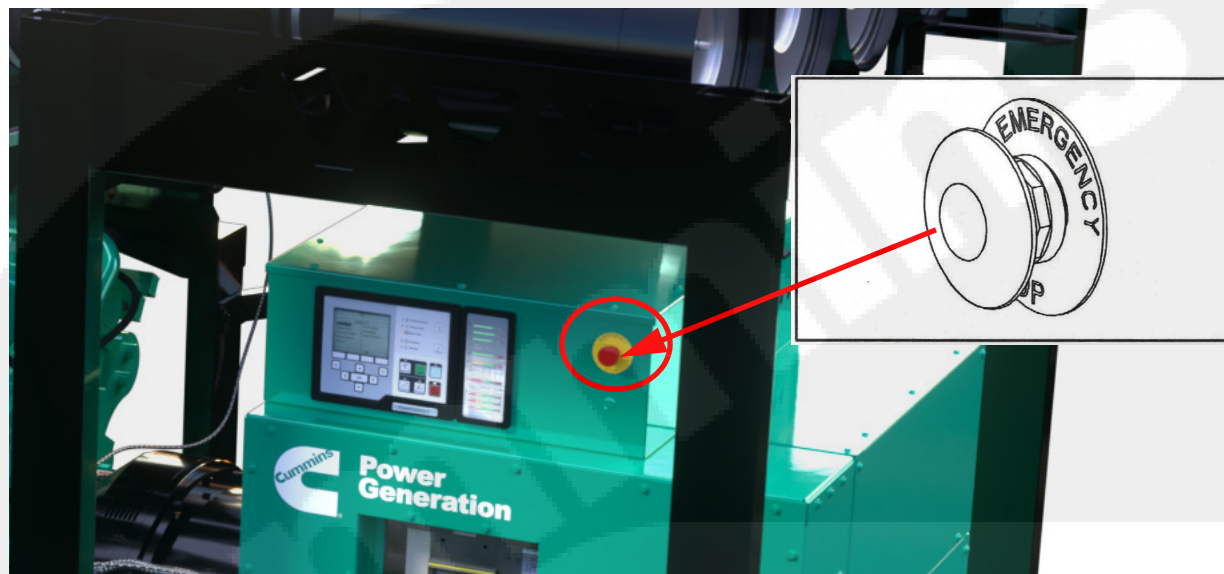


Figure 6-6 Emergency Stop button on the control panel

When the **Emergency Stop** button is pressed at the Operator Panel, the Operator Panel display will illuminate red at the **Warning** LED and fault code **1433 LOCAL EMERGENCY STOP** will appear on the graphical LCD display.

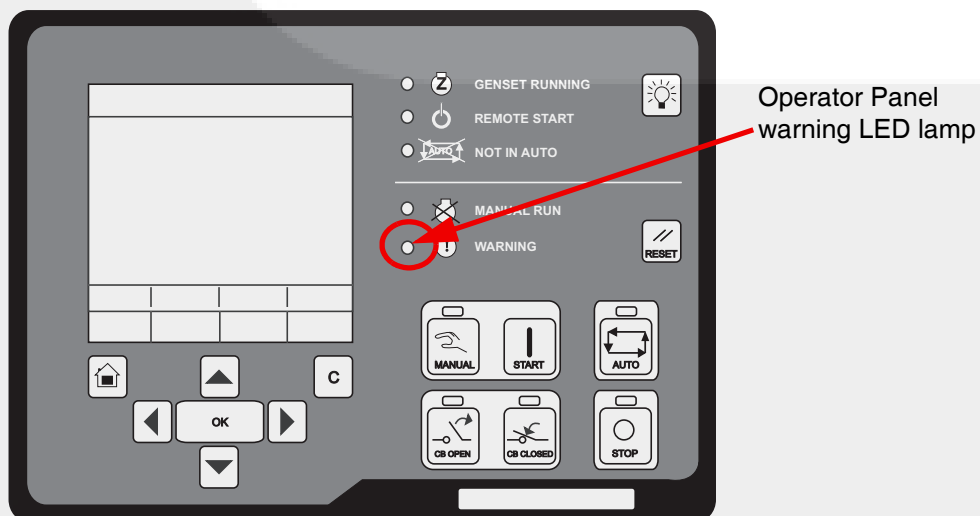


Figure 6-7 PCC 3300 HMI Operator Panel - WARNING LED lamp

6.6.5 Stopping the GenSet using the optional secondary Emergency Stop button

Alternately, the GenSet can be immediately stopped from a secondary **Emergency Stop** button. To activate the secondary **Emergency Stop** button, break open the secondary **Emergency Stop** enclosure (shown in [Figure 6-8](#)) and press the large red knob.

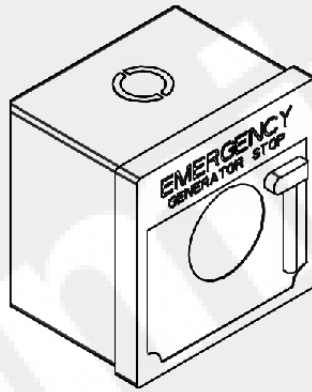


Figure 6-8 Optional secondary Emergency Stop button

6.6.6 Resetting the GenSet after an emergency stop

IMPORTANT: Make sure the remote start control is not active or, when the **Emergency Stop** button is reset, the GenSet could start running.

After an emergency stop, reset the **Emergency Stop** and press the **RESET** button on the GenSet Operator Panel or the remote HMI Operator Panel.

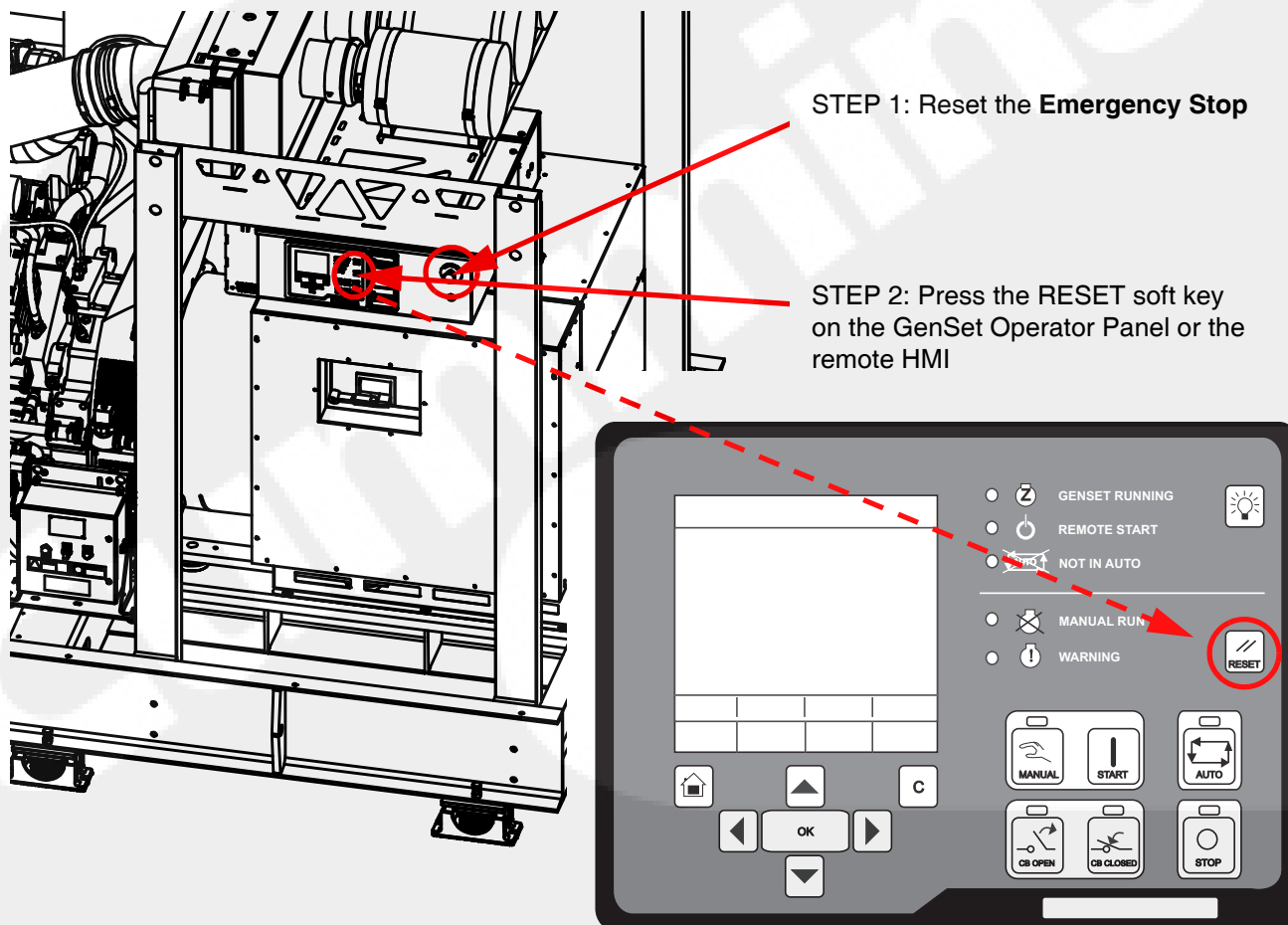


Figure 6-9 Operator Panel RESET soft key

7 - Maintenance

7.1 Introduction

The engine and generator set (GenSet) are to be operated in accordance with all manufacturer's guidelines and recommendations. The following sections outline the steps and guidelines for general inspections and maintenance repairs.

All maintenance tasks must be assessed for health and safety risks and the preventative measures identified must be actioned. Accompaniment is required for tasks where the presence of someone else will add significantly to the safety of the task. Read, understand, and comply with all Caution, Warning, and Danger notes in this manual. Ensure adequate lighting and staging (where required) are installed.

Make sure the cause of an emergency stop is fully investigated and remedied before resetting the fault(s) and restarting the GenSet.

Cummins highly recommends that any service or maintenance work be performed by qualified technicians. All warranty work must be completed by an authorized Cummins distributor. For additional engine maintenance information that is not contained in this manual, see the engine Operation and Maintenance Manual or the engine Owners Manual.

7.1.1 Locking the GenSet out for maintenance - accidental restart prevention

IMPORTANT: *Before any work is carried out for significant maintenance, the GenSet must be immobilized. If a GenSet is paralleled with others, all GenSets being paralleled must be immobilized before any work is performed on any one of them. Even if the GenSet(s) is put out of service by pressing the Stop button on the Operator Panel, the GenSet(s) cannot be considered safe to work on until the engine(s) is properly immobilized.*

To immobilize the engine:

1. Press the **Stop** button on the Operator Panel to shut down the GenSet.
2. Press the **Emergency Stop** button. This will prevent the GenSet from starting, regardless of the start signal source, and will provide an additional safety step for immobilizing the GenSet.

*When the **Emergency Stop** button is pressed, the Operator Panel will indicate the shutdown condition by illuminating the red **Warning** LED and displaying a message on the graphical display.*

3. Locate and close the manual shut-off valve upstream of the GenSet.
4. Disconnect all component heaters, as applicable, and the battery charger from the external power supply.



CAUTION

Disconnect battery charger from AC source before disconnecting battery cables. Otherwise, disconnecting cables can result in voltage spikes which are damaging to DC control circuits of the GenSet.

5. Disconnect the starting batteries. Disconnect the negative (-) cable first, using an insulated wrench.

 WARNING

Accidental starting of the GenSet can cause severe personal injury or death. Prevent accidental starting by disconnecting the negative (-) cable from the battery terminal.

6. Lock the cables (with a padlock) to prevent reconnection during maintenance.
7. Place warning notice - "GenSet immobilized for safe working conditions" - at the Operator Panel to indicate that maintenance is in progress.

 DANGER

Failure to properly immobilize all connected GenSets in a paralleling application before working on any one of them could cause severe personal injury. Never work on one paralleled GenSet without first immobilizing all connected GenSets.

 DANGER

Contacting high voltage components can cause electrocution, resulting in severe personal injury or death. Keep the output box covers in place during troubleshooting.

 WARNING

Lead-acid batteries present a risk of fire because they generate hydrogen gas. Ignition of explosive battery gases can cause severe personal injury or death. Arcing at battery terminals, light switches, or other equipment, flame, pilot lights and sparks can ignite battery gas. Do not smoke or switch trouble light ON or OFF near battery. Discharge static electricity from body before touching batteries by first touching a grounded metal surface.

 WARNING

Ventilate battery area before working on or near battery. Wear goggles. Stop the GenSet and disconnect the battery charger before disconnecting the battery cables. Disconnect the negative (-) cable first and reconnect last.

7.1.2 Reconnecting the GenSet after maintenance activities

To reconnect the GenSet after periodic maintenance:

1. Unlock the padlock securing the cables.
2. Connect the starting batteries. Connect the positive (+) cable first, using an insulated wrench.
3. Connect all component heaters, as applicable, and the battery charger to the external power supply.
4. Locate and open the manual shut-off valve upstream of the GenSet.
5. Pull out the **Emergency Stop** button.
6. Remove the warning notice - "GenSet immobilized for safe working conditions" - and store the sign for future use.

7.1.3 GenSet compliance

Owner/Operator unit engine certification must be monitored and documented to remain in compliance with NFPA and the Environmental Protection Agency (EPA). Refer to NFPA 110 Standard for Emergency and Standby Power Systems. Reference to the EPA Spark-Ignited (SI) New Source Performance Standards (NSPS) final ruling can be found under Title 40 Code of Federal Regulation (CFR) 60.4243.

For complete information, the owner/operator should review the entire NFPA 110 and CFR 60.4243.

7.2 Recommended maintenance schedule

It is recommended that an annual maintenance check be performed by a qualified Service Center. The GenSet should be maintained according to the maintenance schedules outlined in this Maintenance Section. Perform maintenance tasks as specified using hourly or daily periods - whichever occurs first. Use the engine hours shown on the system status screen to keep an accurate log of all service performed for warranty support.

Some maintenance procedures require special tools or must be completed by qualified personnel. Contact your local Cummins Authorized Repair Location for detailed information. For additional information on engine-specific maintenance procedures, reference the engine operation and maintenance manual or the engine owners manual.

If the GenSet will be subjected to any extreme operating conditions, consult with your local Authorized Cummins Distributor and determine a suitable schedule of maintenance. The time between service intervals should be reduced accordingly. Some of the factors that can affect the maintenance schedule include:

- Extremes in ambient temperatures (below 0 °F (18 °C) or above 100 °F (38 °C))
- Exposure to weather
- Exposure to salt water
- Exposure to dust, sand, or other airborne contaminants

To reduce the chance of a GenSet shutdown, regularly perform the following maintenance tasks:

- Maintain an appropriate oil level.
- Keep the battery connections clean and tight.
- Ensure that the air inlet and outlet openings are clear.
- Avoid overloading the GenSet.

IMPORTANT: *Repair or replace worn, damaged, or improperly functioning components identified during periodic maintenance procedures.*

IMPORTANT: *Perform maintenance tasks as specified using the period of operation that occurs first.*



7.2.1 Routine maintenance activity - monthly

Monthly maintenance item <i>regardless of running time hours</i>		Refer to this section of this manual:
Prior to starting the GenSet:		
	Check the engine oil level	7.5.1.1
	Check the coolant hoses and clamps	7.5.2
	Check the coolant level at JW and LTA radiators	7.5.2.1
	Check the coolant level at intake air warmer, if installed	7.5.2.2
	Inspect the radiator core	7.5.3.1
	Inspect the radiator fan blades	7.5.3.3
	Inspect the JW and LTA radiator hoses	7.5.3.4
	Adjust the alternator belt	7.5.5.1
	Adjust the radiator fan belt	7.5.5.3
	Verify that the coolant heater has power and is running.	7.5.7
	Verify that the lube oil heater has power and is running.	7.5.8
	Check the GenSet enclosure, if applicable	7.5.10
During the operation of the GenSet:		
	Inspect the engine	7.4.1
	Check the air cleaner service indicator	7.4.2
	Check all exhaust components	7.4.3
	Check for oil leaks	7.4.4
	Check the fuel lines and hoses	7.4.5
	Check for coolant leaks	7.4.6
	Check the operation of the Operator Panel	7.4.7

7.2.2 Routine maintenance activity at every 250 hours of running time**IMPORTANT:** *Check the emissions at 250 running hours and then at every 750 running hours thereafter.*

Maintenance item at each increment of 250 running time hours, <i>regardless of calendar period</i>	Refer to the engine manual. If you do not have access to the engine manual, contact your local Cummins distributor. See 2.2 Related literature .
Measure the valve stem	X
Adjust the overhead set (use the outer base circle (OBC) method)	X
Test the emissions at the first 250 running time hours and then each increment of 750 hours, thereafter.	X

7.2.3 Routine maintenance activity - annually, every two years, or at increment of running time

Maintenance period: each calendar year increment OR each running time hour increment, <i>whichever comes first</i>		Maintenance item	Refer to this section of this manual:	Refer to the engine manual. If you do not have access to the engine manual, contact your local Cummins distributor. See 2.2 Related literature .
Calendar period	Running hours			
1 year	250	Adjust the alternator belt tension	7.5.5.1	
	250	Adjust the radiator fan belt tension	7.5.5.3	
	250	Inspect and grease the fan shaft bearings	7.5.6	
	375	Change the engine oil and oil filter	7.5.1.2	
	500	Replace the alternator belt	7.5.5.2	
	500	Replace the radiator fan belt	7.5.5.4	
	750	Check the batteries	7.5.6	
	750	Clean the fuel strainer	7.4.5	
	750	Check the overhead set (OBC)		X
	750	Inspect the coil-on-plug and replace the rubber boot		X
	750	Test the emissions*		X
2 years	N/A	Inspect the GenSet coolant heater	7.5.7	
		Inspect the GenSet lube oil heater	7.5.8	
		Grease the alternator bearings		X
	750	Replace the spark plugs		X
	N/A	Replace the air cleaner filters	7.5.2.7	

*Check the emissions at 250 running hours and then at every 750 running hours thereafter regardless of the calendar year.

7.2.4 Routine maintenance activity - at extended running time

The following table outlines suggested maintenance activities and intervals for this GenSet. After 6000 running hours, consult the engine manual.

Running hours	Maintenance item	Refer to this section of this manual:	Refer to the engine manual. If you do not have access to the engine manual, contact your local Cummins distributor. See 2.2 Related literature .
1500	Check the crankcase breather tube		X
	Check the engine electrical connections		X
	Check the turbocharger coolant hoses		X
	Check the turbocharger oil drain and oil supply lines		X
	Measure the valve stem		X
	Check the Selective Catalyst Additive (SCA)		X
	Change the coolant filters		X
3000	Check the cam follower assembly		X
	Check the camshaft		X
	Check the engine mounts		X
	Check the fuel line seals		X
	Check the gear cover trunnion sleeve		X
4500	Replace the throttle body driver module isolation grommets		X
	Clean the engine		X
	Check the aftercooler		X
	Measure the turbocharger axial clearance		X
	Measure the turbocharger radial bearing clearance		X
6000	Replace the coil-on-plug extension		X
	Drain and flush the JW and LTA radiator coolant and the intake air warmer coolant, if installed	7.5.2.6	
	Replace the engine cylinder head		X
	Measure the front gear train backlash		X
	Replace the LTA water pump		X
	Check the push rods or tubes		X
	Check the rocker lever assembly		X
	Replace the JW water pump		X

7.3 Maintenance records

Cummins strongly recommends that the owner/operator keep detailed records of all GenSet maintenance activity. Accurate maintenance logs will aid Cummins service technicians with troubleshooting GenSet performance and/or operation issues.

[illegible]

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November 2022

7.4 Maintenance while in operation

The engine must be maintained in good mechanical condition if the operator is to obtain optimum satisfaction from its use. Running reports are necessary to enable programmed or emergency servicing to be carried out. Comparison and intelligent interpretation of the running report, together with a practical follow-up action will eliminate most failures and emergency repairs.

Preventative maintenance begins with day-to-day awareness of the condition of the GenSet. Look and listen for changes in engine performance, sound, or appearance that can indicate service or repair is needed. Check the GenSet mounting bolts for any signs of wear. The following sections cover several areas that should be frequently inspected for continued safe operation.

STAY ALERT!



Look!

Listen!

Assess!

Monitor fluid levels (engine oil, engine coolant and fuel), oil pressure, and coolant temperature frequently.

During operation, be alert for mechanical problems that could create unsafe or hazardous conditions:

- leaks
- loose or damaged parts
- worn or damaged belts
- any change in engine or GenSet appearance

IMPORTANT: *Components that have guards against inadvertent touching must be visually inspected only. Do not remove the guards to do the inspection.*



7.4.1 Engine inspection

Most engine problems give an early warning. Monitor fluid levels and oil pressure and coolant temperatures frequently. Look and listen for changes in engine performance, sound, or appearance that can indicate service or repair is needed:

- Misfire
- Significant vibration
- Unusual noises
- Sudden changes in engine operating temperatures or pressures
- Excessive exhaust smoke
- Low lubricating oil pressure
- Loss of (or low) power
- Abnormal engine coolant temperature
- Excessive use of coolant, fuel, or lubricating oil
- Any coolant, fuel, or lubricating oil leaks
- Unexplained frequency fluctuation

See your authorized Cummins distributor regarding the wiring harness and software required for performing engine diagnostics using a personal computer (laptop).

7.4.2 Air cleaner restriction indicator reading

As shown in [Figure 7-1](#), the GenSet has an air cleaner restriction indicator on the air transfer tube on the GenSet.

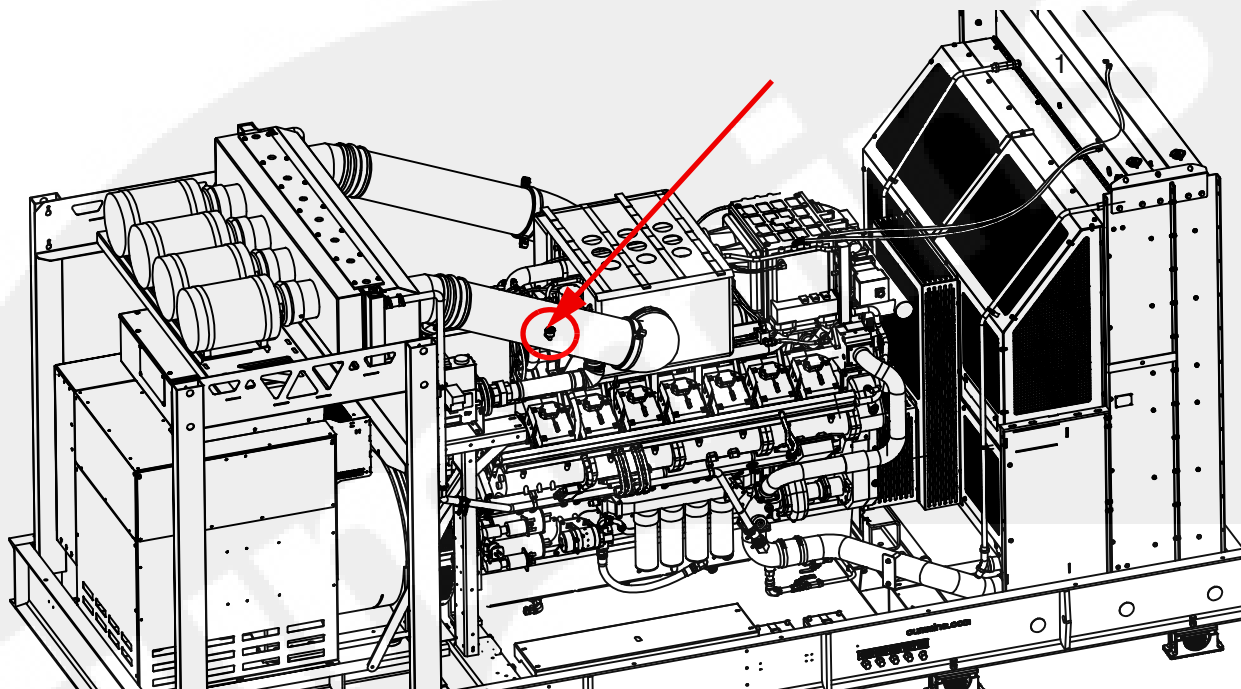


Figure 7-1 Air cleaner restriction indicator (shown on the right side of the GenSet)

Check the air cleaner restriction indicator. As shown in [Figure 7-2](#), when the GenSet air restriction reaches its maximum restriction, the red plunger inside the indicator will be visible in the window where "CHANGE FILTER" is shown. For maximum air restriction limits, see [9.3 C1000N6B data sheet](#) or [9.4 C1300N6 data sheet](#). To replace the air cleaner filter see [7.5.4 Air filter replacement](#).



Figure 7-2 Air cleaner restriction indicator maintenance identifier

7.4.3 Exhaust system inspection

Exhaust installations are subject to various detrimental conditions such as extreme heat, infrequent operation, and light loads. Visually and audibly, regularly inspect the exhaust manifold, exhaust pipe, and muffler without removing guarding and panels. Check for leaks at all connections, welds, gaskets and joints, and ensure that exhaust pipes are not heating surrounding areas excessively. If any leaks are detected, shut down the GenSet (if possible). Contact your authorized dealer and have the leaks corrected immediately.

WARNING

Moving parts can cause severe personal injury or death. Use extreme caution around moving parts.

DANGER

Engine exhaust may carry deadly carbon monoxide gas. Inhalation of exhaust gases can result in severe personal injury or death. Routinely check the exhaust system for leaks. Be sure deadly exhaust gas is piped outside and away from any windows, doors, vents or other inlets to building. Do not allow exhaust gases to accumulate in habitable areas.

WARNING

Exhaust components become very hot when the GenSet is in use and remain hot for a period of time after the GenSet has been shut down. These components can cause severe personal injury or death from contact. Allow these components to cool completely before performing any maintenance tasks.

7.4.4 Lubrication inspection

Look for any oil leaks along the lubrication lines, dipstick, and oil filter area.

7.4.5 Fuel system inspection

Inspect the fuel supply lines, filters, and fittings for leaks. Check any flexible sections for cuts, cracks, and abrasions and make sure they are not rubbing against anything that could cause breakage. If any fuel leaks are detected, shut down the GenSet, turn off the supply valves, and have any fuel leaks corrected immediately.

WARNING

Ignition of fuel can cause severe personal injury or death by fire or explosion. Do not permit any flame, cigarette, arcing switch or equipment, pilot light, or other igniter near the fuel system or in any areas sharing ventilation.

7.4.6 Cooling system inspection

Look for coolant leaks around the bottom of the GenSet and on the ground below. Minor leaks that can be replenished by daily additions of coolant to the recovery tank should be repaired by a qualified service technician as soon as possible. Larger leaks are cause for shutting down the GenSet until it can be repaired.

CAUTION

Operating the GenSet when coolant level is low can cause serious engine damage.

WARNING

Contact with the cooling system or the engine can result in serious burns. During GenSet maintenance activity, do not touch the engine or cooling system until they have cooled.

Check the operation of the coolant heater by verifying that hot coolant is being discharged from the outlet hose. **Do not touch the outlet hose.** If the heater is operational, radiant heat should be felt with a hand held close to outlet hose.

NOTE: The “**Engine Cold**” (Code 1435) message, in conjunction with illumination of the warning light, is provided to meet the requirements of NFPA 110. The engine cold sensing logic initiates a warning when the engine jacket water coolant temperature falls below 70 °F (21 °C). In applications where the ambient temperature falls below 40 °F (4 °C), a cold engine may be indicated even though the coolant heater is connected. Under these conditions, although the GenSet may start, it may not be able to accept load within ten seconds. When this condition occurs, check the coolant heater for proper operation. If the coolant heater is operating properly, other precautions may be necessary to warm the engine before applying a load.

NOTE: Fault code 123 may be indicating higher-than-expected engine coolant temperature. If overheating is suspected, measure the coolant temperature with a gauge while the engine is warming up. If the temperature exceeds 220 °F (104 °C), service the cooling system as necessary. If the temperature is not higher than expected but shutdown recurs, the coolant sensor may be faulty.

7.4.7 Operator panel inspection

It is important to regularly check to see that all aspects of the GenSet are receiving adequate electricity. Be sure to check the following values on the control panel:

- **Frequency/RPM:** The generator frequency should be stable under load and the reading should be the same as the GenSet nameplate rating.
- **AC voltmeter (Alternator menu):** At no load, the line-to-line or line-to-neutral voltage(s) should be the same as the GenSet nameplate rating.
- **AC ammeter (Alternator menu):** At no load, the current readings should be zero. With a load applied, each line current should be similar.
- **Lamp Test Button:** Press the **Lamp Test** button (the light bulb icon). All of the LED lamps should illuminate for five seconds to ensure that all warning indicators are working properly.

7.4.8 Remote operator panel inspection

It is important to regularly check to see that all aspects of the GenSet are receiving adequate electricity. Be sure to check the following values on the remote operator panel:

- **Frequency/RPM:** The generator frequency should be stable under load and the reading should be the same as the GenSet nameplate rating.
- **AC voltmeter (Alternator menu):** At no load, the line-to-line or line-to-neutral voltage(s) should be the same as the GenSet nameplate rating.
- **AC ammeter (Alternator menu):** At no load, the current readings should be zero. With a load applied, each line current should be similar.
- **Lamp Test Button:** Press the **Lamp Test** button (the light bulb icon). All of the LED lamps should illuminate for five seconds to ensure that all warning indicators are working properly.

7.4.9 Battery inspection

Check the terminals on the batteries for clean and tight connections. Loose or corroded connections create resistance which can hinder starting.

7.5 Maintenance while locked out for service

The following sections outline detailed instructions for periodic maintenance activities on the GenSet while the GenSet is **safely immobilized and locked out for service**.

IMPORTANT: Before any work is carried out for significant maintenance, the GenSet must be immobilized. If a GenSet is paralleled with others, all GenSets being paralleled must be immobilized before any work is performed on any one of them. Even if the GenSet(s) is put out of service by pressing the Stop button on the Operator Panel, the GenSet(s) cannot be considered safe to work on until the engine(s) is properly immobilized. [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

7.5.1 Lubrication system maintenance

The use of quality engine oils, combined with appropriate oil and filter change intervals, are critical factors in maintaining engine performance and durability. Extending the oil and filter change interval beyond the recommendations will decrease engine life due to factors such as corrosion, deposits, and wear. It is the responsibility of the operator to change the engine oil at the recommended interval.



Engine components (drains, filters, hoses, etc.) can be hot and cause severe burns, lacerations of the skin, and liquid splash. Use personal protective equipment when working with or around hazardous materials. Examples of personal protective equipment include (but are not limited to) safety glasses, protective gloves, hard hats, steel-toed boots, and protective clothing.



Crankcase pressure can blow hot engine oil out the fill opening causing severe burns. Always stop the GenSet before removing the oil fill cap.



State and federal agencies have determined that contact with used engine oil can cause cancer or reproductive toxicity. Avoid skin contact and breathing of vapors. Use rubber gloves.



Hot crankcase oil can cause burns if it is spilled or splashed on skin. Keep fingers and hands clear when removing the oil drain plug and wear protective clothing.

For the GenSet oil specifications, refer to [9.5 C1000N6B/C1300N6 oil specification](#). The GenSet lubrication system is shown in [Figure 7-3](#) and [Figure 7-4](#).

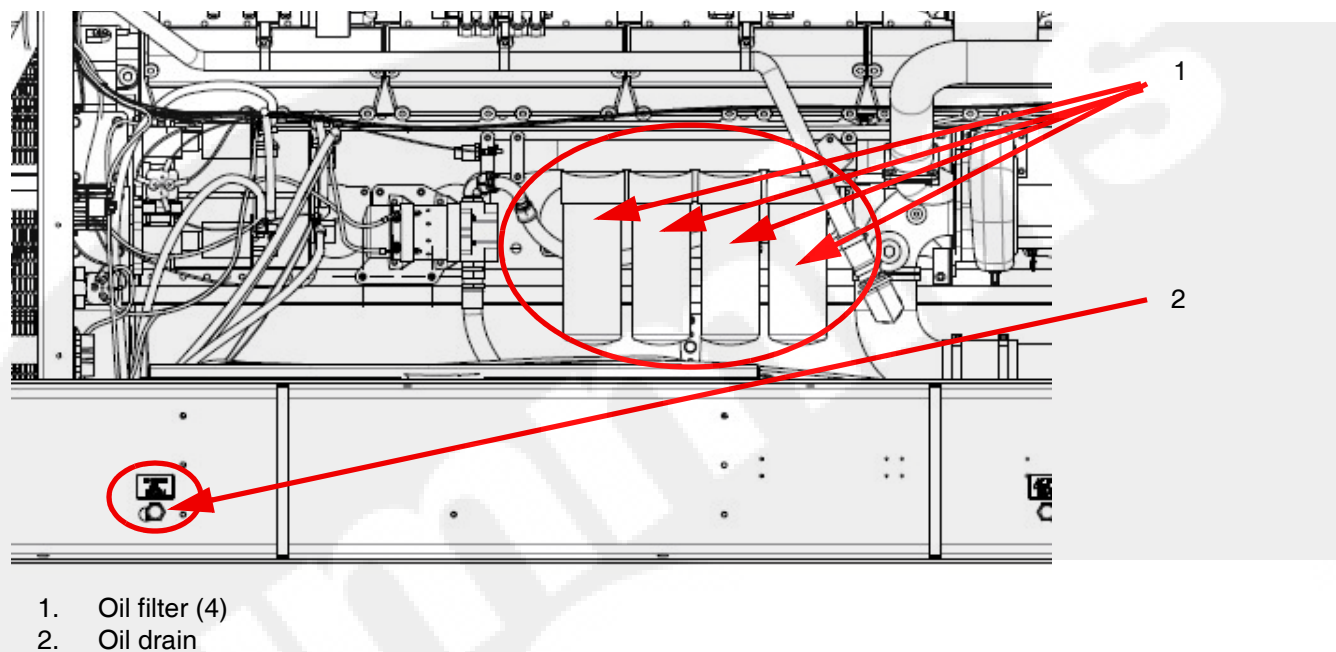


Figure 7-3 Lubrication system (GenSet right side)

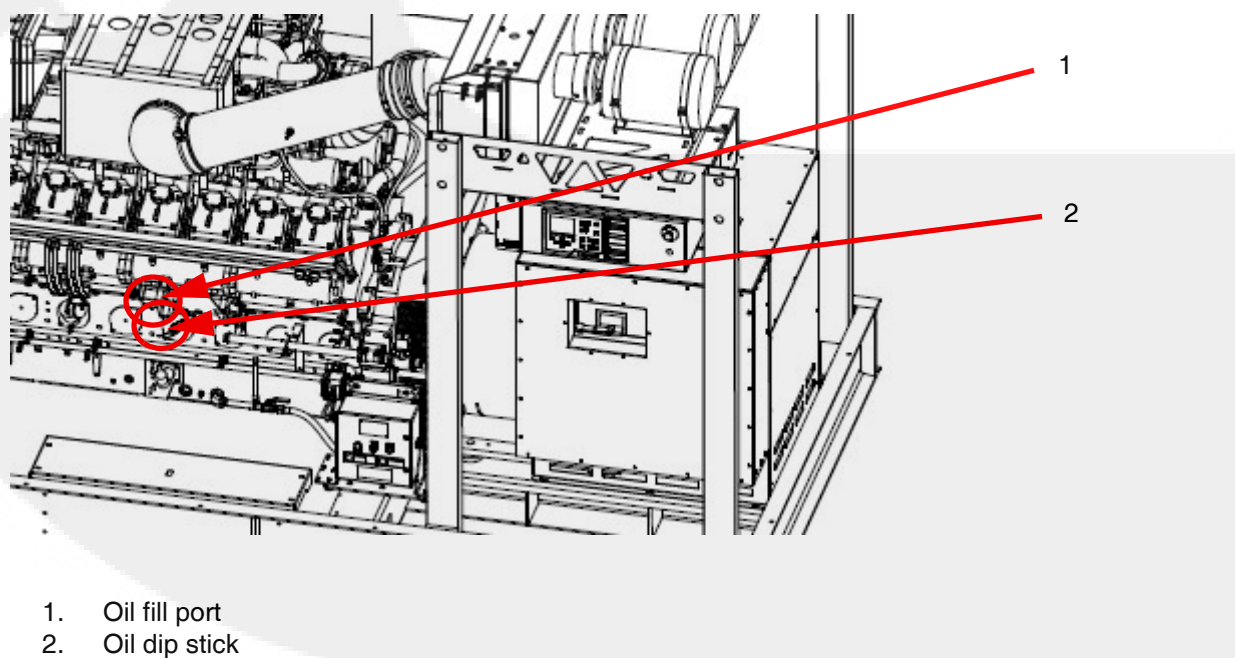


Figure 7-4 Lubrication system (GenSet left side)

7.5.1.1 Checking the engine oil level

Check the engine oil level after the GenSet has stopped running for at least 5 minutes - or *before* starting the GenSet. This allows oil in the upper portion of the engine to drain back into the crankcase (oil pan). Ensure that the GenSet is in a level position when checking the engine oil level.



Avoid prolonged or repeated skin contact with engine oil. Comply with all local health and safety regulations/codes during handling or disposal.

The dipstick is stamped with an **UPPER** and **LOWER** mark to indicate the level of oil in the crankcase. Remove the dipstick, wipe it clean and reinstall it. Take the dipstick out again, and check the oil level. As shown in [Figure 7-5](#), the oil level should be maintained at **halfway** between the UPPER and LOWER marks on the dipstick.



Do not operate the engine with the oil level below the LOWER mark or above the UPPER mark. Overfilling can lead to oil foaming and expulsion from the breather cap. Operation below the LOWER mark can cause loss of oil pressure.

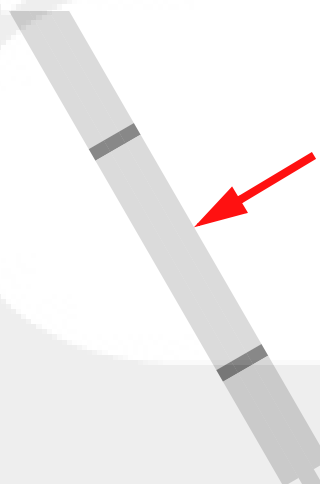


Figure 7-5 Normal oil level (cold engine) on the dipstick

If the oil level is found to be insufficient, oil must be added:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Prior to removal, ensure that the oil fill cap area is clean to prevent debris from entering the engine.
3. Add the appropriate amount of oil based on the engine oil level check performed beforehand.
4. Wait 5 minutes and recheck the engine oil level. Based on the results, add or drain additional oil.
5. Clean up and dispose of any waste oil in accordance with local environmental regulations.
6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.1.2 Changing the engine oil and oil filter

NOTE: Change the engine oil and oil filter more often in hot and dusty environments.

The GenSet oil filters (4), oil drain, and oil drain valve are all located on the right side of the GenSet (see [Figure 7-3](#)). To change the oil:

1. Run the GenSet under load until it is up to operating temperature, 140 °F (60 °C).

NOTE: Warm oil is more viscous (thinner) and drains more quickly and completely out of the engine than when cold. On a hot engine, contaminants are more likely to remain suspended in the oil (vs. when the oil is cold and the contaminants settle) and this increases the chances that contaminants will be expelled from the engine during the draining process.

2. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
3. De-energize the lube oil heater and the coolant heater.
4. Prepare an appropriately-sized container to house the drained oil.
5. Remove the oil drain cap.
6. As shown in [Figure 7-6](#), slowly open the oil drain valve and allow the appropriate amount of oil to drain into the container.

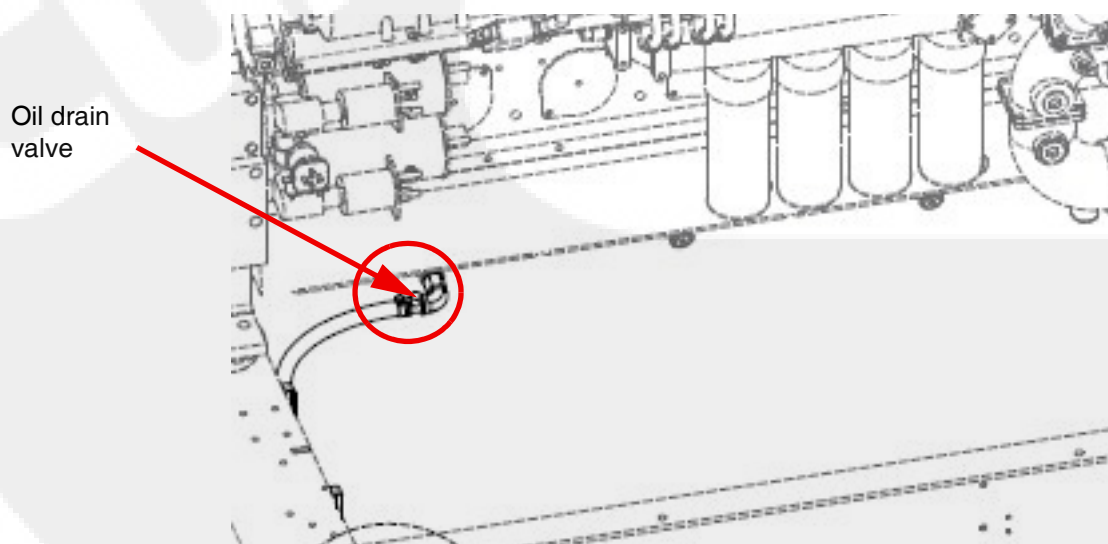


Figure 7-6 Engine oil drain valve (GenSet right side)

7. When oil has stopped flowing from the oil drain hose, close the oil drain valve and re-install the oil drain cap.
8. Clean the oil drain hose and dispose of used oil in accordance with local environmental guidelines.

NOTE: High oil level may be caused by fuel in the oil. If fuel is suspected to be present in the oil, contact your local distributor for troubleshooting and or repair information.

9. Place a container under the oil filters to catch residual oil when each oil filter is removed.
10. Clean the area around the oil filter heads, remove the oil filters with a filter wrench and discard them in accordance with local environmental regulations.
11. Thoroughly wipe off the filter mounting surfaces. Remove the O-rings, if it does not come off with the filters.
12. Lubricate the gaskets with clean engine oil prior to installation
13. Pre-fill the new filters with clean oil of the appropriate viscosity. To fill, pour the oil into the center hole of the filter.

NOTE: *Be careful that no debris is poured into the filter. If using an oil supply with a metallic or plastic seal under the cap, be careful to peel the seal back. Puncturing the seal with a knife or sharp object can create debris in the oil container.*

NOTE: *The lack of lubrication while the filter is pumped full of oil at start-up can damage the engine. Be sure to fill the oil filter before installing.*

14. Install the filters by hand until the gasket makes contact to the lube head.
15. Tighten each filter an additional $\frac{3}{4}$ of a full turn. Do not over tighten.

NOTE: *Mechanical over-tightening of the filter can distort the threads or damage the filter element seal. Do not over tighten.*

16. Fill the engine with clean lubricating oil up to the UPPER mark of the oil dipstick. Be careful not to add oil above the UPPER mark of the oil dipstick.

NOTE: *Too much oil can cause high oil consumption. Too little oil can cause severe engine damage. Keep the oil level between the UPPER and LOWER marks on the dipstick.*

17. Clean the area around the oil fill cap and install the oil fill cap securely.
18. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).
19. Re-connect the lube oil heater and coolant heater to the independent power source.
20. After installing a new filter cartridge, the engine oil level normally decreases a little. Run the GenSet at idle to inspect for leaks at the oil drain valve and oil filter seal. Tighten connections only as much as is necessary to eliminate leaks. Do not over tighten.

NOTE: *Engine oil pressure must be indicated on the graphical display within 15 seconds after starting. If oil pressure is not registered within 15 seconds, shut off the engine immediately to avoid engine damage.*

21. Shut off the engine.
22. Wait approximately 5 minutes to let the oil drain from the upper parts of the engine and recheck the oil level.



23. Add or drain oil, as necessary, to bring the oil level to halfway between the UPPER and LOWER marks on the dipstick.
24. Dispose of the used oil and oil filter in accordance with local environmental regulations.

IMPORTANT: *Used oil and filters must be disposed of properly to avoid environmental damage and clean-up liability. Check all federal, state and local regulations for disposal requirements.*

7.5.2 Coolant system maintenance

The coolant level should be checked daily. With the engine cool, inspect the coolant level by view in the sight glass. The coolant level should be maintained at the top of the sight glass. If the coolant level is found to be low, add the appropriate amount of coolant to bring the coolant level to the top of the sight level glass.



Standing on the engine, bed frame, alternator or other generator set parts may cause severe personal injury, death, and/or equipment. Always work from a secure platform.

Ensure the appropriate type of engine coolant is added, in the appropriate concentration of antifreeze. Cummins recommends the use of fully formulated antifreeze/coolant meeting Cummins Engineering Standards (CES) 14603. For further details and discussion of coolant for Cummins engines, refer to Service Bulletin 3666132, Cummins Coolant Requirements and Maintenance. Typically, antifreeze/coolants meeting ASTM4985 (GM6038M specification) or ASTM D6210 criteria are acceptable antifreeze/coolants for engines covered by this manual. Low-silicate antifreeze/coolants meeting ASTM D4985 (GM6038M specification) are not adequate for extended service intervals. Refer to the engine operation and maintenance manual for more information about coolant and supplemental coolant additive (SCA).



Overconcentration of antifreeze or use of high silicate antifreeze can cause damage to the engine.

Satisfactory engine coolant broadens the operating temperature by lowering the engine's freezing point and raising the engine's boiling point. The corrosion inhibitors also protect the cooling system components from corrosion to provide longer component life. Cummins recommends using either a 50/50 mixture of good-quality water and fully-formulated antifreeze, or fully-formulated coolant, when filling the cooling system. 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. Cummins recommends using Fleetguard ES Complete Organic Acid Technology (OAT).

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 -33 °F (-36 °C) freezing point and a 226 °F (108 °C) 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.

In ambient temperatures of 32 °F to -25 °F (0 °C to -32 °C), use 50% ethylene glycol antifreeze and 50% water for the engine coolant mixture. In ambient temperatures of -25 °F to -65 °F (-32 °C to -54 °C), use 60% ethylene glycol antifreeze and 40% water for the engine coolant mixture.

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

- corrode brass and copper
- damage heat transfer surfaces
- damage seals and hoses

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

- buildup in coolant low-flow areas
- plug the radiator and oil cooler
- possibly damage the water pump seal

 DANGER

Contact with hot liquid can cause severe burns. Do not open the pressure cap while the engine is running. Let the engine cool down before removing the cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

 WARNING

Removing a hot engine radiator fill cap can cause severe burns from heated coolant spray or steam. Do not remove the radiator fill cap from a hot engine. Wait until the engine temperature is below 122 °F (50 °C) before removing the radiator fill cap. Remove the radiator fill cap slowly to release coolant system pressure.

 WARNING

Avoid prolonged or repeated skin contact with antifreeze.

The C1000N6B and the C1300N6 relies on a radiator cooling system and may be optionally equipped with an intake air warming system that also requires coolant. [Figure 7-7](#) shows the Jacket Water (JW) radiator and the Low Temperature Aftercooler (LTA) radiator cooling system components of the GenSet.

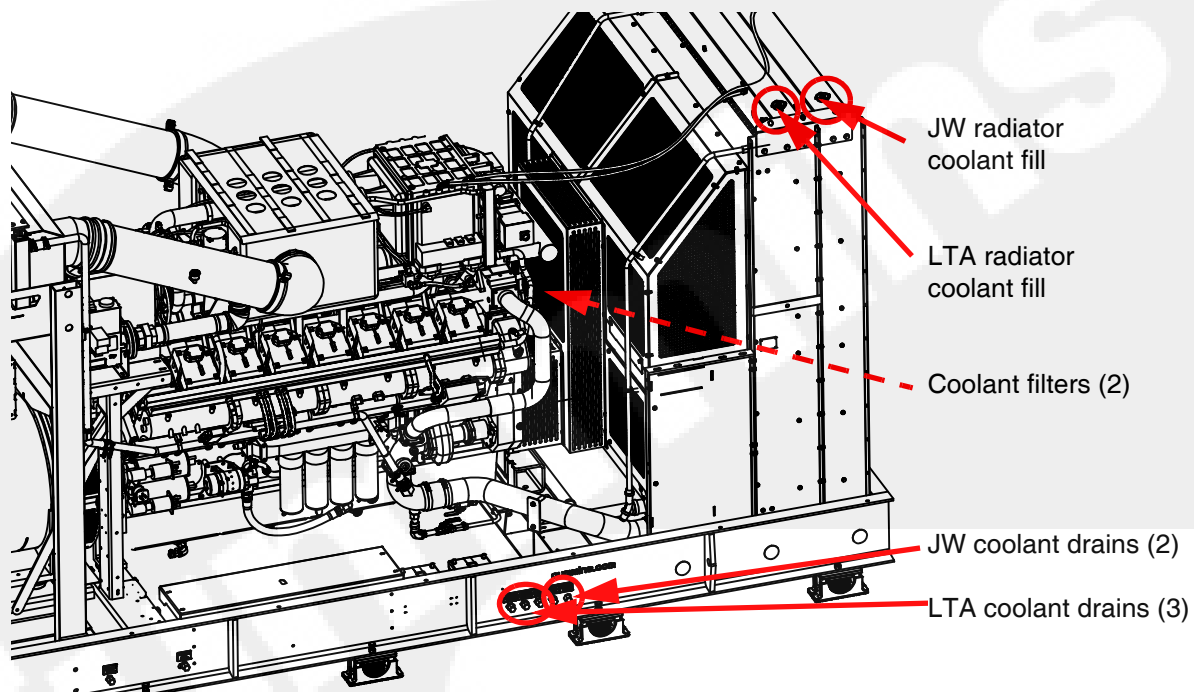


Figure 7-7 GenSet JW and LTA radiator cooling components (GenSet right side)

Figure 7-8 shows the components of the GenSet intake air warmer, if installed.

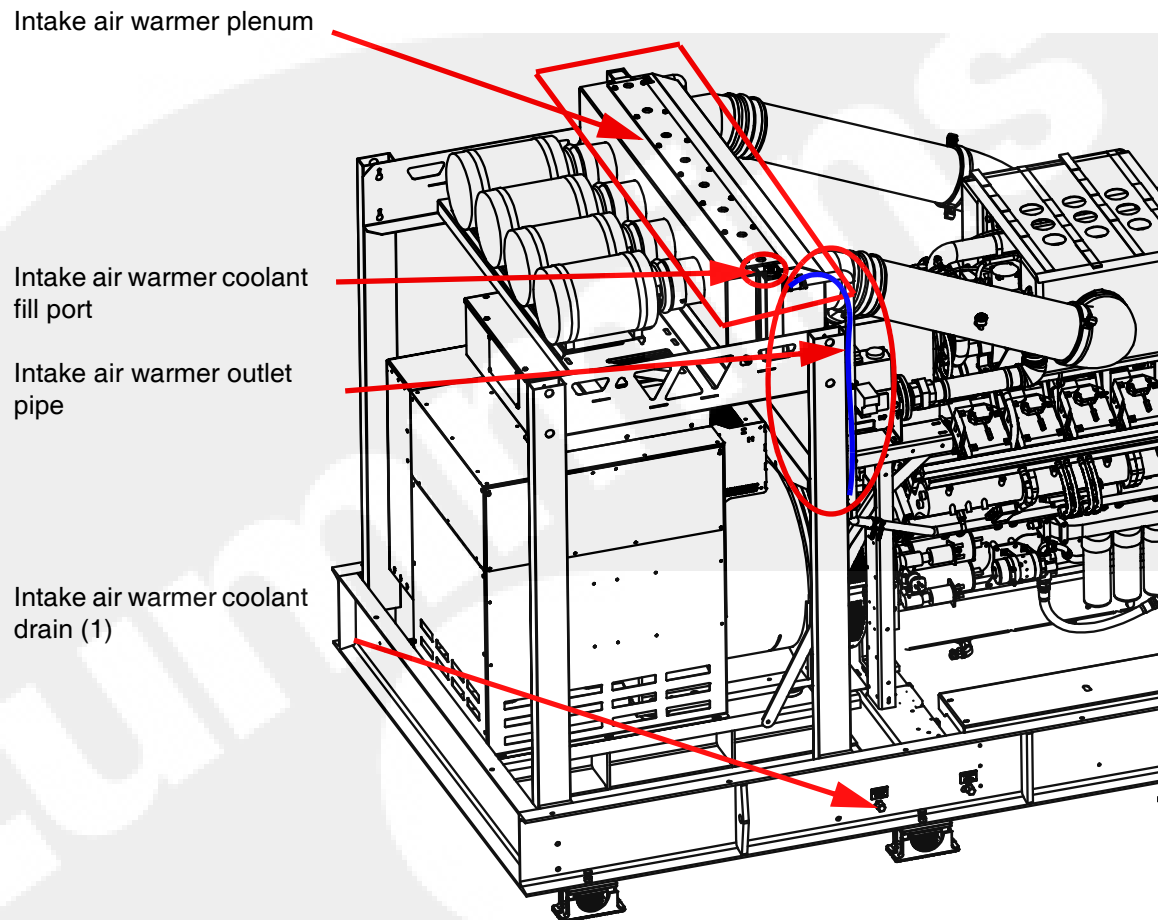


Figure 7-8 GenSet intake air warmer cooling components (GenSet right side)

7.5.2.1 Checking the coolant level at the JW and LTA radiators

Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#). Check the coolant level during shutdown periods and ensure the fluid level is visible in the LTA radiator sight glass and the JW radiator sight glass. If the coolant is not visible in the sight glasses, add coolant (see [7.5.2.3 Adding coolant to the JW radiator](#) and/or [7.5.2.4 Adding coolant to the LTA radiator](#))

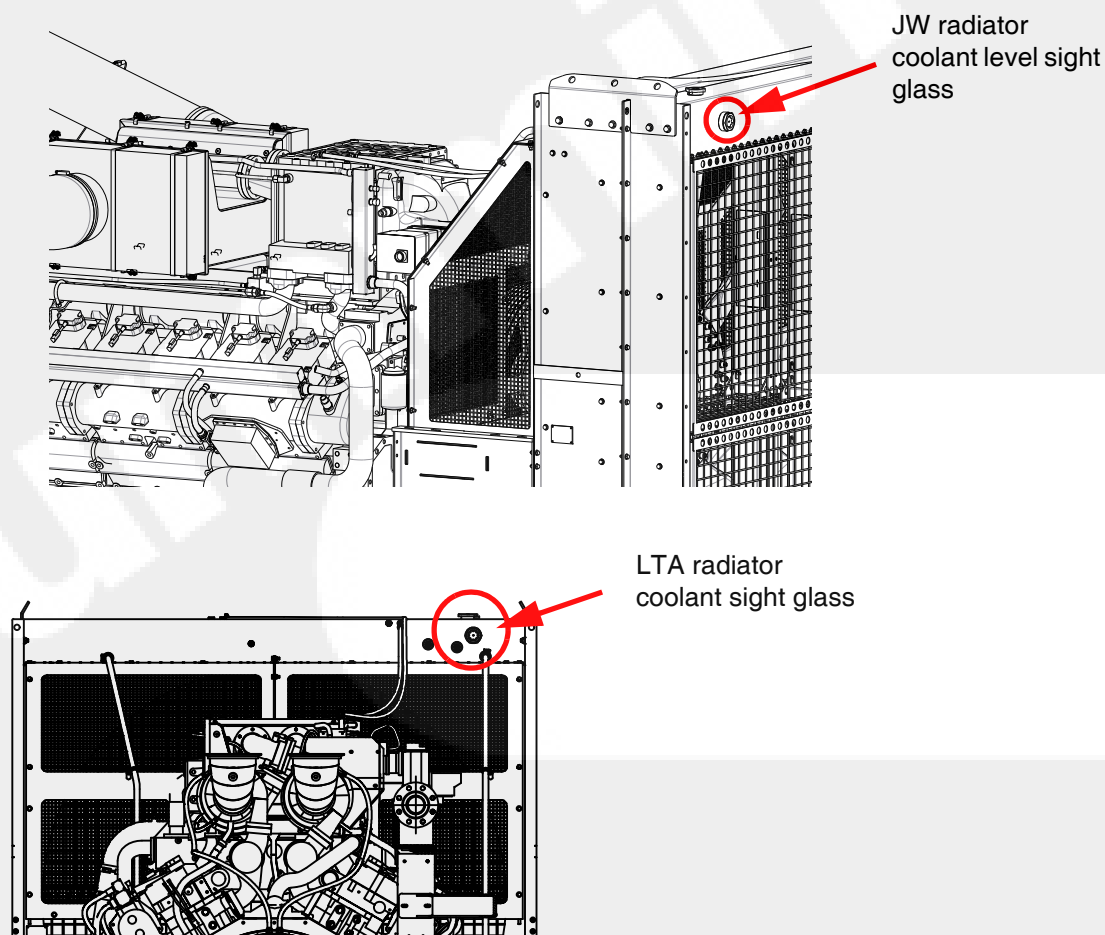


Figure 7-9 JW and LTA coolant level sight glasses

Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.2.2 Checking the coolant level at the intake air warmer (if equipped)

To check the level of coolant in the intake air warmer:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Twist the intake air warmer fill cap counter-clockwise and open the intake air warmer fill port (see [Figure 7-10](#)).

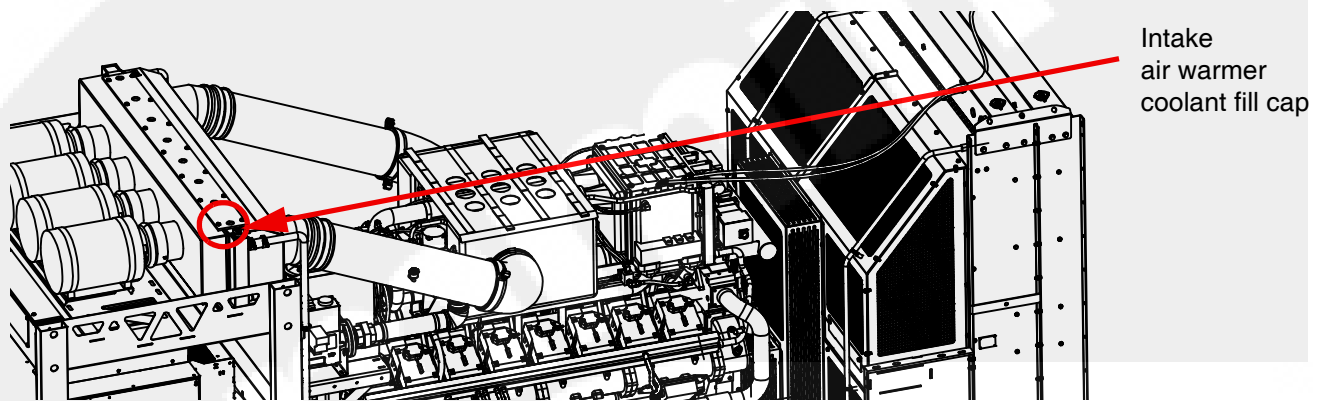


Figure 7-10 Intake air warmer coolant fill cap (GenSet right side)

3. As shown in [Figure 7-11](#), visibly check that the coolant level is at - or just below - the intake air warmer outlet pipe. If the coolant is not visible to the intake air warmer outlet pipe, add coolant. The green section in the figure below indicates the ideal coolant level. It is acceptable to leave some air space in the intake air warmer.

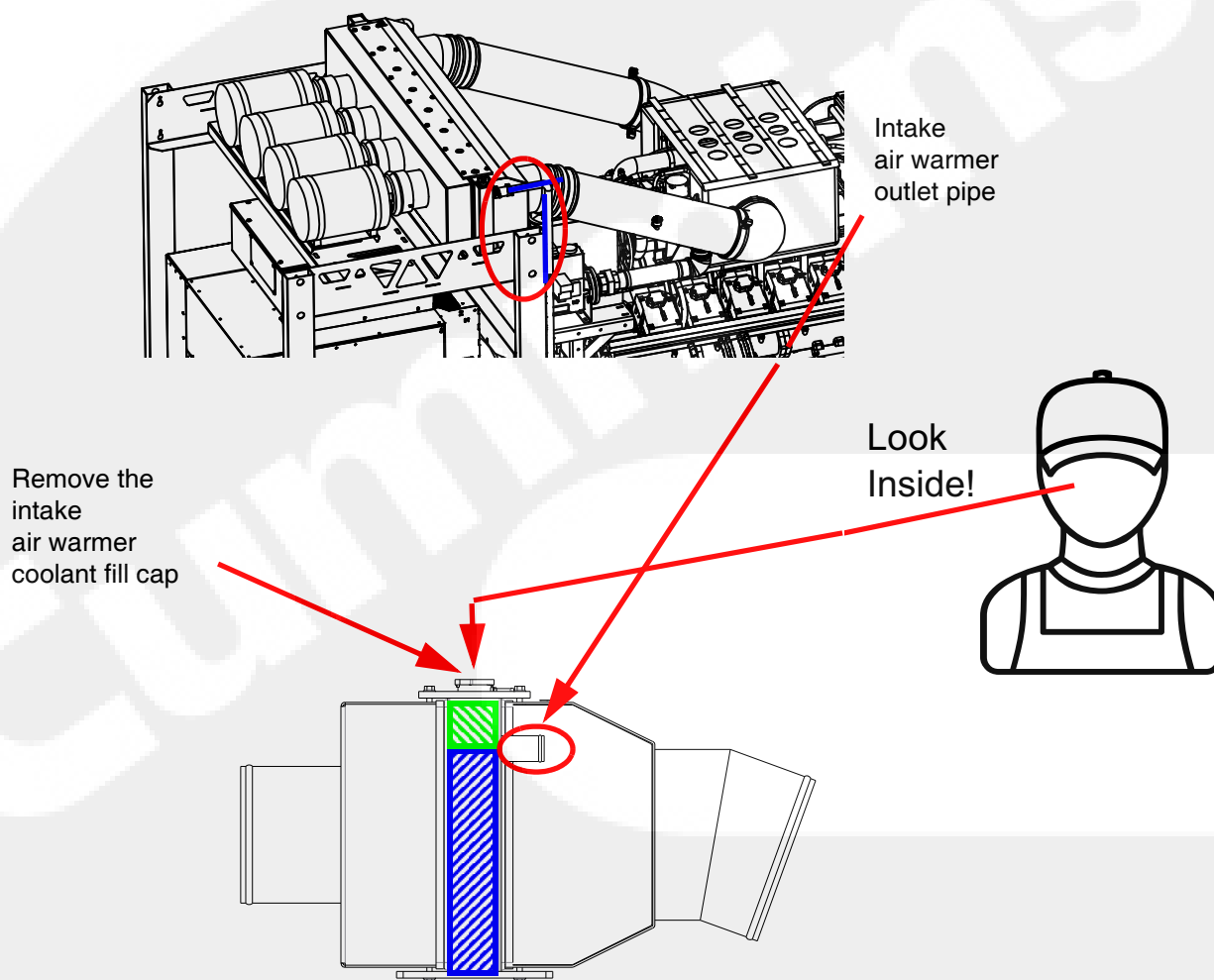


Figure 7-11 Cross-section diagram of the intake air warmer coolant fill port (GenSet right side)

4. If the coolant level is sufficient, install the intake air warmer fill cap by pushing down and twisting clockwise until the cap lip hits the tank stop flange and then reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#). If the coolant level is low, then add coolant. See [7.5.2.5 Adding coolant to the intake air warmer, if equipped](#).

7.5.2.3 Adding coolant to the JW radiator

Do not add cold coolant to a hot engine. Engine castings can be damaged. Allow the engine to cool to below 50 °C (120 °F) before adding coolant. When the engine is first started, monitor the coolant level. As trapped air is expelled from the system, the coolant level may drop and additional coolant must be added.

To prevent severe scalding, let the engine cool before removing the radiator fill cap. Turn the cap slowly, and do not open it fully until the pressure has been relieved. To add coolant to the JW radiator:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. As shown in [Figure 7-12](#), check that the JW radiator coolant drain shut-off valves are closed. Turn the tee handle so that it is perpendicular to the drain line. The JW shut-off valves are located *directly behind the JW drain holes* on the right side of the GenSet.

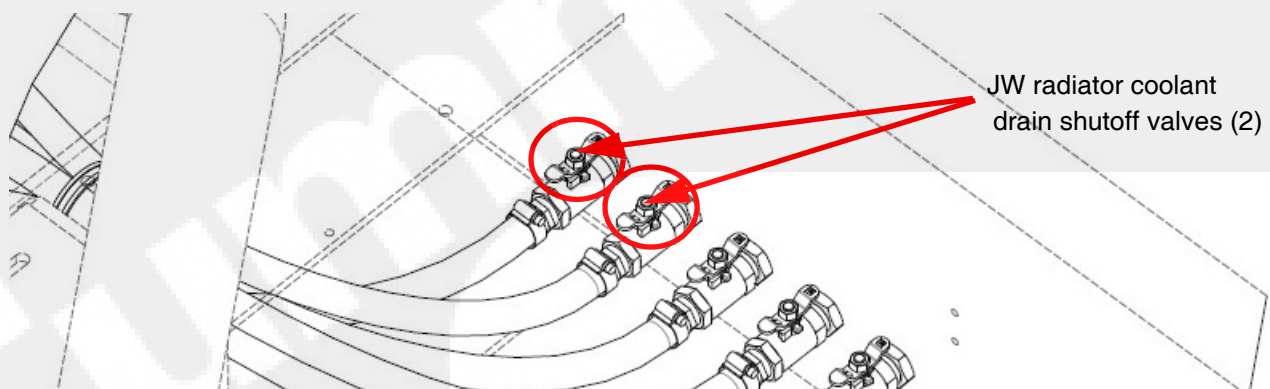


Figure 7-12 GenSet JW radiator coolant drain shut-off valves (GenSet right side)

3. If filling the coolant after draining the system (e.g. filling an empty cooling system), twist open the JW petcock on top of the JW crossover tube (shown in [Figure 7-13](#)).

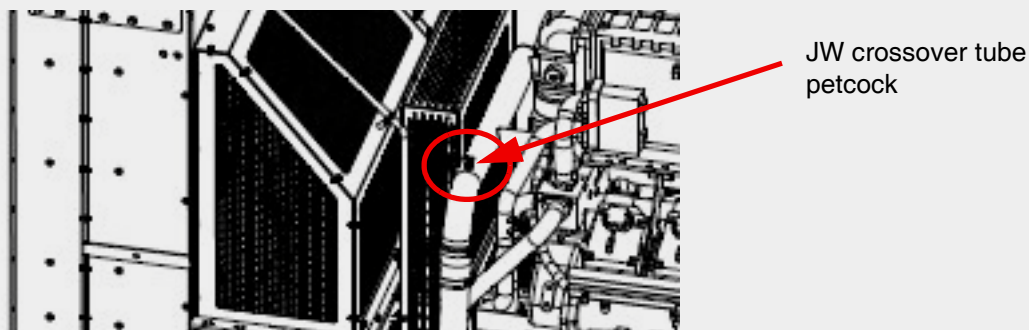


Figure 7-13 JW crossover tube petcock (GenSet left side)

4. As shown in [Figure 7-14](#), twist the JW fill cap counter-clockwise and open the JW radiator fill port.

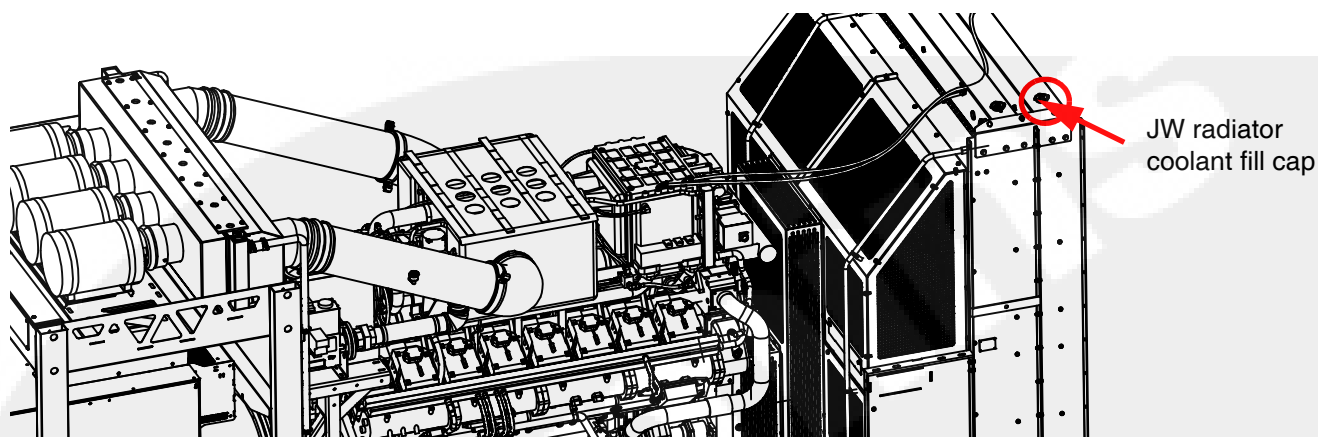


Figure 7-14 JW radiator coolant fill cap (GenSet right side)

5. See [9.6 C1000N6B/C1300N6 coolant specification](#). If filling an empty cooling system, slowly add engine coolant until the coolant spits from the JW crossover tube petcock and then close the petcock.
6. Continue to add engine coolant until the coolant completely covers the JW coolant sight glass (or reaches the bottom of the JW fill neck).
7. Install the JW radiator fill cap by pushing down and twisting clockwise until the cap lip hits the tank stop flange.
8. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.2.4 Adding coolant to the LTA radiator

Do not add cold coolant to a hot engine. Engine castings can be damaged. Allow the engine to cool to below 50 °C (120 °F) before adding coolant. When the engine is first started, monitor the coolant level. As trapped air is expelled from the system, the coolant level may drop and additional coolant must be added.

To prevent severe scalding, let the engine cool before removing the radiator fill cap. Turn the cap slowly, and do not open it fully until the pressure has been relieved. To add coolant to the LTA radiator:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

2. As shown in [Figure 7-15](#), check that the LTA radiator coolant shut-off drain valves are closed. Turn the tee handle so that it is perpendicular to the drain line. The LTA shut-off valves are located *directly behind the LTA drain holes* on the right side of the GenSet.

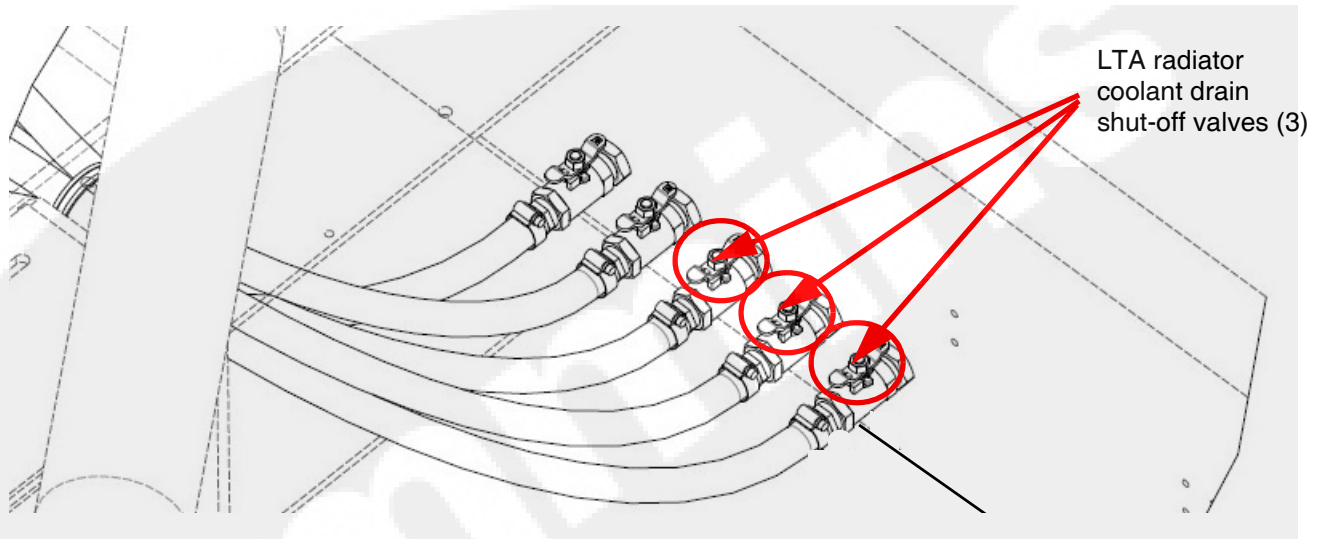


Figure 7-15 LTA radiator coolant drain shut-off valves (GenSet right side)

3. As shown in [Figure 7-16](#), twist the LTA fill cap counter-clockwise and open the LTA radiator fill port.

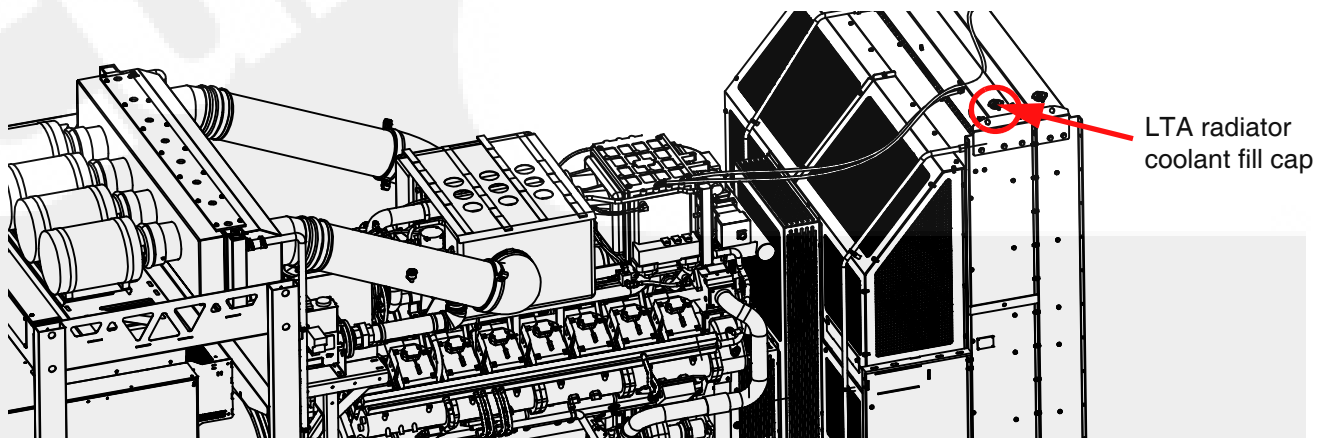


Figure 7-16 LTA radiator coolant fill cap (GenSet right side)

4. For the recommended type of coolant, see [9.6 C1000N6B/C1300N6 coolant specification](#). Slowly add engine coolant until the coolant completely covers the LTA coolant sight glass (or reaches the bottom of the LTA fill neck).

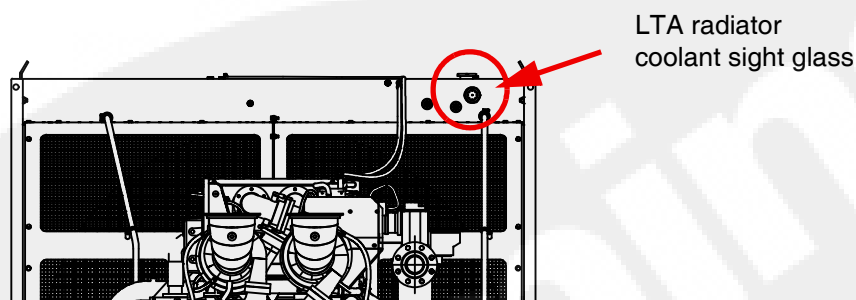


Figure 7-17 LTA radiator coolant sight glass (GenSet back)

5. Install the LTA radiator fill cap by pushing down and twisting clockwise until the cap lip hits the tank stop flange.
6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.2.5 Adding coolant to the intake air warmer, if equipped

Do not add cold coolant to a hot engine. Engine castings can be damaged. Allow the engine to cool to below 50 °C (120 °F) before adding coolant. When the engine is first started, monitor the coolant level. As trapped air is expelled from the system, the coolant level may drop and additional coolant must be added.

To prevent severe scalding, let the engine cool before removing the coolant fill cap. Turn the cap slowly, and do not open it fully until the pressure has been relieved. To add coolant to the intake air warmer:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. As shown in [Figure 7-18](#), check that the intake air warmer drain shut-off valve is closed. Turn the tee handle so that it is perpendicular to the drain line. The intake air warmer shut-off valve is *directly behind* the intake air warmer drain (on the right side of the GenSet).

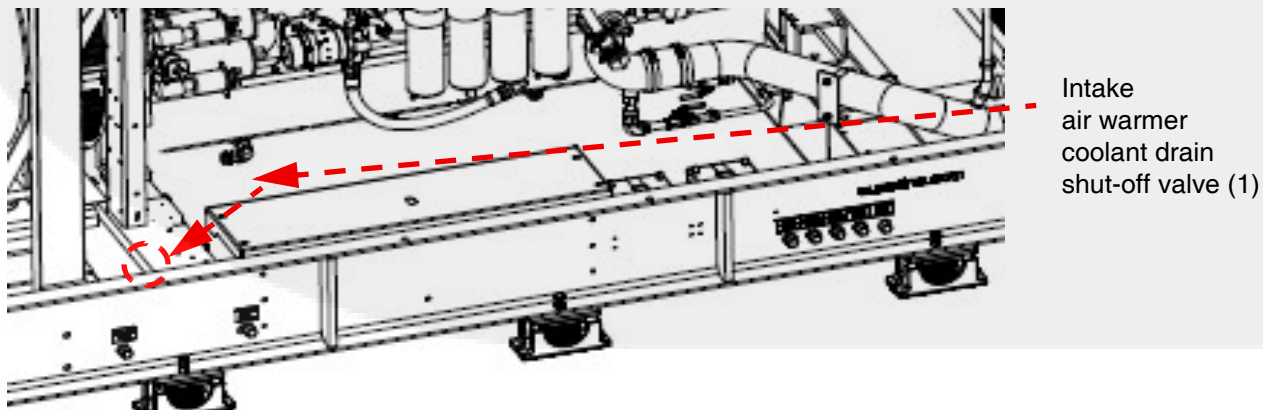


Figure 7-18 GenSet intake air warmer coolant drain shut-off valve (GenSet right side)

3. Twist the intake air warmer fill cap counter-clockwise and open the intake air warmer fill port (see [Figure 7-19](#)).

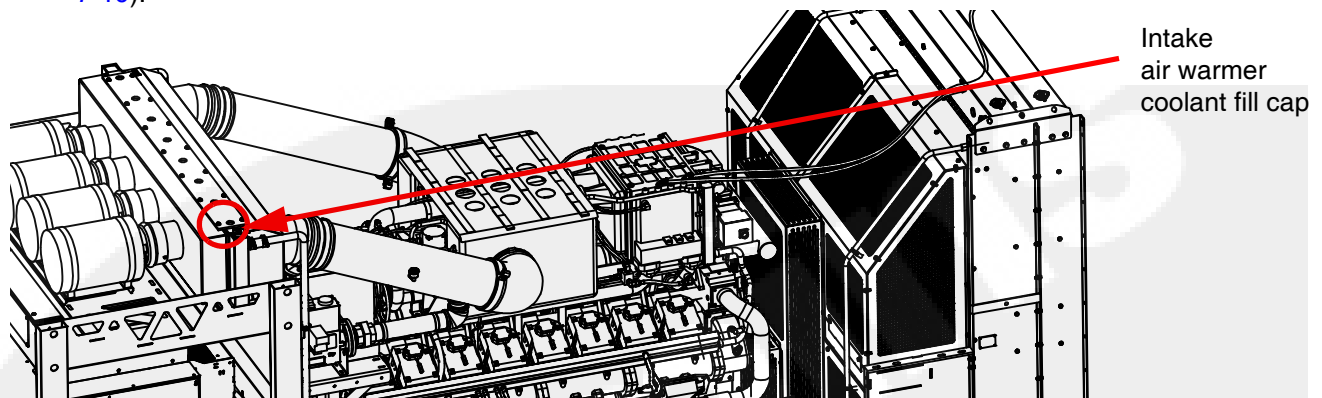


Figure 7-19 Intake air warmer coolant fill cap (GenSet right side)

4. See [9.6 C1000N6B/C1300N6 coolant specification](#). As shown in [Figure 7-20](#), slowly add engine coolant and watch for when the coolant level begins to cover the intake air warmer outlet pipe. It is acceptable to leave some air space in the intake air warmer.

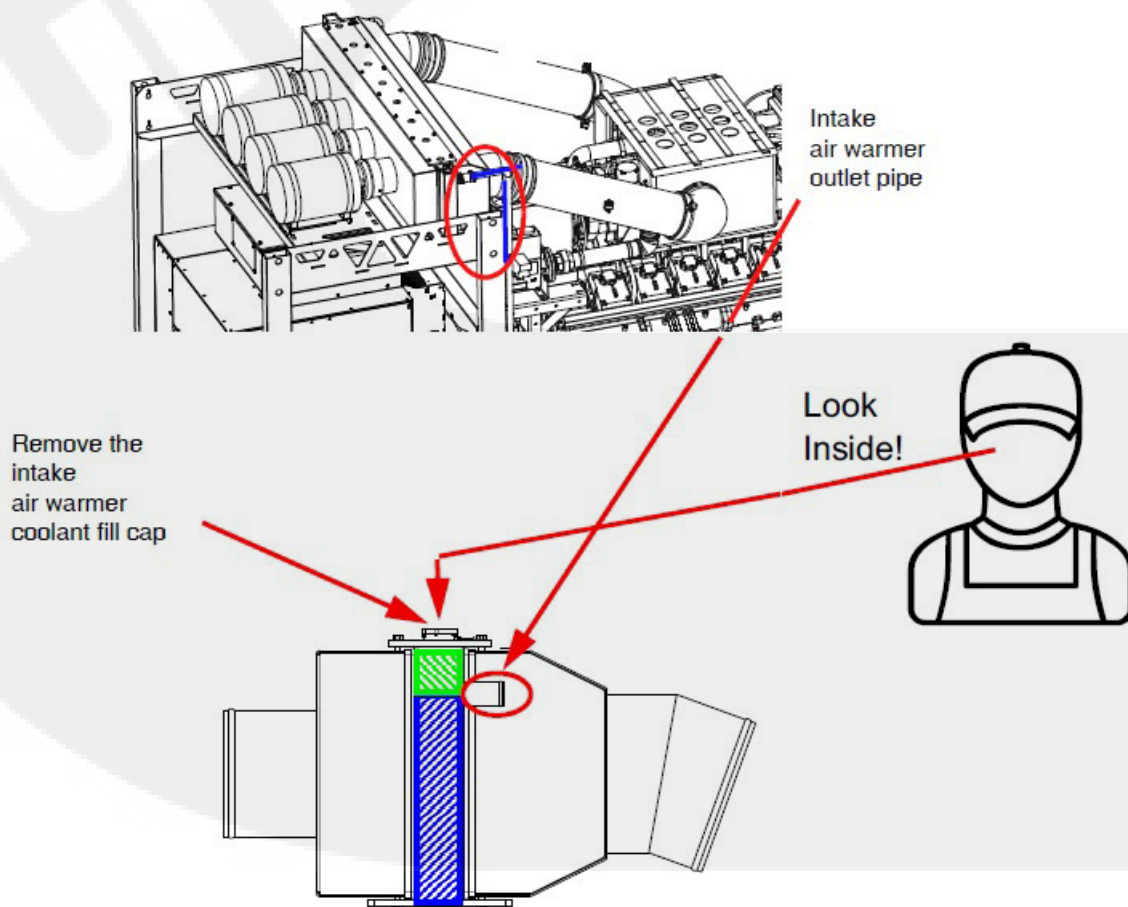


Figure 7-20 Cross-section diagram of the intake air warmer coolant fill port (GenSet right side)

5. Install the intake air warmer fill cap. Push down and twist clockwise until the cap lip hits the tank stop flange.
6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.2.6 Draining and flushing the coolant

To maintain adequate corrosion protection and remove rust and scale deposits, drain and flush the JW, LTA, and intake air warmer (if installed) coolant at the recommended interval. Adequate preparations must be made for the capture and disposal of the drained coolant.

To drain and flush the GenSet cooling system:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Ensure that the engine coolant heater is disconnected from the power source.



The heater element will burn out if the engine coolant is removed with the heater connected to a power source.

3. Check to make sure that all coolant drain shut-off valves are closed. Turn the tee handle so that it is perpendicular to the drain line. [Figure 7-21](#) shows the JW and LTA shut-off valves located *directly behind the JW and LTA drain holes* on the right side of the GenSet. If equipped, the intake air warmer has an identical shut-off valve behind the intake air warmer drain (also on the right side of the GenSet).

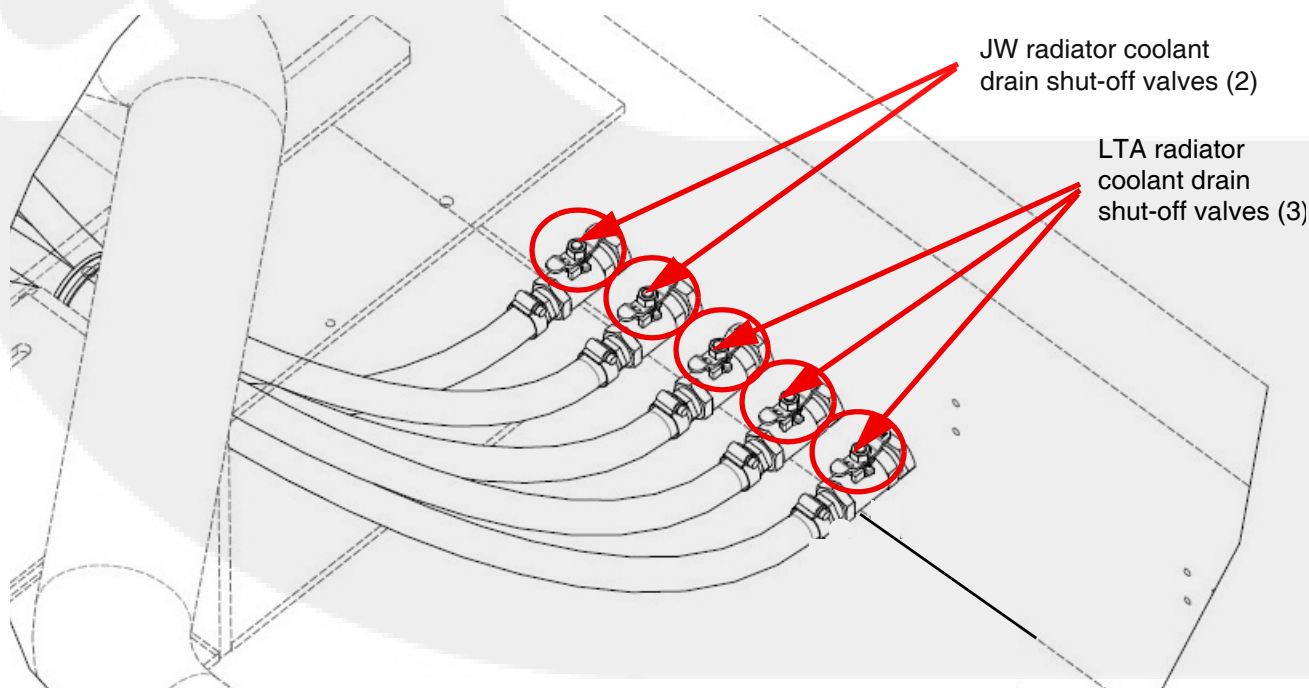


Figure 7-21 JW and LTA radiator coolant drain shut-off valves (GenSet right side)

4. Check that the JW petcock (on top of the JW crossover tube shown in [Figure 7-22](#)) is closed.

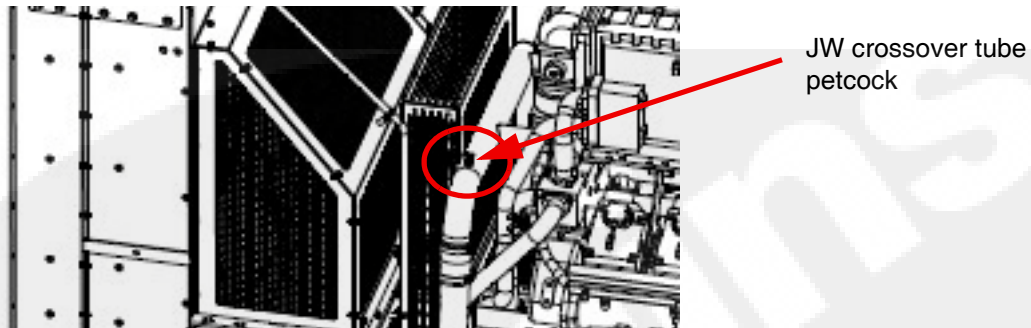


Figure 7-22 JW crossover tube petcock (GenSet left side)

5. Ensure that the engine is cool and then remove the JW radiator coolant fill cap, the LTA radiator coolant fill cap, and the intake air warmer (if installed) coolant fill cap.

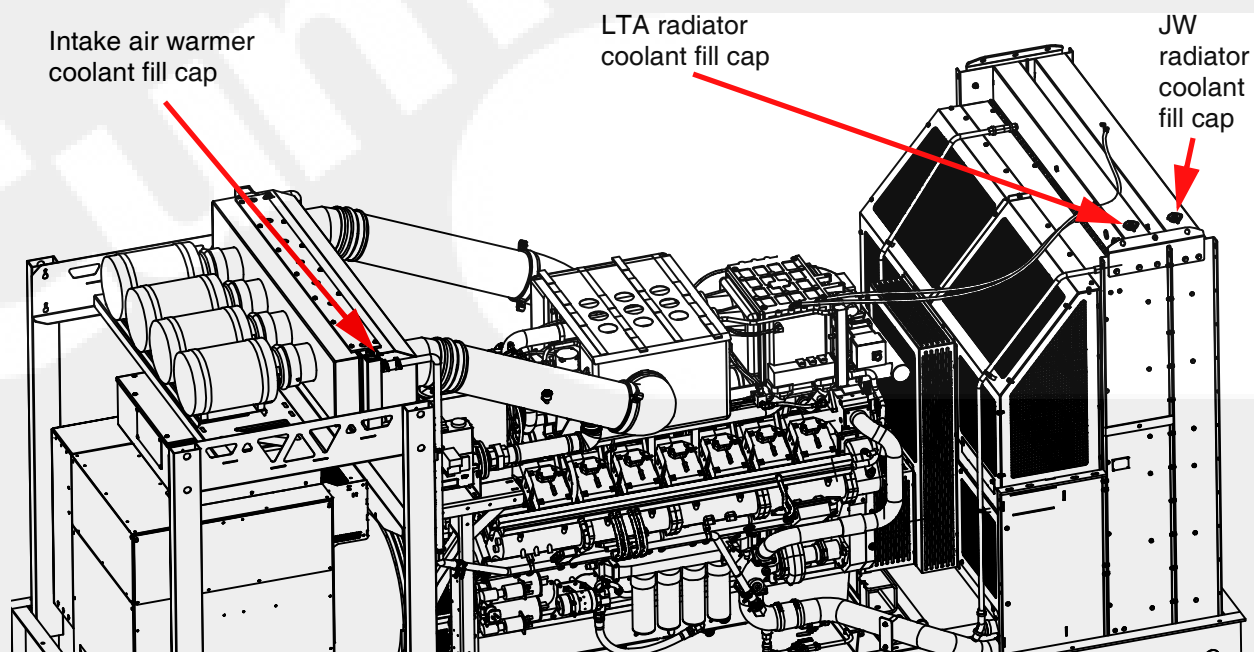


Figure 7-23 GenSet coolant fill caps (GenSet right side)

6. Remove the JW and LTA (five, total) coolant drain caps (shown in [Figure 7-24](#)). If installed, remove the intake air warmer coolant drain cap.

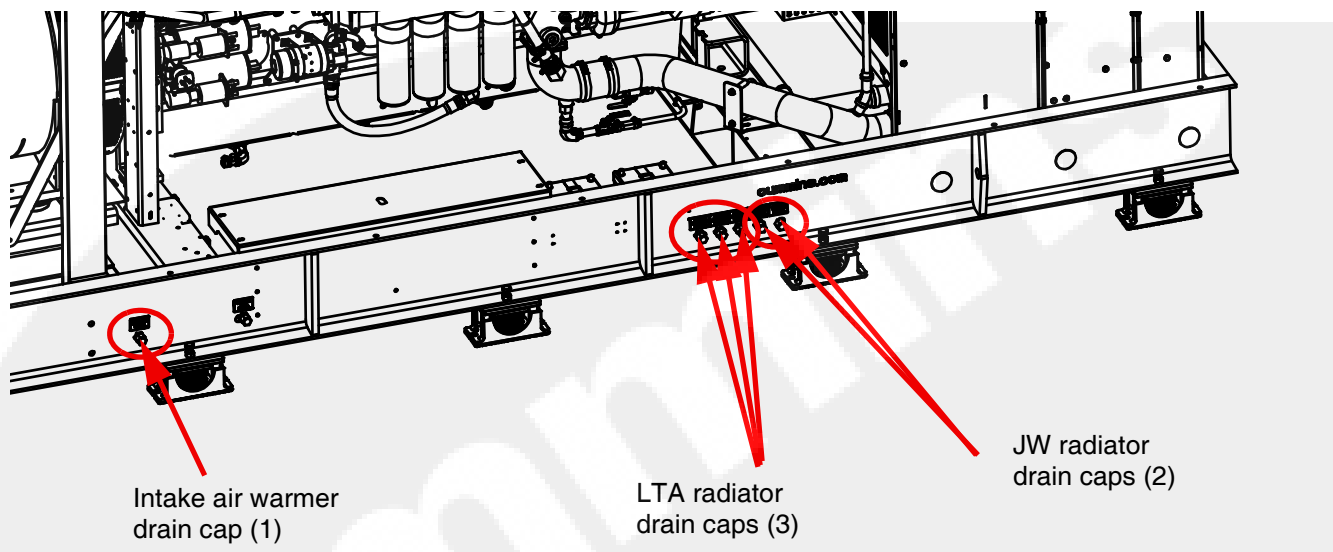


Figure 7-24 GenSet coolant drain caps (GenSet right side)

7. Slowly open the JW, LTA, and intake air warmer (if equipped) drain shut-off valves and drain the coolant.
8. Drain the coolant from the coolant heater by removing the clamp and hose from the bottom of the heater ([Figure 7-25](#)).

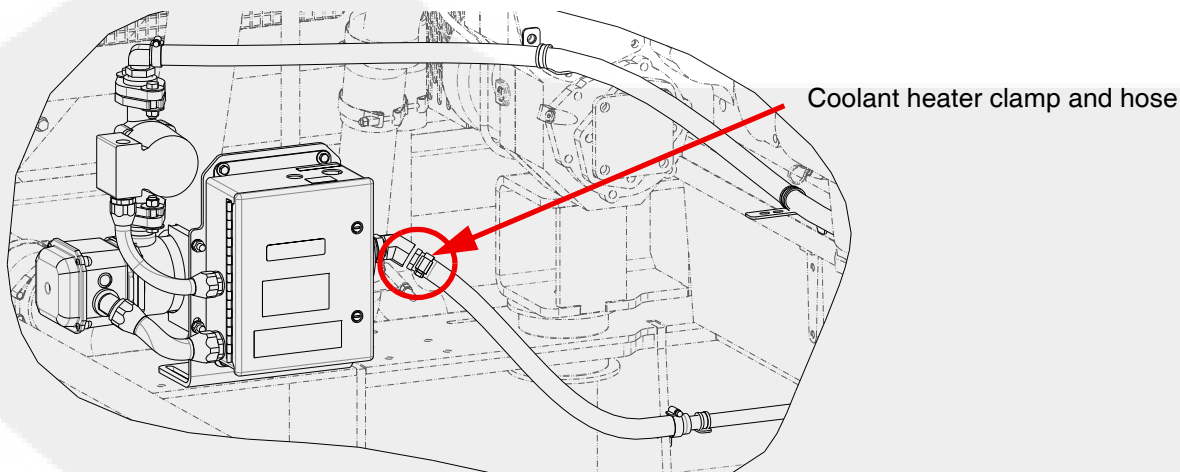


Figure 7-25 Coolant heater clamp and hose (GenSet right side)

9. After the coolant has completely drained, place the end of a water hose into the JW the radiator fill port and turn on the water supply.
10. Regulate the flow of water into the JW radiator until it is equal to the outflow from the JW drain openings.

11. Continue flushing until the outflow from the JW drains is clear of rust sediment.
12. Move the end of the water hose into the LTA radiator fill port.
13. Regulate the flow of water into the LTA radiator until it is equal to the outflow from the LTA drain openings.
14. Continue flushing until the outflow from the LTA drains is clear of rust sediment.
15. If the GenSet is equipped with an intake air warmer, move the end of the water hose into the intake air warmer radiator fill port.
16. Regulate the flow of water into the intake air warmer radiator until it is equal to the outflow from the intake air warmer drain opening.
17. Continue flushing until the outflow from the intake air warmer drain is clear of rust sediment.
18. When the flushing is complete and the GenSet has stopped draining, close all of the radiator drain shut-off valves, re-install the caps on the coolant drains, and turn off the water supply.
19. Reinstall the hose and clamp to the bottom of the coolant heater.
20. Refill the cooling system with the recommended coolant (refer to [7.5.2.3 Adding coolant to the JW radiator](#) and [7.5.2.4 Adding coolant to the LTA radiator](#) and [7.5.2.5 Adding coolant to the intake air warmer, if equipped](#)).

 DANGER

Some coolant is toxic. Keep coolant away from children and animals. Follow local environmental regulations for disposal. Ethylene glycol antifreeze is considered toxic. Dispose of it according to local regulations for hazardous substances.

 CAUTION

The heater element will burn out if the power is connected before it is filled with coolant or if straight antifreeze solution is used for coolant. Before connecting the power, fill the engine with coolant and run it for a while to circulate the coolant through the heater.

21. Reconnect the coolant heater to the independent power source.
22. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.2.7 Replacing the coolant filters

The GenSet coolant filters (2) are located behind the radiator as shown in [Figure 7-26](#).

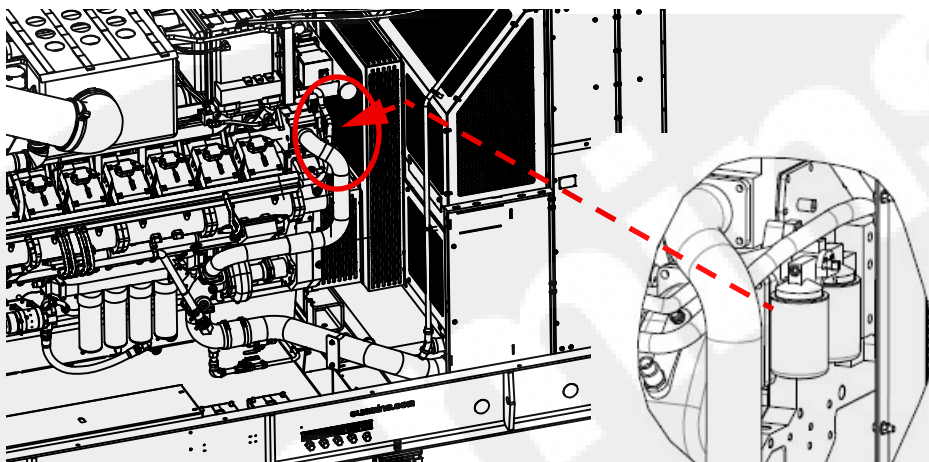


Figure 7-26 GenSet coolant filters (GenSet right side)

To change the coolant filters at the recommended maintenance interval:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Drain the JW and LTA cooling system. See [7.5.2.6 Draining and flushing the coolant](#).
3. As shown in [Figure 7-27](#), turn the valve on the coolant filter head to the OFF position to prevent coolant loss. Unscrew the coolant filters.

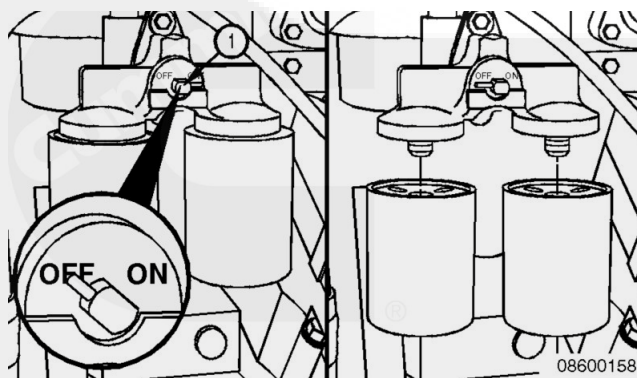


Figure 7-27 Unscrew coolant filters

4. As shown in [Figure 7-28](#), clean the area around the coolant filter head. Clean the gasket surface of the coolant filter head.

NOTE: The o-ring can stick on the coolant filter head. Make sure the o-ring is removed.

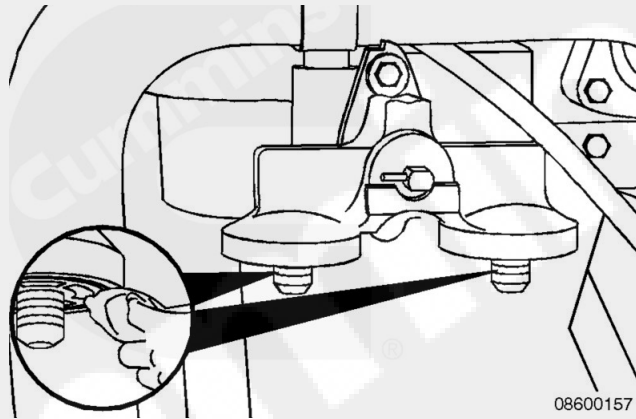


Figure 7-28 Clean the coolant filter heads

5. Lubricate the new coolant filter gaskets with clean engine oil.
6. As shown in [Figure 7-29](#), thread each coolant filter clockwise and rotate into place until the gasket makes first contact with the filter head. Turn the coolant filter an additional $\frac{1}{2}$ to $\frac{3}{4}$ of a turn after contact.
7. Turn the valve on the coolant filter head to the ON position.

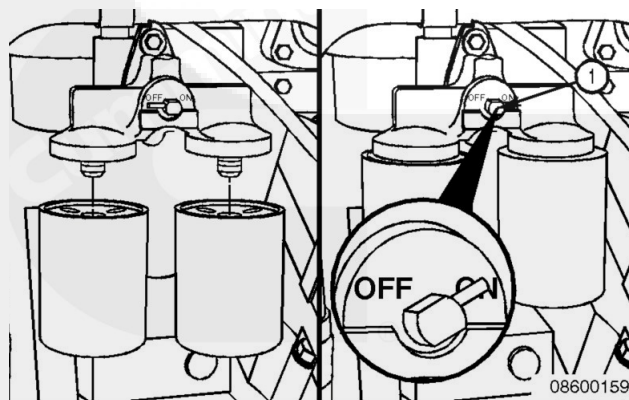


Figure 7-29 Replace the coolant filters

8. Fill the JW and LTA radiators with coolant. See [7.5.2.3 Adding coolant to the JW radiator](#) and [7.5.2.4 Adding coolant to the LTA radiator](#).
9. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.3 Radiator maintenance

Proper air flow through the radiator is required for proper engine operation. A blocked or restricted radiator leads to the engine overheating as well as decreased engine performance. Proper cooling system pressure (15 psi) is essential for optimal engine cooling and minimal coolant loss.

The engine cooling fan pushes large amounts of air through the radiator whenever the GenSet is running. In addition to pushing air through the radiator, the fan also pushes environmental debris, such as dust, dirt, straw, and lint through the radiator which may build up on the radiator core. Buildup of debris on the core will restrict air flow, reducing the ability to cool.

7.5.3.1 Inspecting the radiator core

Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

Inspect the radiator core for debris. Remove all dirt or foreign material with a soft brush or cloth. Use care to avoid damaging the fins. If available, use a low pressure compressed air or stream of water (maximum of 242 kPa [35 psi]) in the opposite direction of normal air flow to clean the radiator. If using water, protect the engine and the generator from over spray.



Improper use of compressed air can cause minor bodily injury from flying debris and dirt. Wear appropriate eye and face protection when using compressed air.

Also inspect the radiator core for the following items:

- radiator core leaks
- damaged electric coils

Replace the radiator fill cap every two years to guard against deteriorated seals and leaks.

Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.3.2 Greasing the radiator fan shaft

Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

Grease the radiator fan drive shaft bearings. Use an NLGI #2 Lithium-base or Lithium complex-base grease suitable for roller bearings. A slight showing of grease at the seals indicates proper lubrication.

Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).



7.5.3.3 Inspecting the radiator fan

Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

As shown in [Figure 7-30](#), a visual inspection of the radiator fan is required daily. Do not operate the GenSet with a damaged fan. Contact a Cummins authorized distributor for repair or replacement of a damaged fan.

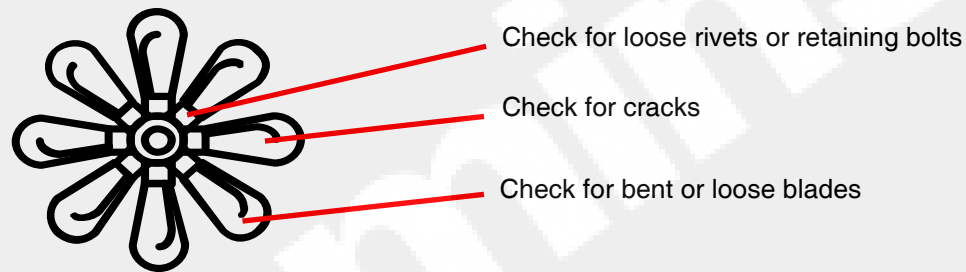


Figure 7-30 Radiator fan inspection

It is imperative that the radiator fan blades are kept clean of dust, soot, and debris, etc. Continued build up of dust or silt on the radiator fan blades will prevent the radiator from operating properly. If the radiator fan blade inspection indicates necessary cleaning, use a soft cloth and mild soap and water to clean each individual fan blade of residue. Any cracks or loose parts will be clearly identifiable on clean radiator fan blades.



DANGER

Moving parts can cause severe personal injury. Use extreme caution around moving parts. All guards must be properly fastened to prevent unintended contact.



WARNING

Never pull or pry on the fan. This can damage the fan blade(s) and cause fan failure.

Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.3.4 Inspecting the JW and LTA radiator hoses

Prior to inspecting the radiator hoses, immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

As shown in [Figure 7-31](#) and [Figure 7-32](#), inspect the JW lower and upper radiator tubes and hoses and their associated clamps for damage. If a radiator hose, tube, or clamp is damaged, replace it. If a clamp is loose, re-tighten it correctly.

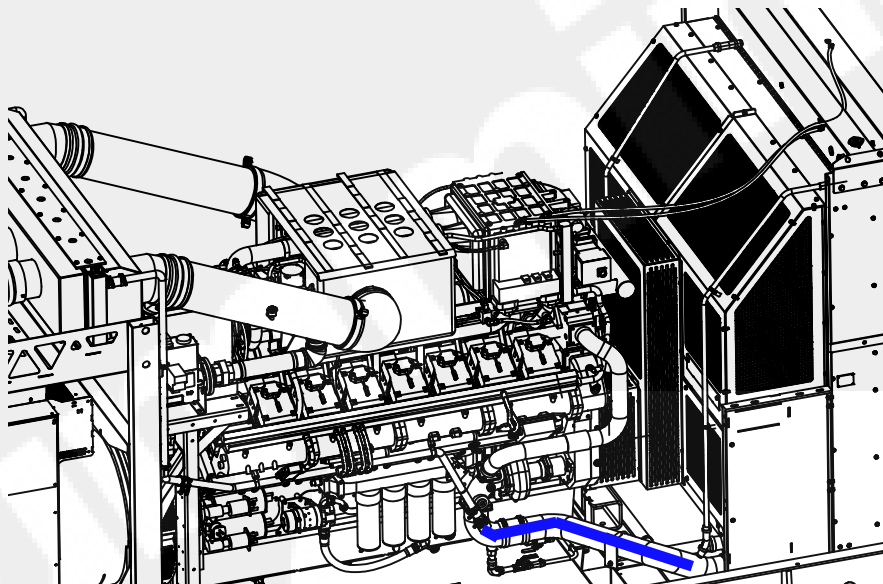


Figure 7-31 JW radiator lower hose (GenSet right side)

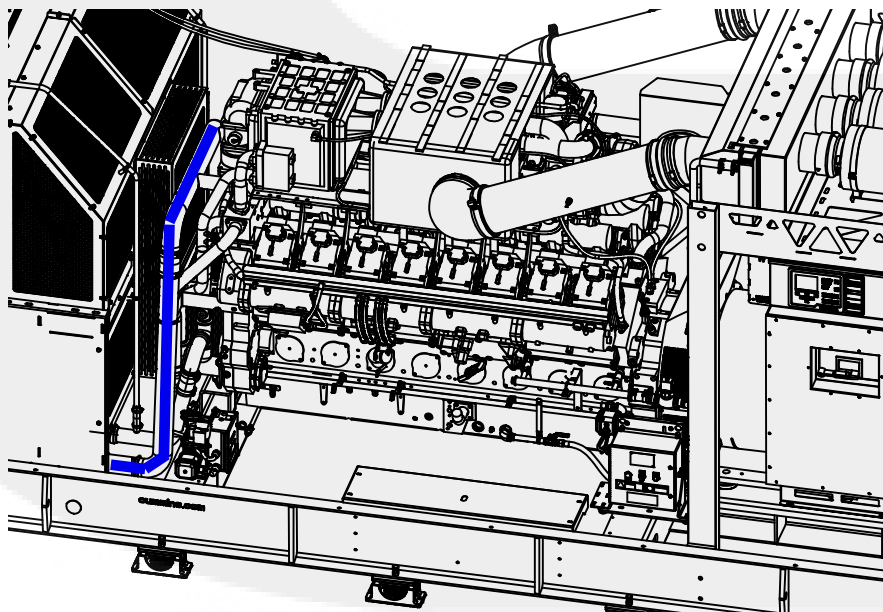


Figure 7-32 JW radiator upper hose (GenSet left side)

As shown in [Figure 7-33](#), inspect the LTA lower and upper radiator hoses and their associated clamps for damage. If a radiator hose or clamp is damaged, replace it. If a clamp is loose, re-tighten it correctly.

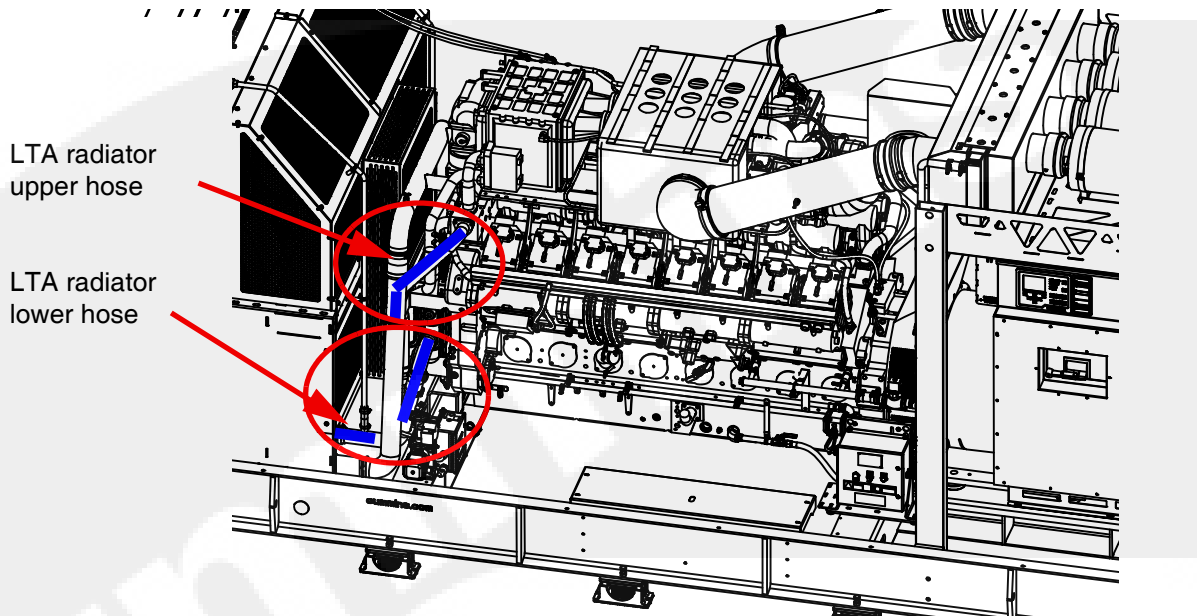


Figure 7-33 LTA radiator upper and lower hoses (GenSet left side)

Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.4 Air filter replacement

The GenSet has an air cleaner service indicator on the right air transfer tube on the GenSet. Every two years or when the air restriction indicator gauge has crossed the red mark (see [7.4.2 Air cleaner restriction indicator reading](#)), replace all four air filter elements at once. This GenSet uses a disposable housing filter element. Do not attempt to clean and re-install these air filters. Do not over-service the air cleaner element. Over-servicing may cause dirt to enter the engine causing premature wear.

To replace the filter elements:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

2. Loosen the two band clamps around each metal housing (shown in [Figure 7-34](#)).

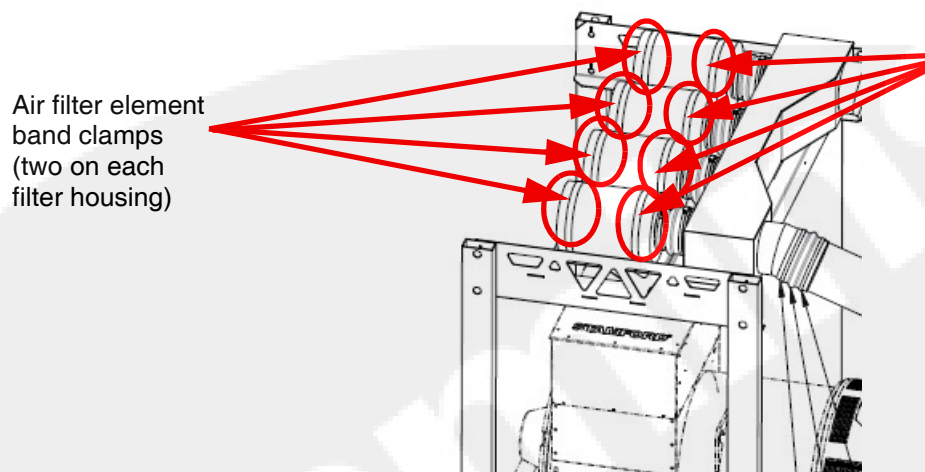


Figure 7-34 Air filter band clamps (GenSet right side)

3. Loosen the clamp on the rubber coupling to each air filter (shown in [Figure 7-35](#)).

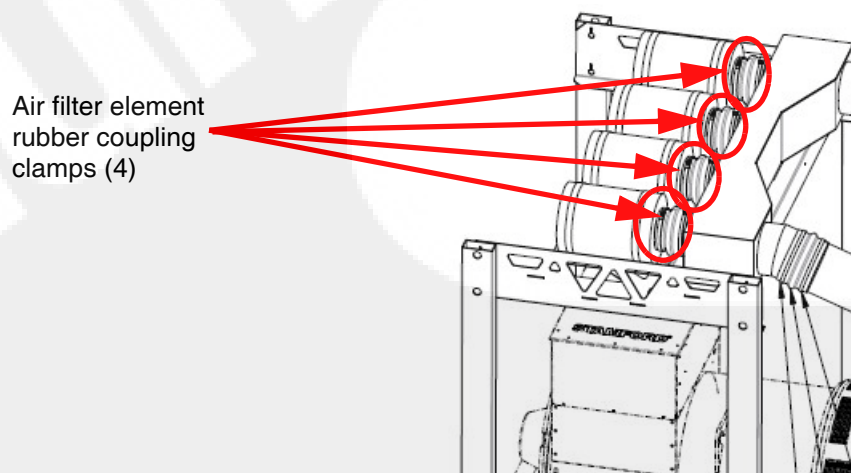


Figure 7-35 Air filter rubber coupling clamps (GenSet right side)

4. Twist and pull to remove the filter housing.
5. Slide a new filter housing into place.
6. Rotate the housing to orient the grate opening on the housing to generally the 3 or 9 o'clock position.
7. Re-tighten the mounting band clamps (2) and hose clamp (1) on the rubber couplings.
8. Repeat steps 4 through 7 to replace the other three air filter elements.

9. Reset the air filter service indicator by pressing the center of the yellow cover where it says "PUSH CENTER TO RESET".
10. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.5 Belt maintenance

Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

Visually inspect a belt through the guarding and check for:

- Intersecting cracks. Small transverse (across the belt width) cracks are acceptable. Longitudinal (direction of belt length) cracks that intersect with transverse cracks are NOT acceptable.
- Frays or pieces of material missing.
- Glazed or cracked side walls.
- Uneven wear on sidewalls of the belt.
- Heavy rust on belt grooves



Belt in good condition



Belt showing signs of wear

Figure 7-36 Belt wear examples

Visually inspect the sheaves through the guarding and check for:

- Damaged or worn grooves.
- Breaks on flanges of grooves.
- Frays or pieces of material missing.



Figure 7-37 Sheave wear examples

As shown in [Figure 7-38](#), belt tension is measured by pushing the belt halfway between the fan drive pulley and alternator pulley at the specified force to measure the deflection (1).

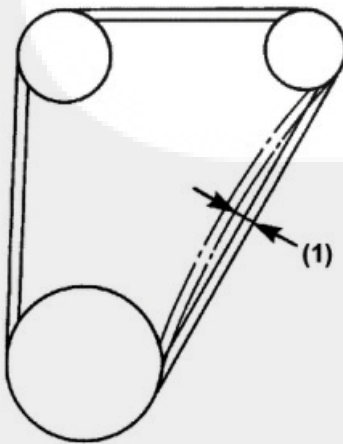


Figure 7-38 Checking belt tension

7.5.5.1 Adjusting the alternator belt tension

To ensure optimal GenSet operation, it may be necessary to adjust the alternator belt tension. [Figure 7-42](#) shows the location of the alternator fan access panels.

To adjust the alternator belt tension:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. [Figure 7-39](#) shows the alternator belt cover. To access the alternator belt:
 - a. Remove the bolts on the rear access panel and slide the panel outward
 - b. Remove the top two and bottom two alternator cover mounting nuts and slide the belt cover up and forward to remove it

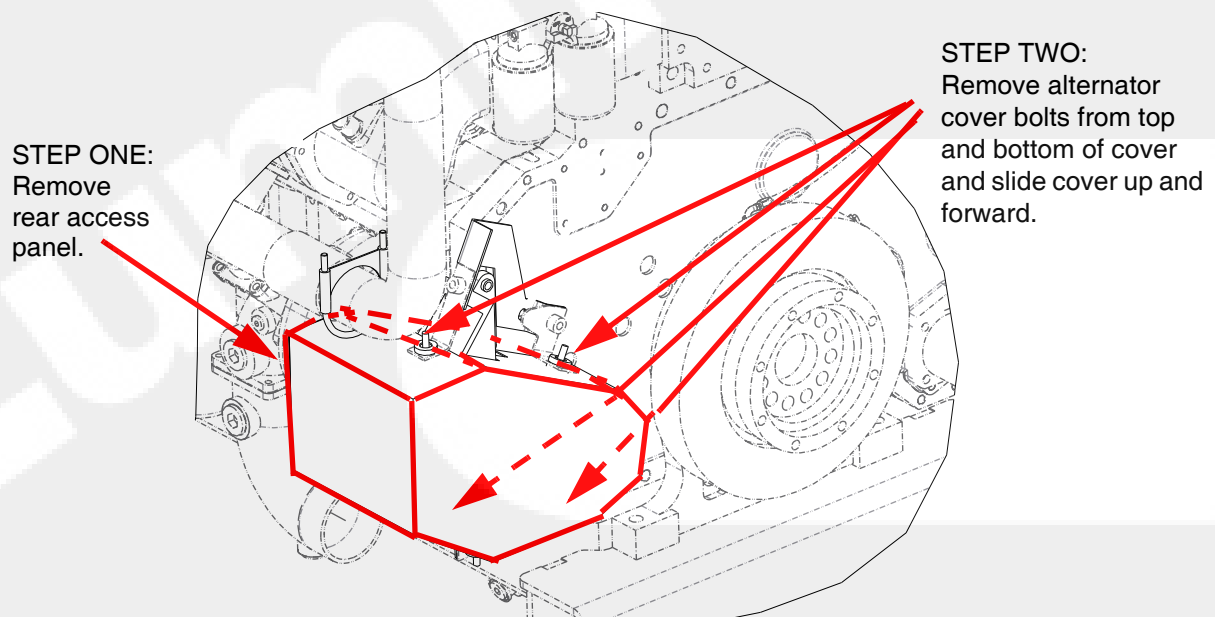


Figure 7-39 GenSet alternator belt cover (GenSet left side)

3. Apply moderate thumb pressure to the alternator belt between the pulleys. As shown by “1” in [Figure 7-40](#), proper belt tension is a deflection (when the belt is pulled in the middle of the span) of 0.28 to 0.35 in. (7 to 9 mm) under a load of 22 lbs. (10 kg). See also [Figure 7-38](#).

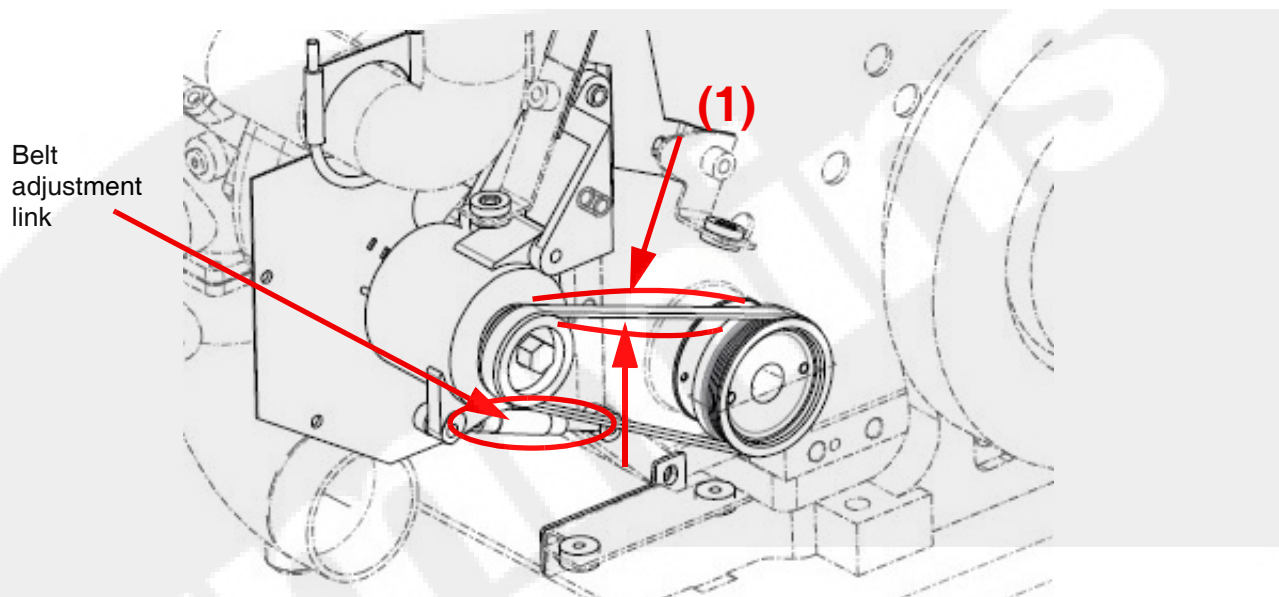


Figure 7-40 GenSet alternator belt tension

4. If the tension is incorrect, the alternator belt must be adjusted. Loosen the alternator mounting screw. Loosen the jam nuts on the alternator adjustment link and rotate the turnbuckle to increase its length until the alternator belt tension is appropriate. Tighten the jam nuts on the adjuster link and the alternator mounting bolt.
5. Re-install the alternator cover and the nuts and reinstall the rear access panel and bolt tight.
6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.5.2 Replacing the alternator belt

To replace the alternator belt:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. To access the alternator belt (see [Figure 7-39](#)):
 - a. Remove the bolts on the rear access panel and slide the panel outward
 - b. Remove the top two and bottom two alternate cover mounting nuts and slide the belt cover up and forward to remove it

3. As shown in [Figure 7-41](#), loosen the alternator mounting screw. Loosen the jamb nuts on the alternator adjustment link and back them off to the end of the threads.

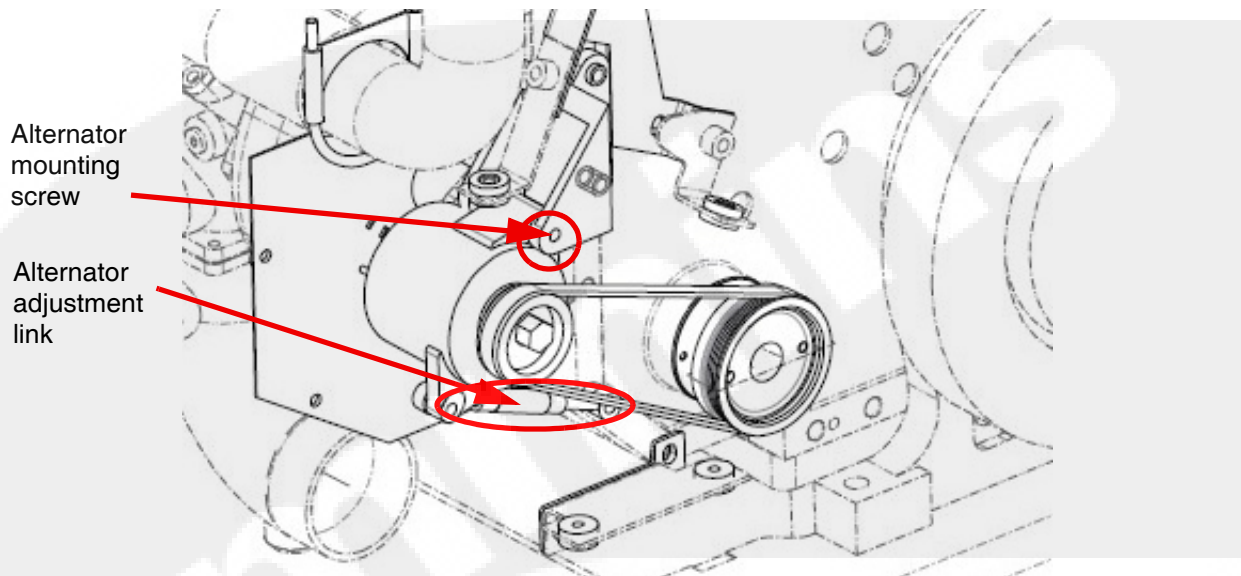


Figure 7-41 GenSet alternator belt tension

4. Rotate the turnbuckle to shorten the link until the old belt can be lifted off and a new belt can be installed. See [7.5.5.1 Adjusting the alternator belt tension](#).
5. Tighten the jamb nuts on the alternator adjustment link and the alternator mounting bolt.
6. Re-install the alternator cover and the nuts and reinstall the rear access panel and bolt tight.
7. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.5.3 Adjusting the radiator fan belt tension

To ensure optimal GenSet operation, it may be necessary to adjust the radiator fan belt tension.

IMPORTANT: *The radiator fan belt may need periodic adjustment during the first 24-48 hours of runtime.*

NOTE: *The radiator fan drive uses six (6) 5VX profile belts, 1160 mm long. When replacing belts, they must be ordered and replaced as a matching set.*

To adjust the radiator belt tension:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

2. Remove the bolts of the radiator fan access panels (shown in [Figure 7-42](#)) and carefully remove the panels.

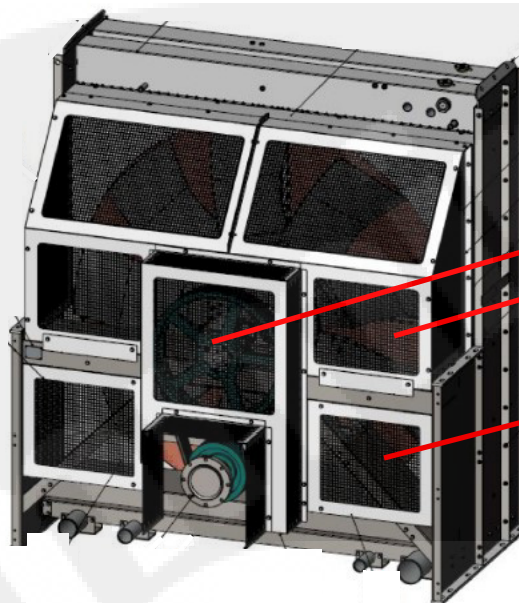


Figure 7-42 Radiator fan access panels ((back of GenSet radiator)

3. In the middle of the belt span (opposite side of tensioner), confirm the fan belt tension is approximately 13/64 inch deflection at 16-25 pounds of effort. If the belt is too loose, the belt may slip. If the belt is too tight, the fan belt and bearing life can be reduced.
4. If the tension needs to be adjusted, slightly loosen the idler assembly mounting bolts. Loosen the jamb nut on the adjusting screw. Turn the adjusting screw as needed to affect the belt tension. Re-tighten the jamb nut and mounting screw.
5. Re-install all guards and bolt tight.

IMPORTANT: *DO NOT RUN THE GENSET WITHOUT ALL BELT GUARDS IN PLACE.*

6. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.5.4 Replacing the radiator fan belt

To replace the radiator fan belt:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Remove the bolts of the radiator fan access panels and carefully remove the panels (shown in [Figure 7-42](#), above).
3. Slightly loosen the idler assembly mounting bolts. Loosen the jamb nut on the adjusting screw. Turn the adjusting screw to retract the idler fully.

4. Remove all six belts and discard them.
5. Replace the radiator fan belts with a new matched set of belts.
6. Set the fan belt tension to be 13/64" deflection at 16-25 pounds. See also [7.5.5.3 Adjusting the radiator fan belt tension](#).
7. Tighten adjusting screw jamb nut and idler assembly mounting bolts.
8. Re-install the radiator fan access panels and bolt tight.
9. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#)

7.5.6 Battery maintenance



WARNING

Accidental starting of the GenSet can cause severe personal injury or death. Press the Emergency Stop button and disconnect the charger before disconnecting battery cables. Disconnect negative (-) cable first and reconnect last. To prevent arcing, use an insulated wrench to connect the positive battery cable before connecting the negative battery cable.



WARNING

Ignition of explosive battery gases can cause severe personal injury or death. Arcing at battery terminals, light switch or other equipment, flame, pilot lights and sparks can ignite battery gas. Do not smoke, or switch trouble light ON or OFF near battery. Discharge static electricity from body before touching batteries by first touching a grounded metal surface.

Always replace the starting battery with the same number and type (vented, lead acid) of battery. Properly dispose of the expired battery in accordance with local environmental agency requirements.

NOTE: *Servicing of the batteries is to be performed or supervised by trained personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from battery components.*

A significant amount of GenSet failures are due to battery issues. It is therefore vital that batteries are stored, commissioned, and maintained as detailed here. Reference should also be made to the battery manufacturer's instructions. Batteries require attention at all times, even when not working. A battery will not last if it is neglected.

IMPORTANT: *The battery charger must be connected to a power source that is protected by a ground fault circuit interrupter (GFCI).*

Handling and proper use of batteries is not hazardous if the correct precautions are observed and personnel are trained in their use:

- Use proper PPE. Wear full eye protection and protective clothing.
- To prevent dangerous arcing, always disconnect the negative(-) ground cable from the battery using an insulated wrench, before working on any parts of the electrical system or the engine. Discharge static electricity from body before touching batteries, by first touching a grounded metal surface.

- Thoroughly ventilate battery area before working on the battery. Do not smoke while servicing batteries, or cause sparks or arcing that may ignite battery gases. Ignition of explosive battery gases can cause severe personal injury.
- Check the terminals on the batteries for clean and tight connections. Loose or corroded connections create resistance, which can hinder starting. Clean and reconnect the battery cables if loose, using an insulated wrench. Keep the battery terminals and connections free from corrosion by lightly coating them with petroleum jelly.
- Do not wear jewelry. Remove any conductive items from pockets. These items can fall into equipment and result in a short circuit, which can cause shock or burning. Refer to local standards for PPE details (in the U.S, see NFPA 70).
- Laying tools or metal objects across the battery can cause arcing that may ignite battery gases causing explosions resulting in personal injury. Never lay tools or metal objects across the top of the battery.
- Keep batteries upright to prevent spillage. Electrolyte is a dilute sulphuric acid that is harmful to the skin and eyes.
- Keep the battery, and the battery area, clean and dry. If fitted, ensure that the vent caps are securely screwed down, or pushed home. To avoid contamination of the battery, only clean it when the vent plugs (if fitted) are in place.
- Before disconnecting a battery, always remove power from the AC powered battery charger. Failure to do so can result in voltage spikes high enough to damage the DC control circuits of the GenSet.
- Make sure each battery is secured to prevent movement.
- Check the battery harness connections. If any harness connections are damaged, contact your service representative.
- Before disconnecting a battery, isolate the utility-powered or solar-powered battery charger.
- Use tools with insulated handles to prevent the risk of electric shock. To disconnect the battery, use an insulated wrench to disconnect the negative cable first. To connect the battery, use an insulated wrench to connect the negative cable last.
- Electrolyte is a dilute sulphuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. Wear full eye protection and protective clothing. If electrolyte contacts the skins, wash it off immediately with water. If electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention.
- Wash spilled electrolyte down with an acid neutralizing agent. A common practice is to use a solution of one pound (500 grams) bicarbonate of soda (also known as baking soda or sodium bicarbonate) to one gallon (4 liters) of water. Continue to add the bicarbonate of soda solution until the evidence of reaction (that is, foaming) has stopped. Flush the resulting liquid with water and dry the area.



7.5.6.1 Cleaning the batteries

To properly clean the batteries:

1. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
2. Wipe the batteries with a damp cloth wherever dirt appears excessive.

IMPORTANT: *Be sure the vent plugs are tight to prevent the cleaning solution from entering the cells.*

3. If corrosion is present around the terminal connections, remove the battery cables and wash the terminals with a solution consisting of 4 oz. (113 g) of baking soda added to 1 quart (.94 Liter) of water. (This solution is also used for removing spilled electrolyte.)
4. After cleaning, flush the outside of the battery and surrounding areas with clean water.
5. Keep the battery terminals clean and tight. After making the connections, coat the terminals with a light application of petroleum jelly or non-conductive grease to retard corrosion.
6. After cleaning, make sure the battery and surrounding areas are dry.
7. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.6.2 Replacing a battery

Always use correct handling techniques to lift and move a battery.

Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#). To disconnect the battery, use an insulated wrench to disconnect the negative cable first. Always replace the starting battery with the same number and type (vented, lead acid, maintenance-free, Ni-Cad) of battery. To connect the battery, use an insulated wrench to connect the negative cable last. Properly dispose of the expired battery in accordance with local environmental agency requirements. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).



Electrolyte or explosion of battery can cause severe personal injury or death. Do not burn the battery in a fire for disposal. Do not open or mutilate batteries. Damage to the battery case will release electrolyte which is harmful to the skin and eyes and is also toxic. Burning of a battery may cause an explosion. Comply with all local health and safety regulations/codes during handling or disposal.

NOTE: *Nickel-cadmium (Ni-Cad) battery systems are often required in extreme high or low ambient temperatures because their performance is less affected by temperature extremes than that of lead-acid batteries. Ni-Cad batteries require special battery chargers in order to bring them to the full-charge level. These chargers must be provided with a filter to reduce "charge ripple" which can disrupt the engine and GenSet control systems. The battery charger must be connected to a power source that is protected by a ground fault circuit interrupter (GFCI).*

7.5.6.3 Fuel system maintenance

Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).

To properly maintain the GenSet fuel system:

- Visually inspect the fuel lines and piping, filters, and fittings for evidence of leakage.
- Check that all fuel plumbing is in good condition with no cracks or leaks.
- Be sure that the lines are properly supported and that the nuts and clamps are securely tightened. To tighten hose clamps to the proper torque, use a hose-clamp torque wrench. If the clamps do not seal at the specified torque, replace the clamps, the hose, or both.
- Make sure all fuel system electrical connections are working and able to function as required.
- Examine electrical connections and wiring insulation adjacent to fuel lines for fire safety.
- The fuel strainer is made of fine mesh and is installed at the gas supply to the GenSet. Periodically remove and clean the fuel strainer to prevent the accumulation of dirt, sand, rust, etc.

Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.7 Coolant heater maintenance

IMPORTANT: *Prior to inspecting or performing maintenance activities regarding the GenSet coolant heater, the heater must be de-energized (disconnected from the independent utility power supply).*

7.5.7.1 Checking and cleaning the coolant heater components

To properly maintain the GenSet coolant heater:

1. With the GenSet running, check the coolant heater outlet temperature to ensure that coolant is flowing. If the coolant temperature along the return hose exceeds 140 °F (60 °C) or the pump produces a loud, rattling sound during operation, it may indicate:
 - a. Air pockets are restricting coolant flow. Air may collect due to loops in hose, routing hose over the top of the engine, excessive hose lengths, or kinks. Reroute the coolant hoses or change port locations.
 - b. Contaminants in the coolant are restricting flow. Flush the coolant system and refill. See [7.5.2.6 Draining and flushing the coolant](#).
2. Remove the coolant heater from the independent power source.
3. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#). Allow the heating system to cool.
4. Check and replace cracked or weakened hoses. See [7.5.3.4 Inspecting the JW and LTA radiator hoses](#).
5. Check the electrical wiring for wear and excessive heat.

6. As shown in [Figure 7-43](#), clean the coolant heater heating element:
 - a. Remove the coolant heater heating element assembly enclosure cover.
 - b. Unscrew the wiring enclosure screws to remove the wiring enclosure.
 - c. Unscrew the element plate screws and remove the plate and element from the tank.
 - d. Clean the coolant heater tank.
 - e. Re-assemble the coolant heater components.

IMPORTANT: *Ensure that the o-rings are in place.*

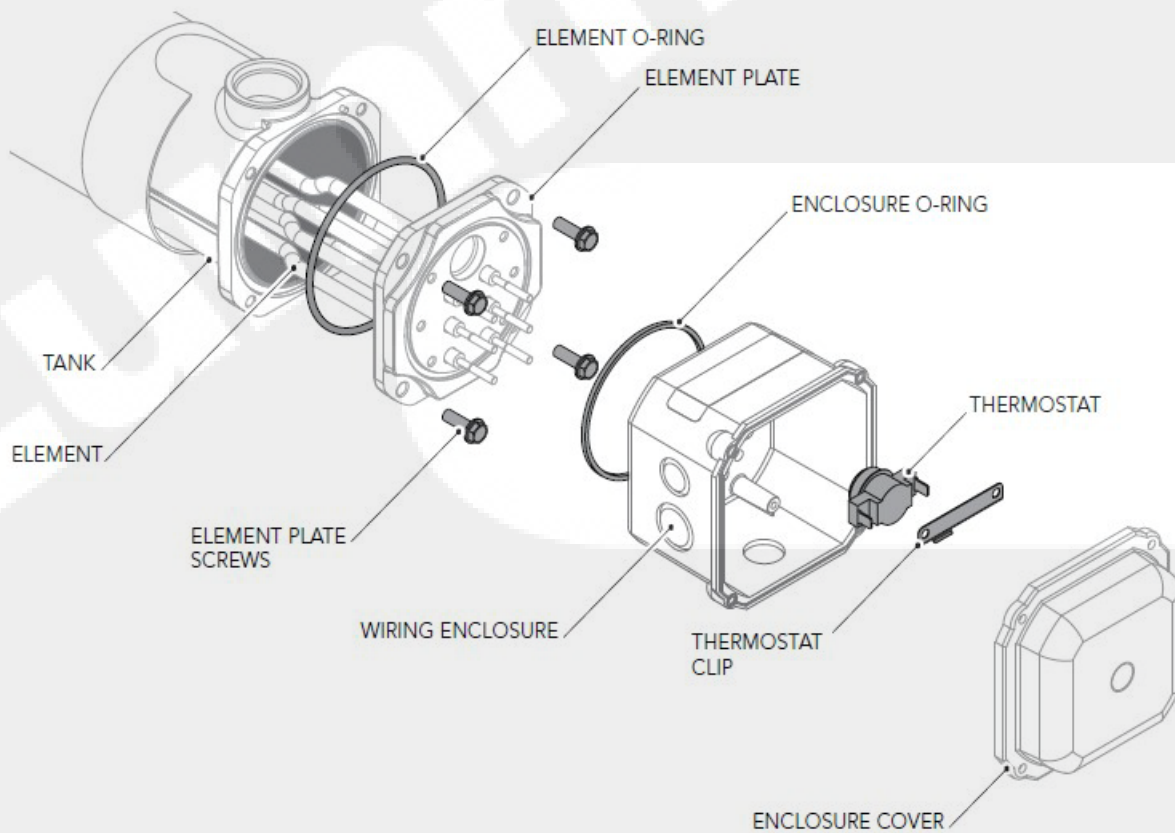


Figure 7-43 GenSet coolant heater components

7. Reconnect the coolant heater to the independent power source.
8. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.7.2 Replacing the coolant heater thermostat

The coolant heater components are shown in [Figure 7-43](#).

1. Remove the coolant heater from the independent power source.
2. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#). Allow the heating system to cool.
3. Remove the coolant heater heating element assembly enclosure cover.
4. Unscrew the wiring enclosure screws to remove the wiring enclosure.
5. Disconnect the terminals from the thermostat sensing unit spade connectors.
6. As shown in [Figure 7-44](#), loosen the thermostat clip.

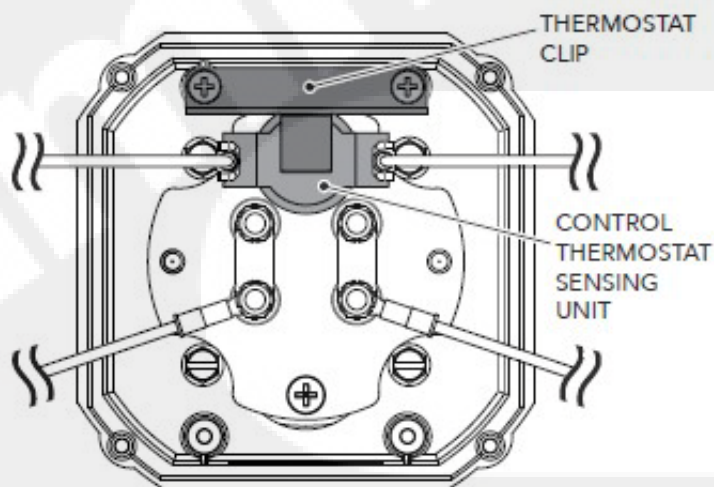


Figure 7-44 GenSet coolant heater thermostat sensing unit

7. Remove the thermostat and place the new thermostat in the recessed space.
 8. Tighten the thermostat clip.
 9. Re-assemble the coolant heater components.
- IMPORTANT:** *Ensure that the o-rings are in place.*
10. Reconnect the coolant heater to the independent power source.
 11. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.8 Lube oil heater maintenance

IMPORTANT: *Prior to inspecting or performing maintenance activities regarding the GenSet lube oil heater, the heater must be de-energized (disconnected from the independent utility power supply).*

7.5.8.1 Checking and cleaning the lube oil heater components

To properly maintain the GenSet lube oil heater:

1. Remove the lube oil heater from the independent power source.
2. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).
3. Periodically check plumbing connections for leaks and, if necessary, tighten connections. A loose connection on the suction side will cause a loss of flow and cavitation in the pump. It can also pull air into the heating tank and cause an element failure. Replace any cracked or weakened hoses.
4. Tighten all electrical connections. Vibration may cause terminals to loosen.
5. Periodically check and tighten all mounting bolts. Vibration may cause mounting bolts to loosen.
6. Check for continuity across the coil connections to test for failure; an open or direct-short reading indicates a failed contactor coil.
7. Periodically inspect the contacts on the magnetic contactor for welding, arc erosion and mechanical wear. If any of these conditions exist, replace the magnetic contactor.
8. Check the pump mechanical seal. Pump mechanical seals are controlled leakage devices and are not intended to create a zero leak seal. Some leaking from the seal is expected during normal operation. If the seal becomes worn, replace it.

9. As shown in [Figure 7-45](#), clean the lube oil heater heating element:
 - a. Remove the lube oil heater heating element assembly enclosure cover.
 - b. Unscrew the wiring enclosure screws to remove the wiring enclosure.
 - c. Unscrew the element plate screws and remove the plate and element from the tank.
 - d. Clean the lube oil heater tank.
 - e. Re-assemble the lube oil heater components.

IMPORTANT: *Ensure that the o-rings are in place.*

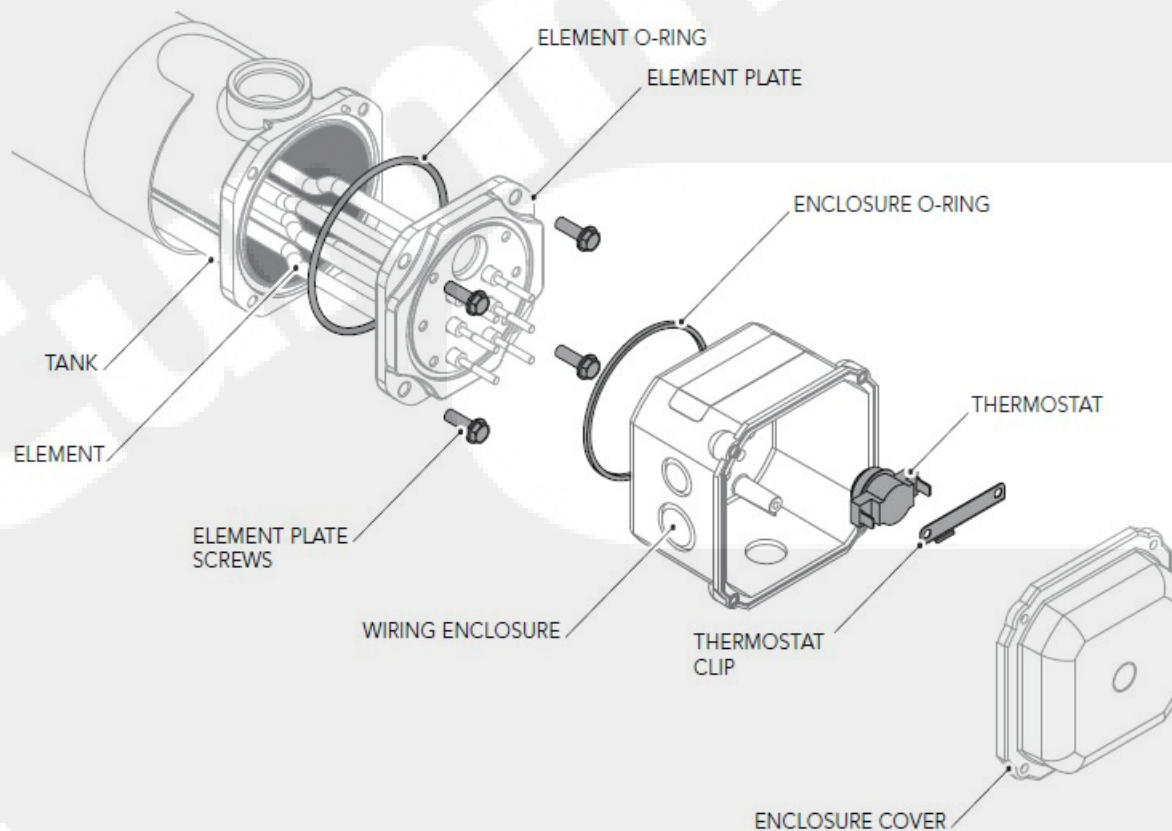


Figure 7-45 GenSet lube oil heater components

10. Reconnect the coolant heater to the independent power source.
11. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.8.2 Replacing the lube oil heater thermostat and heating element

The lube oil heater components are shown in [Figure 7-45](#).

1. Remove the lube oil heater from the independent power source.
2. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#). Allow the heating system to cool.
3. Remove the lube oil heater heating element assembly enclosure cover.
4. Unscrew the wiring enclosure screws to remove the wiring enclosure.

IMPORTANT: Note the GenSet's phase configuration and wire connection positions. Replacement elements may be a different phase configuration.

5. As shown in [Figure 7-46](#), loosen the thermostat clip.

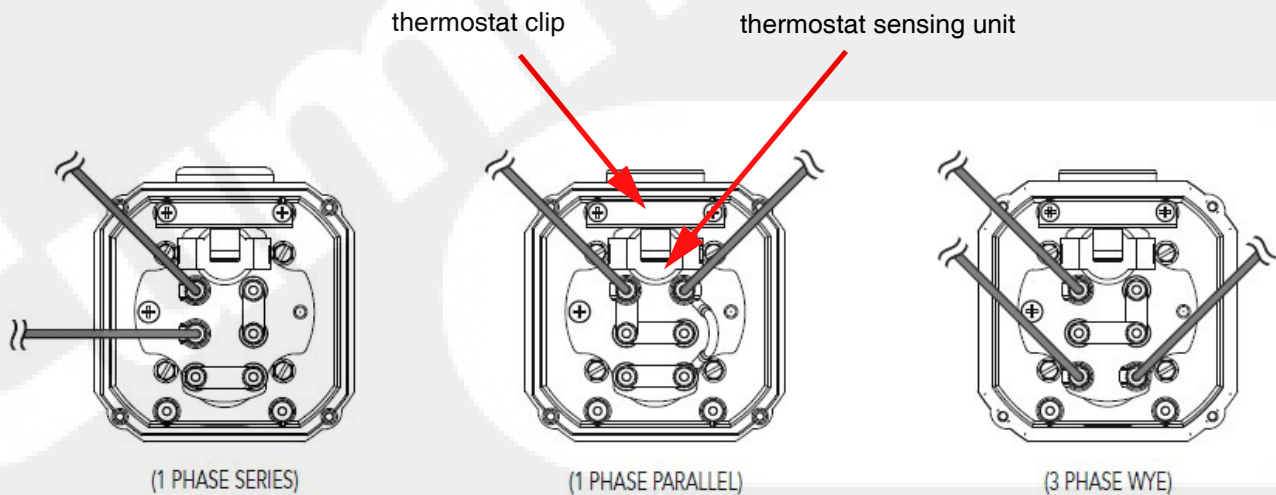


Figure 7-46 GenSet lube oil heater element plate

6. Disconnect the ground (green/yellow) and power electrical wires from the element posts inside the wiring enclosure.
7. Note the positions of the quick disconnect (QD) terminals on the high-limit thermostat (G) spade connectors and then remove the QD connections.
8. Disconnect the terminals from the thermostat sensing unit spade connectors.
9. Remove the thermostat and place the new thermostat in the recessed space.
10. Tighten the thermostat clip.
11. Remove the wiring enclosure from the element plate.
12. Remove the element plate screws and then remove the element from the tank.

13. Replace the element.

IMPORTANT: *Ensure that the o-rings are in place.*

14. To reassemble the heating element and tank, follow the steps listed above in reverse order.
 - a. Make sure the ground and power electrical wires are properly reconnected using the provided washers, cup washers and nuts.
 - b. Ensure that the high-limit thermostat is held in place with the thermostat plate.
 - c. Reconnect electrical connections to their original positions. Ensure the enclosure O-ring is in place.
 - d. Tighten the element plate screws to 144 lb·inch (16 N·m).
15. Reconnect the lube oil heater to the independent power source.
16. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.8.3 Replacing the lube oil heater control thermostat sensing unit

1. Remove the lube oil heater from the independent power source.
2. Immobilize the GenSet. Follow the accidental restart instructions in [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#). Allow the heating system to cool.
3. Remove the lube oil heater heating element assembly enclosure cover.
4. Unscrew the wiring enclosure screws to remove the wiring enclosure.
5. As shown in [Figure 7-46](#), loosen the thermostat clip and note the position of the thermostat sensing unit.

6. As shown in [Figure 7-47](#), replace the lube oil heater control thermostat sensing unit:

NOTE: The thermostat well (A) is a dry well; removing the thermostat well from the oil tank is not required to complete this procedure.

- a. Pull the plug (C) from the thermostat well (A). The control thermostat sensing unit (B) will be attached to the plug.
- b. Remove the control thermostat sensing unit (B) from the plug (C).
- c. Insert a new control thermostat sensing unit into the plug (C). Push the plug (C) into the thermostat well (A). Hand tighten the hex nut to the well.

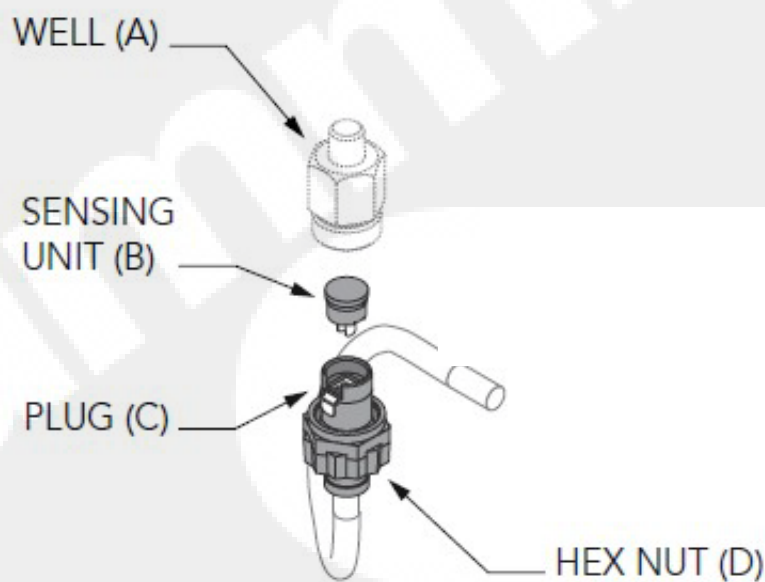


Figure 7-47 GenSet lube oil heater control thermostat sensing unit

7. Re-assemble the lube oil heater components.
8. Reconnect the lube oil heater to the independent power source.
9. Reconnect the GenSet following the instructions in [7.1.2 Reconnecting the GenSet after maintenance activities](#).

7.5.9 Intake air warming system maintenance (if equipped)

The intake air warming system (if equipped) does not require periodic maintenance of its own except with regard to its coolant. The system self-regulates and should not require any interaction from the user. To check the coolant, add coolant, or drain and flush the intake air warming system, see [7.5.2.2 Checking the coolant level at the intake air warmer \(if equipped\)](#), [7.5.2.5 Adding coolant to the intake air warmer, if equipped](#) and [7.5.2.6 Draining and flushing the coolant](#).

When air cleaners are replaced (see [7.5.4 Air filter replacement](#)), inspect the face of the intake air warming system core for dust or other debris build up. Clean the core, if necessary (see [7.5.3.1 Inspecting the radiator core](#)).

IMPORTANT: *DO NOT RUN THE GENSET WITH THE INTAKE AIR WARMER FILL CAP REMOVED OR LOOSE.*

Refer also to [8.7 Intake air warmer troubleshooting](#) for more information.

7.5.10 GenSet enclosure maintenance (if applicable)

Check the GenSet enclosure. Visually check the enclosure and perform a walk around inspection of GenSet. Make sure no inlets/outlets are covered/restricted, service access doors are operational, and safety systems are in place and operational. To replace damaged parts, contact your authorized distributor.

8 - Troubleshooting

8.1 Introduction

This section outlines basic troubleshooting measures for remedying generator set (GenSet) operational issues. For detailed instructions to assist in locating and identifying the possible causes of faults in the GenSet, refer to the specific PCC manual. Refer also to the engine-specific operator manual for engine specifications. See [2.2 Related literature](#).

IMPORTANT: *Before any work is carried out for significant maintenance, the GenSet must be immobilized. If a GenSet is paralleled with others, all GenSets being paralleled must be immobilized before any work is performed on any one of them. Even if the GenSet(s) is put out of service by pressing the Stop button on the Operator Panel, the GenSet(s) cannot be considered safe to work on until the engine(s) is properly immobilized. [7.1.1 Locking the GenSet out for maintenance - accidental restart prevention](#).*

8.2 Basic troubleshooting and safety considerations

Before starting any fault finding actions, perform the following general inspections:

- Ensure that all switches and controls are in their correct positions.
- Check for adequate fuel.
- Check for adequate lubricating oil.
- Check for adequate coolant.
- Ensure that the area around the radiator and the radiator core are free from obstruction.
- Check for adequate battery charge.
- Secure the battery connections.
- Secure the electronics and alternator connections.
- Secure the panel connections.
- Ensure that the protection circuits have been replaced.
- Ensure that blown fuses have been replaced.
- Reset any tripped contactors or circuit breakers.

8.3 Line circuit breaker issues

The optional line circuit breaker mounts in the GenSet output box. If the load exceeds the circuit breaker current rating, the line circuit breaker will open, preventing the GenSet from being overloaded. If the circuit breaker trips, disconnect the load(s), locate the source of the overload or short circuit, and correct as necessary. Manually reset the breaker to reconnect the load to the GenSet (push the circuit breaker to **OFF** to reset it and then to **ON** to reconnect the circuit). Call a qualified electrician, if necessary.

Validate that the bus rotation is clock-wise “A, B, C”.

8.4 Controls and diagnostics issues

See your authorized Cummins dealer regarding software, hardware and/or network requirements for control and diagnostics via computer or network. Refer to the PCC manual, if applicable. To troubleshoot the remote control panel, see drawing A067G824 in Section 10 of this manual.

8.5 Operator panel indicator lamps

The operator panel digital display on the front of the GenSet includes Indicator Lamps that illuminate when necessary. These Indicator Lamps do not illuminate if they are not called by the GenSet PC.

When the **Lamp Test** button (the light-bulb icon) is depressed, all of the LED lamps should illuminate for five seconds indicating that all warning indicators are working properly. The **Warning** LED illuminates a yellow lamp whenever the PC detects a condition in the operation of the GenSet that warrants attention. This lamp is automatically shut off when the problematic condition no longer exists.

Refer to the PCC manual.

8.6 Fault codes

The Power Command Control (PCC) continuously monitors engine sensors for abnormal conditions, such as low oil pressure and high coolant temperature. If any of these conditions occur, the operator panel will illuminate the **Warning Indicator Lamp** (yellow) and display a **Fault Code** on the digital display. In the event of an engine shutdown fault (red Shutdown LED), the control will stop the engine immediately.

Should a fault condition occur during operation, consult the PCC manual to locate and correct the problem. Fault codes generally require an authorized service representative to correct the fault.



WARNING

Troubleshooting procedures present hazards that can result in severe personal injury or death. Only qualified service personnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures.

8.6.1 Fault messages

A fault message is an indicator of a Warning or Shutdown condition. It includes the fault type (Warning or Shutdown), fault number, and a short description. It also includes where the fault occurred if the GenSet control did not detect the fault and is simply reporting the fault.

Active and acknowledged faults may be viewed in the **Faults** menu.

Refer to the PCC manual.



8.6.2 Fault acknowledgment

A fault must be acknowledged after the fault has been corrected. Faults are cleared from the operator panel (or the remote operator panel, if installed) by pressing the **Off mode** button.

Faults are re-announced if they are detected again after being acknowledged.

Refer to the PCC manual.

8.7 Intake air warmer troubleshooting

The air warmer is intended to maintain the intake air stream above 65 °F when the ambient air is below that threshold. The system allows a limited flow of engine coolant into the air plenum heater as needed to warm the engine intake air. The frequency of operation will depend on the GenSet loading and ambient temperature at the time. Less load or warmer temps will mean less frequent operation or even none at all. If your GenSet experiences running issues that are suspected to be related to this system, see below.

8.7.1 GenSet is difficult to start (in cold weather)

If the GenSet is difficult to start in cold weather, the coolant heater may not be functioning properly. To troubleshoot the coolant heater:

- Confirm the coolant heater has power
- Confirm the coolant heater heating element is operating
- Confirm the coolant heater pump is operating

8.7.2 GenSet has rough or erratic idle (in cold weather)

If the GenSet is experiencing rough or erratic operation at idle, the GenSet flow solenoid may not be opening or the GenSet air temperature switch may not be functioning properly. Troubleshoot the flow solenoid and the air temperature switch:

- Confirm that the flow solenoid has power and that the fuse is intact (see wiring schematic A067G824 in [10 - C1000N6B and C1300N6 drawings](#)).
- Confirm that the flow solenoid is opening. If the ambient air temperature is below 65 °F, the temperature of the pipe downstream of the solenoid should be warmer than ambient - and at times - approaching the temperature of the engine coolant.
- Confirm that the air temperature switch is working properly. The air temperature switch is described as a "normally closed" switch that "opens" on rise. Using a voltmeter or a test light, the switch should read CONTINUOUS when the ambient temperature is below approximately 70 °F.

8.7.3 GenSet speed is hunting or there is audible turbo surge (in cold weather)

If the GenSet speed is hunting or there is audible turbo surge, follow the troubleshooting steps outlined in [8.7.2 GenSet has rough or erratic idle \(in cold weather\)](#).

8.7.4 GenSet displays High Intake Temp fault code

If the GenSet displays the **High Intake Temp** fault code on the PCC screen:

- **AT FULL LOAD OR PARTIAL LOAD**, the GenSet air temperature switch failed to open. The GenSet air temperature switch is described as a "normally closed" switch that "opens" on rise. Using a voltmeter or test light, the switch should read OPEN when the ambient temperature is below approximately 70 °F.

- **FOLLOWING FULL LOAD SHED**, the GenSet flow solenoid is not closing. If the ambient temperature is above 75 °F, the coolant pipe should not be warmer than its surroundings.
- **This may not be an issue.** Certain combinations of ambient temperature, load, and the timing of GenSet shutdown may produce a nuisance fault that is not indicative of any failure in the intake air warming system. The air temperature switch threshold can be adjusted slightly to lower the cycling range. The screw may be rotated clockwise no more than 30 degrees (1/12th of a turn). This will lower the cycling window by approximately 8 °F.

9 - C1000N6B and C1300N6 specifications

9.1 Introduction

Agency-certified products purchased from Cummins comply only with those specific requirements and as noted on company product datatag. Subsequent modifications must meet commonly accepted engineering practices and/or local, state and national codes and standards. Product modifications must be submitted to the local authority having jurisdiction (AHJ) for approval. The information, specifications, and recommended guidelines in this manual are based on information in effect at the time of printing. Cummins reserves the right to make changes at any time without obligation. If you find differences between your engine and the information in this manual, contact your local Cummins Authorized Repair Location or call 1-800-CUMMINS (1-800-286-6467) toll free in the U.S. and Canada.

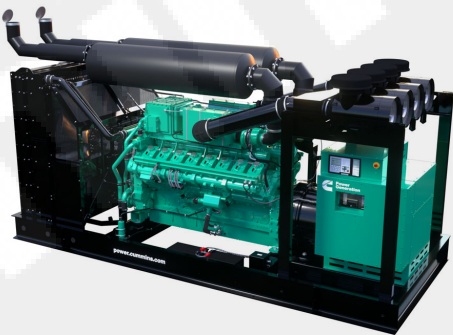
9.2 C1000N6B and C1300N6 specification sheet



Specification sheet

Gaseous fuel generator set

1000 kW - 1300 kW
60 Hz



Description

You can count on the 1000-1300 kW natural gas generator set (GenSet) for the reliability, quality, and dependability that is genuine Cummins performance. EPA-certified, this fully-integrated power generation system provides optimum performance and versatility for demand response and stationary standby power applications.

Features

- Over 100 years of Cummins power generation technology and innovation
- Listed to UL 2200 and CSA standards for all low voltage models
- Stamford rugged and reliable alternator with state-of-the-art technology
- One-year (demand response) and two-year (standby) base warranty supported by a worldwide Cummins twenty-four hour, seven days-a-week, distributor network
- Accepts 100% rated load in a single step
- Capable of meeting NFPA 110 Type 10 for Level 1 emergency or standby power supply systems (EPSSs) when installed and operated per Cummins and NFPA guidelines
- Standard Power Command Control (PCC) 3300 technology provides digital (precise) frequency and voltage regulation
- Efficient and convenient operation monitoring and control options:
 - Modbus over the Internet (monitor and control)
 - Remote HMI (monitor and control)

Model	Power rating 60 Hz kW (kVa) Standby and demand response	Emissions	Data sheet
C1000N6B	1000 (1250)	EPA-certified for stationary emergency and non-emergency applications	NAD-C1000N6B
C1300N6	1300 (1625)		NAD-C1300N6

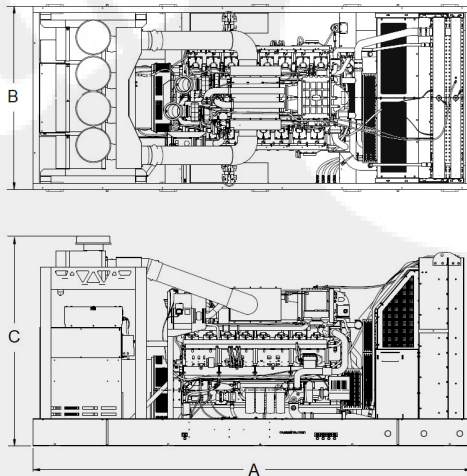


Engine specifications

Base engine	Cummins QSK 60G
Displacement	3671 in ³ (60.1 L)
Minimum battery capacity	1800 amps at minimum ambient temperature of 0 °F (-18 °C)
Battery charging alternator	55 amps
Starting voltage	24-volt, negative ground
Standard cooling system	104 °F (40 °C)

Alternator specifications

Design	Brushless, 4-pole, drip-proof revolving field
Stator	2/3 pitch
Rotor	Direct-coupled by flexible disc
Insulation system	Class H per NEMA MG1-1.65 or better
Standard temperature rise	125 °C
Exciter type	Permanent Magnet Generator (PMG)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct-drive centrifugal blower

Outline drawing

All models	Dim "A" in. (cm)	Dim "B" in. (cm)	Dim "C" in. (cm)
Open set	240 (610)	102 (259)	115 (292)
Sound-attenuated Level II enclosure	403 (1024)	102 (259)	128 (325)

*NOTE: Consult drawings for applicable weights.
Contact the factory for additional information.*

This outline drawing is for reference only.
Do not use for installation design.



GenSet options and accessories

Alternator

- 80 °C rise
- 105 °C rise
- 125 °C rise
- 120/240 V, 200 W anti-condensation heater

Fuel system - flexible fuel connector and fuel strainer

Exhaust system - critical grade silencer

Generator set

- Batteries
- Battery charger - 120/208/240 V, 20A
- Main line circuit breaker
- Electronically-operated (E.O.) generator breaker
- PowerCommand Network I/O module
- PowerCommand Network Aux 101, 102 module
- Remote control HMI with extension harness
- Remote annunciator panel
- Spring isolators
- Audible alarm
- Sound-attenuated enclosure Level II with silencer
- Warranty - five-year standby including parts, labor, and travel

Applicable codes and standards



The Underwriters Laboratory (UL) 2200 Listing is a comprehensive safety standard encompassing the design, construction, and performance of stationary GenSets.



CSA Group tests products under a formal process to ensure that they meet the safety and/or performance requirements of applicable standards. This GenSet is certified to: CSA 22.2 No. 100 Motors and Generators; CSA 22.2 No. 0.4-044 Bonding of Electrical Equipment; CSA 22.2 No. 14 Industrial Control Equipment; and CSA 22.2 No. 0 General Requirements - Canadian Electrical Code, Part II. All low voltage models are CSA-certified to product class 4215-01.



Engine is certified to Stationary Emergency and Non-Emergency U.S. EPA New Source Performance Standards (NSPS), 40 CFR 60 subpart JJJJ. U.S. applications must be applied per EPA regulations.

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

NAS-C1000N6B-C1300N6
November 2022

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cummins.com



PowerCommand 3.3 control system

An integrated microprocessor-based GenSet control system providing voltage regulation, engine protection, AmpSentry alternator protection, operator interface and isochronous governing.



Advanced control methodology

- Designed for reliable operation in harsh environment.
- Provides battery monitoring and testing features and smart starting control system.
- Includes three-phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.
- Digitally governed with temperature dynamic governing and integrated digital electronic isochronous governing.
- **Prototype tested** - UL, CSA, and CE compliant.
- **Supports multiple languages**- English, Spanish, and French (standard); other languages, optional.
- **Protects the engine**- cranking lockout, overspeed shutdown, and battleshort; sensor failure indication; low fuel level warning or shutdown; low oil pressure warning and shutdown; high/low coolant temperature warning and shutdown; fail to start (overcrank) and fail to crank shutdown; and battery voltage monitoring, protection, and testing.
- **Enables paralleling control** - direct control of the paralleling breaker and displays breaker status; First Start Sensor System selects first GenSet to close to bus; Phase Lock Loop Synchronizer with voltage matching; sync check relay; isochronous kW and kVar load sharing; load govern control for utility paralleling; extended Paralleling (baseload/peak shave) Mode; and digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions.
- **Includes AmpSentry alternator protection** - over current and short circuit shutdown; over current warning; single and three-phase fault regulation; over and under voltage/frequency shutdown; overload warning with alarm contact; reverse power and reverse var shutdown; and field overload shutdown.
- Cummins InPower PC-based service tool connects to the PowerCommand 3.3 control system for detailed diagnostics, setup, data logging, and fault simulation.
- Comes standard with PCCNet and Modbus interface.
- Allows for up to twenty configurable data inputs and outputs.

State-of-the-art operator panel

- Includes LED lamps indicating GenSet running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop.
- **Displays engine data** - DC voltage and engine speed; lube oil pressure and temperature; coolant temperature; and comprehensive full authority electronic (FAE) data.
- **Provides GenSet data** - start attempts, starts, running hours, kW hours; load profile (operating hours at percent load in 5% increments); fault history – up to 32 events; data logging and fault simulation (requires InPower); air cleaner restriction indication; exhaust temperature in each cylinder.
- **Includes alternator data** - Line-to-neutral and line-to-line AC volts; three-phase AC current; frequency; kW, kVar, and power factor kVa (three-phase and total); and winding temperature and/or bearing temperature (optional).

Refer to document S-1570 for more detailed information.



100 YEARS OF POWER GENERATION

Ratings definitions

Emergency Standby Power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power is in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Prime Power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Base Load (Continuous) Power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271, and BS 5514.

Demand Response Power Rating - Spark Ignited Gas (DRP):

Applicable for supplying electrical power in parallel with commercially available power in variable and non-variable load applications. This fuel rating is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engine operation is limited to a total of 500 hours per year. Engines may be operated in parallel to the public utility for up to 500 hours per year, with an average load factor no greater than 80% of rated Demand Response Power. Engines with Standby Power ratings available can be run in Emergency Standby applications up to the Standby Power rating for up to 50 hours per year. The customer should be aware, however, that the life of any engine will be reduced by constant high load operation.

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect GenSets to any building electrical system except through an approved device or after the building main disconnect is open. Neutral connection must be bonded in accordance with National Electrical Code.

Specifications are subject to change without notice.

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NAS-C1000N6B-C1300N6
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9.3 C1000N6B data sheet



Generator set data sheet

Model	C1000N6B
Frequency	60 Hz
Fuel type	Natural gas
kW (kVa) rating	1000 (1250) standby and demand response
Emissions	EPA-certified for stationary emergency and non-emergency applications

Exhaust emission data sheet	EDS-3078
Sound performance data sheet	MSP-4070
Cooling performance data sheet	MCP-2120
Prototype test summary data sheet	PTS-701
Standard set-mounted radiator cooling outline	C1000N6B-01

Fuel consumption

Fuel consumption for cfh and m³/hr is based on 905 Btu/ft³.

	50% load	75% load	full load
cfh	-	9005	11,551
m ³ /hr	-	255	327
MMBtu/hr	-	8.15	10.45

Fuel supply

Fuel supply pressure is measured at the factory-supplied fuel shut-off (FSO) valve.

Minimum operating pressure, in. H ₂ O (kPa)	72 (18)
Maximum operating pressure, in. H ₂ O (kPa)	166 (41)

Engine

	Standby and demand response	Prime
Engine manufacturer	Cummins	
Engine model	QSK 60G	
Configuration	V16	
Aspiration	Turbocharged	
Gross engine power output, bhp (kWm)	1484 (1107)	
BMEP at set rated load, psi (kPa)	178 (1230)	
Bore, in. (mm)	6.25 (159)	
Stroke, in. (mm)	7.48 (190)	
Rated speed, rpm	1800	
Piston speed, ft./min (m/s)	1875 (9.5)	

Specifications subject to change without notice
NAD-C1000N6B - NAD-C1000N6B DR March 2022

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Engine (cont'd.)	Standby and demand response	Prime
Compression ratio	11.4:1	
Lube oil capacity, qt. (L)	188 (178)	
Overspeed limit, rpm	2150	
Regenerative power, kW	250	

Air

Combustion air, scfm (m ³ /min)	2960 (84)	
Max air cleaner restriction (dirty filter), in. H ₂ O (kPa)	6 (1.5)	

Exhaust

Exhaust flow at set rated load, cfm (m ³ /min)	8428 (239)	
Exhaust temp, °F (°C)	934 (501)	
Max allowable system back pressure, in. H ₂ O (kPa)	11 (2.7)	

Cooling

Ambient design, °F (°C)	104 (40)	
Fan load, HP (kWm)	99 (73.8)	
Coolant capacity (with radiator), gal (L)	135 (511)	
Cooling system air flow, acfm (m ³ /min)	95,430 (2702)	
Heat rejected, jacket water circuit, Btu/min (MJ/min)	40,347 (42.57)	
Heat rejected, after-cooler circuit, Btu/min (MJ/min)	4793 (5.06)	
Total heat radiated to room, Btu/min (MJ/min)	45,140 (47.63)	
Max cooling air flow static restriction, in. H ₂ O (kPa)	0.5 (0.12)	

Weight

Weight represents a set with standard features. See outline drawing for weights of other configurations.

Unit wet weight lbs. (kgs)	35,400 (16, 057)
----------------------------	------------------

Full-load amperage (FLA) at rated voltage

Three-phase FLA is based on 0.8 power factor (PF).

120/240 (1 Ph)	120/208	127/220	139/240	220/380	240/416	254/440	277/480	347/600
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1504	1203

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NAD-C1000N6B - NAD-C1000N6B DR March 2022

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Engine derates

For non-standard remote installations, contact your local Cummins representative.

Barometer in. Hg (mbar)	SAE standard altitude ft. (m)	Derate factor based on 1000 kWe at ambient temperature °F (°C)							
		68 (20)	77 (25)	86 (30)	95 (35)	104 (40)	113 (45)	122 (50)	131 (55)
20.7 (701)	9843 (3000)	0.85	0.83	0.81	0.80	0.78	0.73	0.69	0.64
21.4 (723)	9022 (2750)	0.89	0.88	0.86	0.84	0.82	0.78	0.73	0.69
22.1 (747)	8202 (2500)	0.94	0.92	0.90	0.88	0.86	0.82	0.78	0.73
22.8 (771)	7382 (2250)	0.98	0.96	0.94	0.93	0.91	0.86	0.82	0.77
23.5 (795)	6562 (2000)	1.00	1.00	0.99	0.97	0.95	0.91	0.86	0.82
24.3 (820)	5741 (1750)	1.00	1.00	1.00	1.00	0.99	0.95	0.91	0.86
25.0 (846)	4921 (1500)	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.90
25.8 (872)	4101 (1250)	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.95
26.6 (899)	3281 (1000)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
27.4 (926)	2461 (750)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28.3 (954)	1640 (500)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
29.1 (983)	820 (250)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
29.5 (995)	492 (150)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30.0 (1012)	0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

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NAD-C1000N6B - NAD-C1000N6B DR March 2022

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Ratings definitions

Emergency standby power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power is in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Prime power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Base load (continuous) power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271, and BS 5514.

Demand Response Power Rating - Spark Ignited Gas (DRP):

Applicable for supplying electrical power in parallel with commercially available power in variable and non-variable load applications. This fuel rating is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engine operation is limited to a total of 500 hours per year. Engines may be operated in parallel to the public utility for up to 500 hours per year, with an average load factor no greater than 80% of rated Demand Response Power. Engines with Standby Power ratings available can be run in Emergency Standby applications up to the Standby Power rating for up to 50 hours per year. The customer should be aware, however, that the life of any engine will be reduced by constant high load operation.

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect GenSets to any building electrical system except through an approved device or after the building main disconnect is open. Neutral connection must be bonded in accordance with National Electrical Code.

Specifications are subject to change without notice.

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9.4 C1300N6 data sheet



Generator set data sheet

Model	C1300N6
Frequency	60 Hz
Fuel type	Natural gas
kW (kVa) rating	1300 (1625) standby and demand response
Emissions	EPA-certified for stationary emergency and non-emergency applications

Exhaust emission data sheet	EDS-3079
Sound performance data sheet	MSP-4071
Cooling performance data sheet	MCP-2121
Prototype test summary data sheet	PTS-702
Standard set-mounted radiator cooling outline	C1300N6-01

Fuel consumption

Fuel consumption for cfh and m³/hr is based on 905 Btu/ft³.

	50% load	75% load	full load
cfh	8157	11,553	14,926
m³/hr	231	327	423
MMBtu/hr	7.38	10.46	13.51

Fuel supply

Fuel supply pressure is measured at the factory-supplied fuel shut-off (FSO) valve.

Minimum operating pressure, in. H₂O (kPa)	81 (20)
Maximum operating pressure, in. H₂O (kPa)	166 (41)

Engine	Standby and demand response	Prime
Engine manufacturer	Cummins	
Engine model	QSK 60G	
Configuration	V16	
Aspiration	Turbocharged	
Gross engine power output, bhp (kWm)	1953 (1456)	
BMEP at set rated load, psi (kPa)	234 (1610)	
Bore, in. (mm)	6.25 (159)	
Stroke, in. (mm)	7.48 (190)	
Rated speed, rpm	1800	
Piston speed, ft./min (m/s)	1875 (9.5)	

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NAD-C1300N6 - NAD-C1300N6 DR March 2022

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Engine (cont'd.)	Standby and demand response	Prime
Compression ratio	11.4:1	
Lube oil capacity, qt. (L)	188 (178)	
Overspeed limit, rpm	2150	
Regenerative power, kW	250	

Air

Combustion air, cfm (m ³ /min)	3890 (110)	
Max air cleaner restriction (dirty filter), in. H ₂ O (kPa)	10 (2.5)	

Exhaust

Exhaust flow at set rated load, cfm (m ³ /min)	11840 (335)	
Exhaust temp, °F (°C)	900 (482)	
Max allowable system back pressure, in. H ₂ O (kPa)	20 (5)	

Cooling

Ambient design, °F (°C)	104 (40)	
Fan load, HP (kWm)	99 (73.8)	
Coolant capacity (with radiator), gal (L)	135 (511)	
Cooling system air flow, acfm (m ³ /min)	95,430 (2702)	
Heat rejected, jacket water circuit, Btu/min (MJ/min)	52,602 (55.5)	
Heat rejected, after-cooler circuit, Btu/min (MJ/min)	5822 (6.1)	
Total heat radiated to room, Btu/min (MJ/min)	58,424 (61.64)	
Max cooling air flow static restriction, in. H ₂ O (kPa)	0.5 (0.12)	

Weight

Weight represents a set with standard features. See outline drawing for weights of other configurations.

Unit wet weight lbs. (kgs)	35,400 (16, 057)
----------------------------	------------------

Full-load amperage (FLA) at rated voltage

Three-phase FLA is based on 0.8 power factor (PF).

120/240 (1 Ph)	120/208	127/220	139/240	220/380	240/416	254/440	277/480	347/600
N/A	N/A	N/A	N/A	N/A	N/A	N/A	1955	1564

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NAD-C1300N6 - NAD-C1300N6 DR March 2022

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Engine derates

For non-standard remote installations, contact your local Cummins representative.

Barometer in. Hg (mbar)	SAE standard altitude ft. (m)	Derate factor based on 1300 kWe at ambient temperature °F (°C)							
		68 (20)	77 (25)	86 (30)	95 (35)	104 (40)	113 (45)	122 (50)	131 (55)
20.7 (701)	9843 (3000)	0.71	0.69	0.68	0.67	0.65	0.62	0.58	0.55
21.4 (723)	9022 (2750)	0.74	0.73	0.71	0.70	0.69	0.65	0.62	0.58
22.1 (747)	8202 (2500)	0.78	0.76	0.75	0.73	0.72	0.68	0.65	0.62
22.8 (771)	7382 (2250)	0.81	0.80	0.78	0.77	0.75	0.72	0.68	0.65
23.5 (795)	6562 (2000)	0.84	0.83	0.81	0.80	0.79	0.75	0.72	0.68
24.3 (820)	5741 (1750)	0.88	0.86	0.85	0.83	0.82	0.79	0.75	0.72
25.0 (846)	4921 (1500)	0.91	0.90	0.88	0.87	0.85	0.82	0.78	0.75
25.8 (872)	4101 (1250)	0.94	0.93	0.91	0.90	0.89	0.85	0.82	0.78
26.6 (899)	3281 (1000)	0.98	0.96	0.95	0.93	0.92	0.89	0.85	0.82
27.4 (926)	2461 (750)	1.00	1.00	0.98	0.97	0.95	0.92	0.88	0.85
28.3 (954)	1640 (500)	1.00	1.00	1.00	1.00	0.99	0.95	0.92	0.88
29.1 (983)	820 (250)	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.92
29.5 (995)	492 (150)	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.93
30.0 (1012)	0	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95

Specifications subject to change without notice
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Ratings definitions

Emergency standby power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power is in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Prime power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271, and BS 5514.

Base load (continuous) power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271, and BS 5514.

Demand Response Power Rating - Spark Ignited Gas (DRP):

Applicable for supplying electrical power in parallel with commercially available power in variable and non-variable load applications. This fuel rating is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engine operation is limited to a total of 500 hours per year. Engines may be operated in parallel to the public utility for up to 500 hours per year, with an average load factor no greater than 80% of rated Demand Response Power. Engines with Standby Power ratings available can be run in Emergency Standby applications up to the Standby Power rating for up to 50 hours per year. The customer should be aware, however, that the life of any engine will be reduced by constant high load operation.

ISO 9001:2015

This product has been manufactured under the controls established by an approved management system that conforms with ISO 9001:2015.

Warning: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect GenSets to any building electrical system except through an approved device or after the building main disconnect is open. Neutral connection must be bonded in accordance with National Electrical Code.

Specifications are subject to change without notice.

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Columbus, IN 47202-3005
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9.5 C1000N6B/C1300N6 oil specification

NOTE: Because of the addition of the GenSet accessories, the engine oil capacity differs from that of a standard QSK60 G8 twin turbocharger engine.

Lube oil capacity:	188 qt. (178 L)
Recommended lubricating oil:	API classification CJ-4 or CK-4

When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.

Use of an oil other than Cummins recommendation or with a viscosity higher than 10W-30 not only prevents the engine from performing well in low temperatures until it warms up sufficiently but may also lead to excessive engine wear or engine seizure.

Oil viscosity changes in cold temperature as crystallization of the wax element contained in oil proceeds, and fluidity is finally lost. Wrong selection of oil cannot only increase resistance for cold starting but also affect the lubrication of each part. Oils for low temperature, containing additives for lowering the pour point, should be used. Oil used in the engine should have API classification and proper SAE engine oil viscosity according to the ambient temperatures where the engine is operated.

NOTE: The use of synthetic oil is not recommended.

9.6 C1000N6B/C1300N6 coolant specification

NOTE: Because of the addition of the GenSet cooling package, the engine coolant capacity differs from that of a standard QSK60 G8 twin turbocharger engine.

GenSet coolant capacity (with JW and LTA radiators):	135 gal. (511 L)
GenSet coolant capacity (with JW and LTA radiators AND the intake air warmer):	138 gal. (522 L)
GenSet recommended coolant:	Cummins Fleetguard ES Compleat OAT
	50/50 coolant solution (50% distilled or de-ionized water and 50% ethylene glycol)

9.7 C1000N6B/C1300N6 fan belt specification

Cummins recommends the following belt specifications:

Belt type	Deflection	Under load
Radiator fan drive - six (6) 5VX profile belts, 45.7 inches (1160 mm) long	13/64 inch (5 mm)	16-25 pounds (7-11 kg)
Alternator belt - one (1) 5V ribbed belt, 35 inches (889 mm) long	0.28 to 0.35 inch (7 to 9 mm)	22 lbs. (10 kg)

9.8 Cap screw markings and torque values

IMPORTANT: Always use a cap screw of the same measurement and strength as the cap screw being replaced. Using the wrong cap screws can result in engine damage.

Always use the torque values listed in the following tables when specific torque values are not available.

When the ft-lb value is less than 10, convert the ft-lb value to in-lb to obtain a better torque with an in-lb torque wrench. Example: 6 ft-lb equals 72 in-lb.

9.8.1 Cap screw identification

9.8.1.1 U.S. customary cap screws

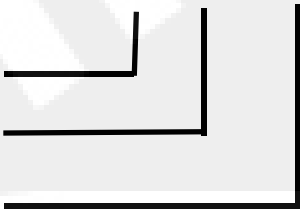
U.S. cap screw example:

5/16 x 18 x 1-1/2

Cap screw thread diameter in inches (5/16")

Number of threads per inch (18)

Cap screw length in inches (1.5")



U.S. customary cap screws are identified by radial lines stamped on the head of the cap screw as shown in the examples below:

SAE Grade 5
(cap screw head has 3 lines)



SAE Grade 8
(cap screw head has 6 lines)



9.8.1.2 Metric cap screws

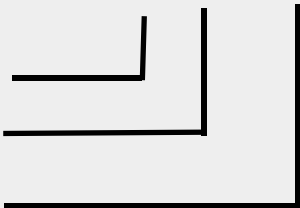
Metric cap screw example:

M8 -1.25 x 25

Cap screw thread diameter in millimeters (8 mm)

Distance between threads in millimeters (1.25 mm)

Cap screw length in millimeters (25 mm)



Metric cap screws and nuts are identified by the steel grade number stamped on the head of the cap screw or on the surface of the nuts as shown in the examples below:

Commercial steel grade

8.8

10.9

12.9

Cap screw head marking**9.8.2 Cap screw torque values****9.8.2.1 U.S. customary cap screw torque values****Table 9-1. U.S. customary cap screw (lubricated threads) torque values**

Cap screw body size (in.) - does not include length of screw)	U.S. cap screw head marking							
	SAE grade 5				SAE grade 8			
	Cast iron		Aluminum		Cast iron		Aluminum	
	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb
1/4-20	9	7	8	6	15	11	8	6
1/4-28	12	9	9	7	18	13	9	7
5/16-18	20	15	16	12	30	22	16	12
5/16-24	23	17	19	14	33	24	19	14
3/8-16	40	30	25	20	55	40	25	20
3/8-24	40	30	35	25	60	45	35	25
7/16-14	60	45	45	35	90	65	45	35
7/16-20	65	50	55	40	95	70	55	40
1/2-13	95	70	75	55	130	95	75	55
1/2-20	100	75	80	60	150	110	80	60
9/16-12	135	100	110	80	190	140	110	80
9/16-18	150	110	115	85	210	155	115	85
5/8-11	180	135	150	110	255	190	150	110
5/8-18	210	155	160	120	290	215	160	120
3/4-10	325	240	255	190	460	340	255	190
3/4-16	365	270	285	210	515	380	285	210
7/8-9	490	360	380	280	745	550	380	280
7/8-14	530	390	420	310	825	610	420	310
1-8	720	530	570	420	1100	820	570	420
1-14	800	590	650	480	1200	890	650	480

9.8.2.2 Metric cap screw torque values

Table 9-2. Metric cap screw (lubricated threads) torque values

Cap screw thread diameter (mm)	Metric cap screw head marking											
	8.8				10.9				12.9			
	Cast iron		Aluminum		Cast iron		Aluminum		Cast iron		Aluminum	
	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb
6	9	5	7	4	13	10	7	4	14	9	7	4
7	14	9	11	7	18	14	11	7	23	18	11	7
8	23	17	18	14	33	25	18	14	40	29	18	14
10	45	33	30	25	65	50	30	25	70	50	30	25
12	80	60	55	40	115	85	55	40	125	95	55	40
14	125	90	90	65	180	133	90	65	195	145	90	65
16	195	140	140	100	280	200	140	100	290	210	140	100
18	280	200	180	135	390	285	180	135	400	290	180	135
20	400	290	—	—	550	400	—	—	—	—	—	—

9.9 U.S. customary pipe plug torque values

Table 9-3. U.S. customary pipe plug torque values

Pipe thread size (in.)	Actual pipe thread outside diameter (O.D.) (in.)	Cast iron or steel components		Aluminum components	
		N-m	ft-lb	N-m	ft-lb
1/16	0.32	15	10	5	45 in-lb
1/8	0.41	20	15	15	10
1/4	0.54	25	20	20	15
3/8	0.68	35	25	25	20
1/2	0.85	55	40	35	25
3/4	1.05	75	55	45	35
1	1.32	95	70	60	45
1-1/4	1.66	115	85	75	55
1-1/2	1.90	135	100	85	65

10 - C1000N6B and C1300N6 drawings

10.1 Introduction

The following pages include the drawings outlined in section 10.2.

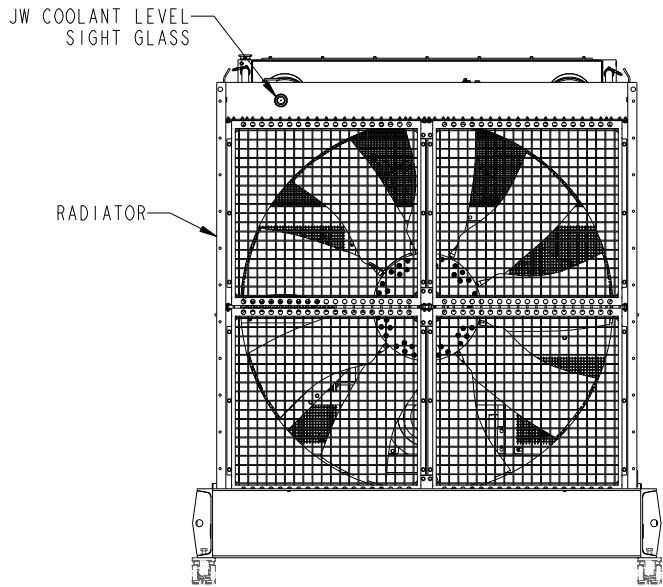
10.2 C1000N6B and C1300N6 drawings

Part number	Title
A065Z573	General Arrangement, C1000N6B Open Set
A065Z574	General Arrangement, C1300N6 Open Set
A066M380	General Arrangement, C1000N6B Enclosed Set Level 2.0
A066M381	General Arrangement, C1300N6 Enclosed Set Level 2.0
A064X195	Assembly, Engine Mount, 60L, Engine to Frame
MM100143	Assembly, Engine Mount, 60L, Enclosed, W/ Floor
A066M245	Assembly, Fuel System, 60L
A064X221	Radiator Assembly, 60L, Josephson
A066E116	Assembly, Air Intake, 60L, Open Set
A066E117	Assembly, Air Intake, 60L, Enclosed Set, Heated
A067G754	Assembly, Cold Weather Access, Coolant Heater, 208V
A067X926	Assembly, Cold Weather Access, Coolant Heater, 240V
A066E112	Assembly, Cold Weather Access, Coolant Heater, 60L GenSet
A067G852	Assembly, Cold Weather Access, Lube Oil Heater, 208V
A067X929	Assembly, Cold Weather Access, Lube Oil Heater, 240V, 1PH
A066E111	Assembly, Cold Weather Access, Lube Oil Heater, 480V, 2KW
A065V413	Assembly, Oil Drain & Coolant Drains, 60L
A067G758	Assembly, Product Guard, 60L, Battery Cover
GE100177	Assembly, Electrical General, 60L Battery Charger
A065P058	Assembly, Enclosure, 60L, Gen Housing
GE100126	Assembly, Electrical General, 60L NG Right Control
GE100124	Assembly, Electrical General, 60L NG Left Control
GE100037	Assembly, Electrical General, Harness, EMAX Breaker
A067G824	Diagram, Wiring, C1000N6B & C1300N6, Overall
A065P242	Assembly, Exhaust System, 60L, Critical, Open
A064X214	Assembly, Exhaust System, 60L, Critical

Part number	Title
A072J012	Assembly, Exhaust System, 60L, Critical, Open, 304SS
A072J011	Assembly, Exhaust System, 60L, Critical, 304SS
A072B400	Label, Information, 60L, Open Set, Installation
A072B401	Label, Information, 60L, Enclosed Set, Installation
A065V653	Assembly, Non Eng Driven EQP, Pre-Lube Pump
A065Z312	Assembly, Engine Driven Access, Charging Alternator
A067G722	Kit, Upfit, QSK60 Oil Pan
A068K700	Assembly, Fuel System, 60L W/ Pressure Regulator

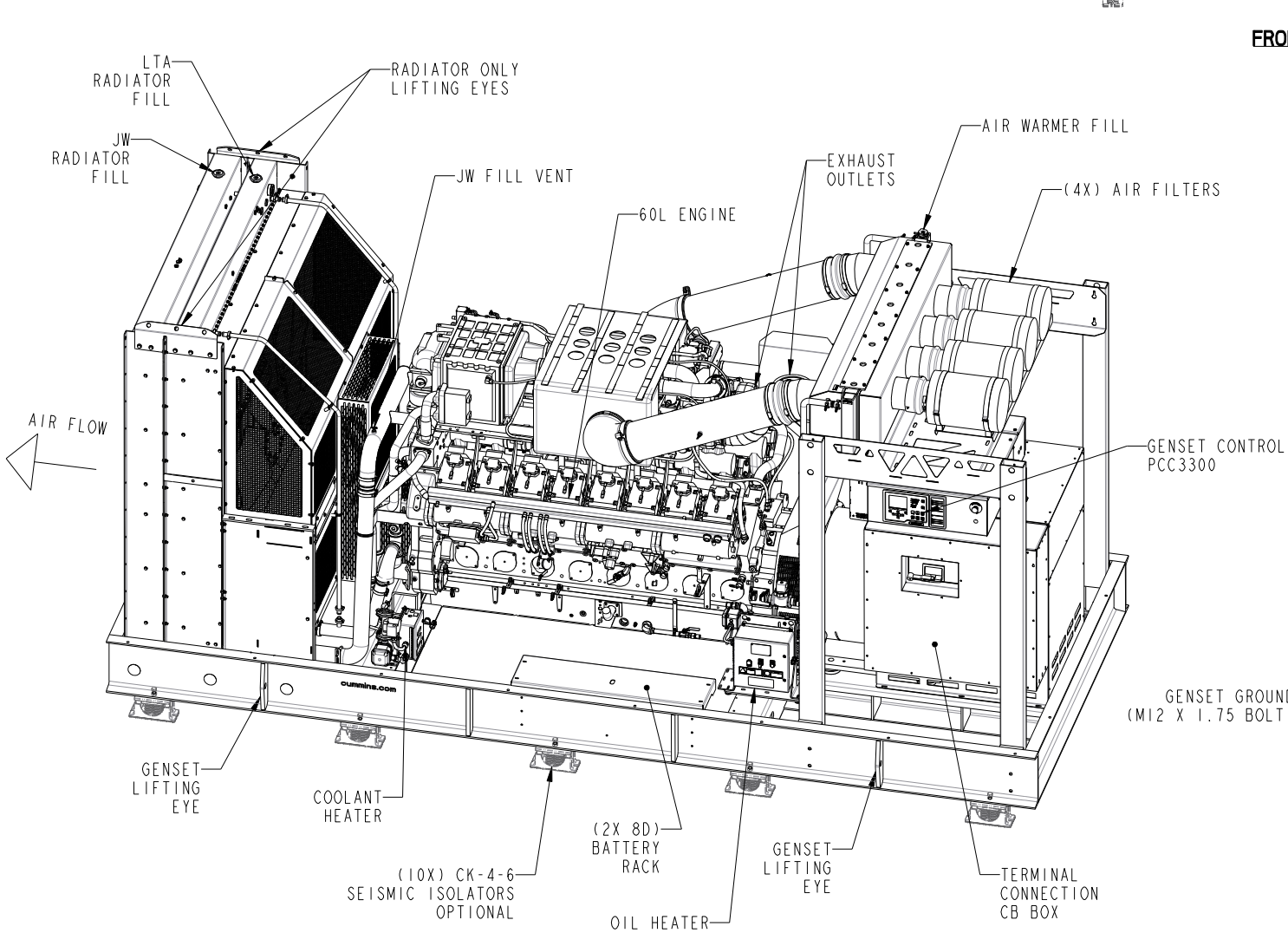
2				1			
REV	REL NO	REVISION		DWN	CKD	APVD	DATE
0	2021-056	INITIAL RELEASE		DJH	JCB	JCB	10FEB21
1	2022-123	UPDATED; FUEL TRAIN; WEIGHTS; NOTES		DJH	JCB	JCB	30MAY22

LEGEND	
SHEET #	DESCRIPTION
1	ISOMETRIC VIEWS, GENSET FEATURE IDENTIFICATION
2	GENSET/ALTERNATOR MODELS
	WEIGHTS, CENTER OF GRAVITY
	GENERAL DIMENSIONS
3	FOUNDATION DRAWING
4	GAS/FUEL CONNECTION
	EXHAUST CONNECTION
5	ELECTRICAL INTERFACE
6	LIFTING DIAGRAM

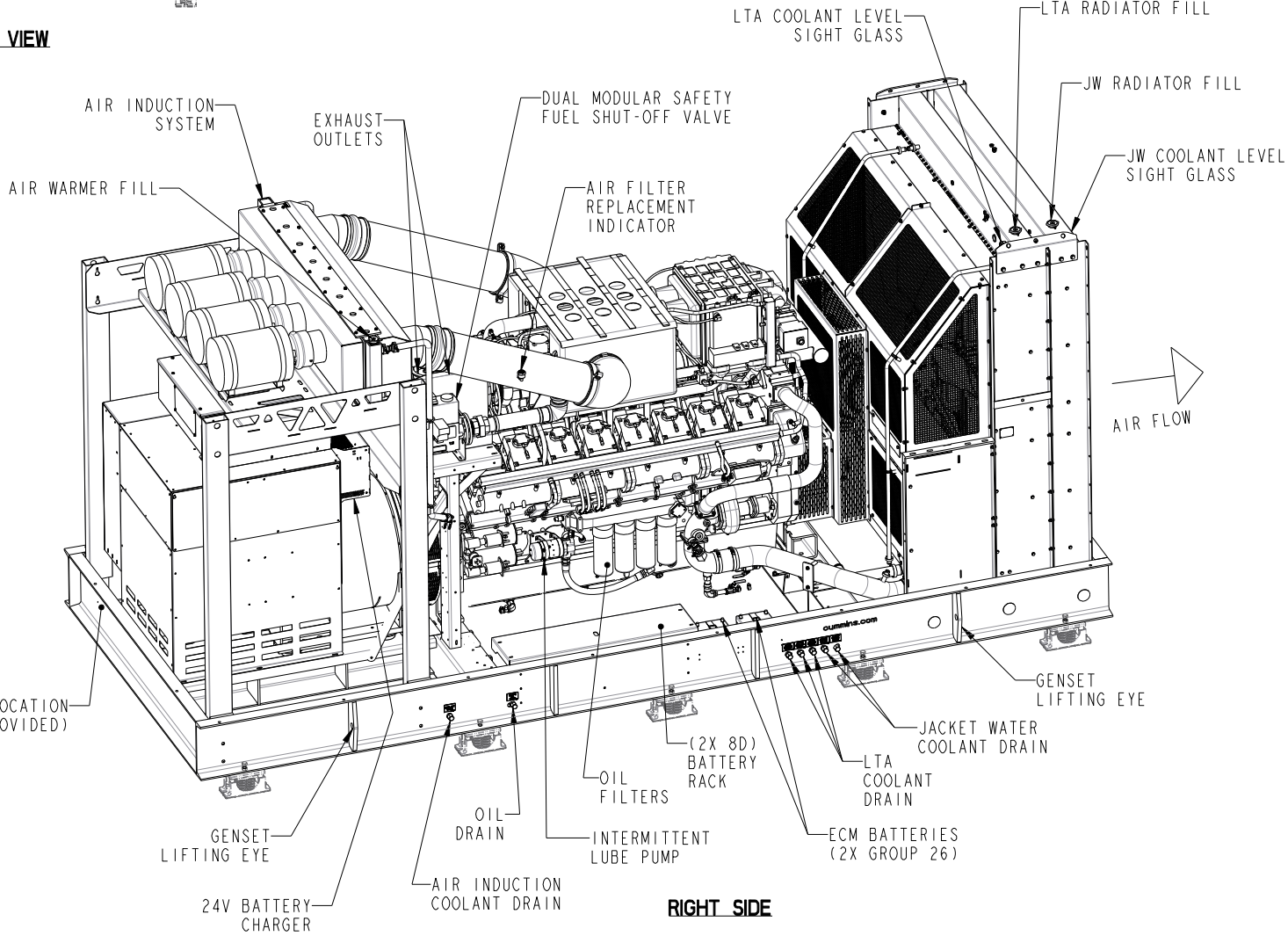


FRONT VIEW

- NOTES:
- DIMENSIONS:
 - 1.1 ALL DIMENSIONS ARE IN INCHES
 - 1.2 ALL DIMENSIONS ARE REFERENCE UNLESS SPECIFICALLY TOLERANCED
 - WEIGHT: REFER TO TABLE(S) ON SHEET 2 FOR STANDARD GENSET WET AND DRY WEIGHT(S)
 - LARGEST NOMINAL DIMENSIONS:
 - 3.1 LENGTH: 240.0 INCHES
 - 3.2 WIDTH: 102.0 INCHES
 - 3.3 HEIGHT: 114.6 INCHES
 - 3.4 DOES NOT INCLUDE THE HEIGHT OF THE SEISMIC ISOLATORS
 - LIFTING INSTRUCTIONS: REFER TO GENSET INSTALLATION MANUAL AND LIFTING LABEL
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE RADIATOR. RADIATOR LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING RADIATOR.
- ALLOW 6.5 FEET AROUND THE GENSET FOR SERVICE
 - ELECTRICAL SPECIFIC NOTES ON SHEET 5

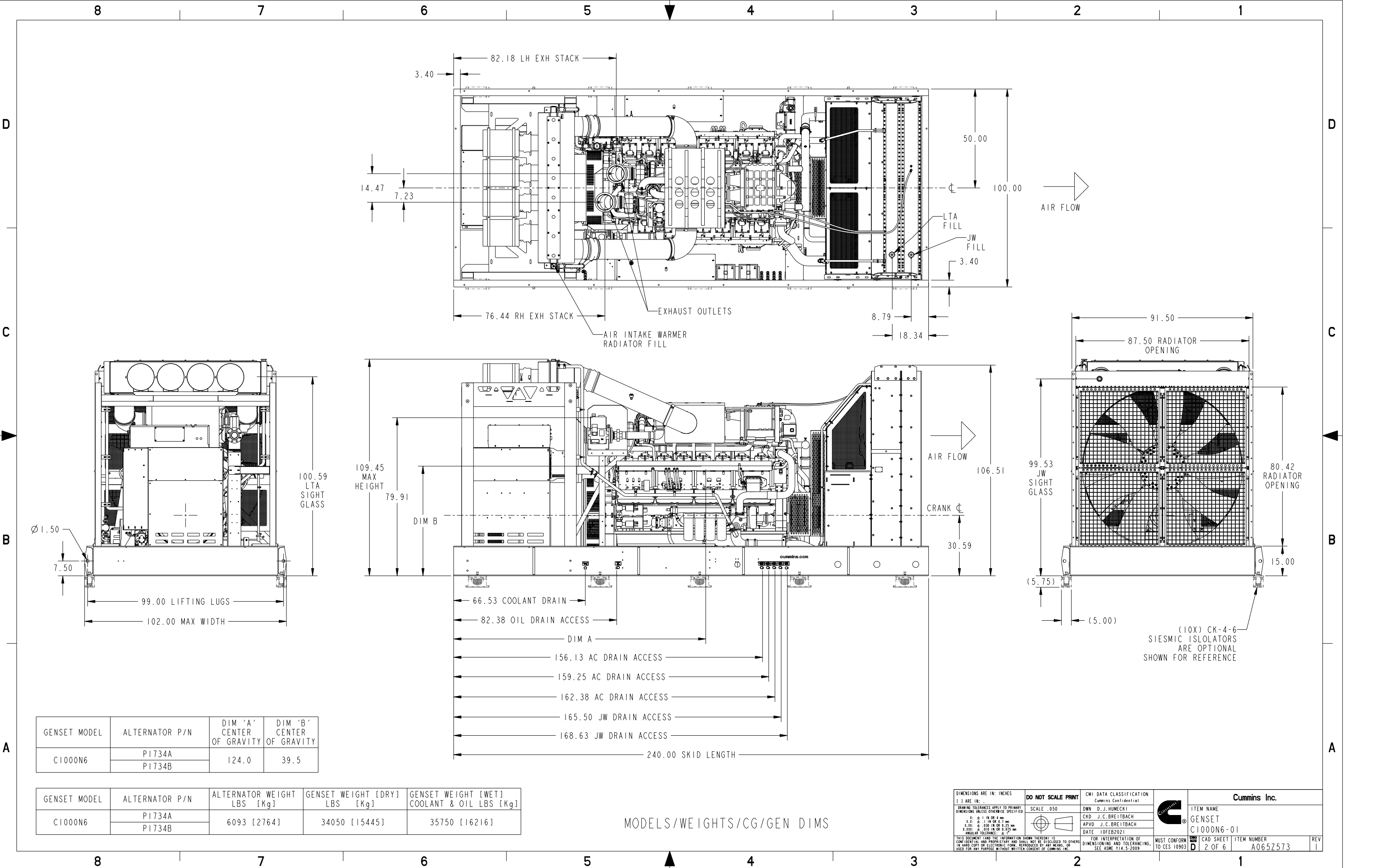


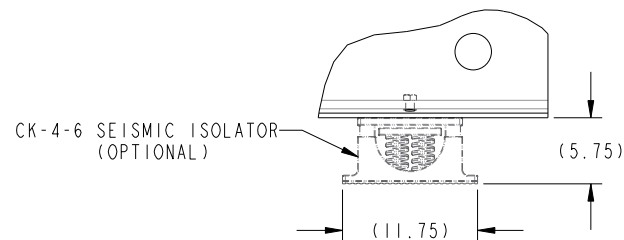
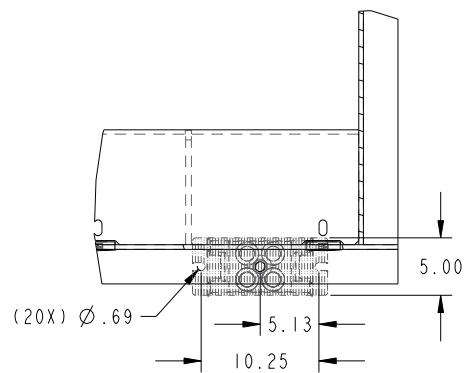
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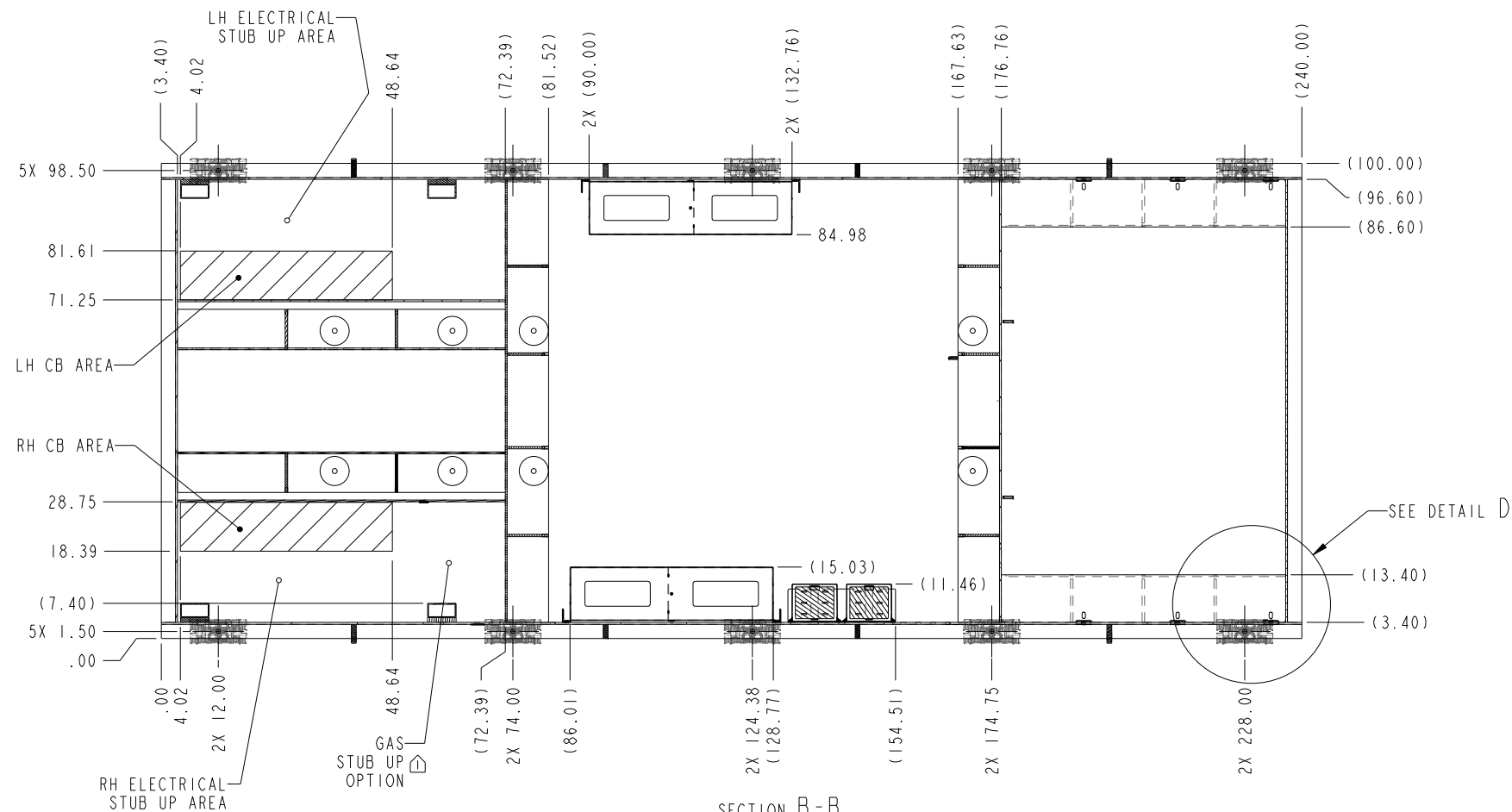
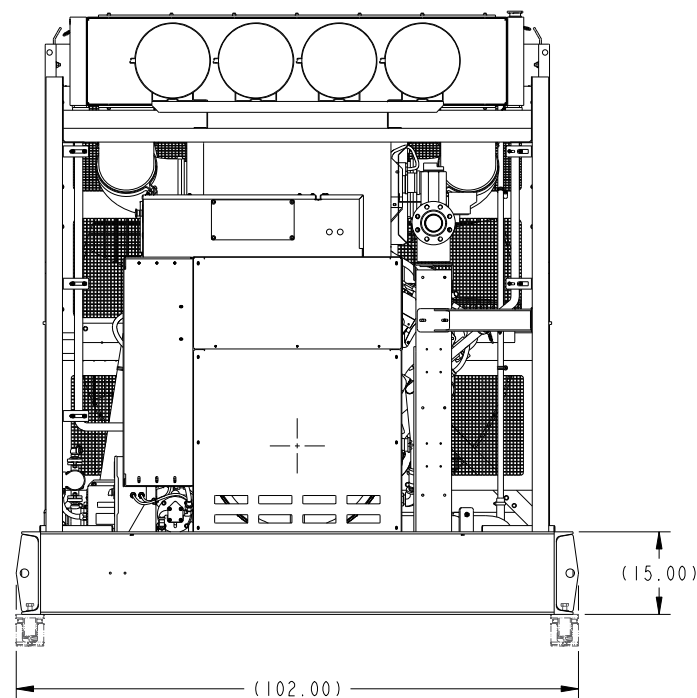
RIGHT SIDE

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .050		ITEM NAME	
X: ± .1 IN OR 4 mm				GENSET	
X.Y: ± .1 IN OR 3 mm				C1000N6-01	
X.Z: ± .001 IN OR 0.025 mm					
ANGULAR TOLERANCES: ±		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY FORM OR BY ANY MEANS, OR REPRODUCED IN ANY MANNER, WITHOUT WRITTEN CONSENT OF CUMMINS INC.		DWN D.J. HUMECKI CKD J.C. BREITBACH APVD J.C. BREITBACH DATE 10FEB2021		DWG NO C1000N6-01	ITEM NUMBER A0652573
				DAD SHEET 1 OF 6	REV A0652573

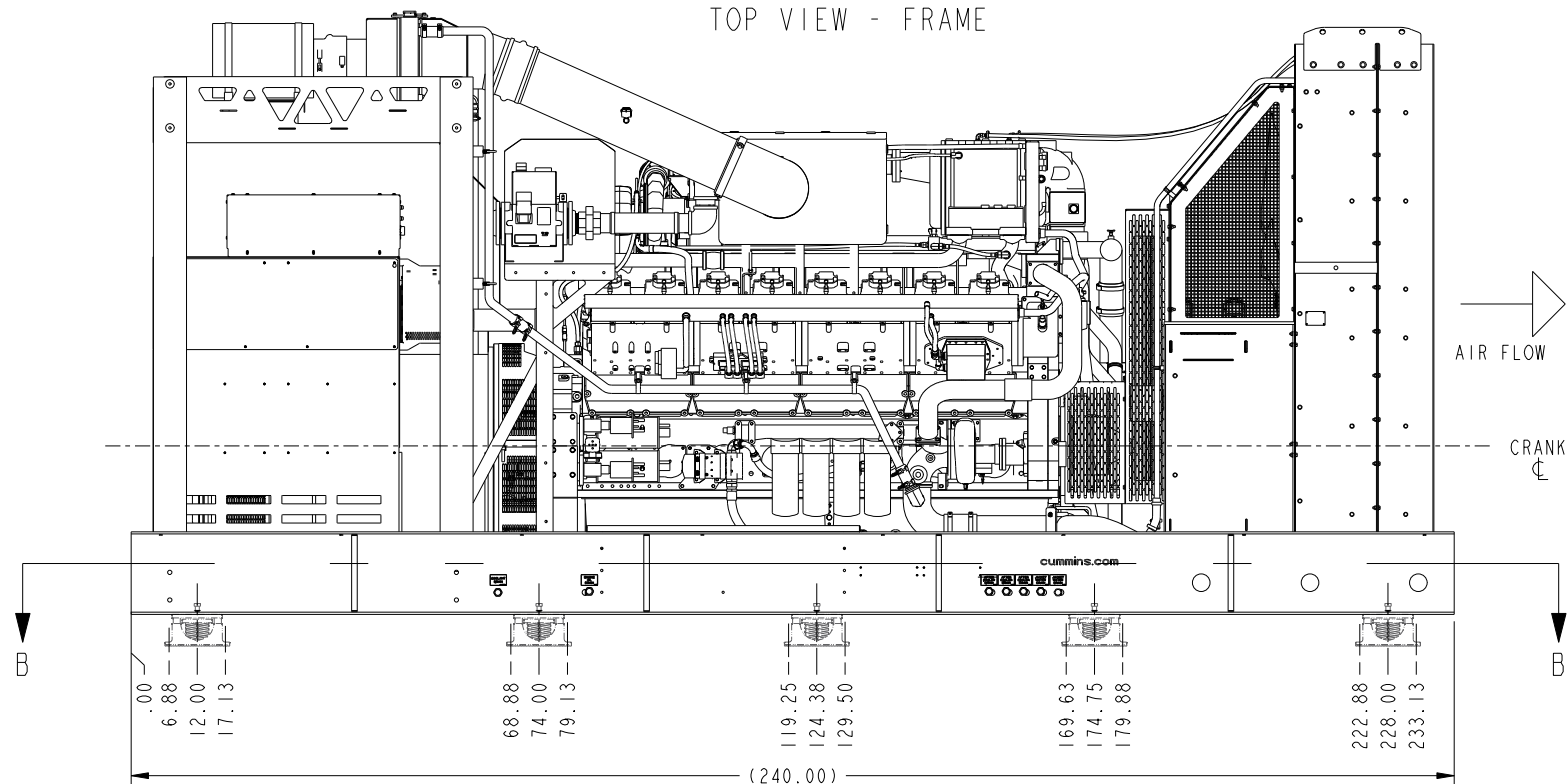




DETAIL D
SCALE .125

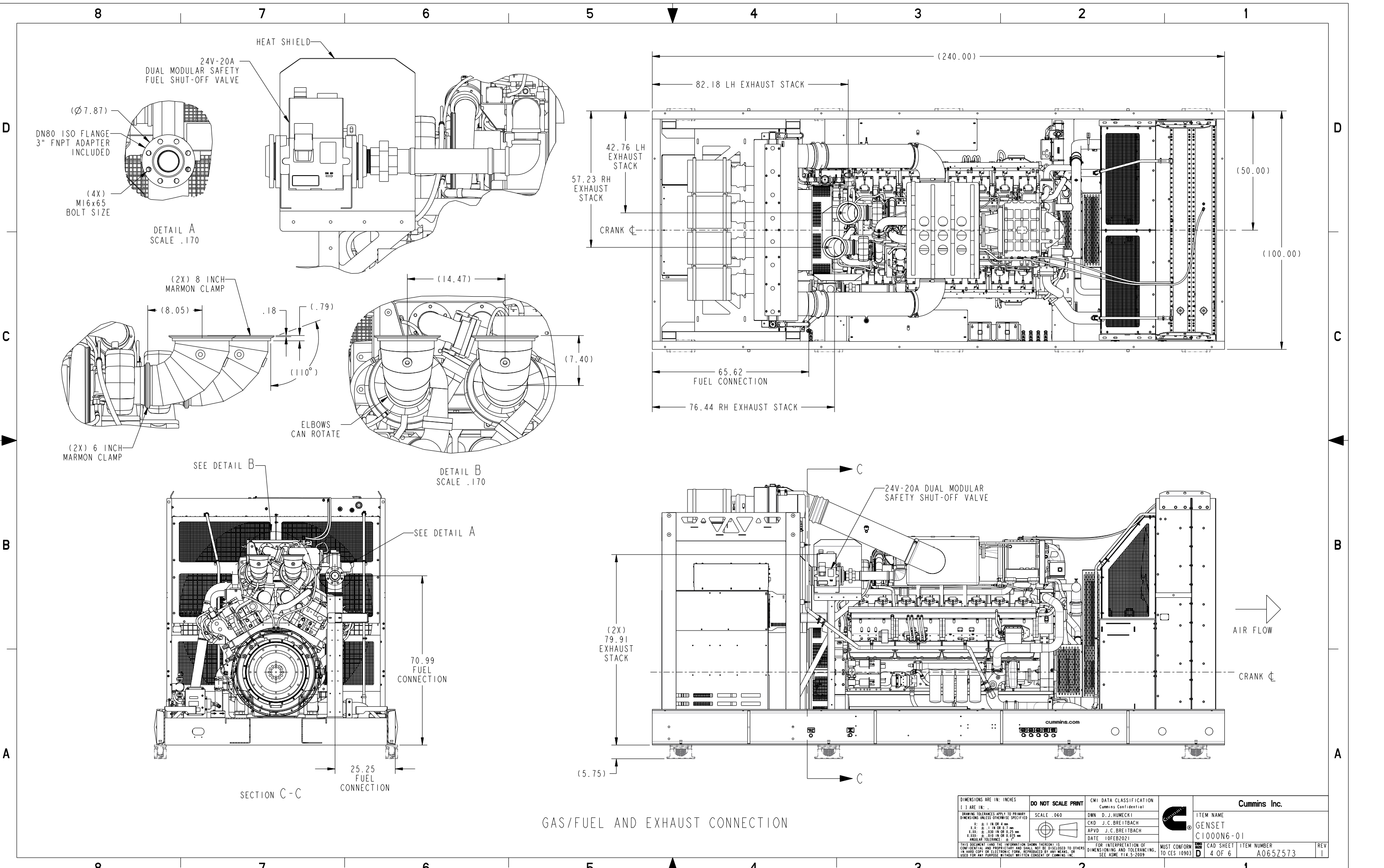


SECTION B-B
TOP VIEW - FRAME



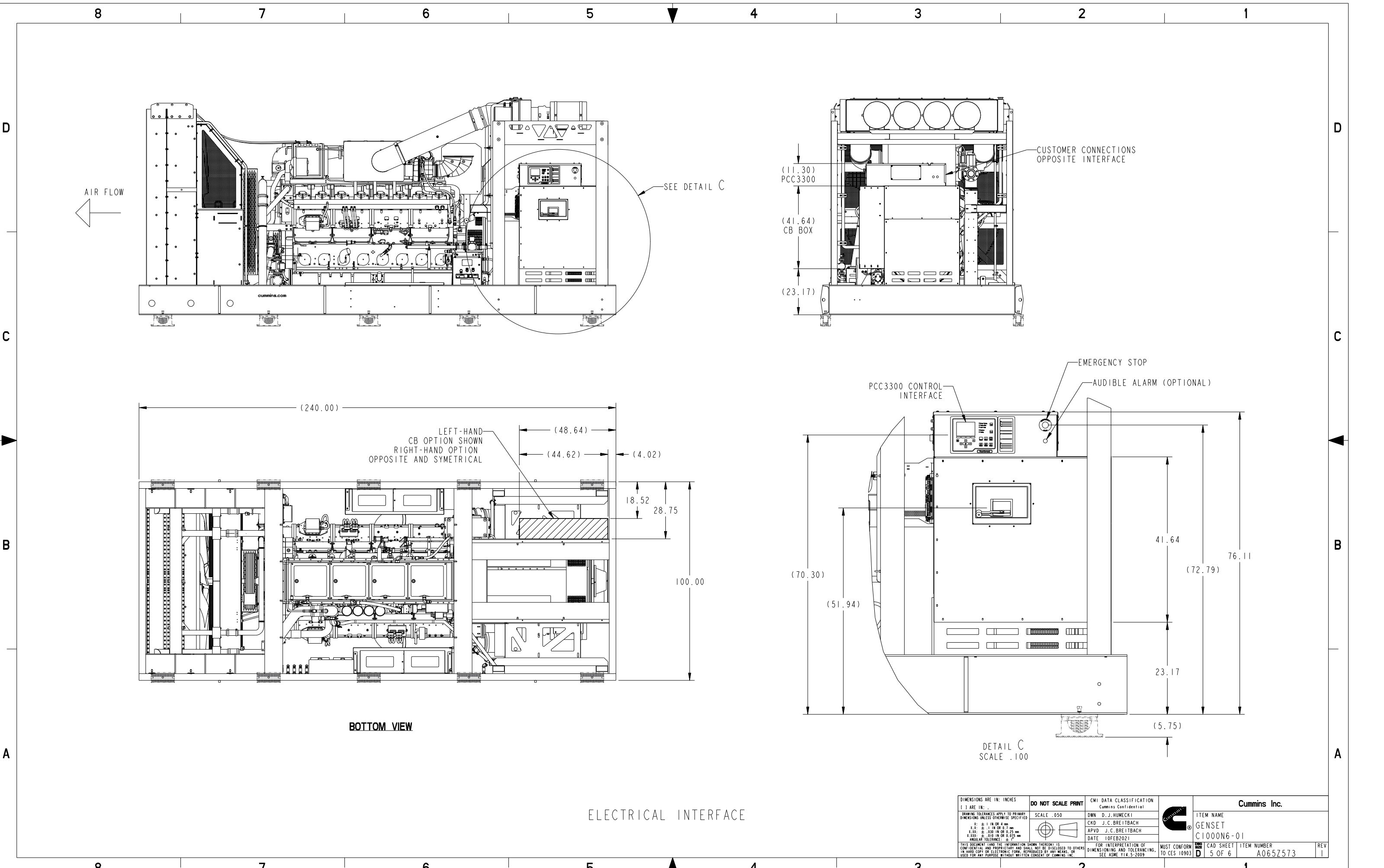
FOUNDATION DRAWING

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT		CMV DATA CLASSIFICATION Cummins Confidential		Cummins Inc.			
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .060			ITEM NAME				
X: ±.1 IN OR 4 mm X.I: ±.01 IN OR 0.7 mm X.II: ±.005 IN OR 0.125 mm ANGULAR TOLERANCES: ±					GENSET				
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009			C1000N6-01				
				MUST CONFORM TO CES 10903		CAD SHEET 3 OF 6		ITEM NUMBER A0652573	REV 1



GAS/FUEL AND EXHAUST CONNECTION

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X: ±.1 IN OR 4 mm X.X: ±.1 IN OR 3 mm X.XX: ±.001 IN OR 0.025 mm ANGULAR TOLERANCES: ±		SCALE .060 	DWN D.J.HUMECKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 10FEB2021		ITEM NAME GENSET C1000N6-01	REV 1
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	CAD SHEET 4 OF 6	ITEM NUMBER A0652573



DIMENSIONS ARE IN: INCHES [] ARE IN: . DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.2: ±.1 IN OR 3 mm X.3: ±.03 IN OR 0.75 mm X.4: ±.01 IN OR 0.25 mm ANGULAR TOLERANCES: ±1° THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY MANNER OR BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
	SCALE .050	DWN D. J. HUMECKI CKD J. C. BREITBACH APVD J. C. BREITBACH DATE 10FEB2009		ITEM NAME GENSET C1000N6-01	REV
	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009			MUST CONFORM TO CES 10903	CAD SHEET 5 OF 6

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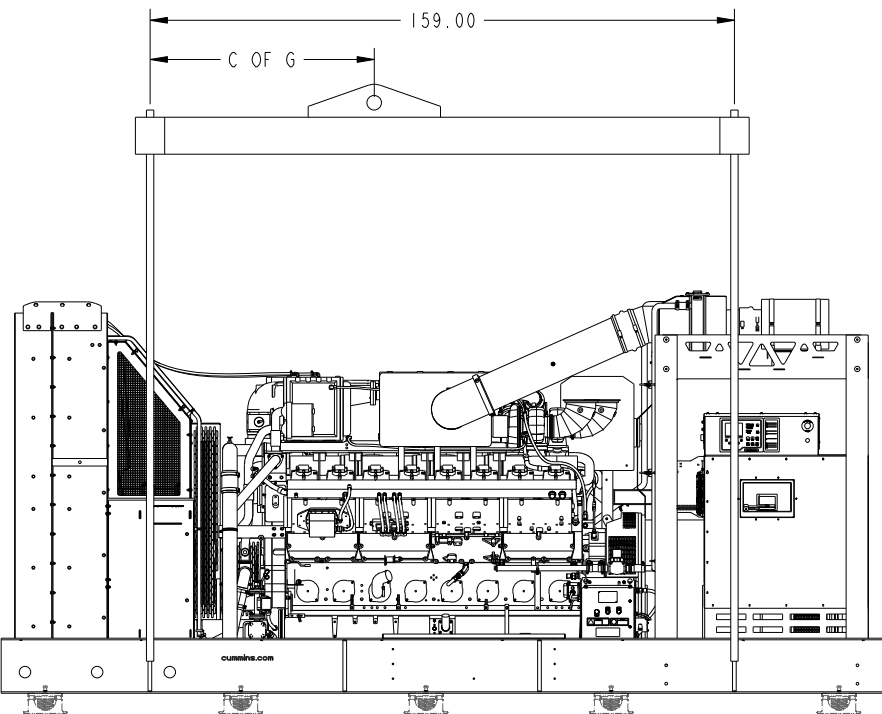
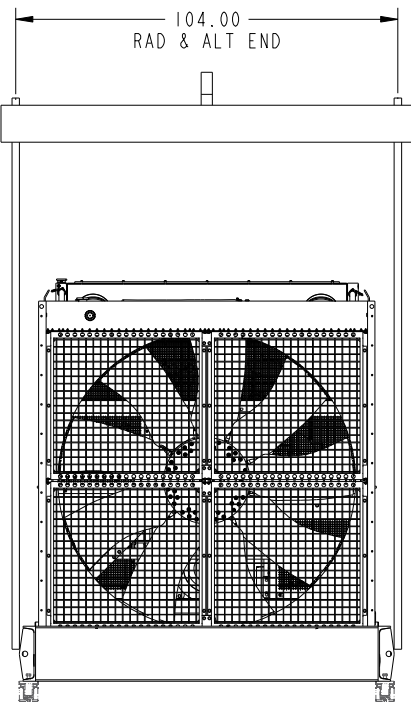
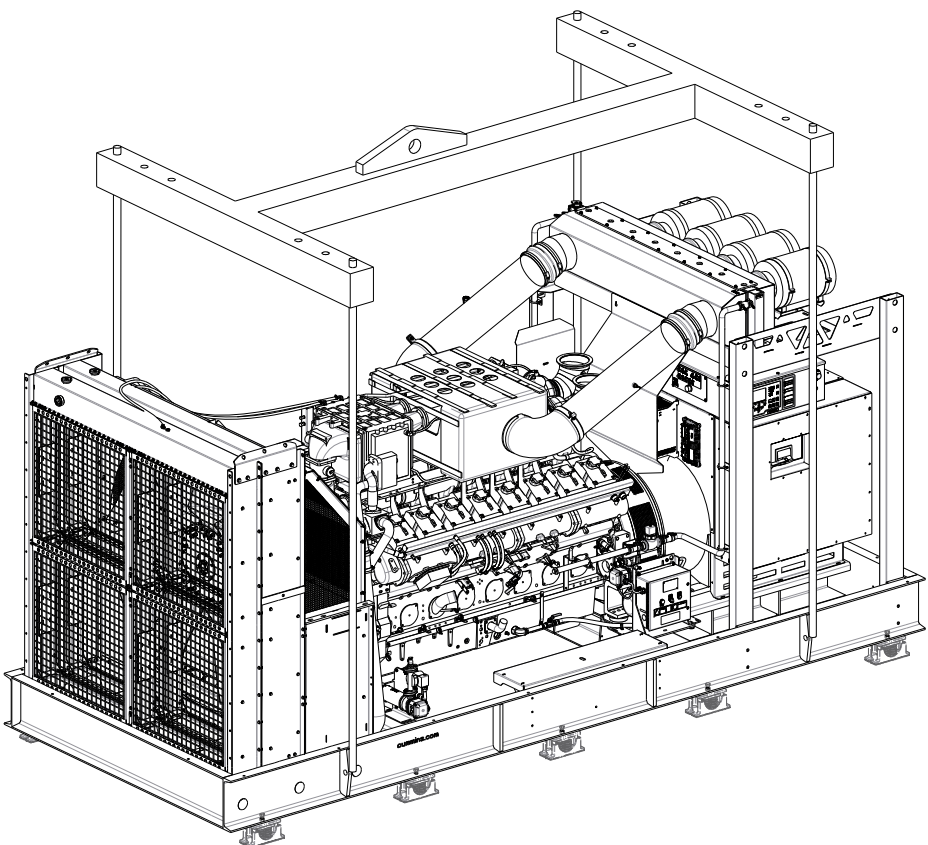
B

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1. IDEAL ARRANGEMENT: LIFTING FRAME AND STRAPS



LIFTING ARRANGEMENT FOR GENSET
FOR C OF G VALUE REFER TO SHEET 2

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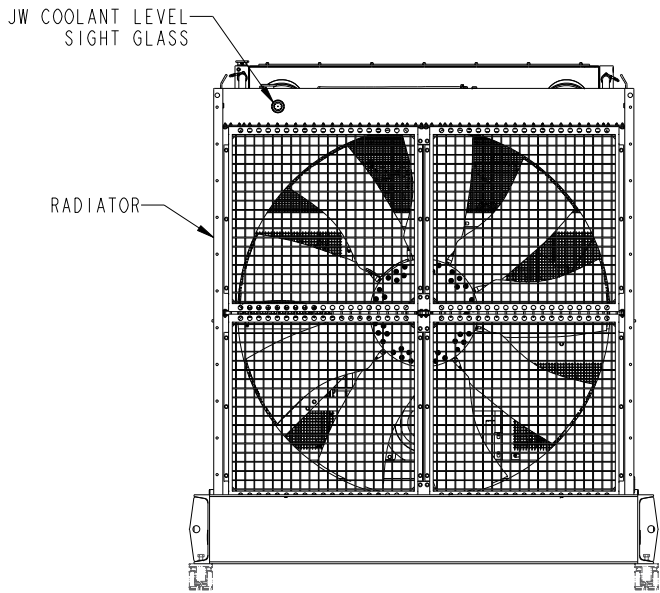
2

1

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.2: ±.1 IN OR 3.2 mm X.3: ±.1 IN OR 0.25 mm X.4: ±.1 IN OR 0.25 mm ANGULAR TOLERANCES: ± 1°		SCALE .050 		 DWN D.J.HUMECKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 10FEB2021		ITEM NAME GENSET C1000N6-01	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	
				CMI DATA CLASSIFICATION Cummins Confidential		CAD SHEET 6 OF 6	
				ITEM NUMBER A0652573		REV 1	

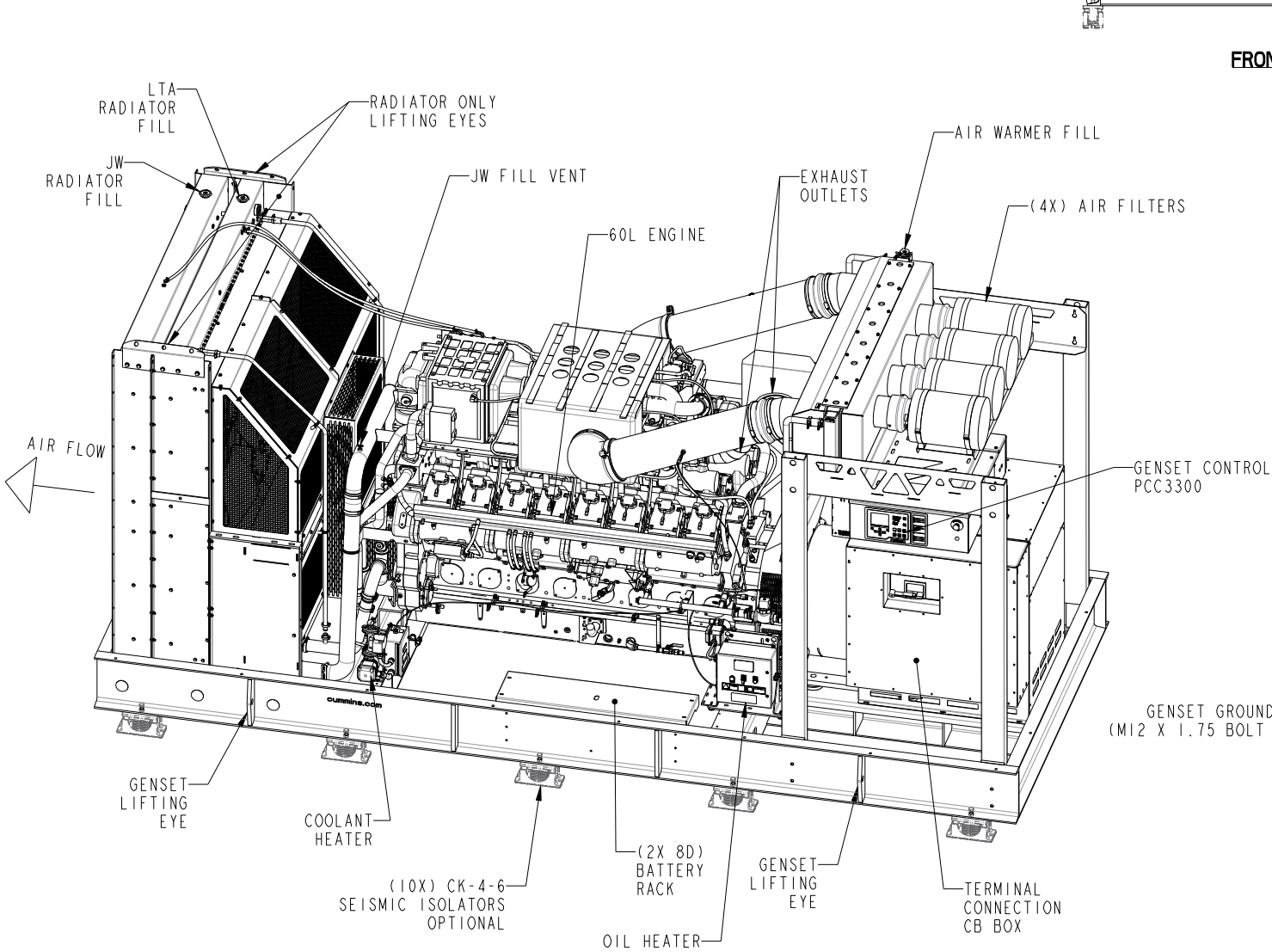
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-056	INITIAL RELEASE	DJH	JCB	JCB	10FEB21
1	2022-123	UPDATED; FUEL TRAIN; WEIGHTS; NOTES	DJH	DJH	JCB	30MAY22

LEGEND	
SHEET #	DESCRIPTION
1	ISOMETRIC VIEWS, GENSET FEATURE IDENTIFICATION
2	GENSET/ALTERNATOR MODELS
	WEIGHTS, CENTER OF GRAVITY
3	GENERAL DIMENSIONS
	FOUNDATION DRAWING
4	GAS/FUEL CONNECTION
	EXHAUST CONNECTION
5	ELECTRICAL INTERFACE
6	LIFTING DIAGRAM

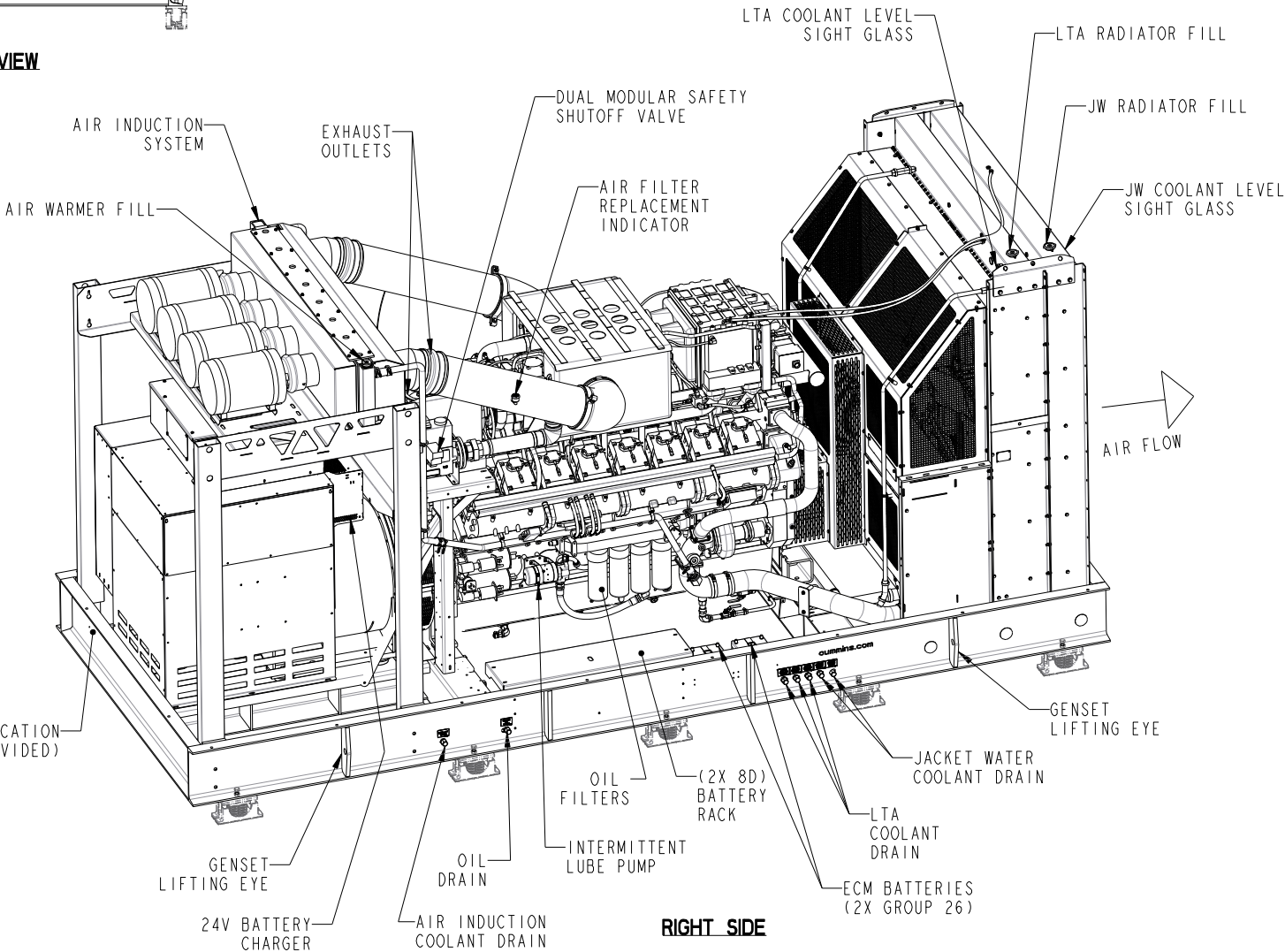


FRONT VIEW

- NOTES:
- DIMENSIONS:
 - ALL DIMENSIONS ARE IN INCHES
 - ALL DIMENSIONS ARE REFERENCE UNLESS SPECIFICALLY TOLERANCED
 - WEIGHT: REFER TO TABLE(S) ON SHEET 2 FOR STANDARD GENSET WET AND DRY WEIGHT(S)
 - LARGEST NOMINAL DIMENSIONS:
 - LENGTH: 240.0 INCHES
 - WIDTH: 102.0 INCHES
 - HEIGHT: 114.6 INCHES
 - DOES NOT INCLUDE THE HEIGHT OF THE SEISMIC ISOLATORS
 - LIFTING INSTRUCTIONS: REFER TO GENSET INSTALLATION MANUAL AND LIFTING LABEL
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE RADIATOR. RADIATOR LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING RADIATOR
- ALLOW 6.5 FEET AROUND THE GENSET FOR SERVICE
 - ELECTRICAL SPECIFIC NOTES ON SHEET 5

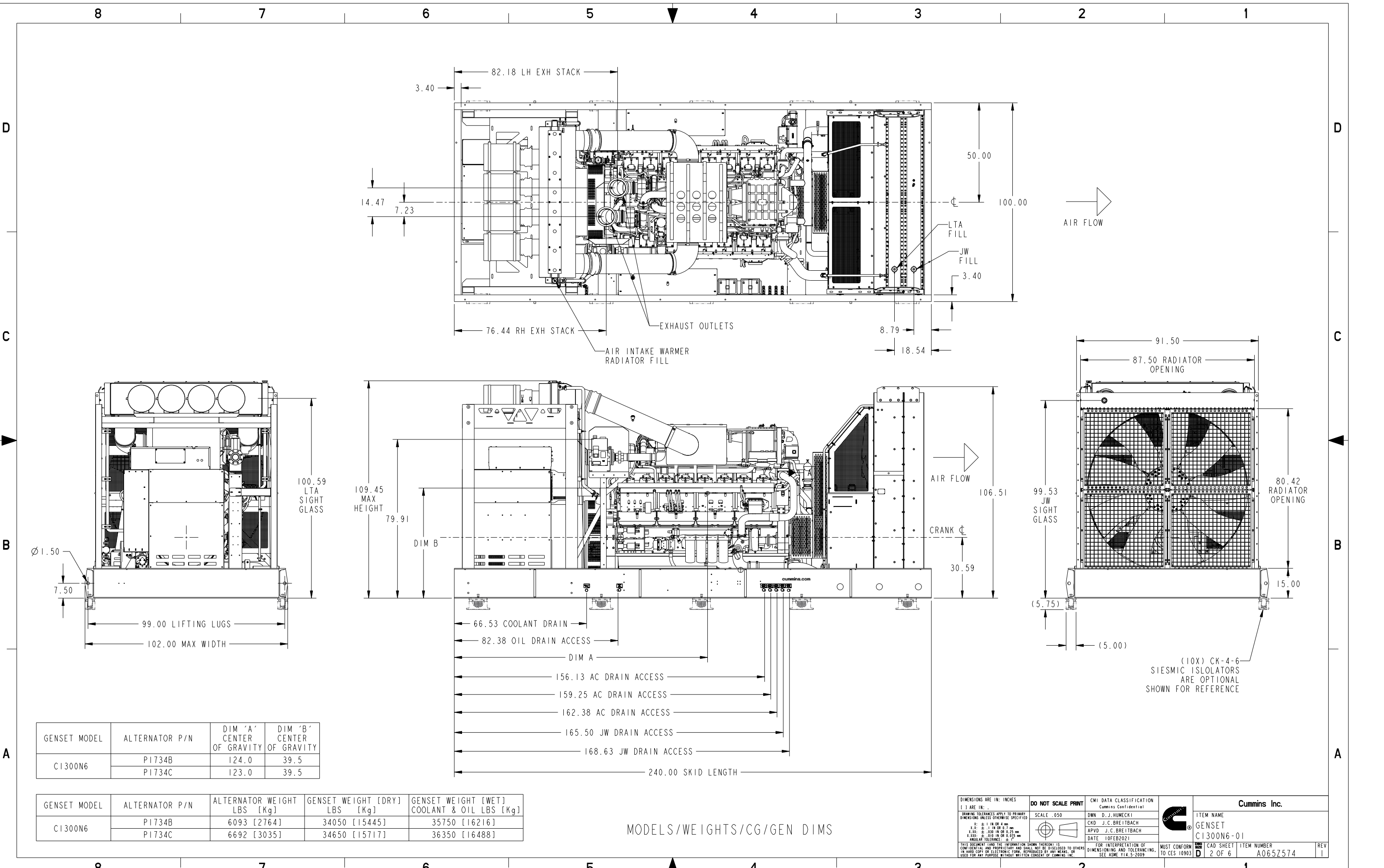


LEFT SIDE



RIGHT SIDE

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.Z: ±.01 IN OR 0.25 mm X.XXX: ±.001 IN OR 0.025 mm ANGULAR TOLERANCES: ±		SCALE .050	DWN D.J. HUMECKI CKD J.C. BREITBACH APVD J.C. BREITBACH DATE 10FEB2021	ITEM NAME GENSET C1300N6-01	ITEM NUMBER A0652574
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY FORM OR BY ANY MEANS, OR REPRODUCED IN ANY MANNER, WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	MUST CONFORM TO CES 10903	CAD SHEET 1 OF 6	REV 1



GENSET MODEL	ALTERNATOR P/N	DIM 'A' CENTER OF GRAVITY	DIM 'B' CENTER OF GRAVITY
C1300N6	PI734B	124.0	39.5
	PI734C	123.0	39.5

GENSET MODEL	ALTERNATOR P/N	ALTERNATOR WEIGHT LBS [Kg]	GENSET WEIGHT [DRY] LBS [Kg]	GENSET WEIGHT [WET] COOLANT & OIL LBS [Kg]
C1300N6	PI734B	6093 [2764]	34050 [15445]	35750 [16216]
	PI734C	6692 [3035]	34650 [15717]	36350 [16488]

MODELS/WEIGHTS/CG/GEN DIMS

DIMENSIONS ARE IN: INCHES
() ARE IN: .

DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED.

X: ± 1 IN OR 4 mm
X.1: ± .1 IN OR 3 mm
X.2: ± .01 IN OR 0.25 mm
X.3: ± .001 IN OR 0.025 mm
ANGULAR TOLERANCES: ± 1°

DO NOT SCALE PRINT

SCALE .050

CMV DATA CLASSIFICATION
Cummins Confidential

DWN D.J.HUMECKI
CRD J.C.BREITBACH
APVD J.C.BREITBACH
DATE 10FEB2021

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009

Cummins Inc.

ITEM NAME
GENSET
C1300N6-01

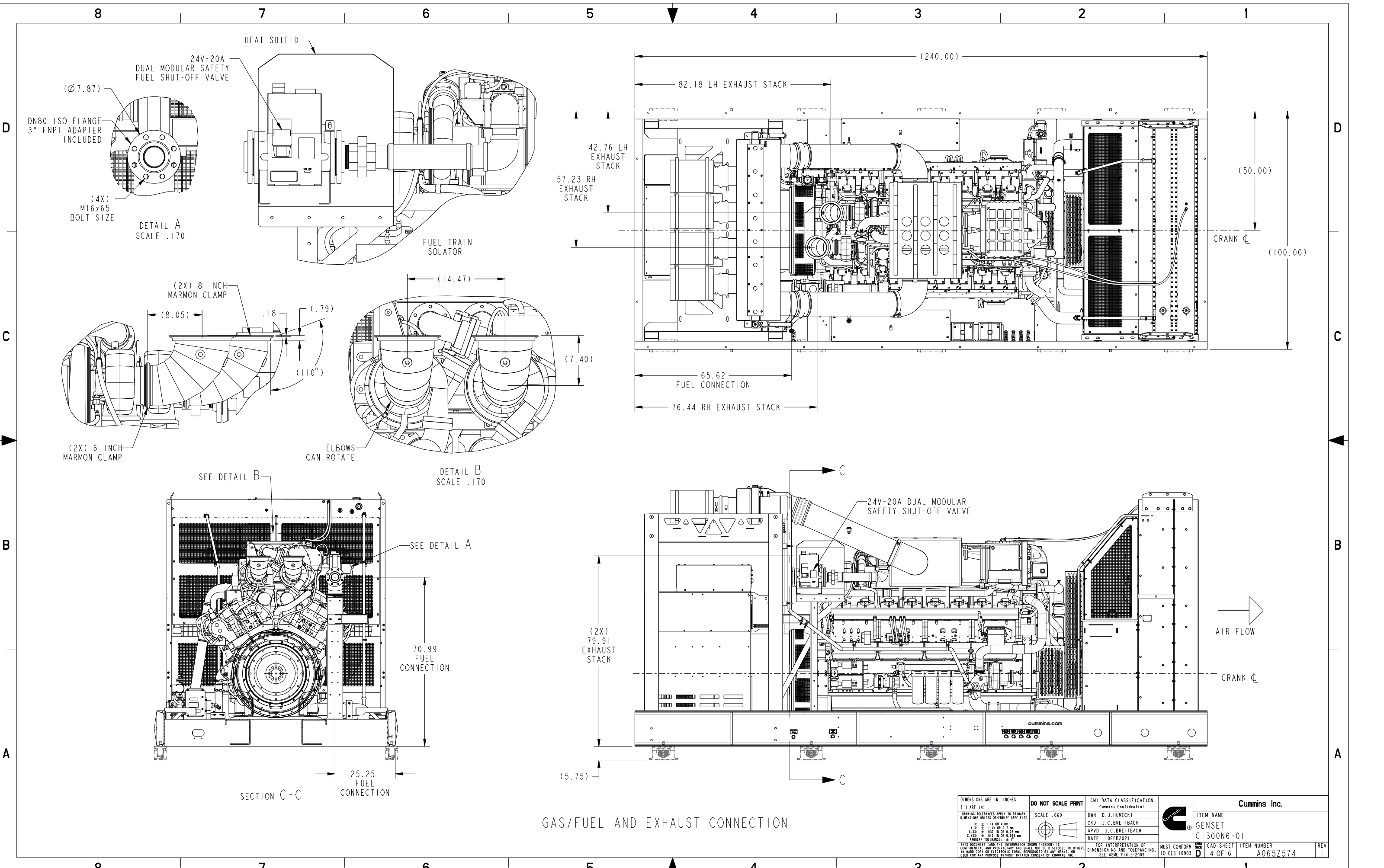
CAD SHEET
2 OF 6

ITEM NUMBER
A0652574

REV
1

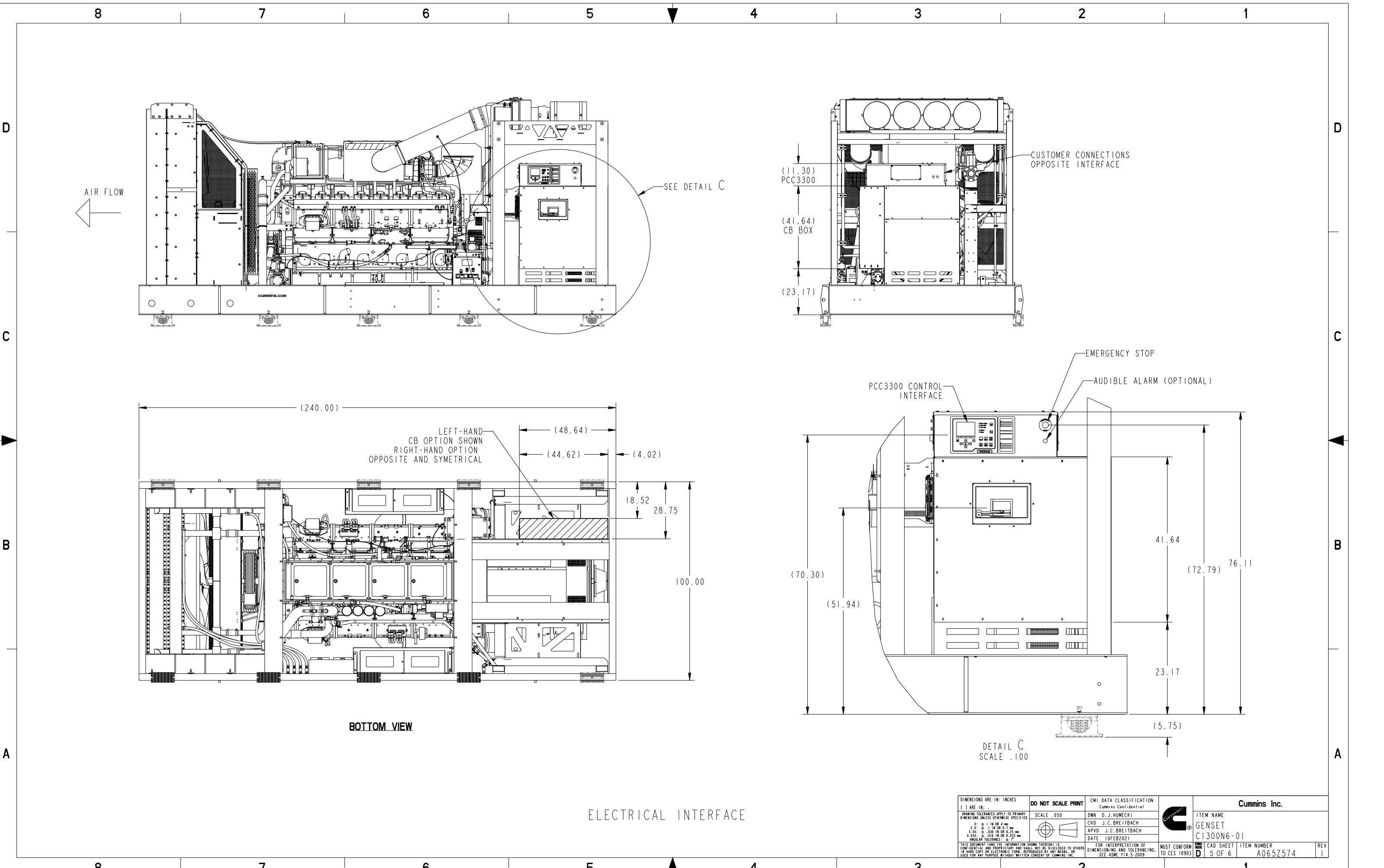
MUST CONFORM TO CES 10903

DIMENSIONS ARE IN: INCHES 1 IN. = 25.4 MM. DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED 1. X.XX ± .005 IN OR 4 mil 2. X.XX ± .010 IN OR 0.125 mm 3. X.XX ± .015 IN OR 0.375 mm 4. ANGULAR TOLERANCE ± .5° THIS DOCUMENT CANNOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT PERMISSION IN WRITING FROM THE CUMMINS ENGINEERING DEPARTMENT. FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE THE CUMMINS DIMENSIONING AND TOLERANCING MANUAL, CUMMINS INC., P.O. BOX 1474, COLUMBIANA, OH 43081-0147.		CUMMINS CUMMINS INC.		ITEM NAME GENSET C1300N6-01		CAD SHEET 3 OF 6		ITEM NUMBER A0652574		REV 001	
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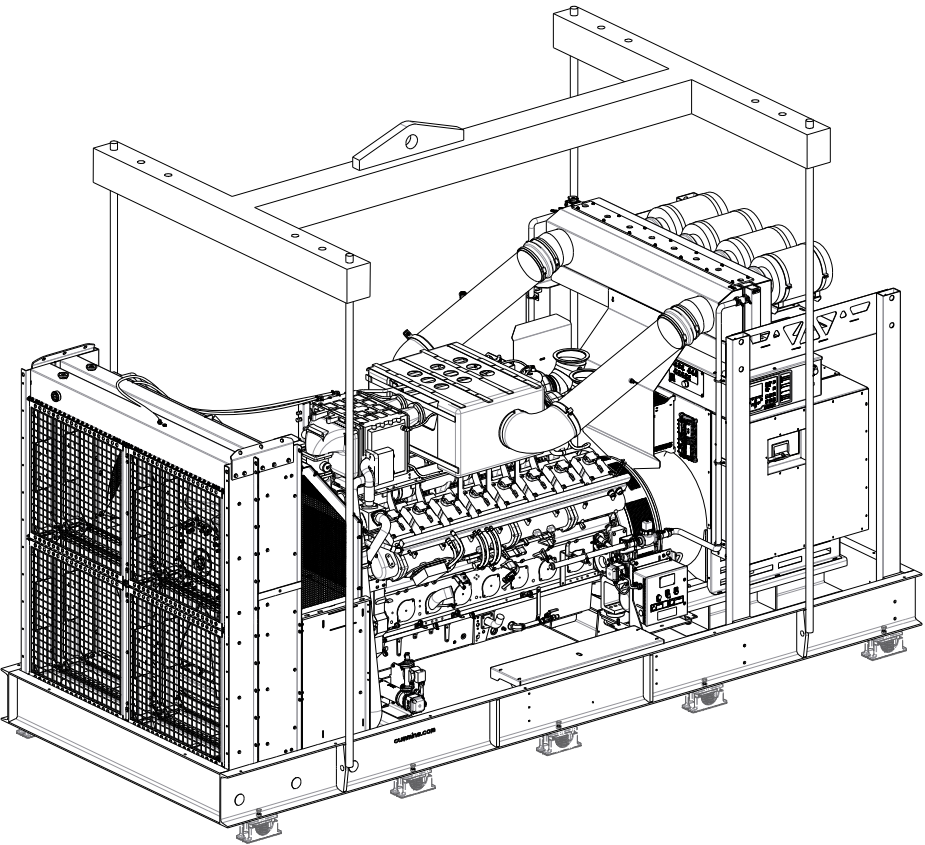


GAS/FUEL AND EXHAUST CONNECTION

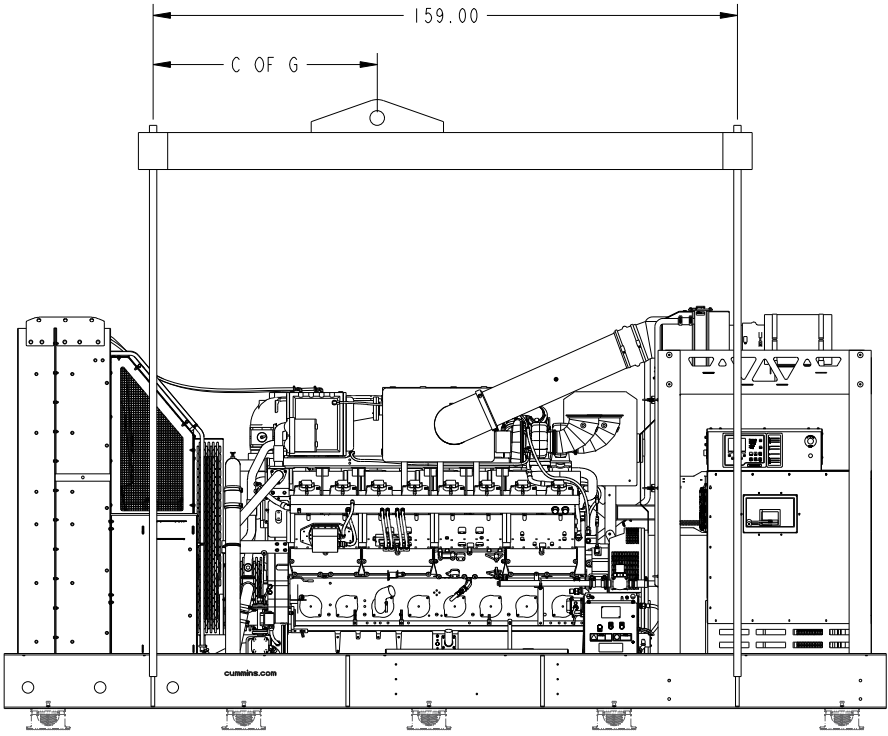
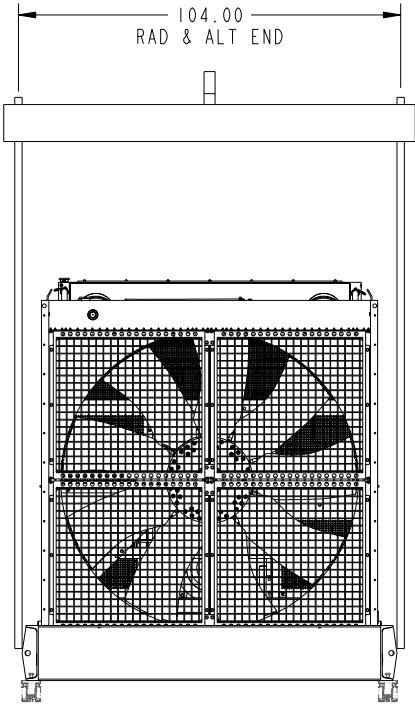
DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X: ± .010 IN OR 0.25 mm X.X: ± .005 IN OR 0.125 mm X.XXX: ± .001 IN OR 0.025 mm ANGULAR TOLERANCES: ±		SCALE .060	DWN D.J.HUMECKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 10FEB2021		ITEM NAME GENSET C1300N6-01	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	CAD SHEET 4 OF 6	ITEM NUMBER A0652574



DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential		Cummins Inc.		
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .050	DWN D.J.HUMECKI		ITEM NAME		
X: ±.1 IN OR 4 mm			CRD J.C.BREITBACH		GENSET		
X.Y: ±.030 IN OR 0.75 mm			APVD J.C.BREITBACH		C1300N6-01		
X.XXX: ±.010 IN OR 0.25 mm			DATE 10FEB2021		MUST CONFORM TO CES 10903		
ANGULAR TOLERANCES: ±°		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009			CAD SHEET 5 OF 6	ITEM NUMBER A0652574	REV 1
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.							



1. IDEAL ARRANGEMENT: LIFTING FRAME AND STRAPS

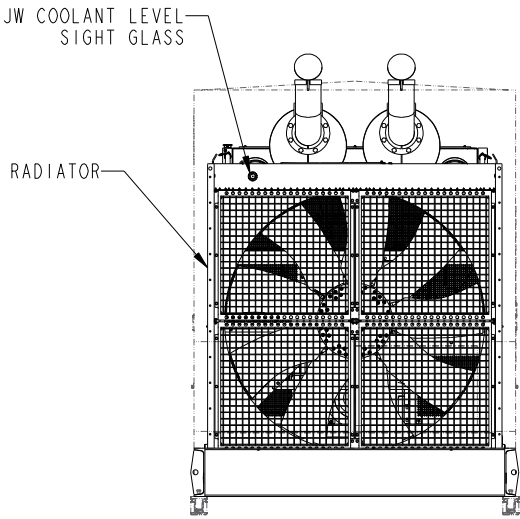


LIFTING ARRANGEMENT FOR GENSET
FOR C OF G VALUE REFER TO SHEET 2

DIMENSIONS ARE IN: INCHES () ARE IN: . DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.2: ±.1 IN OR 3.2 mm X.12: ±.030 IN OR 0.75 mm X.XXX: ±.010 IN OR 0.25 mm ANGULAR TOLERANCES: ±	DO NOT SCALE PRINT	CMV DATA CLASSIFICATION Cummins Confidential		Cummins Inc.			
	SCALE .050	DWN D.J.HUMECKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 10FEB2021		ITEM NAME GENSET			
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	CAD SHEET 6 OF 6	ITEM NUMBER A0652574	REV 1
	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.						

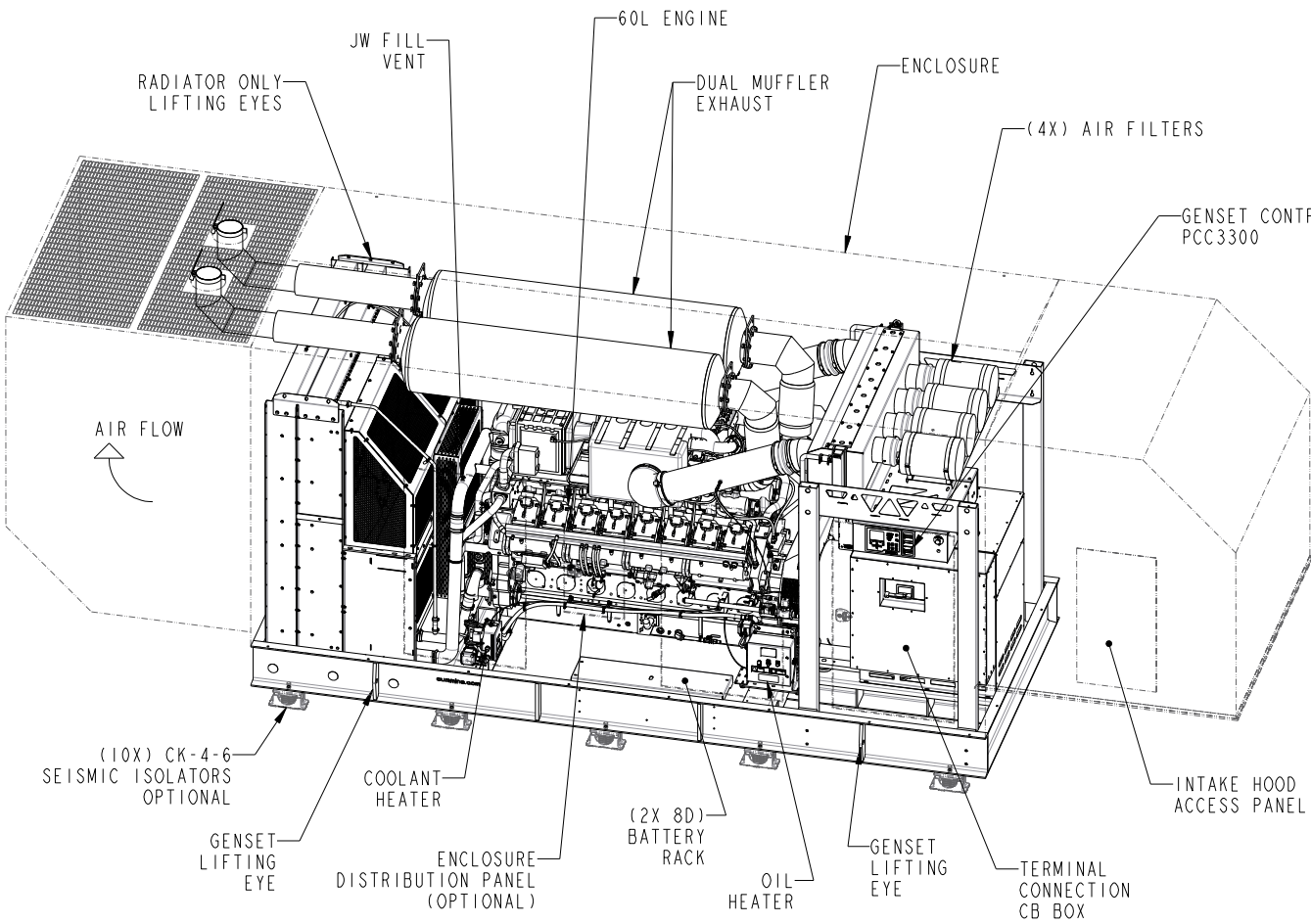
2				1			
REV	REL NO	REVISION		DWN	CKD	APVD	DATE
0	2021-056	INITIAL RELEASE		DJH	JCB	JCB	03AUG21
1	2022-123	UPDATED; FUEL TRAIN;ENCLOSURE;NOTES		DJH	JCB	JCB	30MAY22

LEGEND	
SHEET #	DESCRIPTION
1	ISOMETRIC VIEWS, GENSET FEATURE IDENTIFICATION
2	GENSET/ALTERNATOR MODELS
	WEIGHTS, CENTER OF GRAVITY
	GENERAL DIMENSIONS
3	FOUNDATION DRAWING
4	GAS/FUEL CONNECTION
	EXHAUST CONNECTION
5	ELECTRICAL INTERFACE
6	LIFTING DIAGRAM

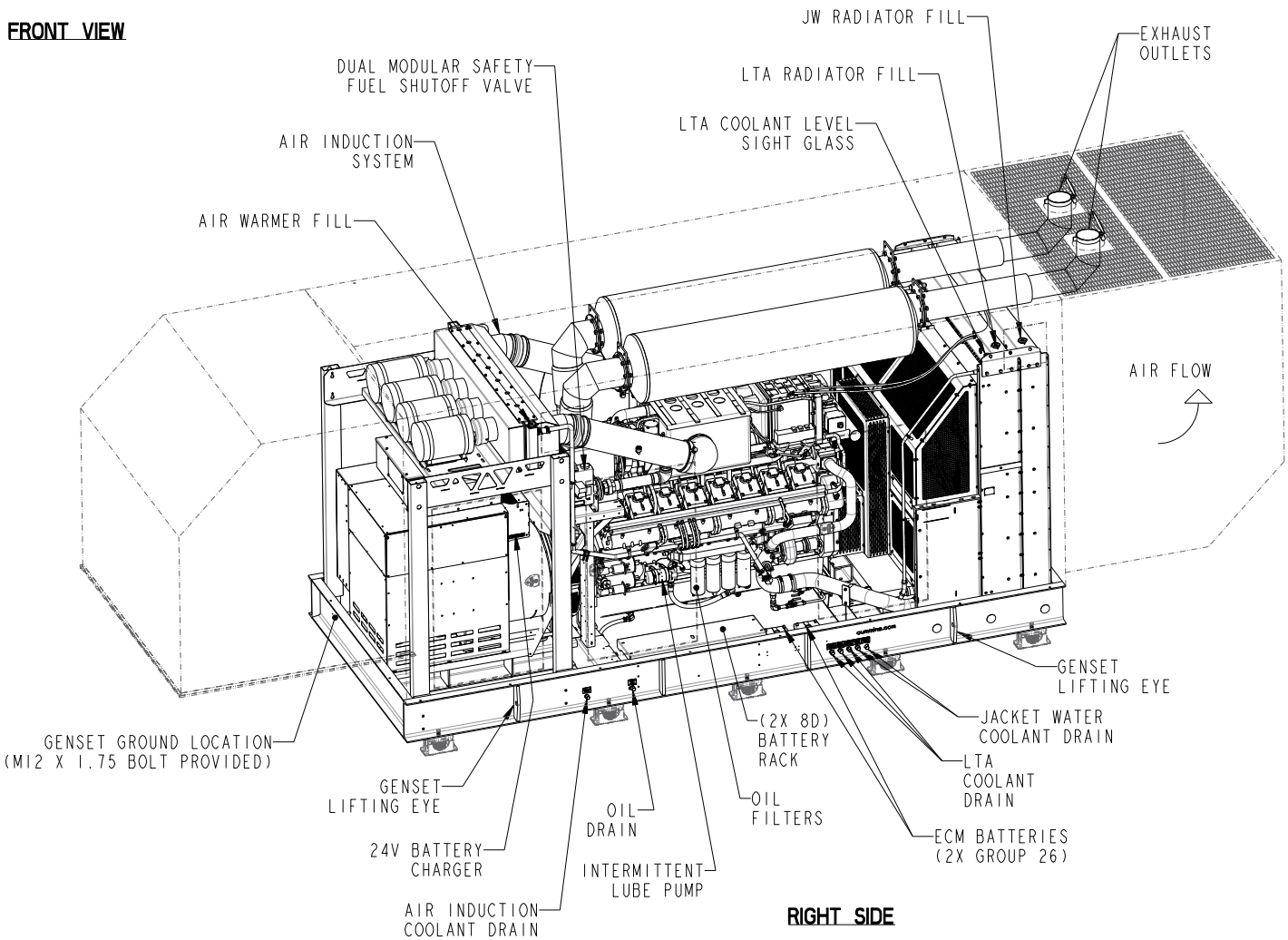


- NOTES:
- DIMENSIONS:
 - ALL DIMENSIONS ARE IN INCHES
 - ALL DIMENSIONS ARE REFERENCE UNLESS SPECIFICALLY TOLERANCED
 - WEIGHT: REFER TO TABLE(S) ON SHEET 2 FOR STANDARD GENSET WET AND DRY WEIGHT(S)
 - LARGEST NOMINAL DIMENSIONS:
 - LENGTH: 402.7 INCHES
 - WIDTH: 102.0 INCHES
 - HEIGHT: 130.5 INCHES
 - DOES NOT INCLUDE THE HEIGHT OF THE SEISMIC ISOLATORS
 - LIFTING INSTRUCTIONS: REFER TO GENSET INSTALLATION MANUAL AND LIFTING LABEL
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE ENCLOSURE
ENCLOSURE LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING ENCLOSURE
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE RADIATOR
RADIATOR LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING RADIATOR
- ALLOW 6.5 FEET AROUND THE GENSET FOR SERVICE
 - ELECTRICAL SPECIFIC NOTES ON SHEET 5

FRONT VIEW

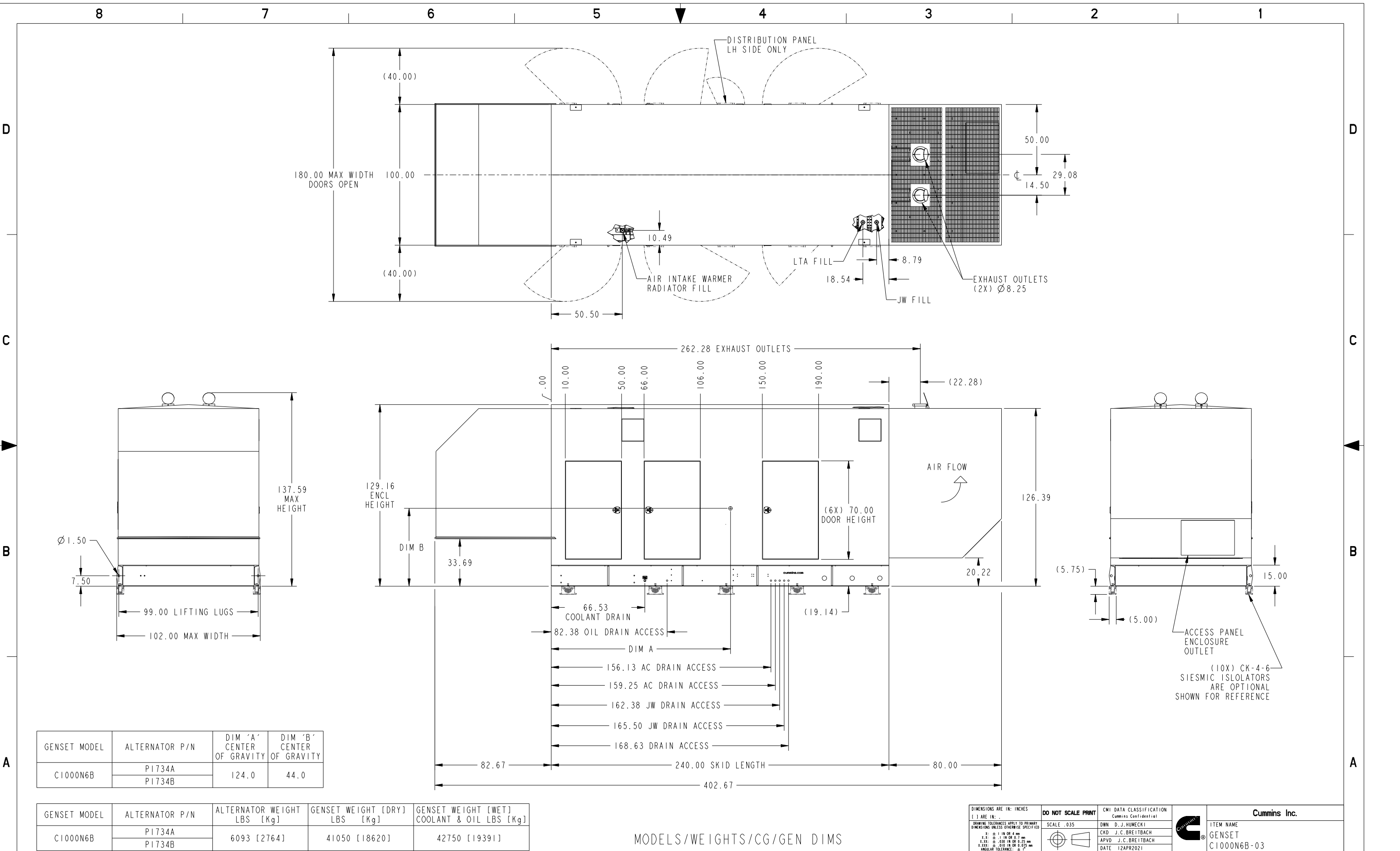


LEFT SIDE



RIGHT SIDE

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .035		ITEM NAME	
X: ± .1 IN OR 4 mm		DWN D.J. HUMECKI		GENSET	
X.12: ± .1 IN OR 3 mm		CKD J.C. BREITBACH		C1000N6B-03	
X.125: ± .050 IN OR 0.25 mm		APVD J.C. BREITBACH		CAD SHEET 1 OF 6	
ANGULAR TOLERANCES: ±		DATE 12APR2021		ITEM NUMBER A066M380	
			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.					
			MUST CONFORM TO CES 10903	REV	



GENSET MODEL	ALTERNATOR P/N	DIM 'A' CENTER OF GRAVITY	DIM 'B' CENTER OF GRAVITY
C1000N6B	PI734A	124.0	44.0
	PI734B		

GENSET MODEL	ALTERNATOR P/N	ALTERNATOR WEIGHT LBS [Kg]	GENSET WEIGHT [DRY] LBS [Kg]	GENSET WEIGHT [WET] COOLANT & OIL LBS [Kg]
C1000N6B	PI734A	6093 [2764]	41050 [18620]	42750 [19391]
	PI734B			

MODELS/WEIGHTS/CG/GEN DIMS

DIMENSIONS ARE IN: INCHES
() ARE IN: .

DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED

X: ± .1 IN OR 4 mm
X.1: ± .1 IN OR 0.7 mm
X.2: ± .030 IN OR 0.75 mm
X.3: ± .010 IN OR 0.25 mm
ANGULAR TOLERANCES: ± 1°

DO NOT SCALE PRINT

SCALE .035

CMI DATA CLASSIFICATION
Cummins Confidential

DWN D.J.HUMECKI
CKD J.C.BREITBACH
APVD J.C.BREITBACH
DATE 12APR2021

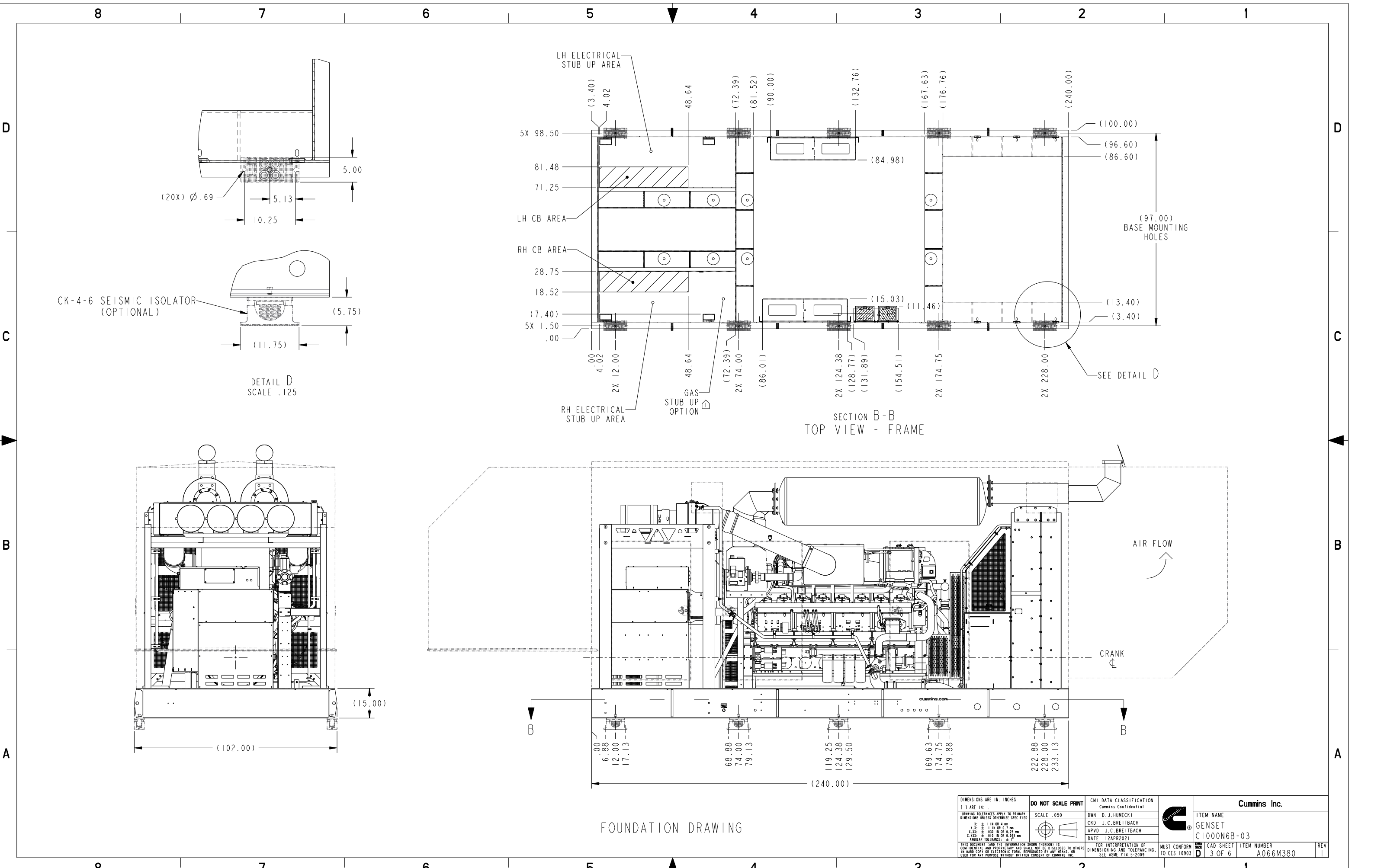
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009

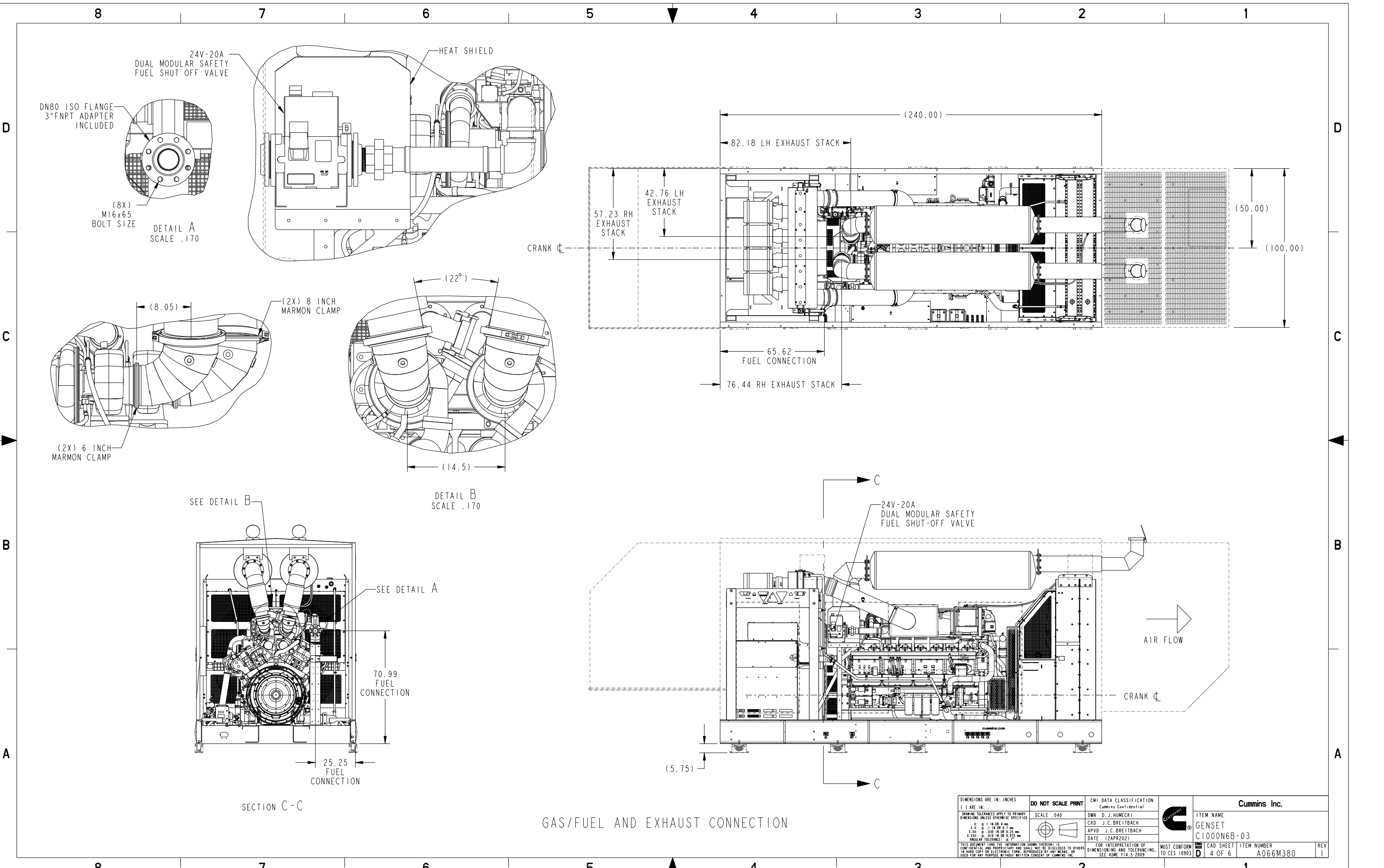
Cummins Inc.

ITEM NAME
GENSET
C1000N6B-03

MUST CONFORM TO CES 10903

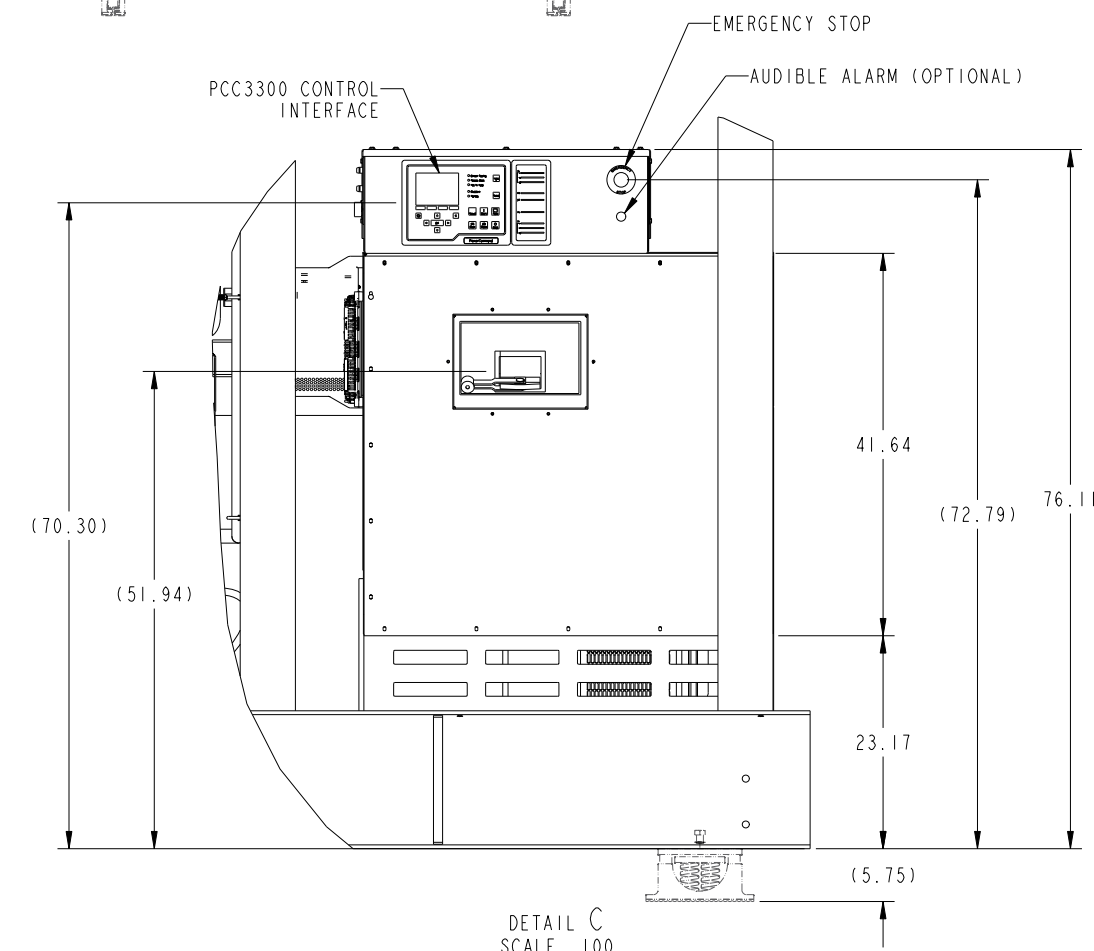
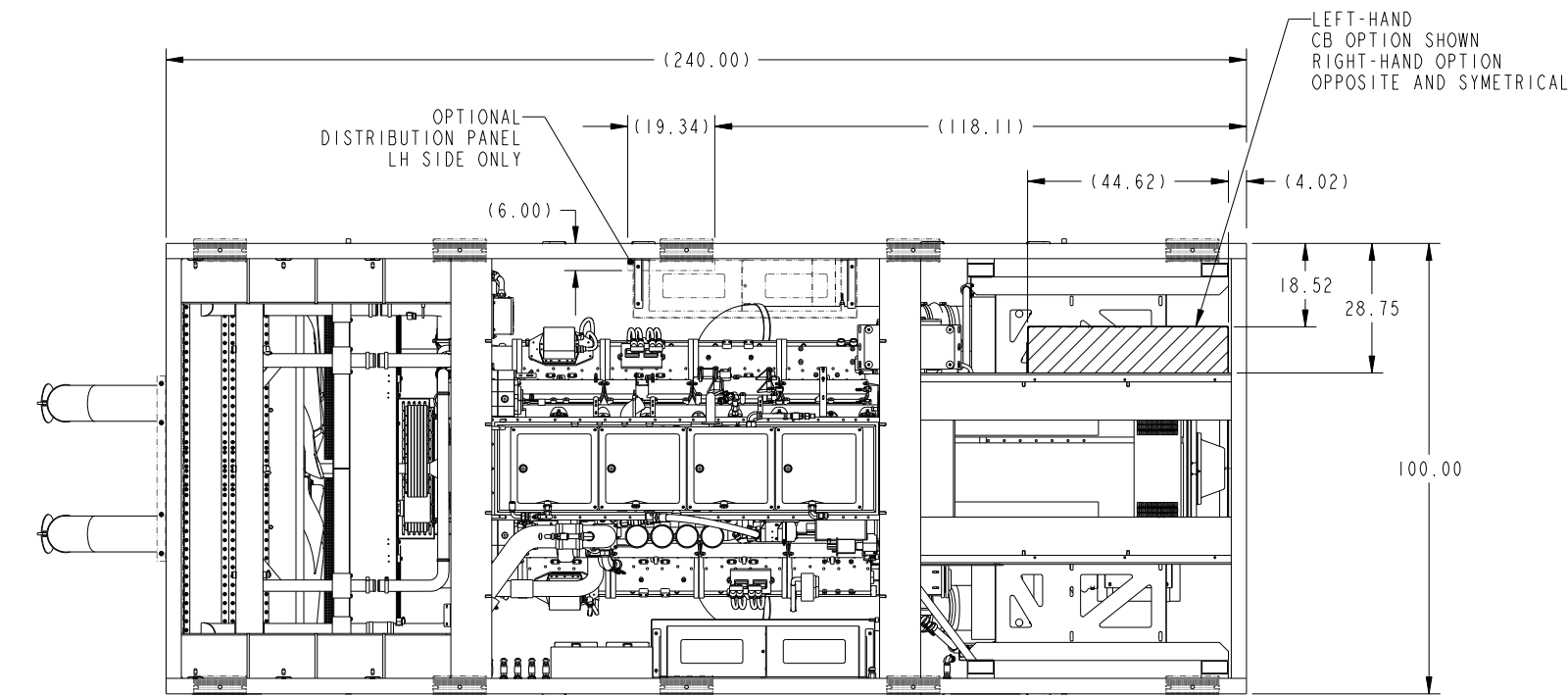
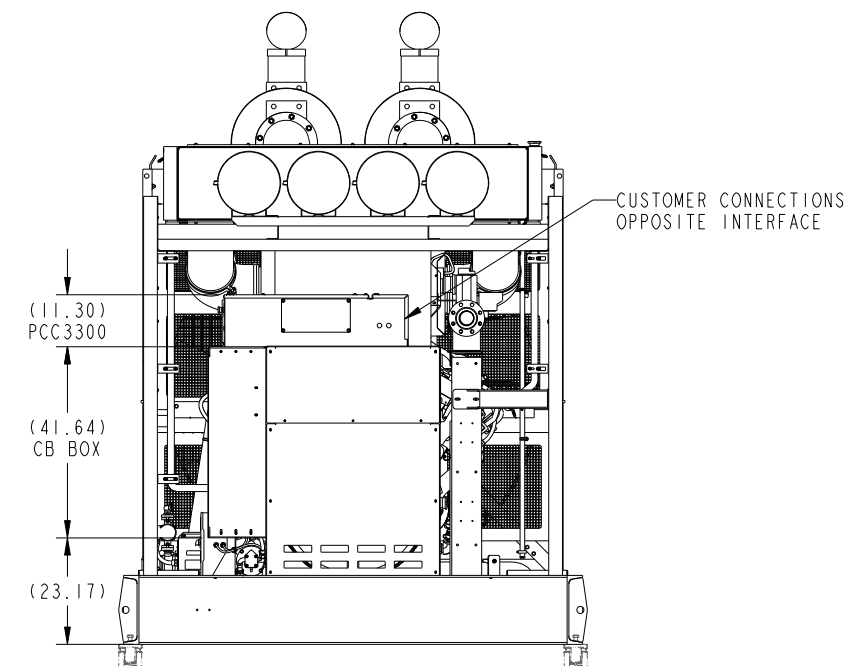
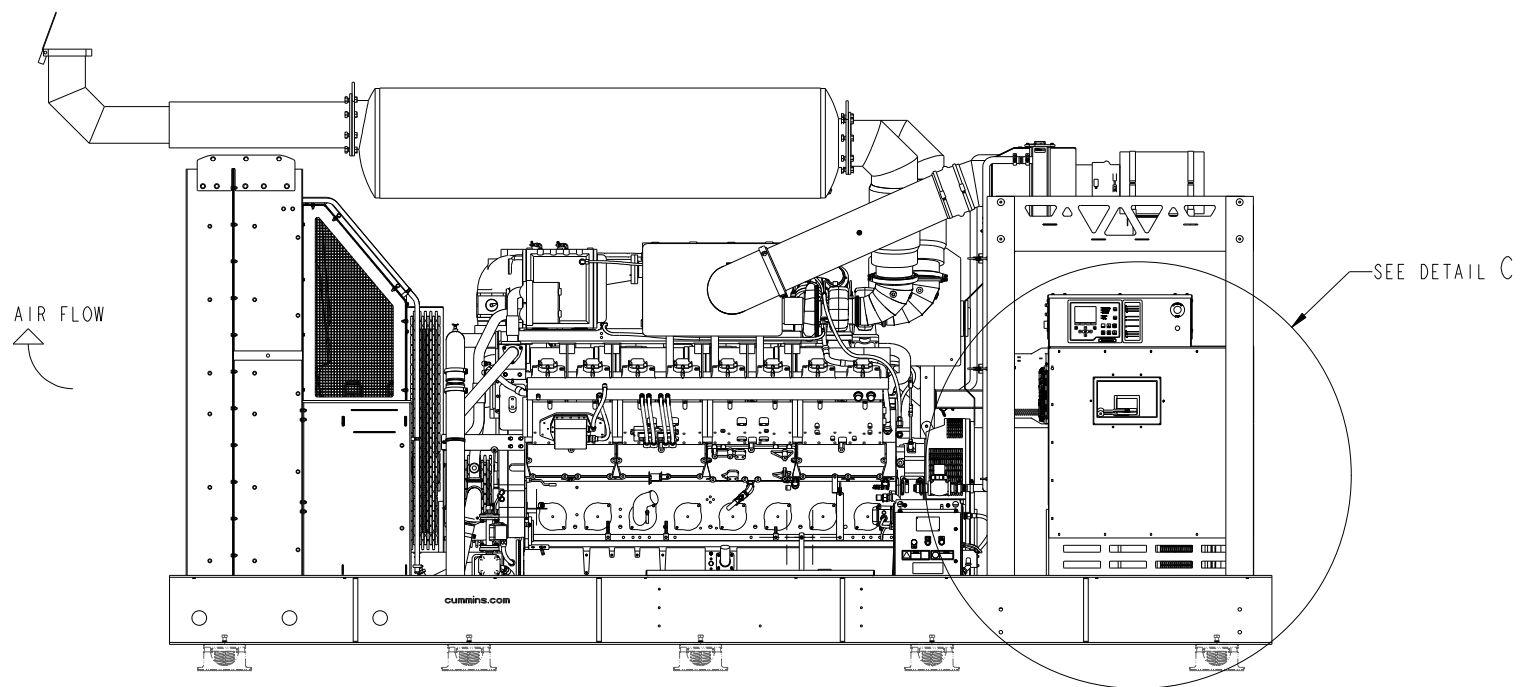
CAD SHEET 2 OF 6
ITEM NUMBER A066M380
REV 1





GAS/FUEL AND EXHAUST CONNECTION

DIMENSIONS ARE IN: INCHES [] ARE IN: mm DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X: ±.1 IN OR 4 mm X.X: ±.1 IN OR 3.2 mm X.XX: ±.050 IN OR 0.25 mm X.XXX: ±.010 IN OR 0.025 mm ANGULAR TOLERANCES: ±		DO NOT SCALE PRINT SCALE .040 	CMV DATA CLASSIFICATION Cummins Confidential 	Cummins Inc.	
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS: UNCLASSIFIED THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS: UNCLASSIFIED IN HARD COPY OR ELECTRONIC FORM, REPRODUCED IN ANY MANNER, OR BY ANY MEANS, WITHOUT PERMISSION OF CUMMINS INC. AND CUMMINS TRADING AND FINANCIAL GROUP, INC. SEE ASME Y14.5-2009			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903
DWN D.J.HUMECKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 12APR2021			ITEM NAME GENSET C1000N6B-03		
DWN D.J.HUMECKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 12APR2021			CAD SHEET 4 OF 6 ITEM NUMBER A066M380		REV 1



BOTTOM VIEW

DETAIL C
SCALE .100

ELECTRICAL INTERFACE
(ENCLOSURE REMOVED FOR CLARITY)

DIMENSIONS ARE IN: INCHES () ARE IN: .	DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
				ITEM NAME GENSET C1000N6B-03	ITEM NUMBER A066M380
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED	SCALE .050	DWN D.J.HUMECKI		CAD SHEET 5 OF 6	REV 1
X: ±.1 IN OR 4 mm Y: ±.1 IN OR 4 mm Z: ±.050 IN OR 1.27 mm ANGULAR TOLERANCES: ±		APVD J.C.BREITBACH			
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		DATE 12APR2021	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		
		MUST CONFORM TO CES 10903			

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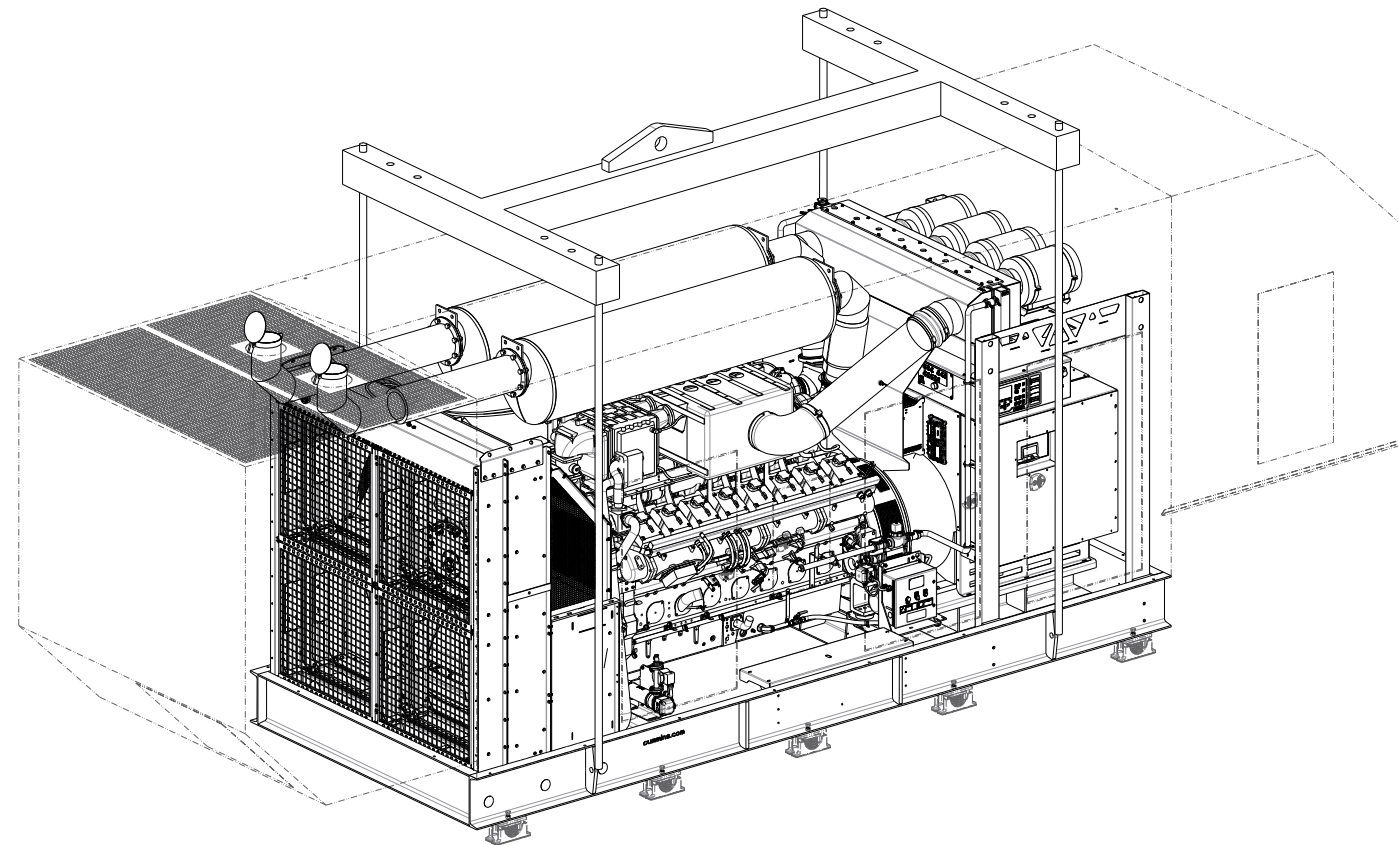
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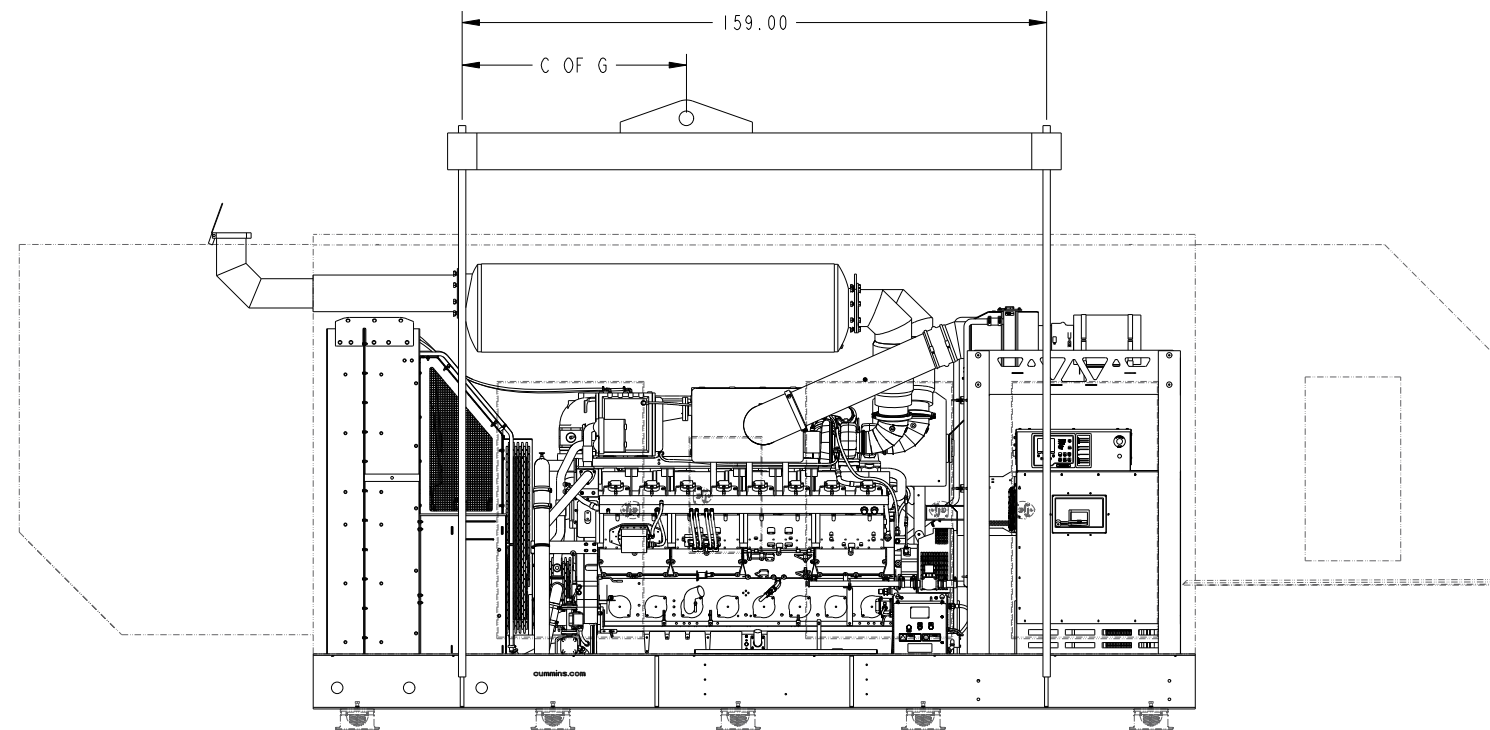
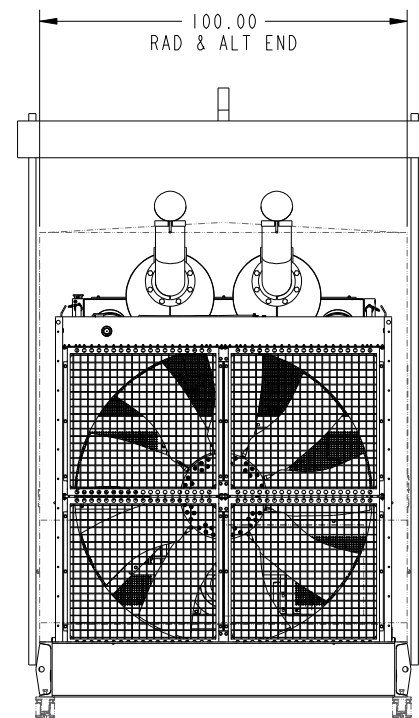
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I. IDEAL ARRANGEMENT: LIFTING FRAME AND STRAPS



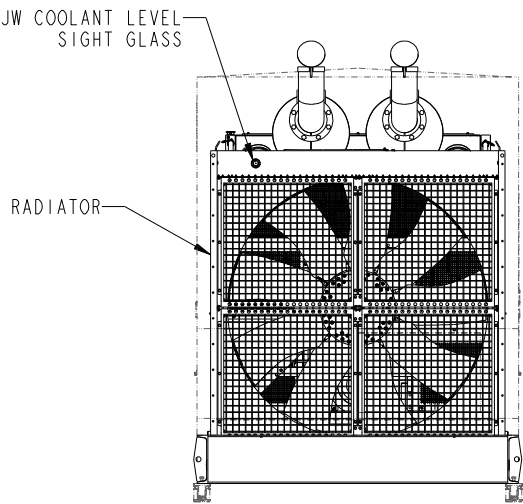
LIFTING ARRANGEMENT FOR GENSET

FOR C OF G VALUE REFER TO SHEET 2

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .050		DWN D.J.HUMICKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 12APR2021		ITEM NAME GENSET C1000N6B-03	
X: ± .1 IN OR 4 mm X.1: ± .1 IN OR 0.7 mm X.2: ± .050 IN OR 0.25 mm ANGULAR TOLERANCES: ± 1°				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		CMI DATA CLASSIFICATION Cummins Confidential	
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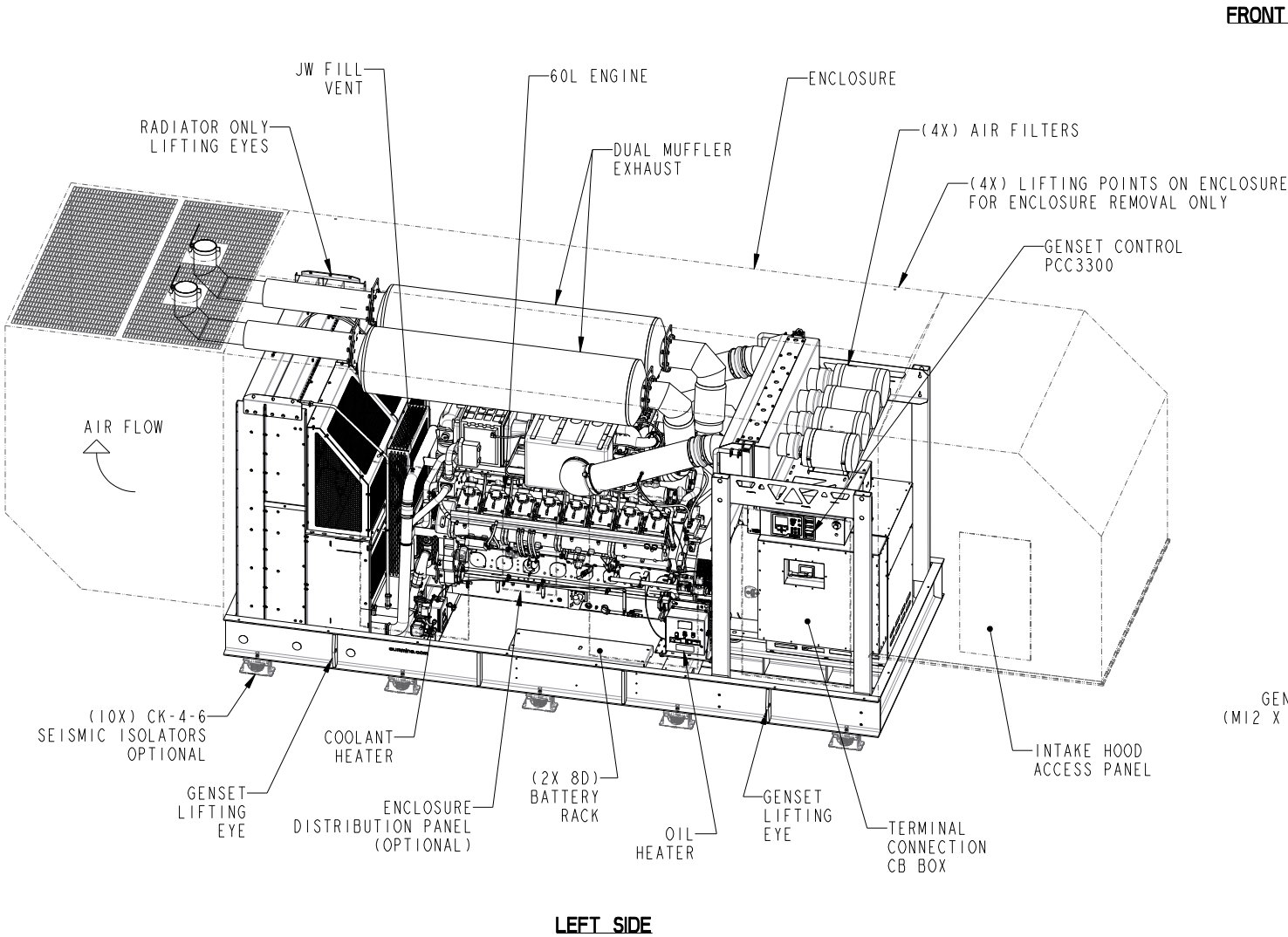
2				1			
REV	REL NO	REVISION		DWN	CKD	APVD	DATE
0	2022-123	INITIAL RELEASE		DJH	JCB	JCB	12SEP21

LEGEND	
SHEET #	DESCRIPTION
1	ISOMETRIC VIEWS, GENSET FEATURE IDENTIFICATION
2	GENSET/ALTERNATOR MODELS
	WEIGHTS, CENTER OF GRAVITY
	GENERAL DIMENSIONS
3	FOUNDATION DRAWING
4	GAS/FUEL CONNECTION
	EXHAUST CONNECTION
5	ELECTRICAL INTERFACE
6	LIFTING DIAGRAM

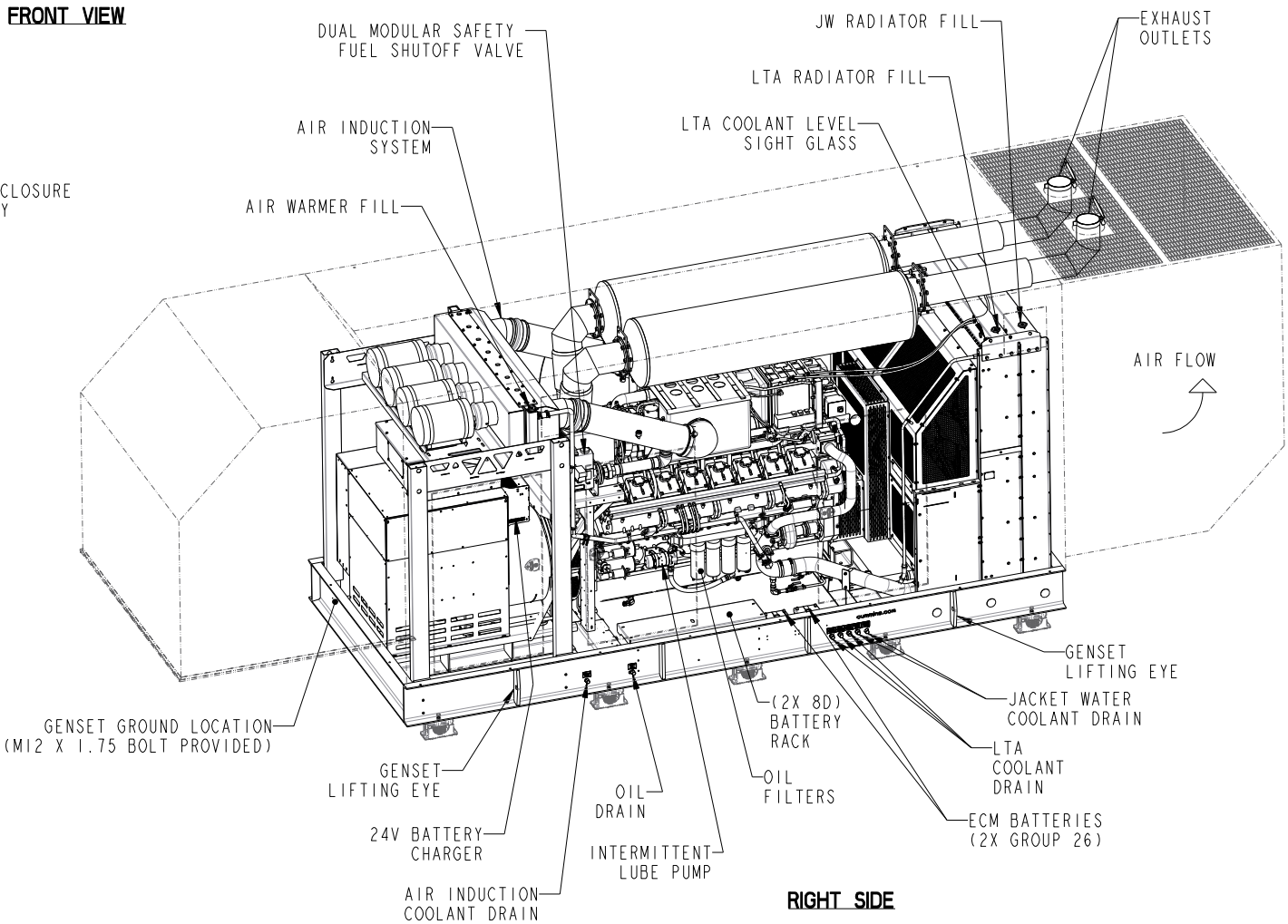


- NOTES:
- DIMENSIONS:
 - ALL DIMENSIONS ARE IN INCHES
 - ALL DIMENSIONS ARE REFERENCE UNLESS SPECIFICALLY TOLERANCED
 - WEIGHT: REFER TO TABLE(S) ON SHEET 2 FOR STANDARD GENSET WET AND DRY WEIGHT(S)
 - LARGEST NOMINAL DIMENSIONS:
 - LENGTH: 402.7 INCHES
 - WIDTH: 102.0 INCHES
 - HEIGHT: 130.5 INCHES
 - DOES NOT INCLUDE THE HEIGHT OF THE SEISMIC ISOLATORS
 - LIFTING INSTRUCTIONS: REFER TO GENSET INSTALLATION MANUAL AND LIFTING LABEL
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE ENCLOSURE
ENCLOSURE LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING ENCLOSURE
- NOTE: GENSET SHALL NOT BE LIFTED USING THE LIFTING EYES MOUNTED TO THE RADIATOR
RADIATOR LIFTING EYES ARE TO BE USED ONLY FOR REMOVING OR INSTALLING RADIATOR
- ALLOW 6.5 FEET AROUND THE GENSET FOR SERVICE
 - ELECTRICAL SPECIFIC NOTES ON SHEET 5

FRONT VIEW

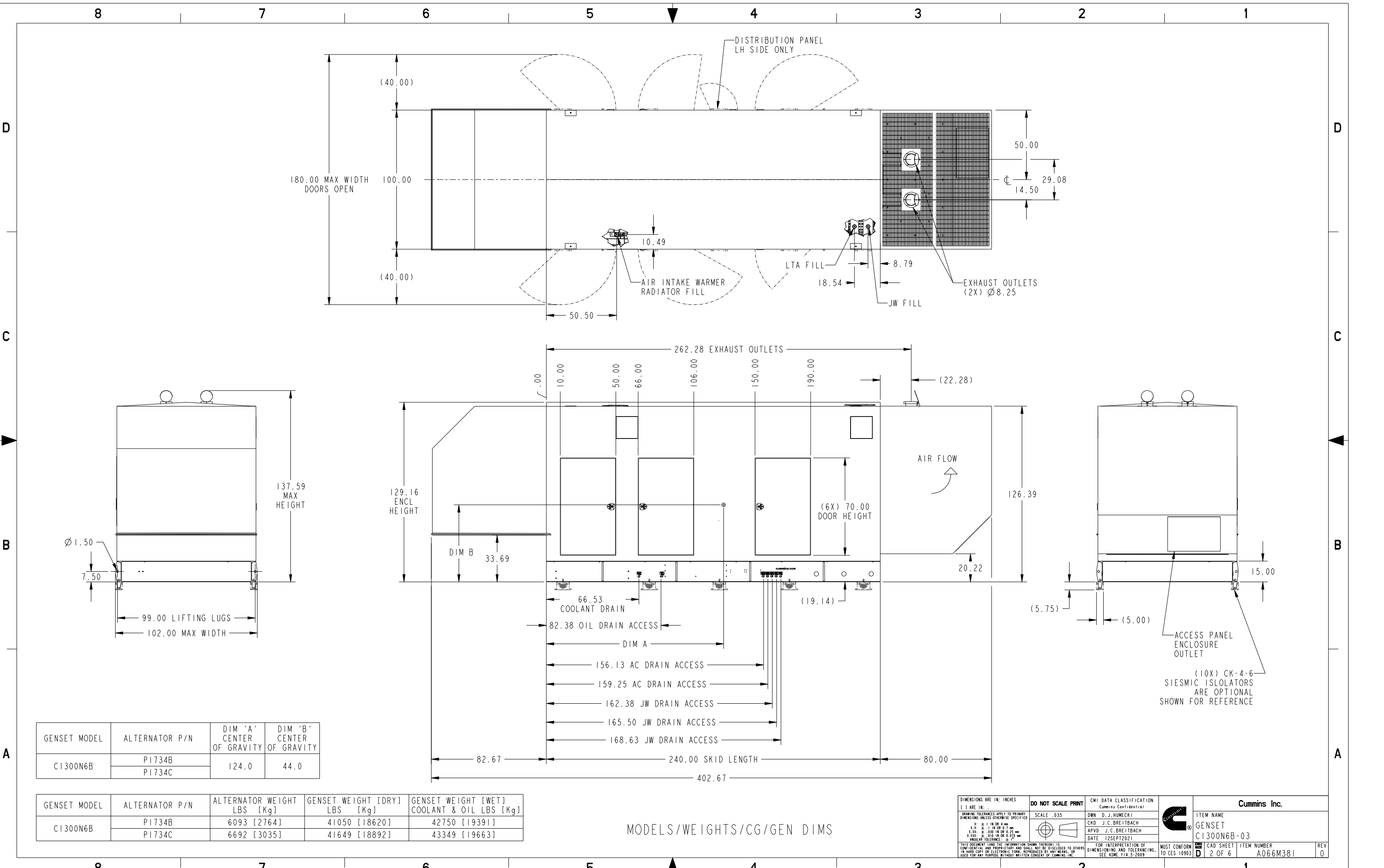


LEFT SIDE



RIGHT SIDE

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .035		ITEM NAME	
X: ± .1 IN OR 4 mm		DWN D.J. HUMECKI		GENSET	
X.Y: ± .1 IN OR 3 mm		CKD J.C. BREITBACH		ITEM NUMBER	
X.Z: ± .001 IN OR 0.025 mm		APVD J.C. BREITBACH		C1300N6B-03	
ANGULAR TOLERANCES: ±		DATE 12SEP2021	MUST CONFORM TO CES 10903		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009
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GENSET MODEL	ALTERNATOR P/N	DIM 'A' CENTER OF GRAVITY	DIM 'B' CENTER OF GRAVITY
C1300N6B	PI734B	124.0	44.0
	PI734C		

GENSET MODEL	ALTERNATOR P/N	ALTERNATOR WEIGHT LBS [Kg]	GENSET WEIGHT [DRY] LBS [Kg]	GENSET WEIGHT [WET] COOLANT & OIL LBS [Kg]
C1300N6B	PI734B	6093 [2764]	41050 [18620]	42750 [19391]
	PI734C	6692 [3035]	41649 [18892]	43349 [19663]

MODELS/WEIGHTS/CG/GEN DIMS

DIMENSIONS ARE IN: INCHES
() ARE IN: .

DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED

X: ±.1 IN OR 4 mm
X.1: ±.01 IN OR 0.7 mm
X.2: ±.01 IN OR 0.7 mm
X.3: ±.01 IN OR 0.7 mm
ANGULAR TOLERANCE: ±1°

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DO NOT SCALE PRINT

SCALE: .035

CMI DATA CLASSIFICATION
Cummins Confidential

DWN: D.J. HUMECKI
CRD: J.C. BREITBACH
APVD: J.C. BREITBACH
DATE: 12SEPT2021

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009

MUST CONFORM TO CES 10903

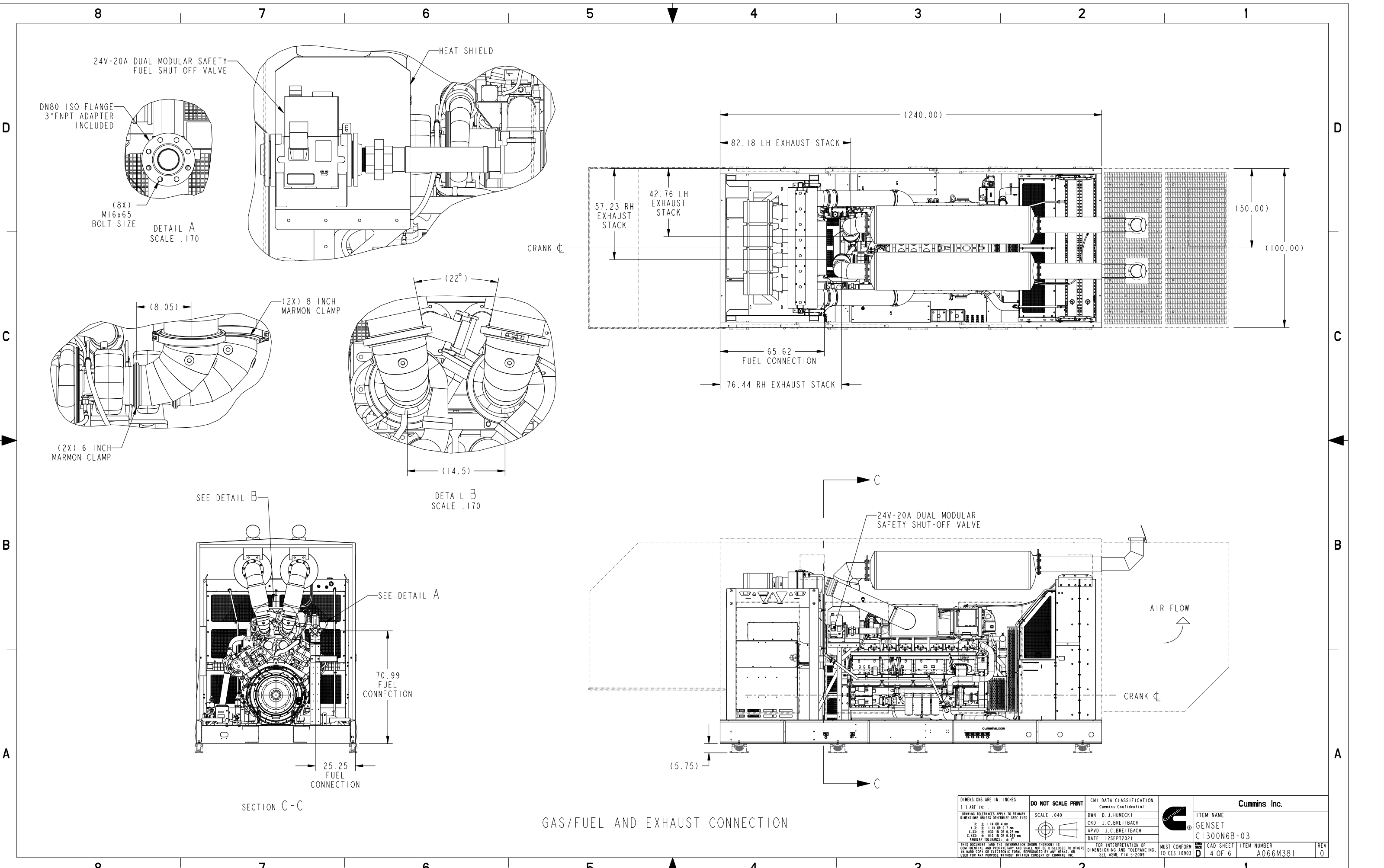
Cummins Inc.

ITEM NAME
GENSET
C1300N6B-03

CAD SHEET
2 OF 6

ITEM NUMBER
A066M381

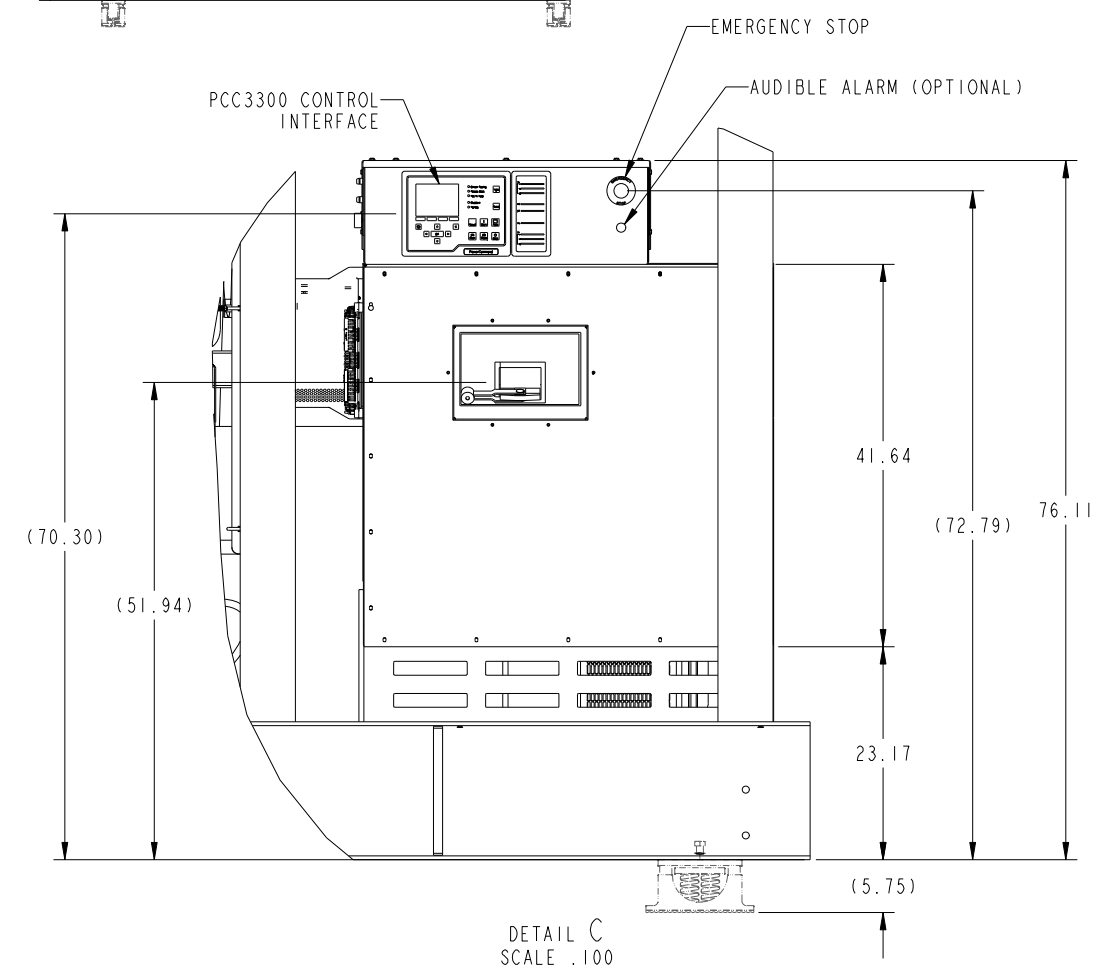
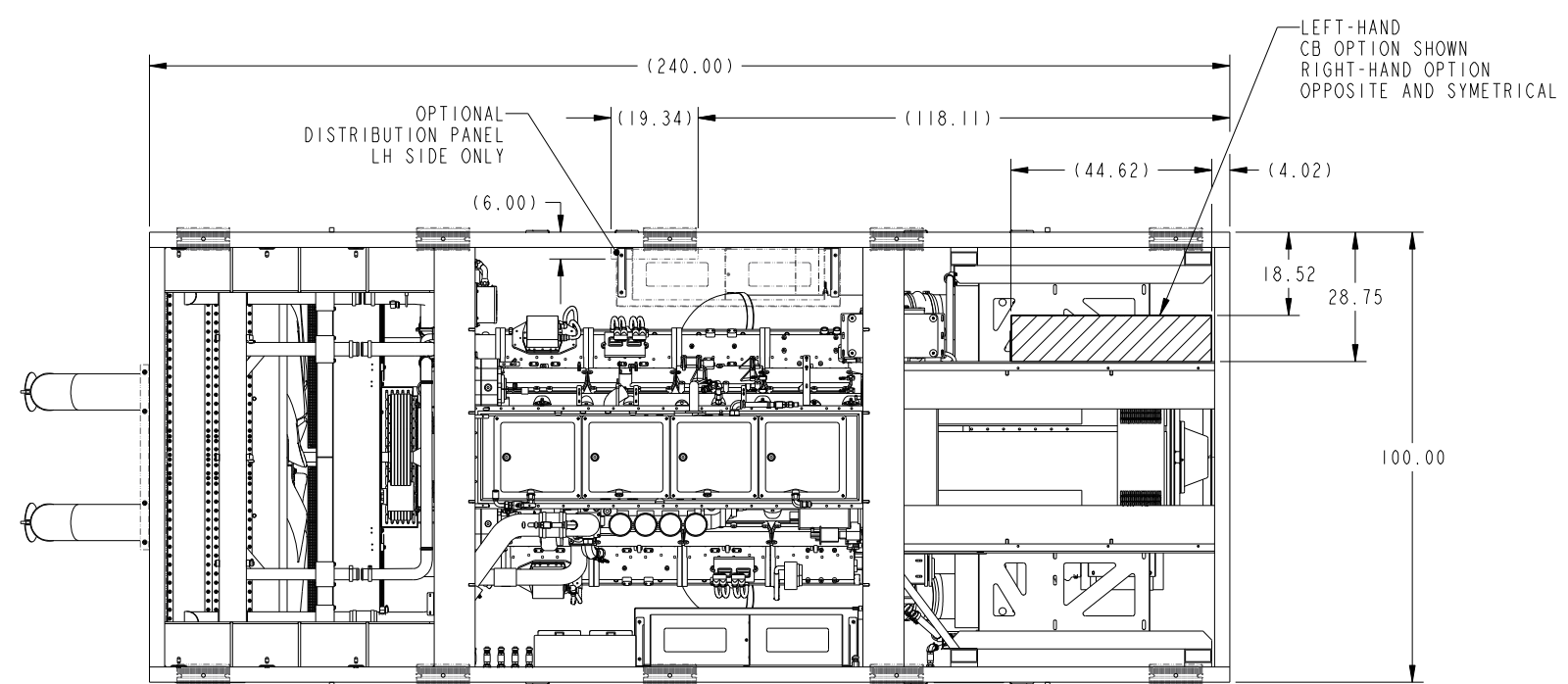
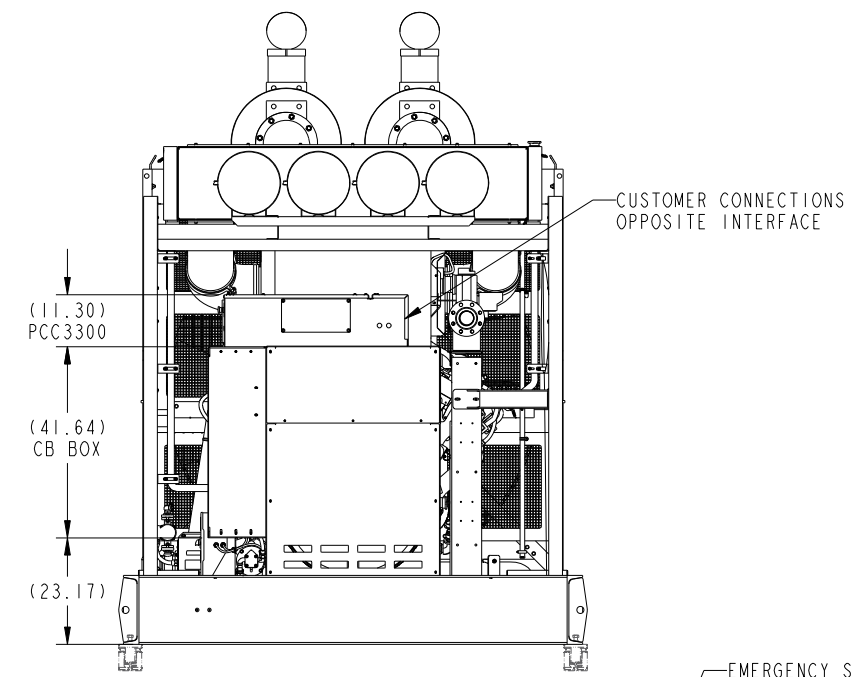
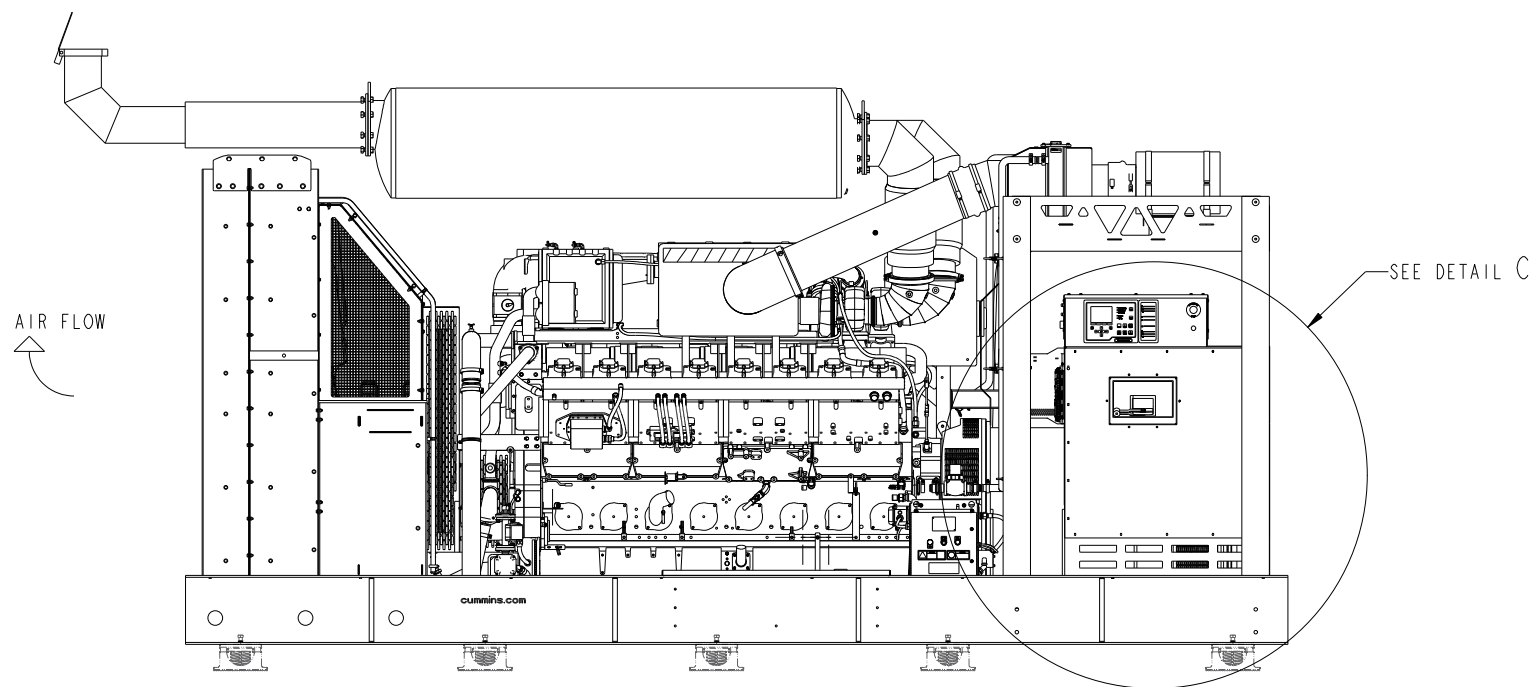
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GAS/FUEL AND EXHAUST CONNECTION

SECTION C-C

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT		CMV DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.X: ±.1 IN OR 3.2 mm X.XX: ±.050 IN OR 1.27 mm X.XXX: ±.010 IN OR 0.25 mm ANGULAR TOLERANCES: ±		SCALE .040 			ITEM NAME GENSET C1300N6B-03		
DWN D.J.HUMICKI CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 12SEPT2021							
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FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009					CAD SHEET 4 OF 6 ITEM NUMBER A066M381		



BOTTOM VIEW

DETAIL C
SCALE .100

ELECTRICAL INTERFACE
(ENCLOSURE REMOVED FOR CLARITY)

DIMENSIONS ARE IN: INCHES () ARE IN: .	DO NOT SCALE PRINT SCALE .050	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
				ITEM NAME GENSET C1300N6B-03	ITEM NUMBER A066M381
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.2: ±.1 IN OR 0.7 mm X.125: ±.001 IN OR 0.25 mm X.XXX: ±.010 IN OR 0.635 mm ANGULAR TOLERANCES: ±1°		DWN D.J.HUMECKI CRD J.C.BREITBACH APVD J.C.BREITBACH DATE 12SEPT2021	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	MUST CONFORM TO CES 10903	CAD SHEET 5 OF 6 REV 0

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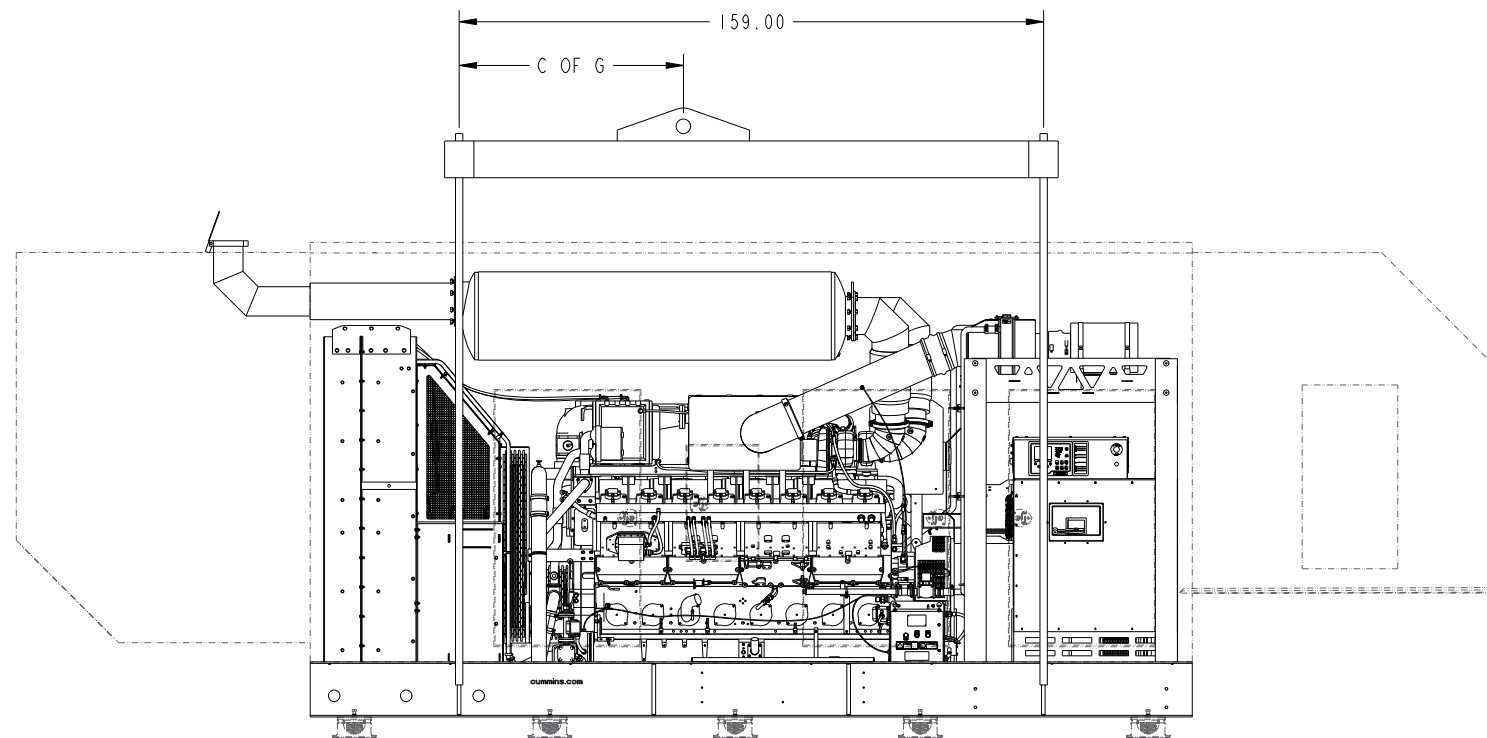
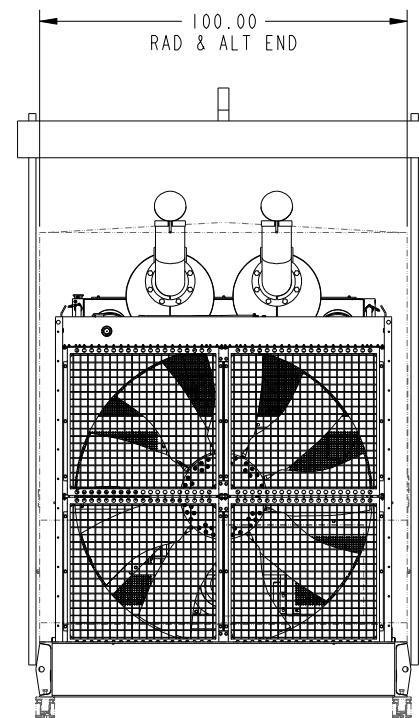
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(4X) LIFTING POINTS ON ENCLOSURE
FOR ENCLOSURE REMOVAL ONLY

I. IDEAL ARRANGEMENT: LIFTING FRAME AND STRAPS



LIFTING ARRANGEMENT FOR GENSET

FOR C OF G VALUE REFER TO SHEET 2

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CM I DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .050	DWN D.J.HUMECKI		ITEM NAME	
X: ±.1 IN OR 4 mm X.2: ±.1 IN OR 3.2 mm X.3: ±.050 IN OR 1.27 mm X.4: ±.010 IN OR 0.25 mm ANGULAR TOLERANCES: ±1°			CKD J.C.BREITBACH		GENSET	
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			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	REV 0
					CAD SHEET 6 OF 6	ITEM NUMBER A066M381

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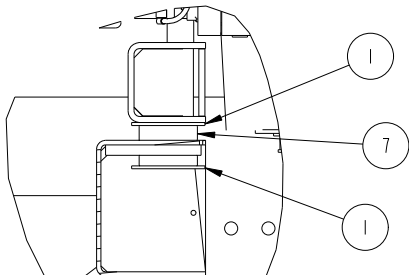
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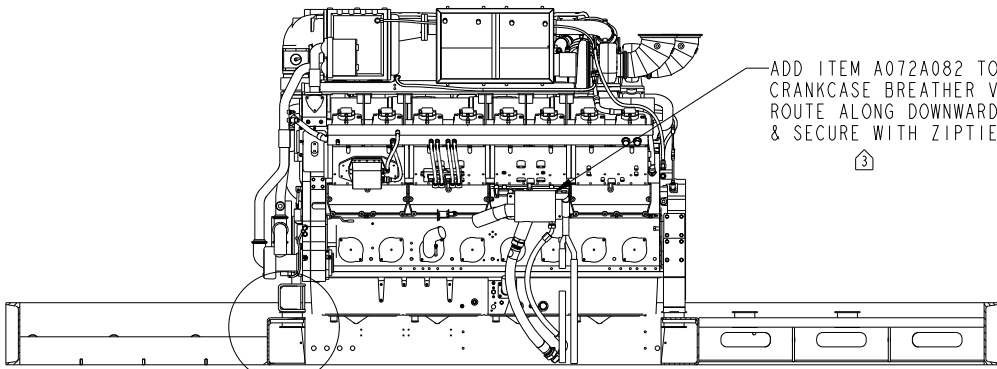
D

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	16	WASHER, SNUBBING; TECH PRODUCTS 0186	13722
2	6	PLUG, HOLE, 3"; HEYCO	24523
3	1	BONDING, PLATE; UL	A042C848
4	2	DECAL, WEBSITE; GENSETS	A058N801
5	1	FRAME, ASSEMBLY; 60L, ENCLOSED	A064X196
6	1	ASM, ENGINE MOUNT; 60L ENG SUPPORT	A064X210
7	8	ISOLATOR, VIBRATION; TECH PRODUCTS 60055	A064X213
8	1	HOSE, FLEXIBLE; DUCT HOSE FOR FUMES	A072A082
9	48	PREMIUM BLUE SAE40; (GALLON)	V876631

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-283	INITIAL RELEASE	DJH	JCB	JCB	17JUL20
2	2022-055	REMOVED 883935; ADDED V876631; UPDATED PER A064X196	JRC	JCB	JCB	04MAR22
3	2022-068	ADDED A072A082; UPDATED NOTES	JRC	JCB	JCB	27APR22

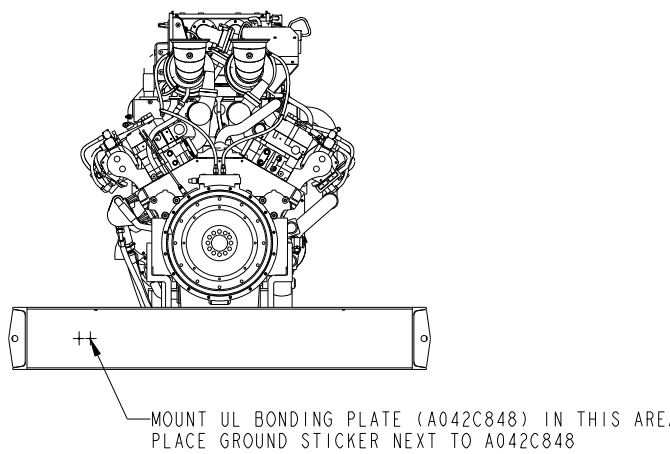
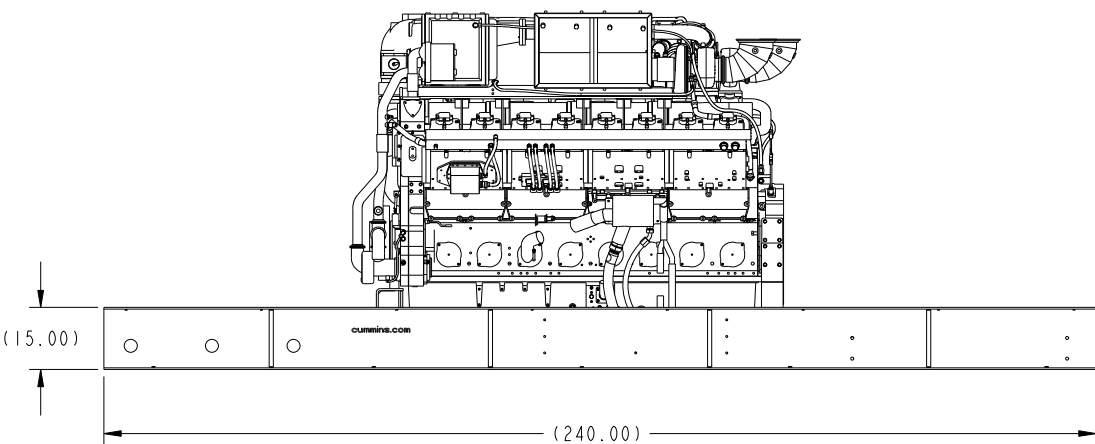
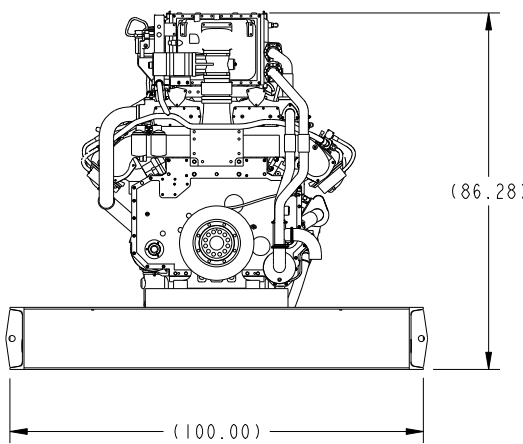
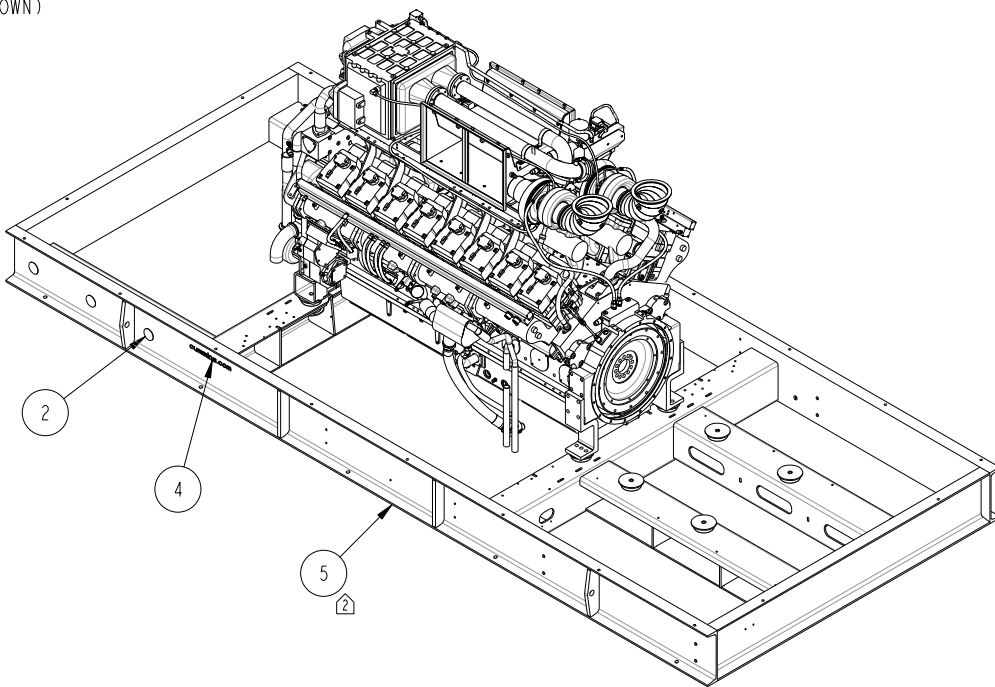
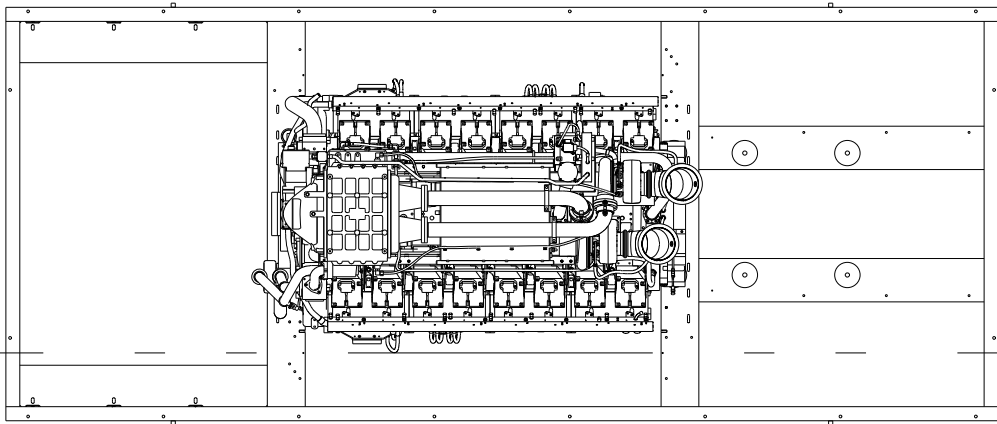


DETAIL A
SCALE .130



ADD ITEM A072A082 TO
CRANKCASE BREATHER VENT (NOT SHOWN)
ROUTE ALONG DOWNWARD HOSES
& SECURE WITH ZIPTIES

SEE DETAIL A
SECTION A-A

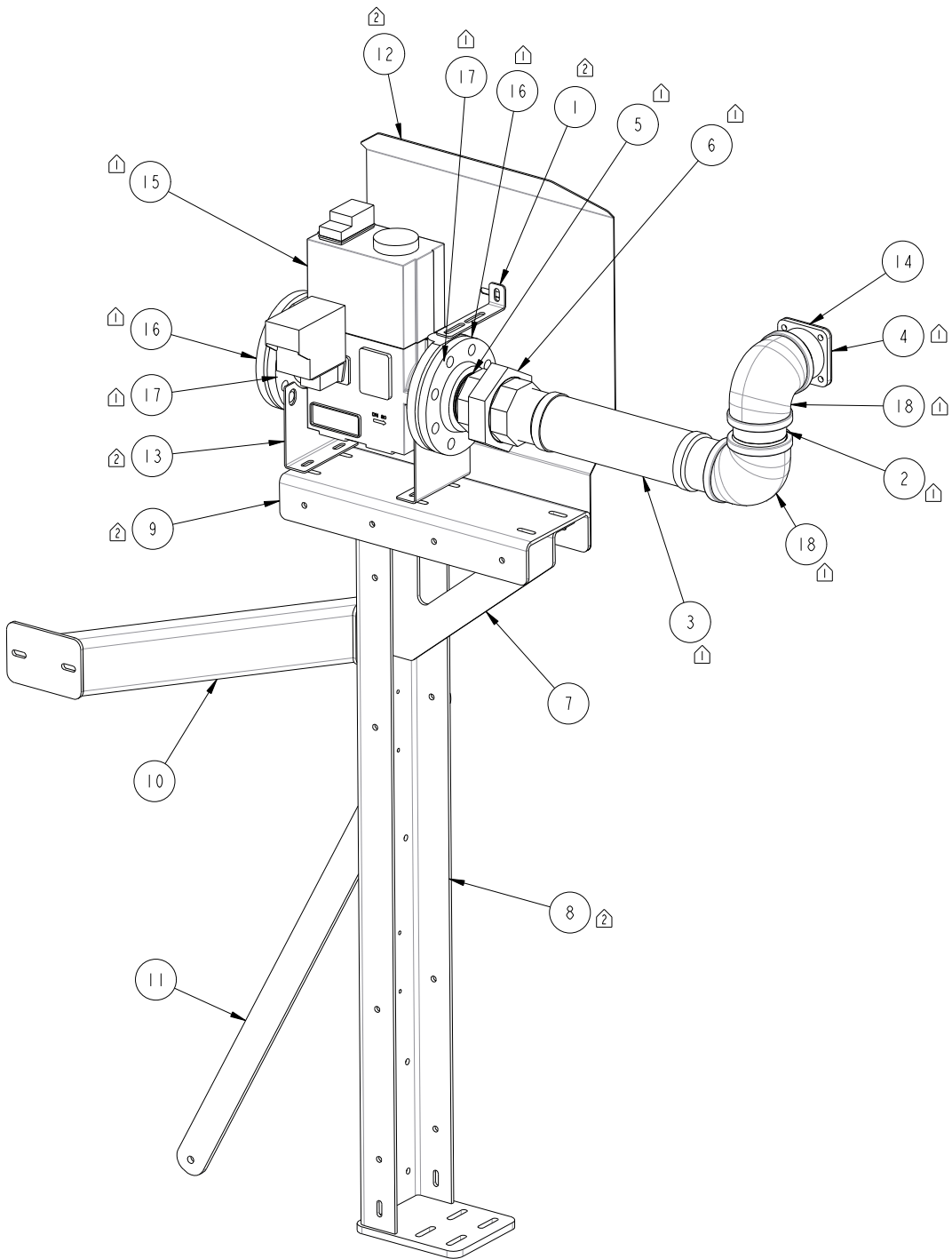
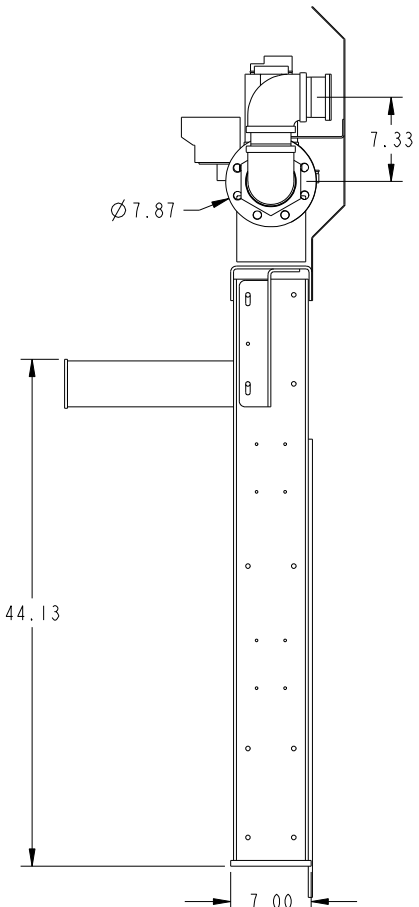
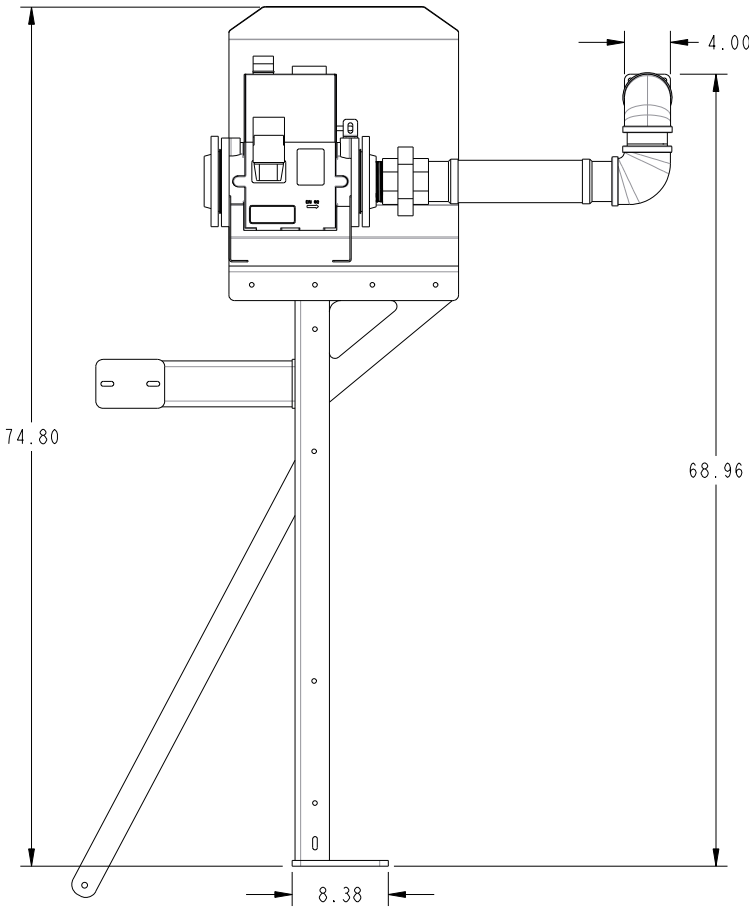
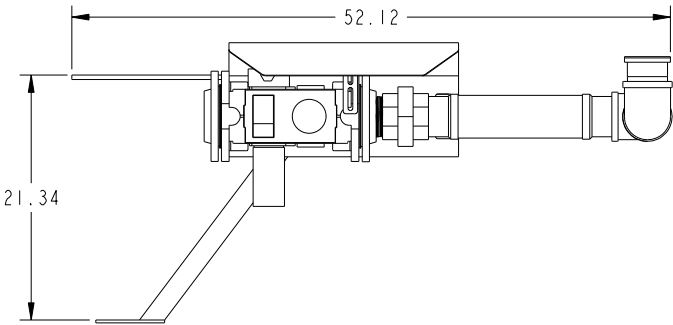


- NOTES:
- USE LOCTITE #242 ON ALL FASTENERS INTO THE ENGINE BLOCK
 - ITEM A072A082 NOT SHOWN OR BALLOONED

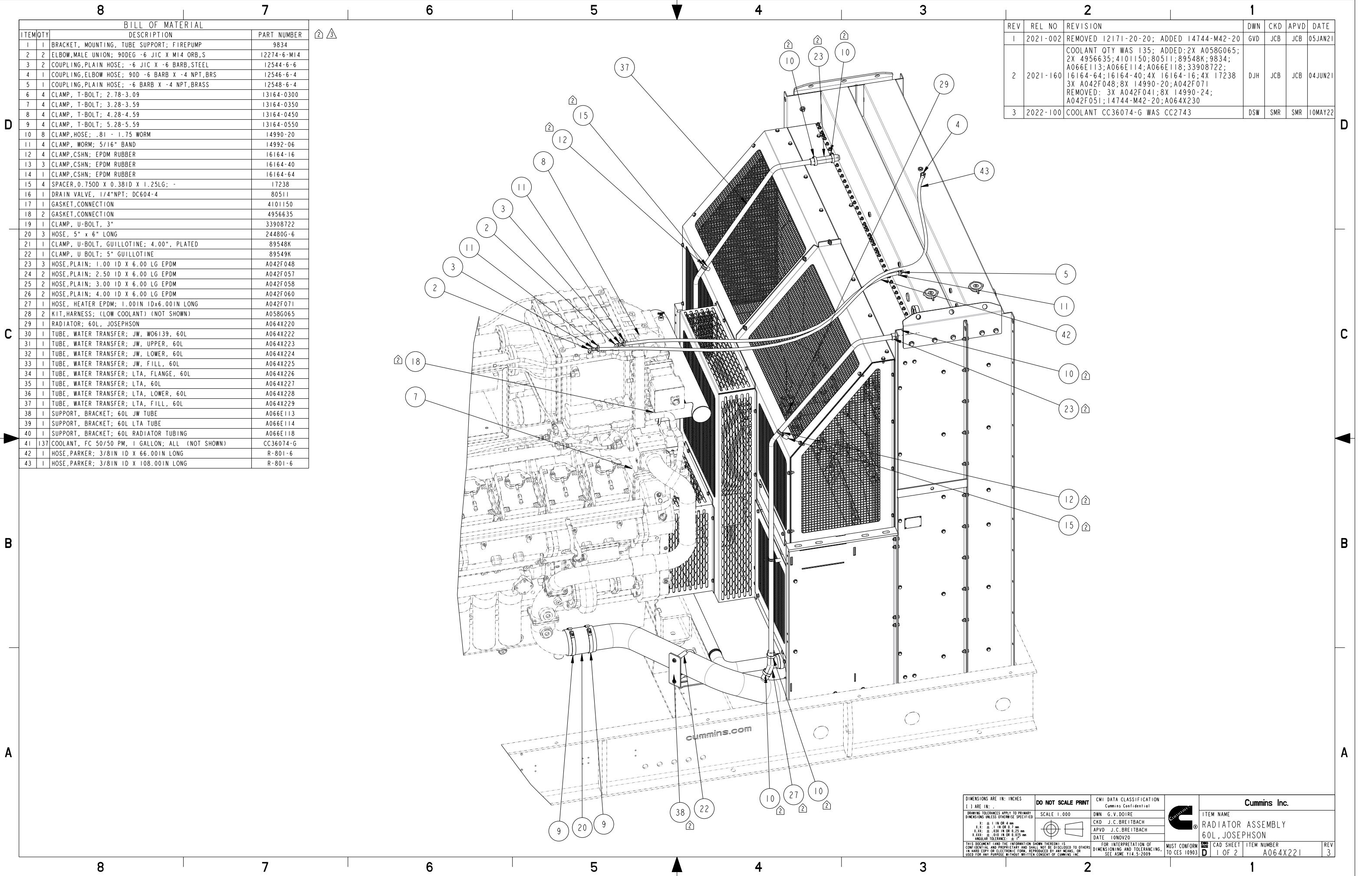
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DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .045	DWN DJH	CKD JCB	ITEM NAME ASM, ENGINE MOUNT 60L ENGINE TO FRAME	
X.1: ± .1 IN OR 4 mm X.2: ± .1 IN OR 6.7 mm X.12: ± .030 IN OR 0.25 mm X.125: ± .010 IN OR 0.915 mm ANGULAR TOLERANCE: ±			APVD JCB	DATE 17JULY2020	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.			MUST CONFORM TO CES 10903		CAD SHEET 1 OF 1	ITEM NUMBER A064X195
					REV 3	

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	BRACKET, MOUNTING, TUBE SUPPORT; FIREPUMP	8657
2	1	NIPPLE, PLAIN PIPE; -48NPT 3.00", BLACK STEEL	18359-0300
3	1	HOSE, BRAIDED, CSA FLEX; NPT X LENGTH	22837
4	1	GASKET	4077631
5	1	NIPPLE, 3X2 5/8	44615K121
6	1	UNION, 150# BLACK; 3 IN NPT FEMALE HEX	A042A030
7	1	GUSSET; 60L FUEL TRAIN	A066E115
8	1	FRAME; 60L FUEL TRAIN	A066E342
9	1	BRACKET, MOUNTING; 60L FUEL TRAIN	A066E343
10	1	BRACE, BRACKET; 60L FUEL TRAIN	A066M241
11	1	BRACE, BRACKET; 60L FUEL TRAIN	A066M242
12	1	SHIELD, HEAT; 60L FUEL TRAIN	A066M243
13	2	BRACKET, MOUNTING; 60L FUEL VALVE	A066Z167
14	1	FLANGE; 60L FUEL TRAIN	A066Z168
15	1	VALVE, FUEL SHUTOFF; SOLENOID, DN80	A067G632
16	2	FLANGE; 3"NPT, RAISED FACE	A067G639
17	2	GASKET	A067G640
18	2	ELBOW, 3 INCH NPT; BLACK	B90M

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-080	INITIAL RELEASE	DJH	JCB	JCB	01APR21
1	2021-188	REMOVED: A066M244; 0504-0262. ADDED: 18359-0300; 22837-08; 4077631; 4461K121; A042A030; A067G632; A067G639; A067GG640;	DJH	JCB	JCB	03SEP21
2	2022-058	ADDED 8657; REVISIONS TO A066E342; A066E343; A066M243; A066Z167.	DJH	JCB	JCB	28FEB22



DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.		
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE: .188	DWN D. J. HUMECKI CKD J. C. BREITBACH APVD J. C. BREITBACH DATE 01APR2021		ITEM NAME ASM, FUEL SYSTEM 60L		
X: ±.1 IN OR 4 mm X.Y: ±.1 IN OR 3 mm X.Z: ±.001 IN OR 0.025 mm ANGULAR TOLERANCES: ±		X: ±.1 IN OR 4 mm X.Y: ±.1 IN OR 3 mm X.Z: ±.001 IN OR 0.025 mm ANGULAR TOLERANCES: ±		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009			
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.				MUST CONFORM TO CES 10903	DWG NO 1 OF 1	CAD SHEET ITEM NUMBER A066M245	REV 2



BILL OF MATERIAL		
ITEM	QTY	DESCRIPTION
1	1	BRACKET, MOUNTING, TUBE SUPPORT; FIREPUMP
2	2	ELBOW, MALE UNION; 90DEG -6 JIC X M14 ORB.S
3	2	COUPLING, PLAIN HOSE; -6 JIC X -6 BARB, STEEL
4	1	COUPLING, ELBOW HOSE; 90D -6 BARB X -4 NPT, BRS
5	1	COUPLING, PLAIN HOSE; -6 BARB X -4 NPT, BRASS
6	4	CLAMP, T-BOLT; 2.78-3.09
7	4	CLAMP, T-BOLT; 3.28-3.59
8	4	CLAMP, T-BOLT; 4.28-4.59
9	4	CLAMP, T-BOLT; 5.28-5.59
10	8	CLAMP, HOSE; .81 - 1.75 WORM
11	4	CLAMP, WORM; 5/16" BAND
12	4	CLAMP, CSHN; EPDM RUBBER
13	3	CLAMP, CSHN; EPDM RUBBER
14	1	CLAMP, CSHN; EPDM RUBBER
15	4	SPACER, 0.750D X 0.38ID X 1.25LG; -
16	1	DRAIN VALVE, 1/4"NPT; DC604-4
17	1	GASKET, CONNECTION
18	2	GASKET, CONNECTION
19	1	CLAMP, U-BOLT, 3"
20	3	HOSE, 5" x 6" LONG
21	1	CLAMP, U-BOLT, GUILLOTINE; 4.00", PLATED
22	1	CLAMP, U BOLT; 5" GUILLOTINE
23	3	HOSE, PLAIN; 1.00 ID X 6.00 LG EPDM
24	2	HOSE, PLAIN; 2.50 ID X 6.00 LG EPDM
25	2	HOSE, PLAIN; 3.00 ID X 6.00 LG EPDM
26	2	HOSE, PLAIN; 4.00 ID X 6.00 LG EPDM
27	1	HOSE, HEATER EPDM; 1.00IN IDx6.00IN LONG
28	2	KIT, HARNESS; (LOW COOLANT) (NOT SHOWN)
29	1	RADIATOR; 60L, JOSEPHSON
30	1	TUBE, WATER TRANSFER; JW, W06139, 60L
31	1	TUBE, WATER TRANSFER; JW, UPPER, 60L
32	1	TUBE, WATER TRANSFER; JW, LOWER, 60L
33	1	TUBE, WATER TRANSFER; JW, FILL, 60L
34	1	TUBE, WATER TRANSFER; LTA, FLANGE, 60L
35	1	TUBE, WATER TRANSFER; LTA, 60L
36	1	TUBE, WATER TRANSFER; LTA, LOWER, 60L
37	1	TUBE, WATER TRANSFER; LTA, FILL, 60L
38	1	SUPPORT, BRACKET; 60L JW TUBE
39	1	SUPPORT, BRACKET; 60L LTA TUBE
40	1	SUPPORT, BRACKET; 60L RADIATOR TUBING
41	137	COOLANT, FC 50/50 PM, 1 GALLON; ALL (NOT SHOWN)
42	1	HOSE, PARKER; 3/8IN ID X 66.00IN LONG
43	1	HOSE, PARKER; 3/8IN ID X 108.00IN LONG

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
1	2021-002	REMOVED 12171-20-20; ADDED 14744-M42-20	GVD	JCB	JCB	05JAN21
2	2021-160	COOLANT QTY WAS 135; ADDED: 2X A058G065; 2X 4956635; 4101150; 80511; 89548K; 9834; A066E113; A066E114; A066E118; 33908722; 16164-64; 16164-40; 4X 16164-16; 4X 17238 3X A042F048; 8X 14990-20; A042F071 REMOVED: 3X A042F041; 8X 14990-24; A042F051; 14744-M42-20; A064X230	DJH	JCB	JCB	04JUN21
3	2022-100	COOLANT CC36074-G WAS CC2743	DSW	SMR	SMR	10MAY22

DIMENSIONS ARE IN: INCHES
1.1 ARE IN: -

DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED
X.1: ± .1 IN OR 4 mm
X.2: ± .1 IN OR 6.7 mm
X.12: ± .030 IN OR 0.25 mm
X.122: ± .010 IN OR 0.915 mm
ANGULAR TOLERANCE: ±

DO NOT SCALE PRINT

SCALE 1:1000

CUMMINS DATA CLASSIFICATION
Cummins Confidential

DWN: G.V.DOIRE
CKD: J.C.BREITBACH
APVD: J.C.BREITBACH
DATE: 10NOV20

Cummins Inc.

ITEM NAME
RADIATOR ASSEMBLY
60L, JOSEPHSON

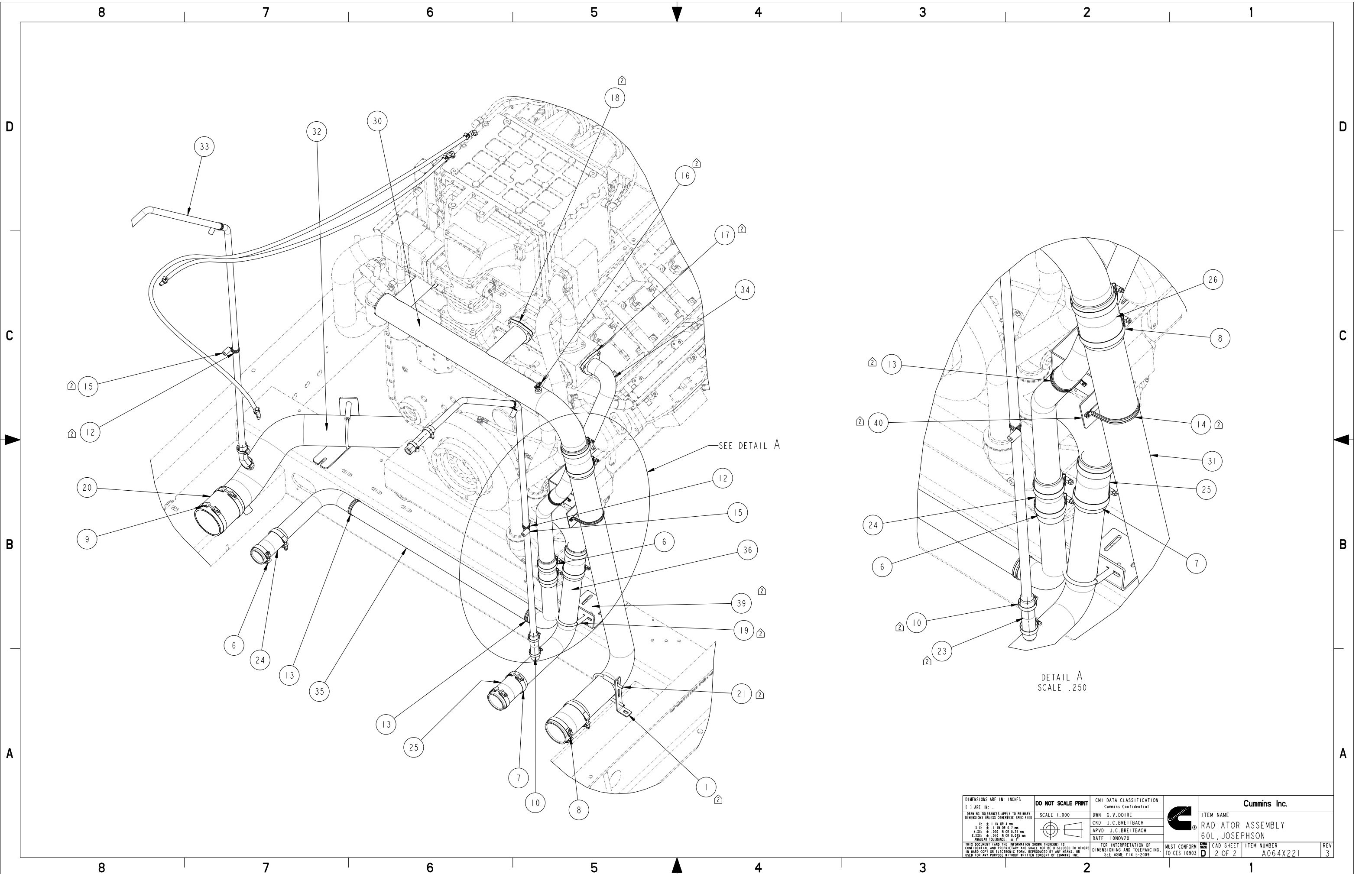
FOR INTERPRETATION OF
DIMENSIONING AND TOLERANCING
SEE ASME Y14.5-2009

MUST CONFORM
TO CES 10903

CAD SHEET
1 OF 2

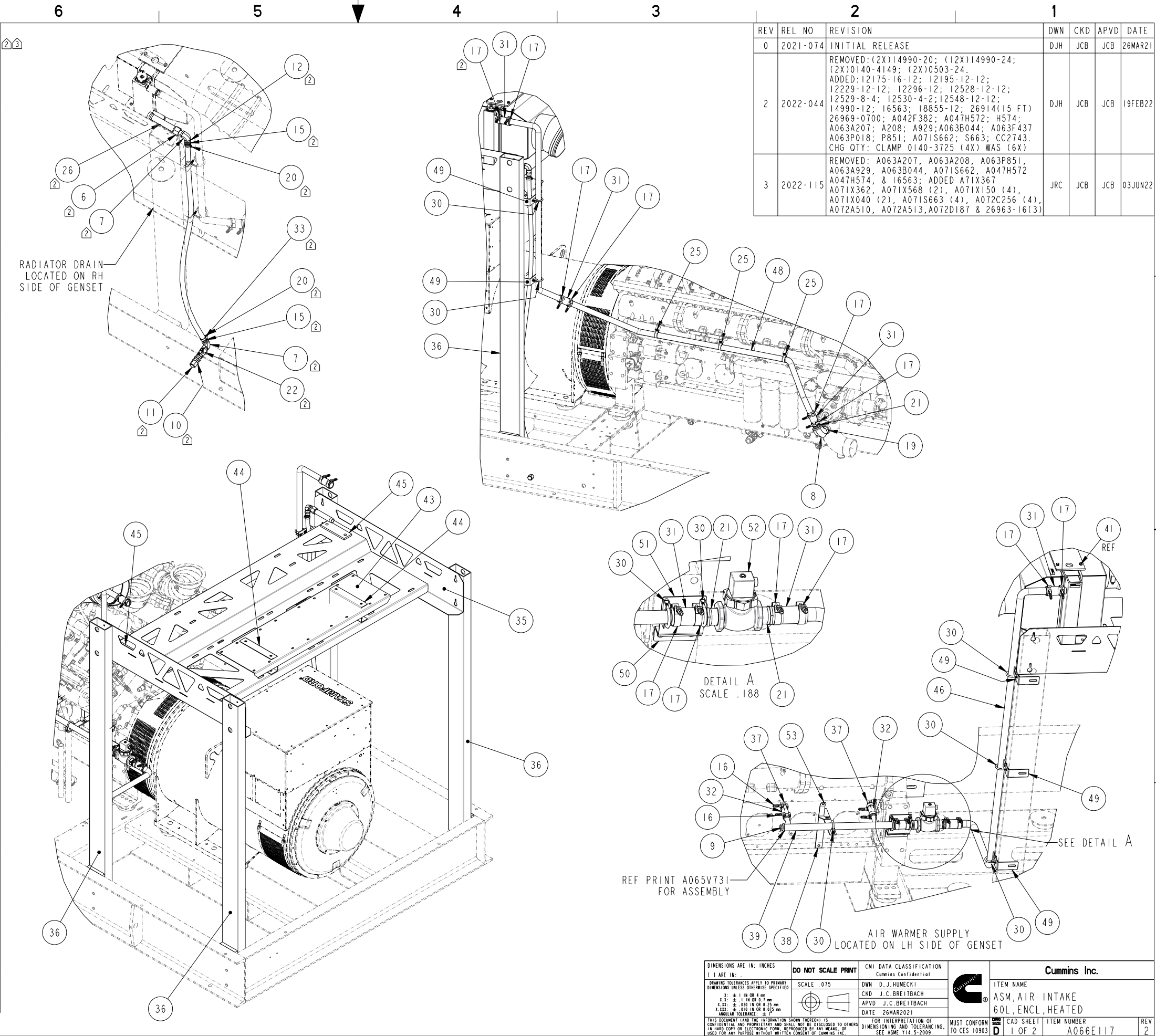
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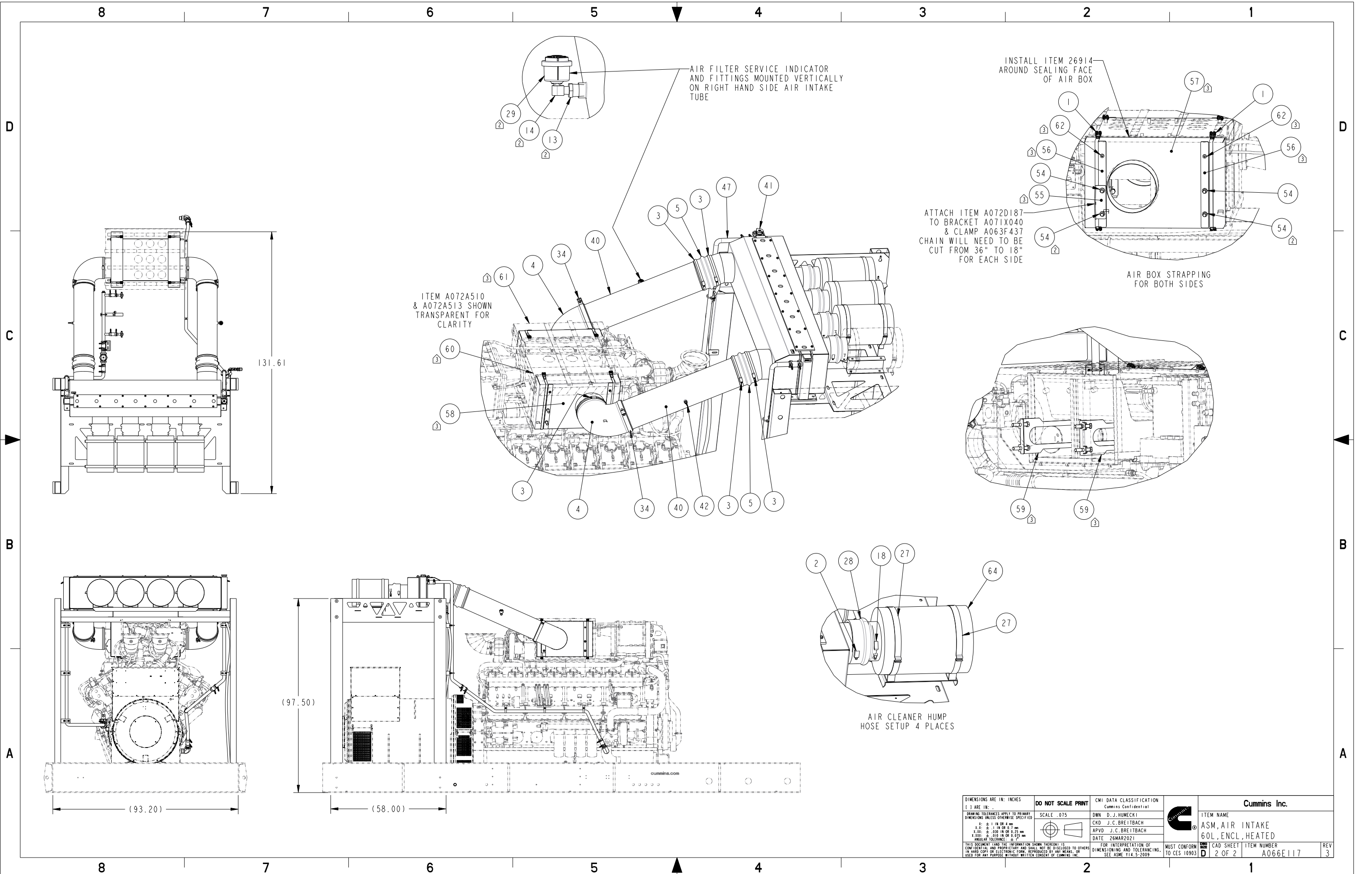
REV
3



DIMENSIONS ARE IN: INCHES [] ARE IN: _____		DO NOT SCALE PRINT		CWI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:1000		DWN G.V.DOIRE		ITEM NAME RADIATOR ASSEMBLY 60L, JOSEPHSON	
X: ± 1/16 IN OR 4 mm X: ± 1/32 IN OR 0.8 mm X: ± 1/64 IN OR 0.25 mm X: ± 0.010 IN OR 0.25 mm ANGULAR TOLERANCE: ± 1°				CKD J.C.BREITBACH			
				APVD J.C.BREITBACH			
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				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009			
						D CAD SHEET 2 OF 2	

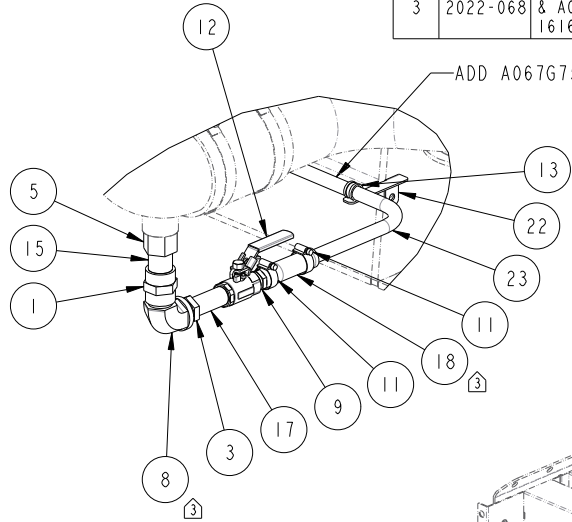
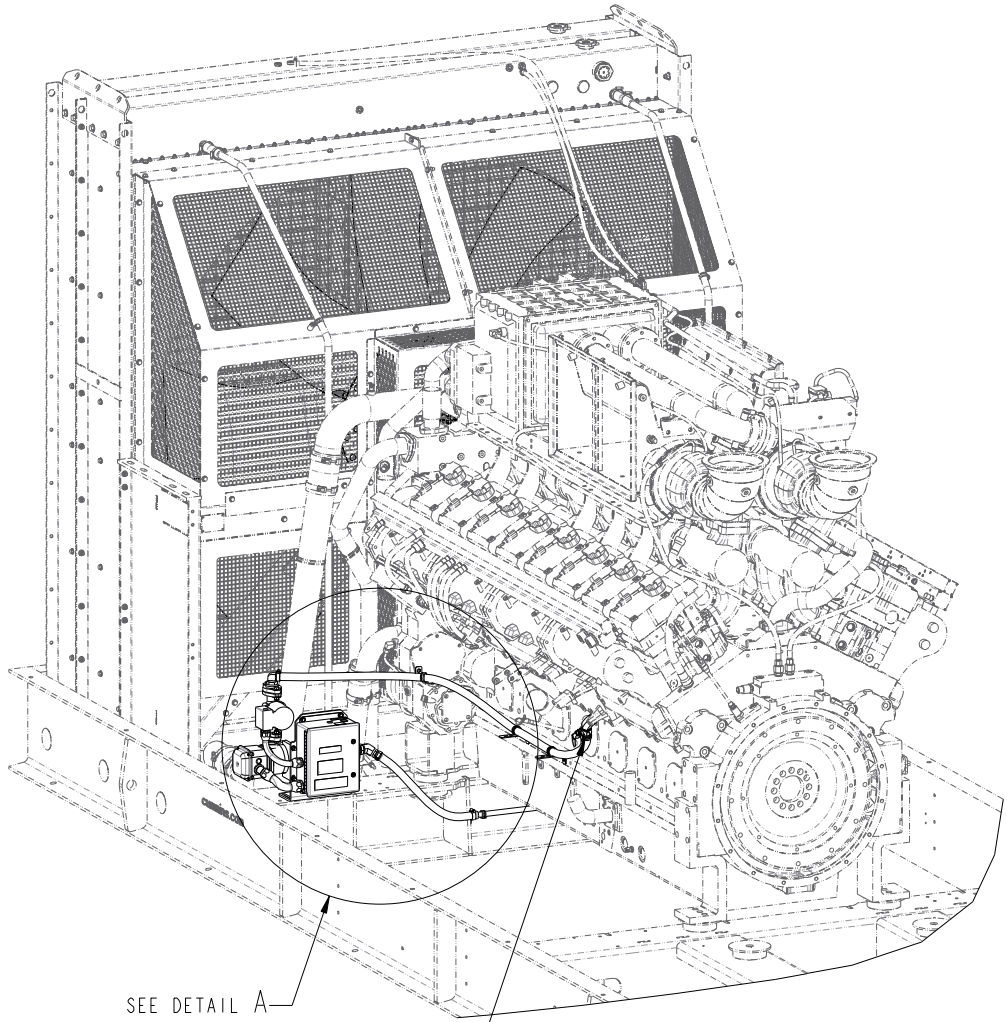
		8		7				
		BILL OF MATERIAL						
ITEM	QTY	DESCRIPTION				PART NUMBER		
D	1	4	CLAMP - AIR CLEANER				0140-3725	
	2	4	CLAMP, HOSE				0503-1870-15	
	3	6	CLAMP-HOSE (250MM-280MM)				0503-2479	
	4	2	ELBOW-HOSE (10" RUBBER 90DEG)				0503-2480	
	5	2	HOSE; INTAKE (10" X 10" HUMP)				0503-2478	
	6	1	ADAPTER,REDUCING PIPE; -16 FNPT X -12 NPT,STEEL				12175-16-12	
	7	2	ELBOW,PLAIN STREET PIPE; 90DEG -12 NPT X -12 FNPT,S				12195-12-12	
	8	1	ELBOW,REDUCING STREET PIPE; 90DEG -20 NPT X -24 FNPT,S				12195-20-24	
	9	1	PLUG,PIPE; EXT HEX -12 NPT,STEEL				12210-12	
	10	1	BLKHD,STR; 12 JIC X 12 NPT				12229-12-12	
	11	1	CAP,PIPE; EXT HEX -12 JIC,STEEL				12296-12	
	12	1	COUPLING,PLAIN PIPE; -12 FNPT X -12 FNPT,BRASS				12528-12-12	
	13	1	NIPPLE,REDUCING HEXAGON; -8 NPT X -4 NPT,BRASS				12529-8-4	
	14	1	ELBOW,REDUCING STREET PIPE; 90DEG -4 FNPT X -2 NPT,B				12530-4-2	
	15	2	COUPLING,PLAIN HOSE; -12 BARB X -12 NPT,BRASS				12548-12-12	
	16	4	CLAMP, SPRING LOADED T-BOLT; 1.26-1.45				12975-0138	
	17	12	CLAMP, SPRING LOADED T-BOLT; 1.82-2.12				12975-0194	
	18	4	CLAMP, T-BOLT; 7.28-7.59				13164-0750	
C	19	1	CONNECTOR,FEMALE; M42 MORB X -20 FNPT,STEEL				14744-M42-20	
	20	2	CLAMP,HOSE; .69-1.25 WORM				14990-12	
	21	3	COUPLING,PLAIN HOSE; -24 NPT X -24 BARB,STEEL				16766-24-24	
	22	1	VALVE,BALL,NPTFxNPTF; BRASS W/TEE HANDLE				18855-12	
	23	15	GASKET,FOAM,0.12 X 1-1/4" WIDE; BULK (FOOT)				26914	
	24	2	CLIP; 1.00 ID, 3/8" HOLE, VINYL				26963-16	
	25	3	CLIP; 1.50 ID, 3/8" HOLE, VINYL				26963-24	
	26	1	NIPPLE,PLAIN PIPE; -16 NPT X 7.00", BLACK				26969-0700	
	27	8	CLAMP,AIR CLEANER; 13.50 IN ID				3836953-S	
	28	4	8"-7" Hump Hose Reducer; AIR INTAKE KIT				3316627S	
	29	1	SERVICE INDICATOR, SINGLE-POSITION; 10 IN H2O				3949067S	
	30	8	CLAMP, U-BOLT, 1.63" OD; ZINC PLATED STEEL, 5/16"-18 UNC				A042A562	
	31	6	HOSE,SILICONE; 1.50IN IDx4.00IN LONG				A042F063	
	32	2	HOSE, HEATER EPDM; 1.00IN IDx4.00IN LONG				A042F071	
	33	1	HOSE,HEATER EPDM; 3/4" IDx96.00" LONG				A042F382	
	34	2	CLAMP, PIPE				A063F437	
	B	35	1	BRACKET, MOUNTING; 60L, AIR INTAKE				A064X236
		36	4	RECTANGLE, HOLLOW; 60L, AIR INTAKE				A064X239
37		2	CONNECTOR,TUBE; W/ FLANGE, ENGINE BLOCK				A065V758	
38		1	BRACKET,WATER TUBE; AIR WARMER CONNECTING TUBE				A065V760	
39		1	CONNECTOR TUBE; W/ FITTING				A065V762	
40		2	TUBE, AIR TRANSFER; 60L, AIR INTAKE				A065Z341	
41		1	RADIATOR; 60L, AIR INTAKE				A065Z401	
42		1	SENSOR, TEMPERATURE; ADJUSTABLE, -100F-600F				A066E306	
43		1	BRACKET, MOUNTING; 60L, AIR INTAKE, HEATED				A066E339	
44		2	BRACKET, MOUNTING; 60L, AIR INTAKE, HEATED				A066E340	
45		2	SHIM; 60L, AIR INTAKE, HEATED				A066E341	
46		1	TUBE, WATER TRANSFER; 60L HEATED AIR INTAKE				A066Z209	
47		1	TUBE, WATER TRANSFER; 60L HEATED AIR INTAKE				A066Z210	
48		1	TUBE, WATER TRANSFER; 60L HEATED AIR INTAKE				A066Z211	
49		5	BRACKET; 60L HEATED AIR INTAKE				A066Z212	
50		1	BRACKET; 60L HEATED AIR INTAKE				A066Z213	
51		1	BRACKET; 60L HEATED AIR INTAKE				A066Z214	
52		1	SOLENOID; BRONZE,1.5" 125PSI-40-220F				A066Z215	
A	53	1	BRACKET, WATER TUBE; 60L HEATED AIR INTAKE				A066Z216	
	54	8	WASHER, SEALING				A071S663	
	55	2	BRACKET, MOUNTING; AIR BOX COVERS				A071X040	
	56	4	PLATE,CLAMPING; AIR BOX COVERS				A071X150	
	57	1	MANIFOLD,AIR INTAKE; 60L RHS AIR BOX				A071X362	
	58	1	MANIFOLD,AIR INTAKE; 60L LHS AIR BOX				A071X367	
	59	2	BRACE,AIR INT CONNECTION; 60L AIR BOX TIE ROD				A071X568	
	60	1	COVER,PROTECTIVE; INTAKE BOX BLANKET				A072A510	
	61	1	COVER,PROTECTIVE; INTAKE BOX BLANKET W/ FLAP				A072A513	
	62	4	WASHER, SEALING; 3/8" ID				A072C256	
	63	1	CHAIN; AIR BOX TETHER				A072D187	
	64	4	CLEANER,AIR				AH1183	
	65	3	COOLANT, FC EG PM, 1 GALLON				CC2743	



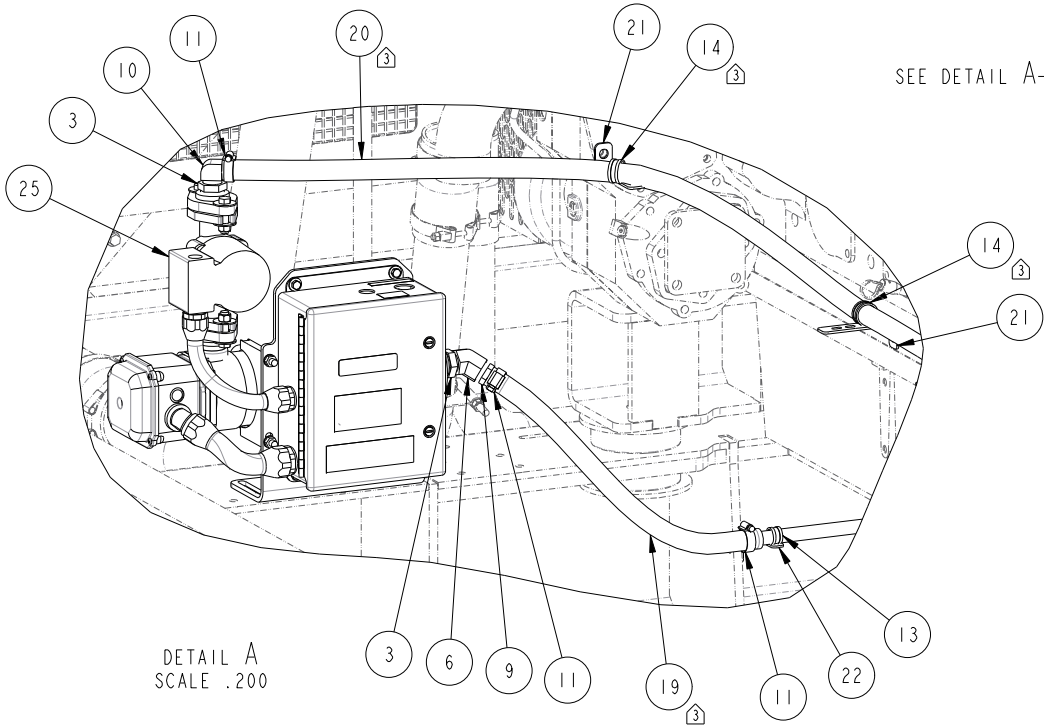
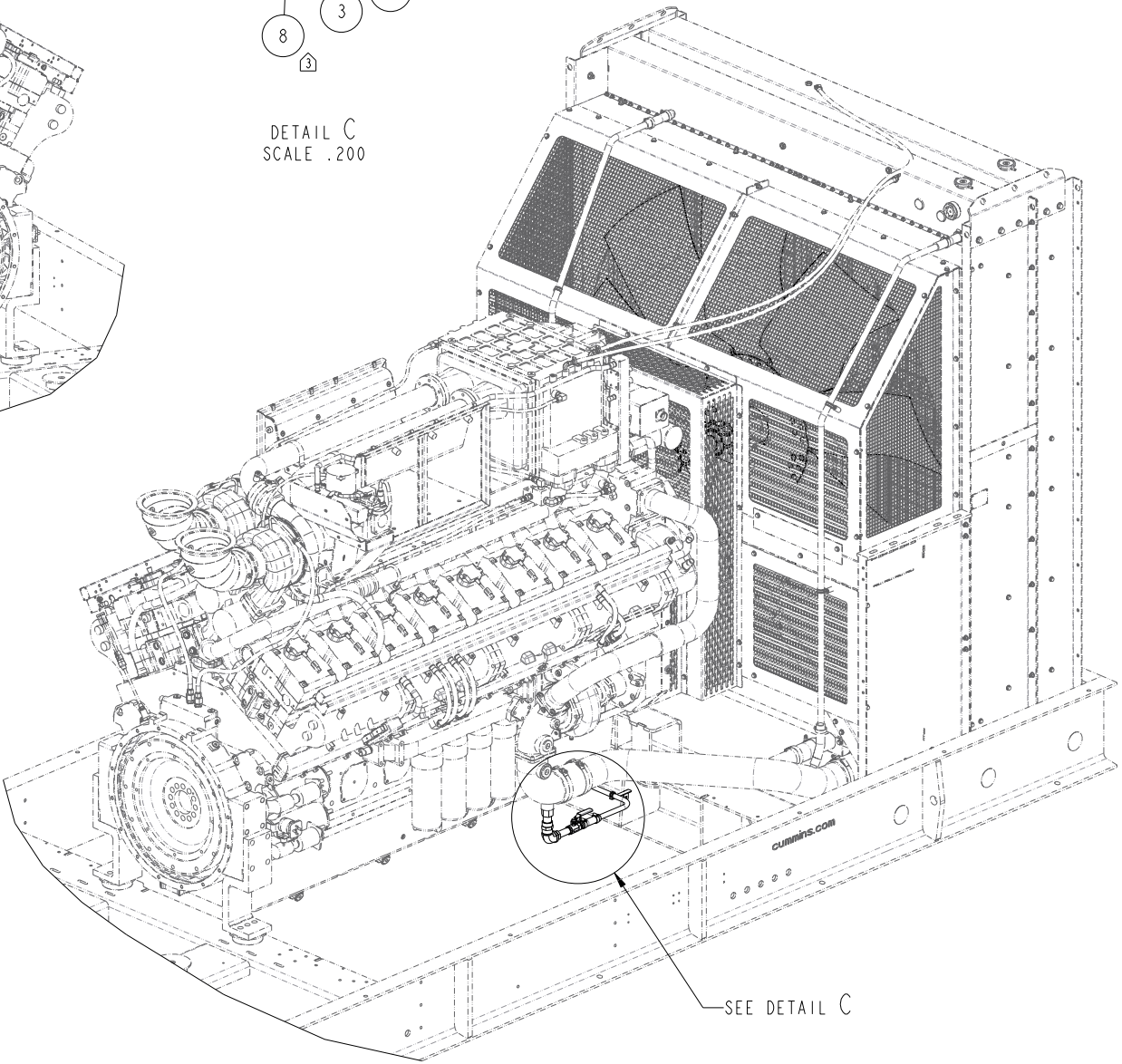


BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	COUPLING,PLAIN PIPE; -16 NPT X -16 NPT,STEEL	12168-16-16
2	1	ADAPTER,REDUCING PIPE; -12 FNPT X -8 NPT,STEEL	12175-12-8
3	3	BUSHING,REDUCING PIPE; -16 NPT X -12 FNPT,STEEL	12176-16-12
4	1	CONNECTOR,FEMALE; M18 ORR X -8 FNPT,STEEL	12181-M18-8
5	1	CONNECTOR,FEMALE; M33 ORR X -16 FNPT,STEEL	12181-M33-16
6	1	ELBOW,PLAIN STREET PIPE; -12 NPT X -12 FNPT,STEEL	12189-12-12
7	1	ELBOW,PLAIN STREET PIPE; 90DEG -12 NPT X -12 FNPT,S	12195-12-12
8	1	ELBOW,PLAIN STREET PIPE; 90DEG -16 NPT X -16 FNPT,S	12195-16-16
9	3	COUPLING,PLAIN HOSE; -12 BEAD X -12 NPT,BRASS	12545-12-12
10	1	COUPLING,ELBOW HOSE; 90D -12 BEAD X -12 NPT,BRS	12547-12-12
11	6	CLAMP,HOSE; .69-1.25 WORM	14990-12
12	2	VALVE,BALL,NPTFXNPTF; BRASS W/LOCKING HANDLE	16145-12
13	2	CLAMP,CSHN; EPDM RUBBER	16164-12
14	3	CLAMP,CSHN; EPDM RUBBER	16164-18
15	1	NIPPLE,PLAIN PIPE; -16 NPT X 2.50", BLACK	26969-0250
16	1	NIPPLE,0.75" NPT PIPE; 2.50" LONG	26985-0250
17	1	NIPPLE,0.75" NPT PIPE; 3.50" LONG	26985-0350
18	1	HOSE,HEATER EPDM; 3/4" IDX4.00" LONG	A042F382
19	1	HOSE,HEATER EPDM; 3/4" IDX20.00" LONG	A042F382
20	1	HOSE,HEATER EPDM; 3/4" IDX72.00" LONG	A042F382
21	3	BRACE, HOSE; -	A060R710
22	2	BRACKET,WATER TUBE; COOLANT HEATER PIPE	A065N806
23	1	TUBE,WATER TRANSFER; JW, 3/4"OD TUBE	A066E278
24	1	INSULATION,TUBE; COOLANT & OIL HEATER	A067G752
25	1	HEATER,ENGINE; COOLANT, 208V, 12KW, 60-100L	A067G753
26	1	HEATER,ENGINE; HOTSTART MODULE, 140-160F	A067W027
27	1	HARNESS, ELECTRICAL WIRING; COLD WEATHER, QSK60G	A067X815

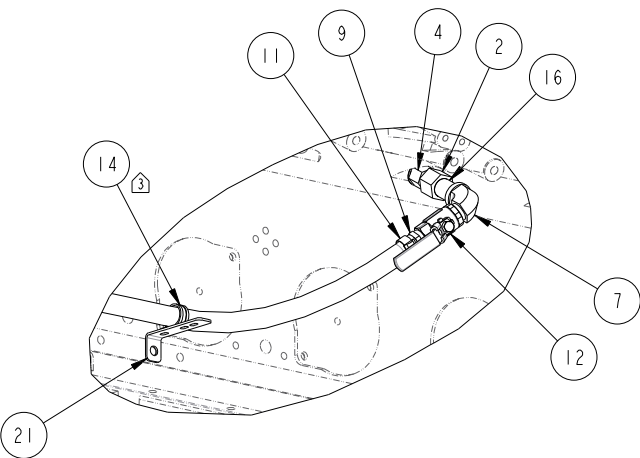
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-241	INITIAL RELEASE	JRC	JCB	JCB	23SEP21
2	2021-270	ADDED A067X815 AND SHEET 2	CTB	KAK	KAK	17NOV21
3	2022-068	REMOVED: 12204-16, 12210-16, 16164-16(3) & A042F073(4",20",72"); ADDED 12196-16-16 16164-18 (3) & A042F382 (4",20", 72")	JRC	JCB	JCB	18MAR22



DETAIL C
SCALE .200



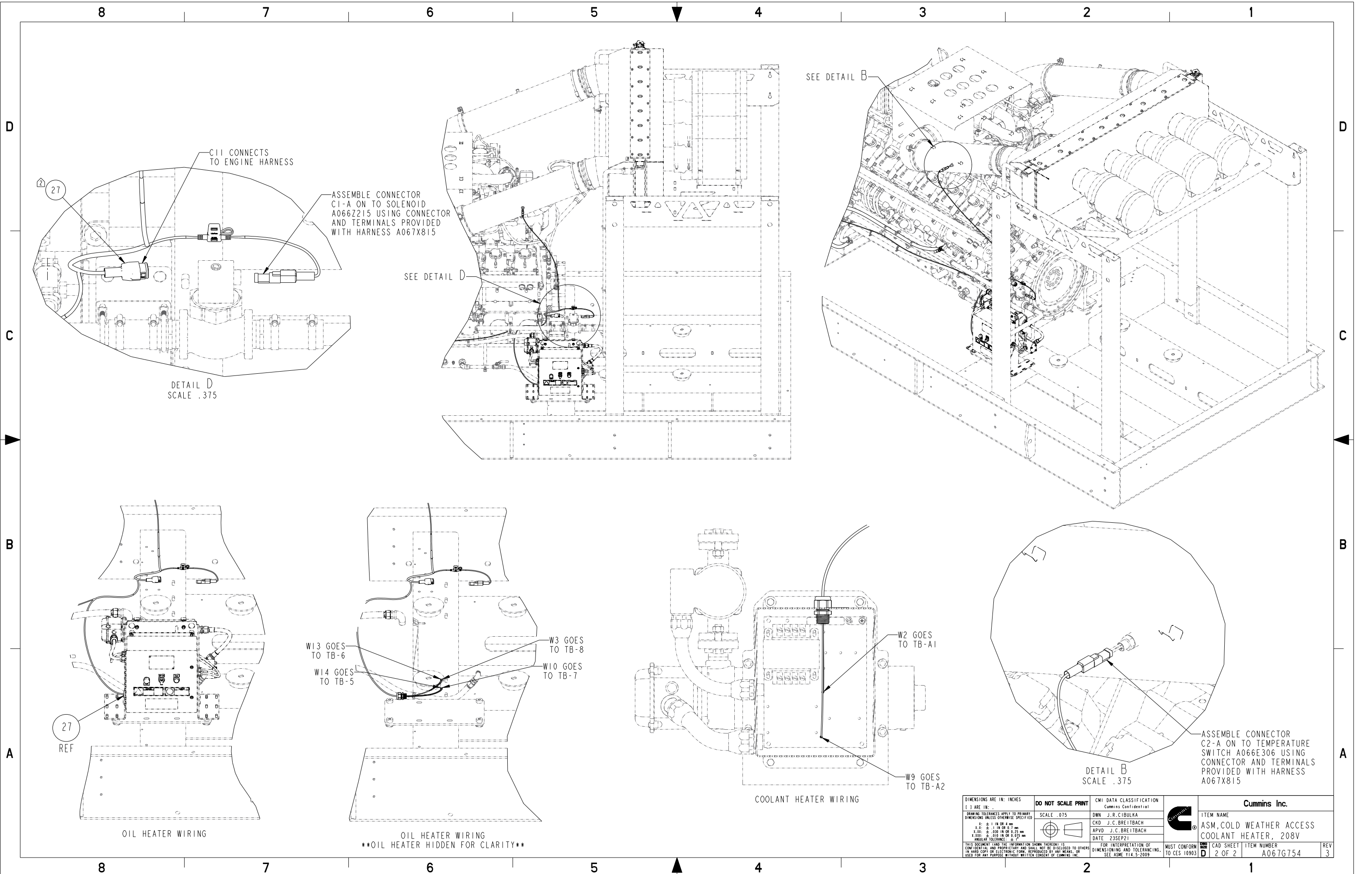
DETAIL A
SCALE .200



DETAIL B
SCALE .200

- NOTES:
- ITEMS A067G752 & A067W027 ARE NOT SHOWN
 - ITEM A067W027 IS TO BE INSTALLED INTO ITEM A067G753 FOLLOWING INSTRUCTIONS PROVIDED BY HOTSTART

DIMENSIONS ARE IN: INCHES () ARE IN: -		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .075		DWN J.R.CIBULKA		ITEM NAME	
X.1: ± .1 IN OR 4 mm				CKD J.C.BREITBACH		ASM,COLD WEATHER ACCESS	
X.12: ± .1 IN OR 0.7 mm				APVD J.C.BREITBACH		COOLANT HEATER, 208V	
X.13: ± .010 IN OR 0.25 mm				DATE 23SEP21			
ANGULAR TOLERANCE: ±							
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				D CAD SHEET 1 OF 2		ITEM NUMBER A067G754	
						REV 3	



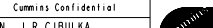
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SCALE .375

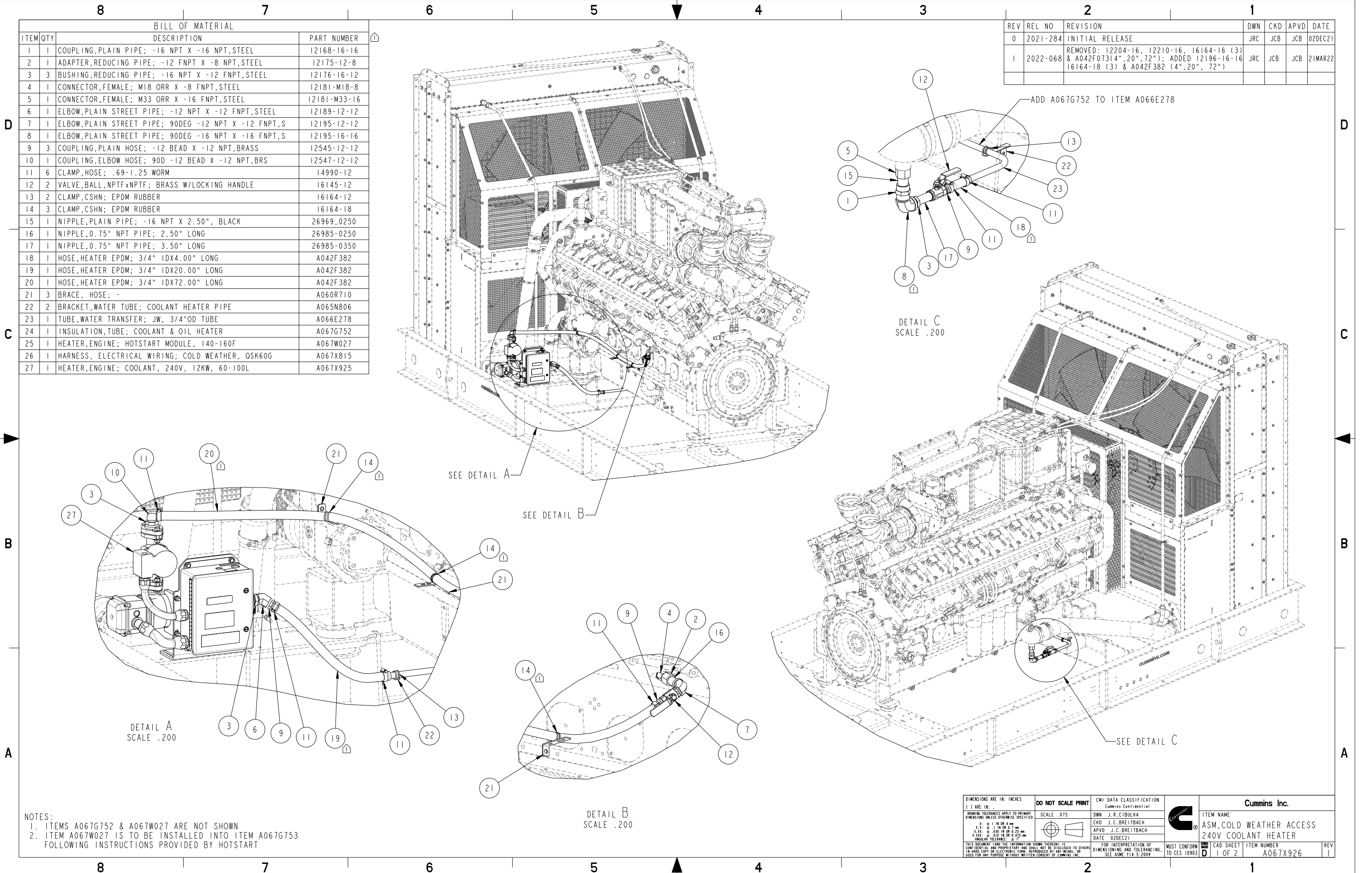
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SCALE .375

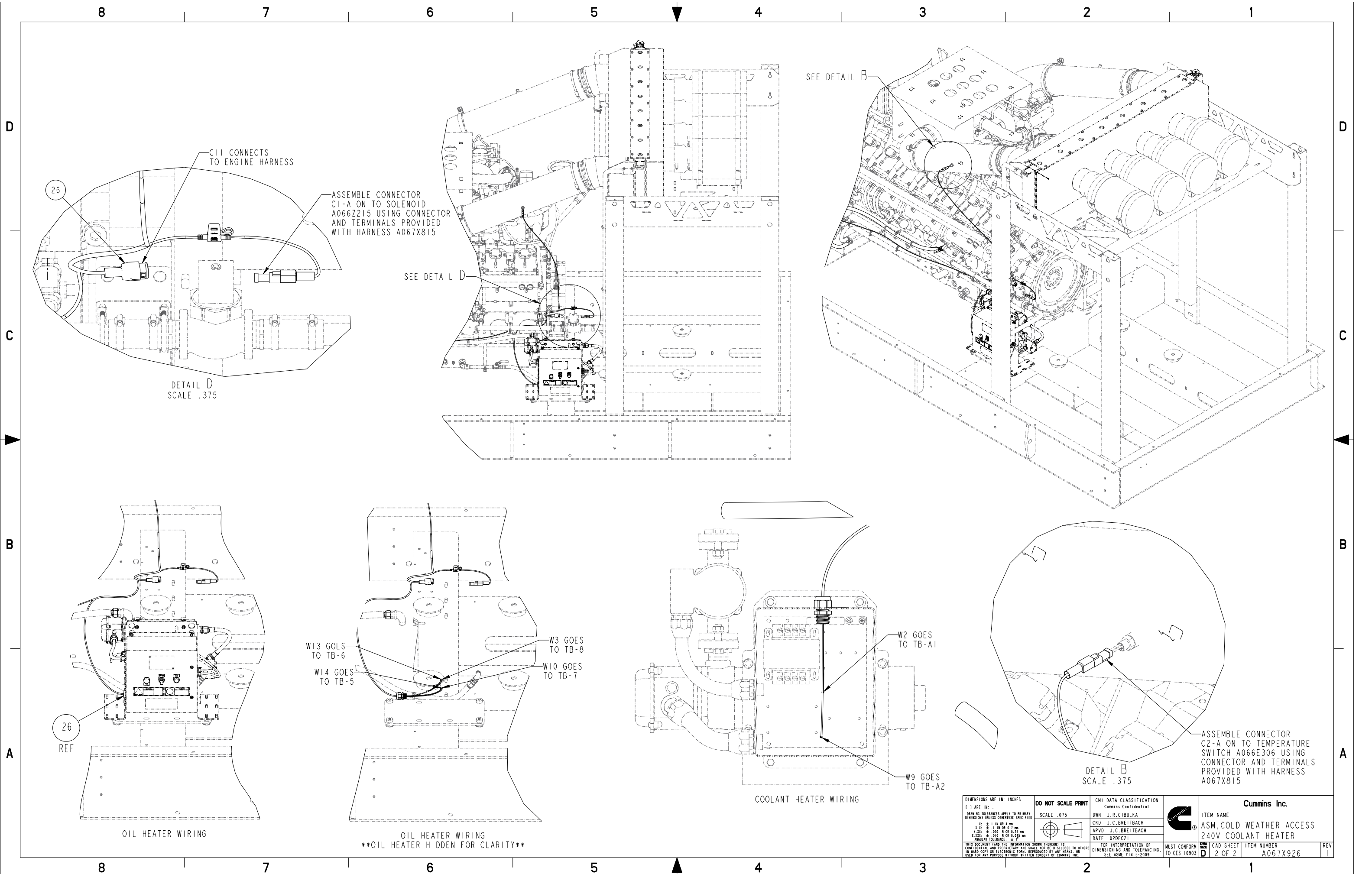
OIL HEATER WIRING

COOLANT HEATER WIRING

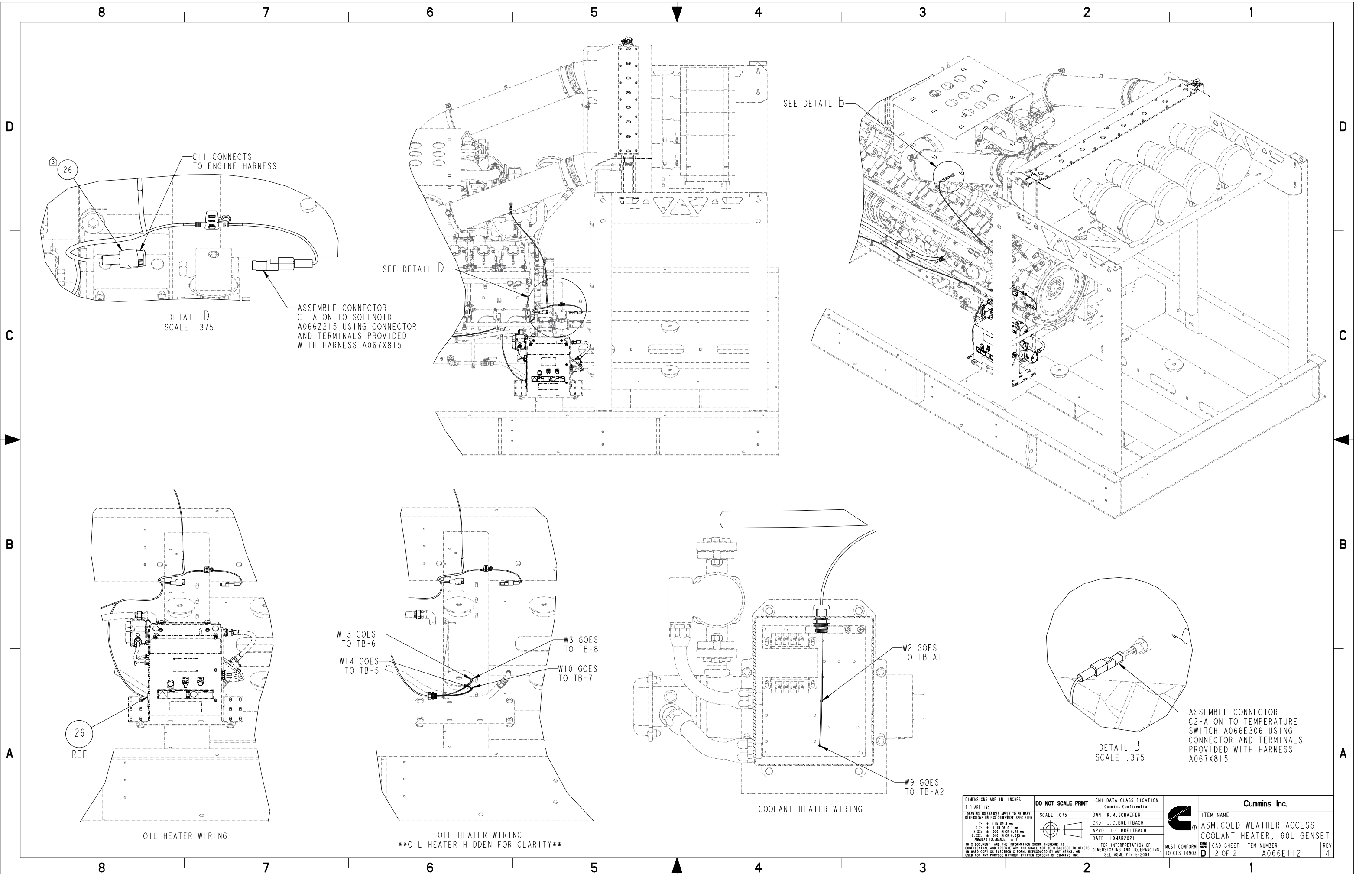
OIL HEATER WIRING
OIL HEATER HIDDEN FOR CLARITY

DIMENSIONS ARE IN: INCHES 1.1 ARE IN: -		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.		
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X.1: ± .1 IN OR 4 mm X.2: ± .1 IN OR 0.7 mm X.12: ± .030 IN OR 0.25 mm X.122: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ±		SCALE .075				ITEM NAME ASM, COLD WEATHER ACCESS COOLANT HEATER, 208V		
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	D CAD SHEET 2 OF 2 ITEM NUMBER A067G754	REV 3





DIMENSIONS ARE IN: INCHES 1.1 ARE IN: -		DO NOT SCALE PRINT		CUMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .075		DWN: J.R.CIBULKA		ITEM NAME	
X: ± .1 IN OR 4 mm				CKD: J.C.BREITBACH		ASM, COLD WEATHER ACCESS	
X.Y: ± .1 IN OR 0.7 mm				APVD: J.C.BREITBACH		240V COOLANT HEATER	
X.Y.Z: ± .030 IN OR 0.25 mm				DATE: 02DEC21		CAD SHEET	
ANGULAR TOLERANCE: ±				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009		2 OF 2	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.						ITEM NUMBER	
						A067X926	
						REV	
						1	



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OIL HEATER WIRING

OIL HEATER WIRING
OIL HEATER HIDDEN FOR CLARITY

COOLANT HEATER WIRING

DETAIL B
SCALE .375

DETAIL D
SCALE .375

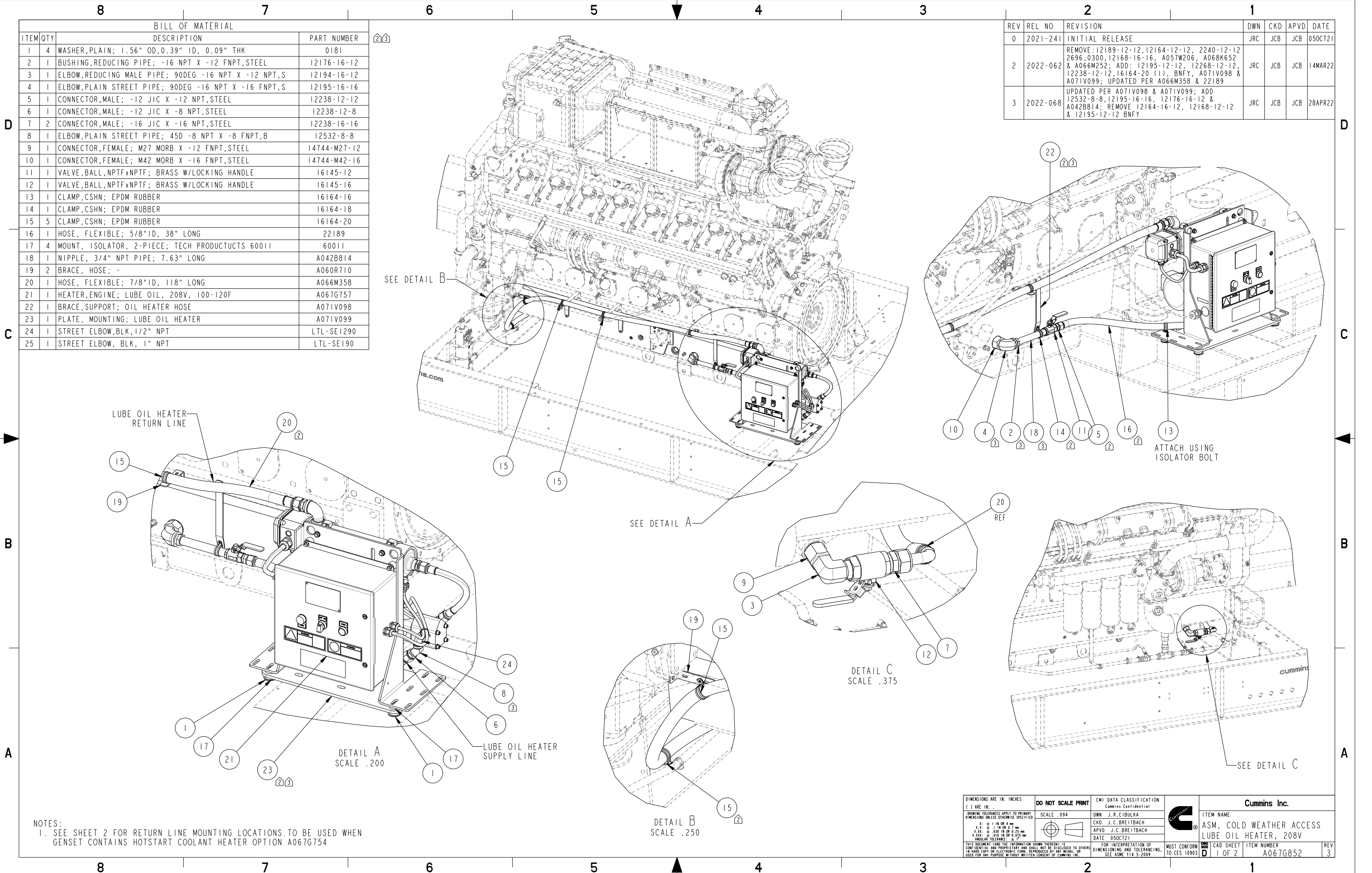
ASSEMBLE CONNECTOR
C1-A ON TO SOLENOID
A066Z215 USING CONNECTOR
AND TERMINALS PROVIDED
WITH HARNESS A067X815

ASSEMBLE CONNECTOR
C2-A ON TO TEMPERATURE
SWITCH A066E306 USING
CONNECTOR AND TERMINALS
PROVIDED WITH HARNESS
A067X815

SEE DETAIL B

SEE DETAIL D

DIMENSIONS ARE IN: INCHES 1.1 ARE IN: .	DO NOT SCALE PRINT SCALE .075	CUMMINS DATA CLASSIFICATION Cummins Confidential	Cummins Inc.
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X.1: ± .1 IN OR 4 mm X.2: ± .1 IN OR 0.7 mm X.12: ± .030 IN OR 0.25 mm X.125: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ±	DWN: W.M. SCHAEFER CKD: J.C. BREITBACH APVD: J.C. BREITBACH DATE: 19MAR2021	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009	ITEM NAME ASM, COLD WEATHER ACCESS COOLANT HEATER, 60L GENSET CUMMINS 2 OF 2 ITEM NUMBER A066E112 REV 4

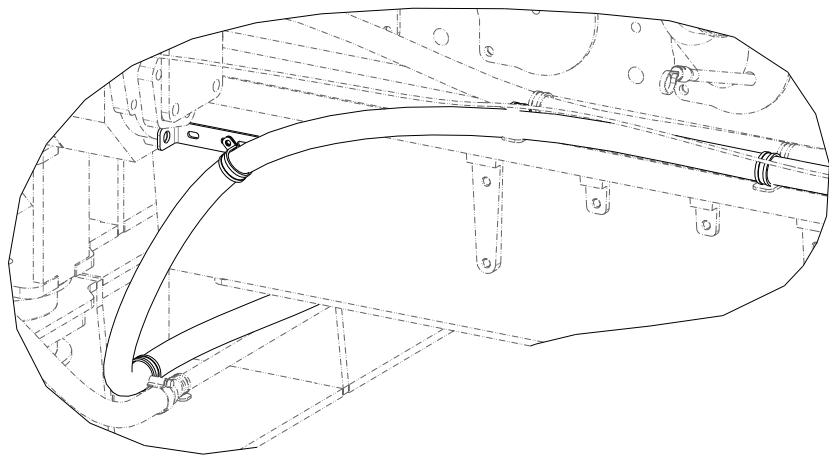


BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	4	WASHER,PLAIN; 1.56" OD,0.39" ID, 0.09" THK	0181
2	1	BUSHING,REDUCING PIPE; -16 NPT X -12 FNPT,STEEL	12176-16-12
3	1	ELBOW,REDUCING MALE PIPE; 90DEG -16 NPT X -12 NPT,S	12194-16-12
4	1	ELBOW,PLAIN STREET PIPE; 90DEG -16 NPT X -16 FNPT,S	12195-16-16
5	1	CONNECTOR,MALE; -12 JIC X -12 NPT,STEEL	12238-12-12
6	1	CONNECTOR,MALE; -12 JIC X -8 NPT,STEEL	12238-12-8
7	2	CONNECTOR,MALE; -16 JIC X -16 NPT,STEEL	12238-16-16
8	1	ELBOW,PLAIN STREET PIPE; 45D -8 NPT X -8 FNPT,B	12532-8-8
9	1	CONNECTOR,FEMALE; M27 MORB X -12 FNPT,STEEL	14744-M27-12
10	1	CONNECTOR,FEMALE; M42 MORB X -16 FNPT,STEEL	14744-M42-16
11	1	VALVE,BALL,NPTF xNPTF; BRASS W/LOCKING HANDLE	16145-12
12	1	VALVE,BALL,NPTF xNPTF; BRASS W/LOCKING HANDLE	16145-16
13	1	CLAMP,CSHN; EPDM RUBBER	16164-16
14	1	CLAMP,CSHN; EPDM RUBBER	16164-18
15	5	CLAMP,CSHN; EPDM RUBBER	16164-20
16	1	HOSE,FLEXIBLE; 5/8"ID, 38" LONG	22189
17	4	MOUNT, ISOLATOR, 2-PIECE; TECH PRODUCTUCTS 60011	60011
18	1	NIPPLE, 3/4" NPT PIPE; 7.63" LONG	A042B814
19	2	BRACE, HOSE; -	A060R710
20	1	HOSE,FLEXIBLE; 7/8"ID, 118" LONG	A066M358
21	1	HEATER,ENGINE; LUBE OIL, 208V, 100-120F	A067G757
22	1	BRACE,SUPPORT; OIL HEATER HOSE	A071V098
23	1	PLATE, MOUNTING; LUBE OIL HEATER	A071V099
24	1	STREET ELBOW,BLK,1/2" NPT	LTL-SE1290
25	1	STREET ELBOW, BLK, 1" NPT	LTL-SE190

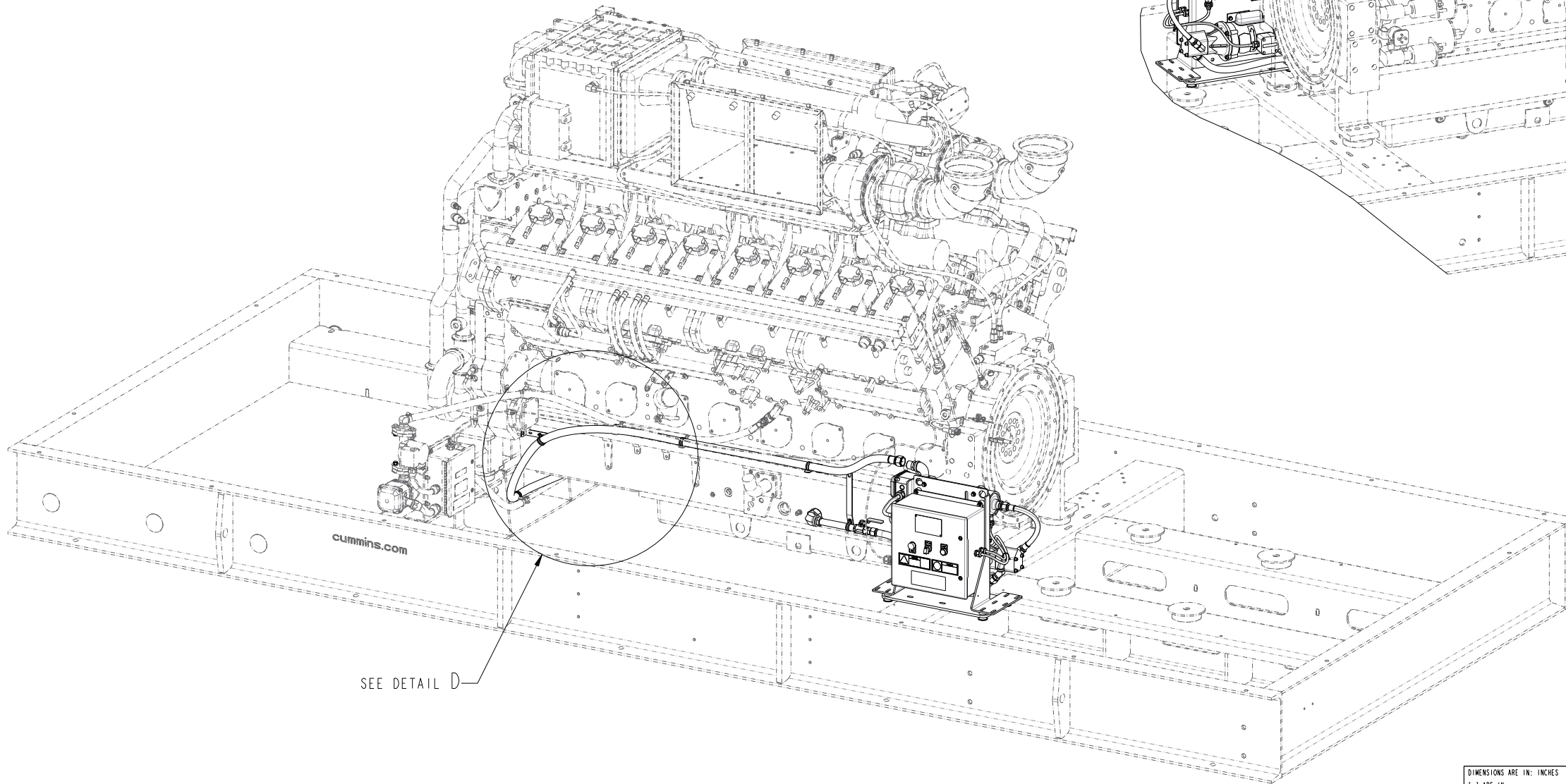
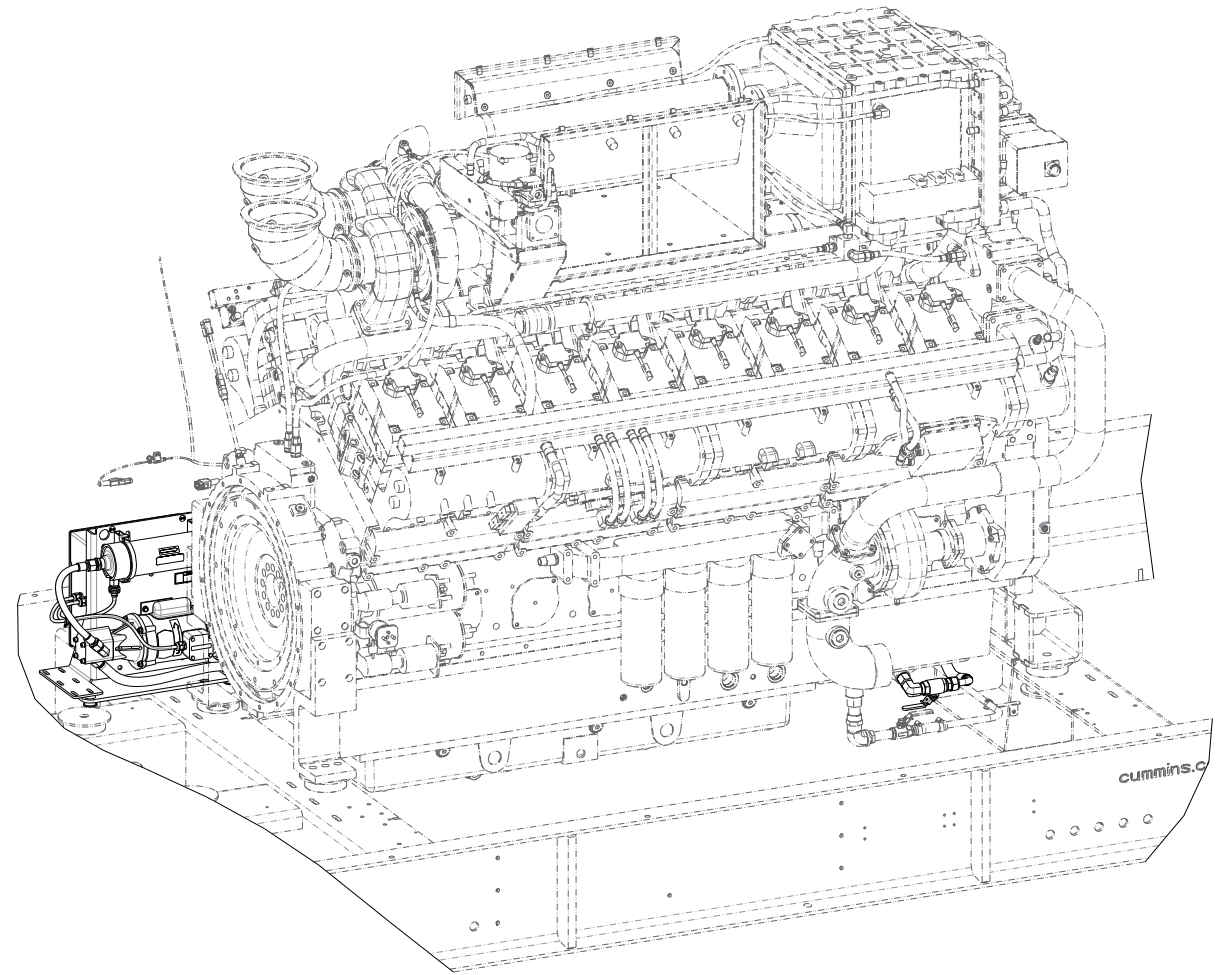
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-241	INITIAL RELEASE	JRC	JCB	JCB	05OCT21
2	2022-062	REMOVE: 12189-12-12, 12164-12-12, 2240-12-12, 2696-0300, 12168-16-16, A057W206, A068K652 & A066M252; ADD: 12195-12-12, 12268-12-12, 12238-12-12, 16164-20 (1), BNFY, A071V098 & A071V099; UPDATED PER A066M358 & 22189	JRC	JCB	JCB	14MAR22
3	2022-068	UPDATED PER A071V098 & A071V099; ADD 12532-8-8, 12195-16-16, 12176-16-12 & A042B814; REMOVE 12164-16-12, 12168-12-12 & 12195-12-12 BNFY	JRC	JCB	JCB	28APR22

NOTES:
1. SEE SHEET 2 FOR RETURN LINE MOUNTING LOCATIONS. TO BE USED WHEN GENSET CONTAINS HOTSTART COOLANT HEATER OPTION A067G754

DIMENSIONS ARE IN: INCHES 1:1 ARE IN: -		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .094	DWN J.R.CIBULKA CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 05OCT21		ITEM NAME ASM, COLD WEATHER ACCESS LUBE OIL HEATER, 208V	
X: ± .1 IN OR 4 mm X, Z: ± .1 IN OR 0.7 mm X, Y, Z: ± .030 IN OR 0.25 mm X, Y, Z: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ±			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	
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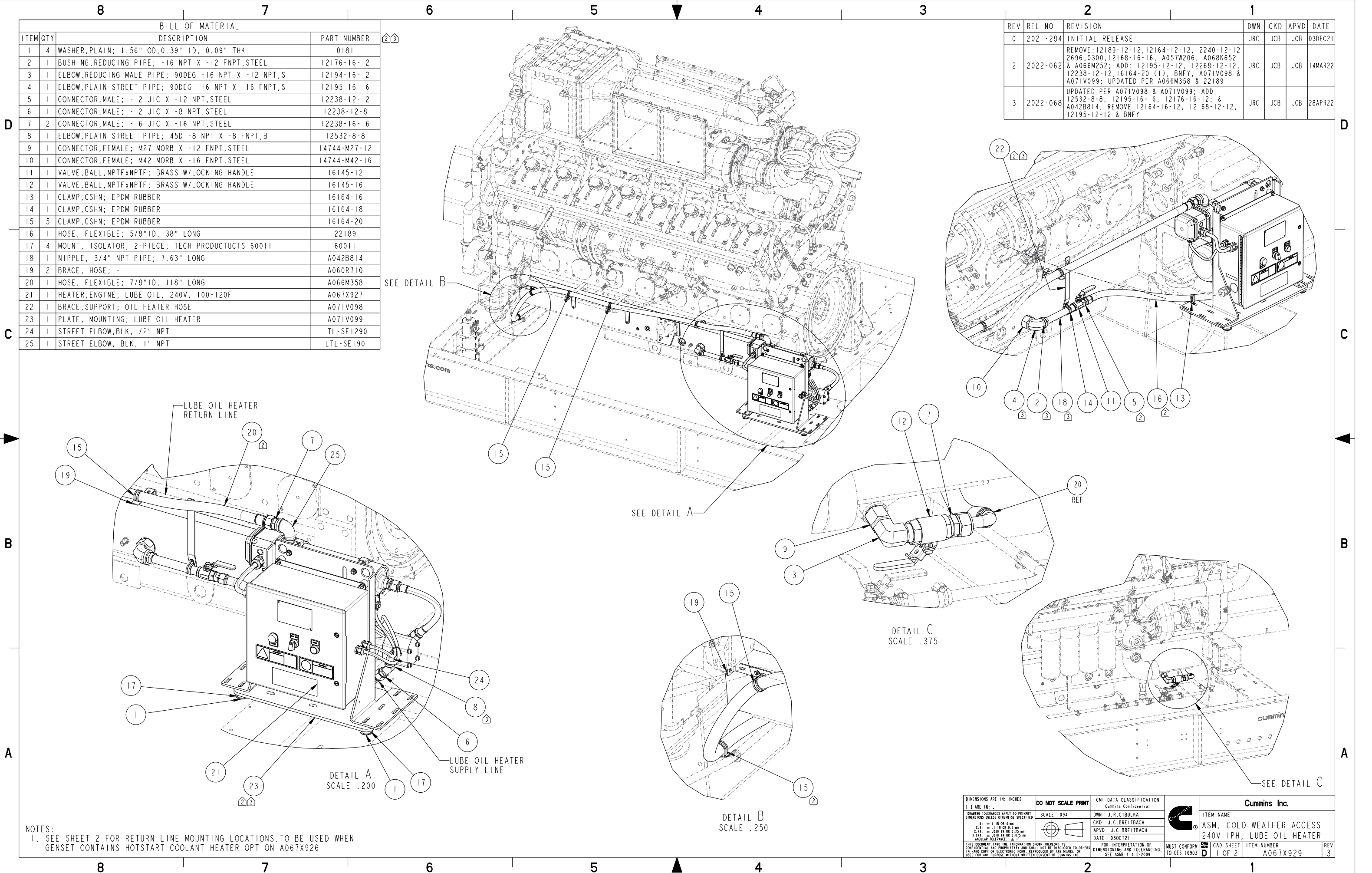


DETAIL D
SCALE .250



SEE DETAIL D

DIMENSIONS ARE IN: INCHES 1:1 ARE IN: DO NOT SCALE PRINT		CWI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X.1: ± .1 IN OR 4 mm X.2: ± .1 IN OR 6.7 mm X.12: ± .030 IN OR 0.25 mm X.125: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ±		SCALE: 1:100 			
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FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903		CAD SHEET 2 OF 2 ITEM NUMBER A067G852	
				REV 3	



BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	4	WASHER,PLAIN; 1.56" OD,0.39" ID, 0.09" THK	0181
2	1	BUSHING,REDUCING PIPE; -16 NPT X -12 FNPT,STEEL	12176-16-12
3	1	ELBOW,REDUCING MALE PIPE; 90DEG -16 NPT X -12 NPT,S	12194-16-12
4	1	ELBOW,PLAIN STREET PIPE; 90DEG -16 NPT X -16 FNPT,S	12195-16-16
5	1	CONNECTOR,MALE; -12 JIC X -12 NPT,STEEL	12238-12-12
6	1	CONNECTOR,MALE; -12 JIC X -8 NPT,STEEL	12238-12-8
7	2	CONNECTOR,MALE; -16 JIC X -16 NPT,STEEL	12238-16-16
8	1	ELBOW,PLAIN STREET PIPE; 45D -8 NPT X -8 FNPT,B	12532-8-8
9	1	CONNECTOR,FEMALE; M27 MORB X -12 FNPT,STEEL	14744-M27-12
10	1	CONNECTOR,FEMALE; M42 MORB X -16 FNPT,STEEL	14744-M42-16
11	1	VALVE,BALL,NPTFxNPTF; BRASS W/LOCKING HANDLE	16145-12
12	1	VALVE,BALL,NPTFxNPTF; BRASS W/LOCKING HANDLE	16145-16
13	1	CLAMP,CSHN; EPDM RUBBER	16164-16
14	1	CLAMP,CSHN; EPDM RUBBER	16164-18
15	5	CLAMP,CSHN; EPDM RUBBER	16164-20
16	1	HOSE,FLEXIBLE; 5/8"ID, 38" LONG	22189
17	4	MOUNT, ISOLATOR, 2-PIECE; TECH PRODUCTUCTS 60011	60011
18	1	NIPPLE, 3/4" NPT PIPE; 7.63" LONG	A042B814
19	2	BRACE, HOSE; -	A060R710
20	1	HOSE,FLEXIBLE; 7/8"ID, 118" LONG	A066M358
21	1	HEATER,ENGINE; LUBE OIL, 480V, 30-60G	A067G755
22	1	BRACE,SUPPORT; OIL HEATER HOSE	A071V098
23	1	PLATE, MOUNTING; LUBE OIL HEATER	A071V099
24	1	THERMOSTAT; HOTSTART MODULE, 100-120°F	A072K603
25	1	STREET ELBOW,BLK,1/2" NPT	LTL-SE1290
26	1	STREET ELBOW, BLK, 1" NPT	LTL-SE190

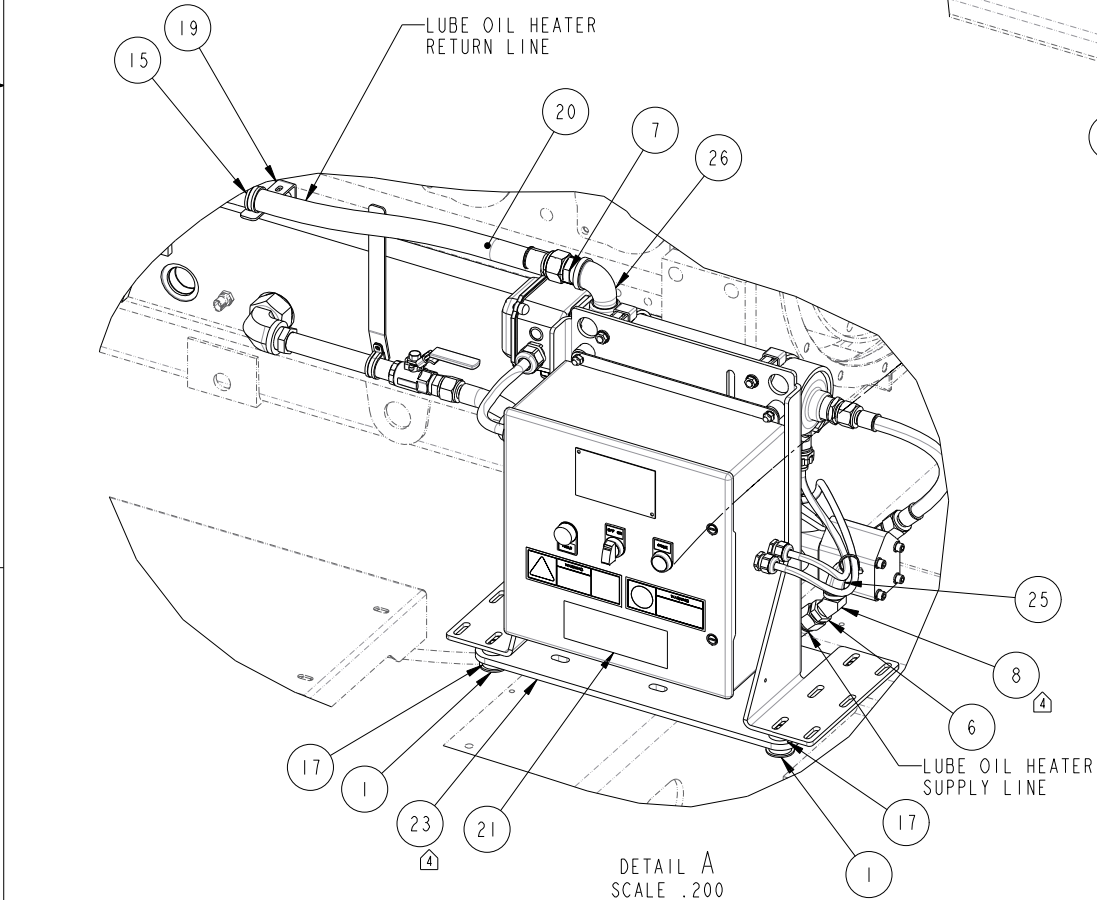
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-064	INITIAL RELEASE	KMS	JCB	JCB	02APR21
4	2022-068	UPDATED PER A071V098 & A071V099; ADD 12532-8-8,12195-16-16, 12176-16-12 & A042B814; REMOVE 12164-16-12, 12168-12-12, 12195-12-12 & BNFY	JRC	JCB	JCB	28APR22
5	2022-148	ADDED A072K603; UPDATED NOTES	JRC	JCB	JCB	08JUL22

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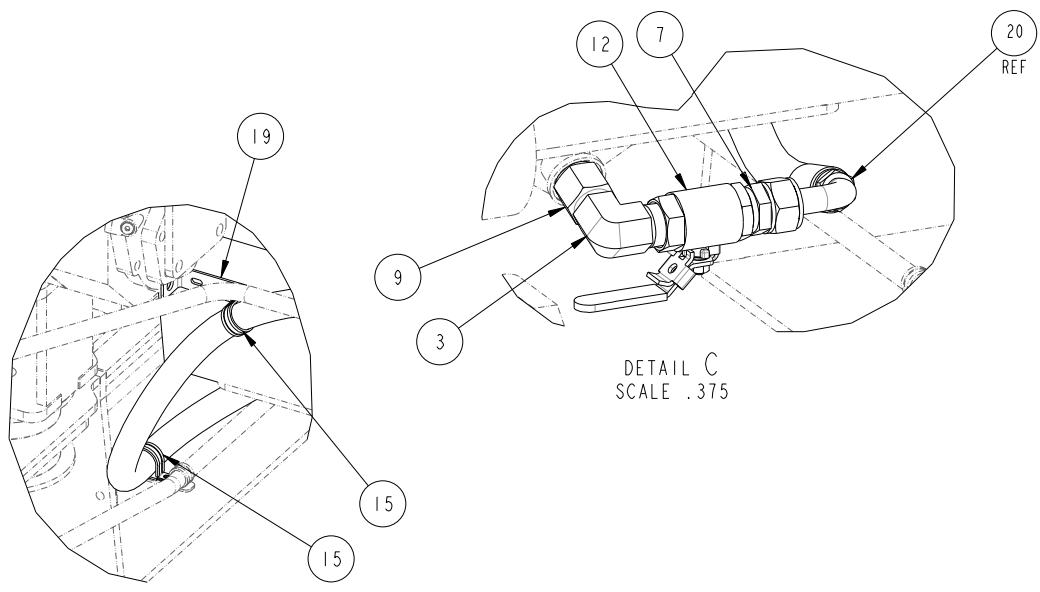
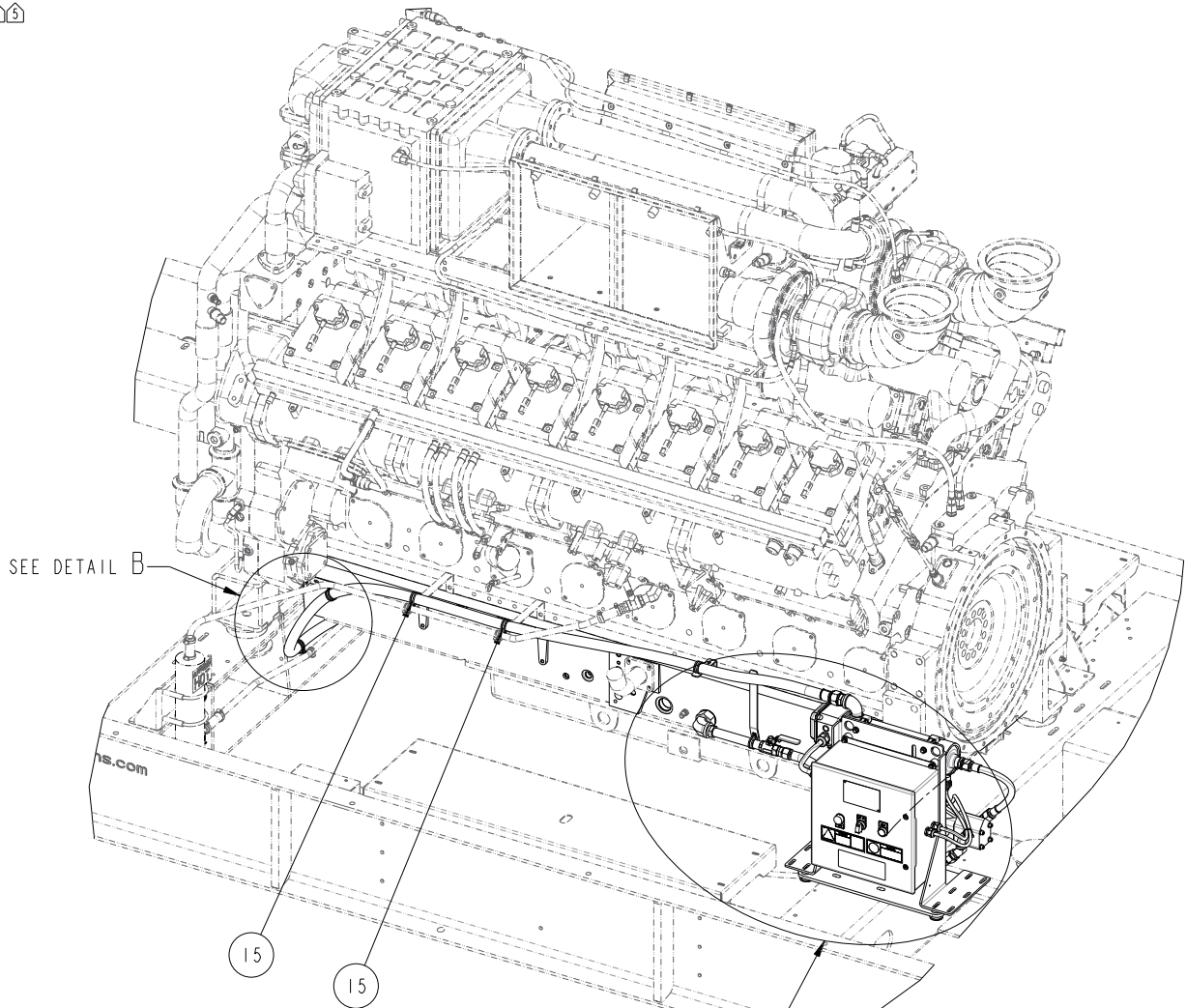
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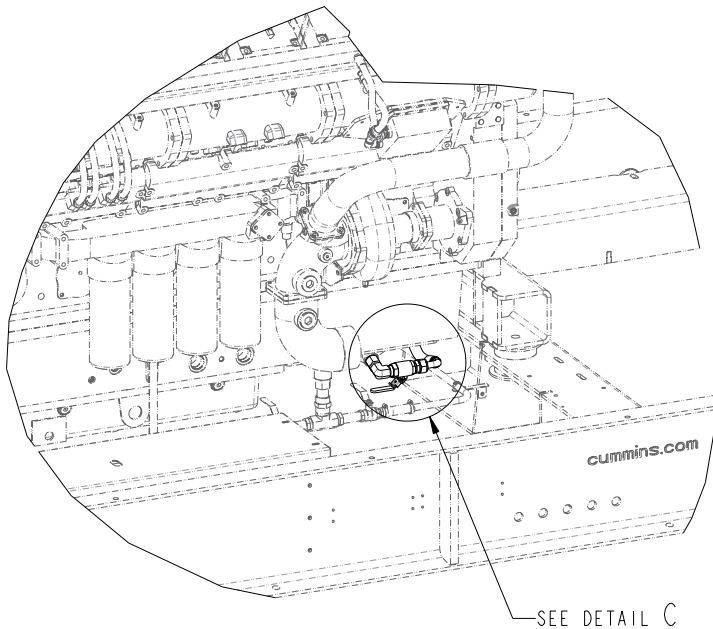
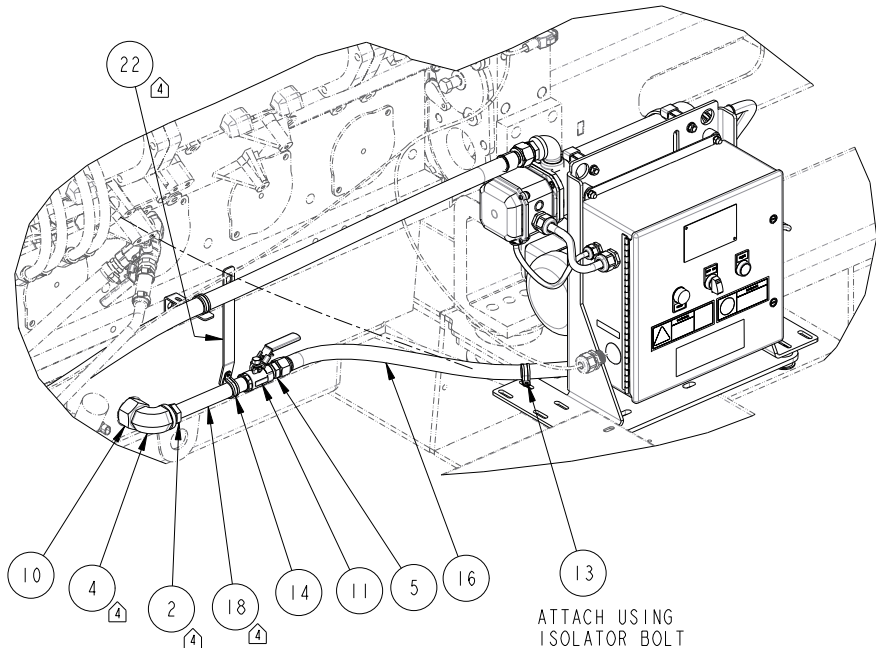
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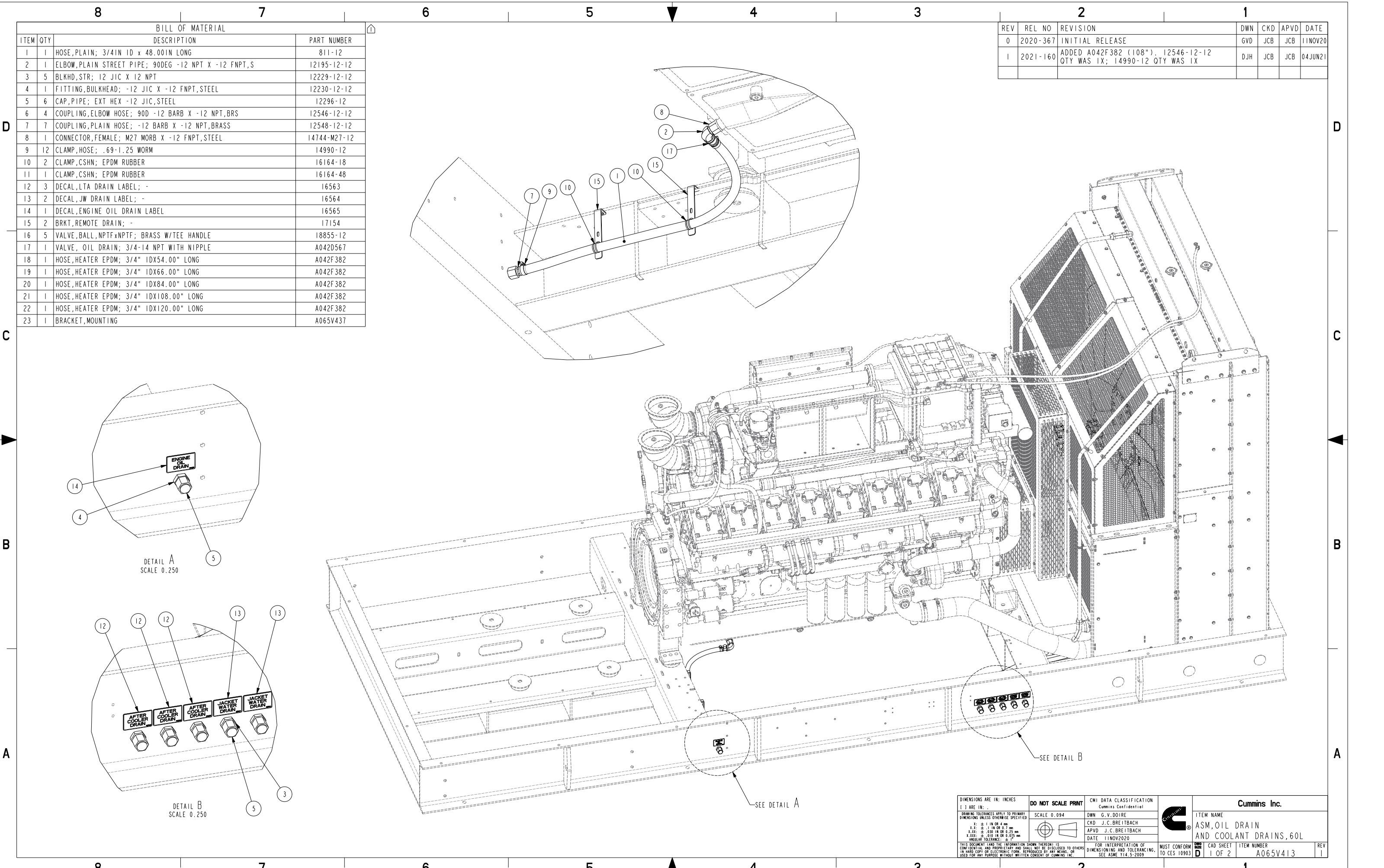
- NOTES:
- SEE SHEET 2 FOR RETURN LINE MOUNTING LOCATIONS TO BE USED WHEN GENSET CONTAINS HOTSTART COOLANT HEATER OPTION A066E112
 - ITEM A072K603 NOT SHOWN. ITEM TO BE INSTALLED INTO ITEM A067G755 FOLLOWING INSTRUCTIONS PROVIDED BY HOTSTART



DETAIL B
SCALE .250



DIMENSIONS ARE IN: INCHES 1.1 ARE IN: -		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .094	DWN: W.M.SCHAEFER CKD: J.C.BREITBACH APVD: J.C.BREITBACH DATE: 02APR2021		ITEM NAME ASM, COLD WEATHER ACCESS LUBE OIL HEATER, 480V, 2KW	
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						REV 5



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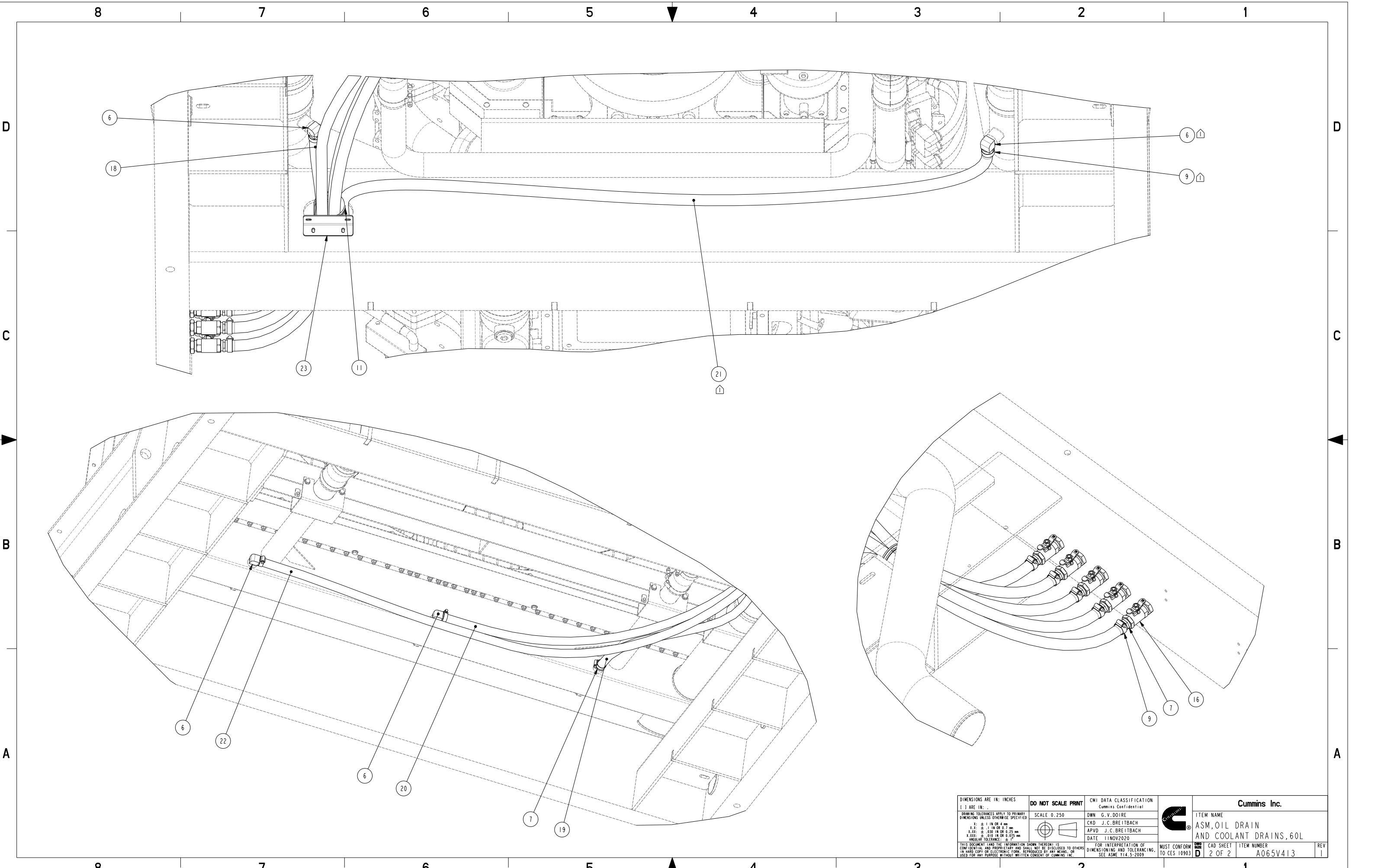
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BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	HOSE,PLAIN; 3/4IN ID x 48.00IN LONG	811-12
2	1	ELBOW,PLAIN STREET PIPE; 90DEG -12 NPT X -12 FNPT,S	12195-12-12
3	5	BLKHD,STR; 12 JIC X 12 NPT	12229-12-12
4	1	FITTING,BULKHEAD; -12 JIC X -12 FNPT,STEEL	12230-12-12
5	6	CAP,PIPE; EXT HEX -12 JIC,STEEL	12296-12
6	4	COUPLING,ELBOW HOSE; 90D -12 BARB X -12 NPT,BRS	12546-12-12
7	7	COUPLING,PLAIN HOSE; -12 BARB X -12 NPT,BRASS	12548-12-12
8	1	CONNECTOR,FEMALE; M27 MORB X -12 FNPT,STEEL	14744-M27-12
9	12	CLAMP,HOSE; .69-1.25 WORM	14990-12
10	2	CLAMP,CSHN; EPDM RUBBER	16164-18
11	1	CLAMP,CSHN; EPDM RUBBER	16164-48
12	3	DECAL,LTA DRAIN LABEL; -	16563
13	2	DECAL,JW DRAIN LABEL; -	16564
14	1	DECAL,ENGINE OIL DRAIN LABEL	16565
15	2	BRKT,REMOTE DRAIN; -	17154
16	5	VALVE,BALL,NPTFXNPTF; BRASS W/TEE HANDLE	18855-12
17	1	VALVE, OIL DRAIN; 3/4-14 NPT WITH NIPPLE	A042D567
18	1	HOSE,HEATER EPDM; 3/4" IDX54.00" LONG	A042F382
19	1	HOSE,HEATER EPDM; 3/4" IDX66.00" LONG	A042F382
20	1	HOSE,HEATER EPDM; 3/4" IDX84.00" LONG	A042F382
21	1	HOSE,HEATER EPDM; 3/4" IDX108.00" LONG	A042F382
22	1	HOSE,HEATER EPDM; 3/4" IDX120.00" LONG	A042F382
23	1	BRACKET,MOUNTING	A065V437

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-367	INITIAL RELEASE	GVD	JCB	JCB	11NOV20
1	2021-160	ADDED A042F382 (108"). 12546-12-12 QTY WAS 1X; 14990-12 QTY WAS 1X	DJH	JCB	JCB	04JUN21

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 0.094		DWN G.V.DOIRE		ITEM NAME ASM,OIL DRAIN AND COOLANT DRAINS,60L	
Z: ± .1 IN OR 4 mm		APVD J.C.BREITBACH		CKD J.C.BREITBACH		CAD SHEET	
X,Y,Z: ± .030 IN OR 0.75 mm		DATE 11NOV2020		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		ITEM NUMBER	
ANGULAR TOLERANCE: ±		MUST CONFORM TO CES 10903		D		A065V413	
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DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 0.250		DWN G.V.DOIRE		ITEM NAME	
Z: ± 1/16 IN OR 4 mm		CKD J.C.BREITBACH		APVD J.C.BREITBACH		ASM, OIL DRAIN	
X, Y, Z: ± .010 IN OR 0.25 mm		DATE 11 NOV 2020		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		AND COOLANT DRAINS, 60L	
ANGULAR TOLERANCES: ± °		MUST CONFORM TO CES 10903		D 2 OF 2		ITEM NUMBER	
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						REV	
						1	

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	RACK, DUAL 8D BATTERY	14150
2	2	BRACKET, BATTERY HOLD DOWN	14168
3	2	ROD, THREADED; McMASTER-CARR or EQUIV	99065A401
4	2	COVER, PROTECTIVE; 60L BATTERY RACK	A067G762
5	2	BRACKET, BATTERY; LH, 60L BATTERY COVER	A067G763
6	2	BRACKET, BATTERY; RH, 60L BATTERY COVER	A067G764
7	6	NUT, 3/8-16 UNC	NUT_3-8-16
8	6	WASHER, 3/8	WASHER_3-8
9	6	WASHER, LOCK; 3/8	WASHER_LOCK_3-8

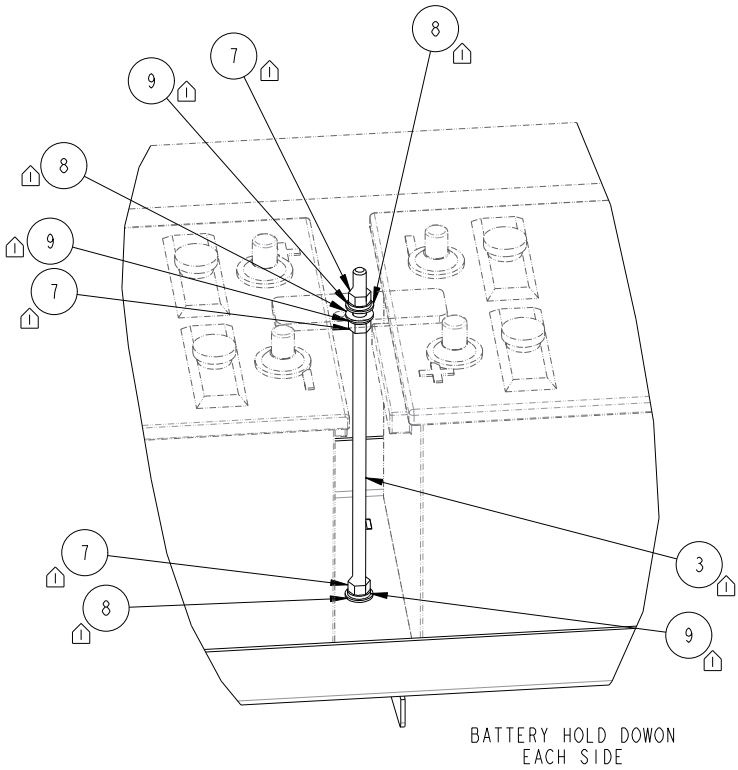
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-233	INITIAL RELEASE	DJH	JCB	JCB	22SEP21
1	2022-012	ADD (2) EACH OF ITEMS 14150, 99065A401, & 14168; (1) EACH OF ITEMS A067G762, A067G763 & A067G764, (6) EACH OF WASHERS & NUTS	JRC	JCB	JCB	18JAN22

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BATTERY HOLD DOWN
EACH SIDE

MOUNT BRACKETS TO FRAME
USING UPPER HOLE PRIOR
TO BATTERY RACK INSTALLATION (4X)

ATTACH COVERS TO SUPPORT BRACKETS
USING (4X) 3/8-16 FASTENERS

SCALE .075

NOTE:
THERE WILL BE A 1/4 INCH
GAP BETWEEN FRAME AND REAR OF
BOTTOM SUPPORT OF ITEM 14150

DIMENSIONS ARE IN: INCHES 1 I ARE IN: .		DO NOT SCALE PRINT	CWI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.			
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE: 200	DWN: D.J. HUMECKI		ITEM NAME			
X.1: ± .1 IN OR 4 mm			CKD: J.C. BRIETBACH		ASM, PRODUCT GUARD			
X.2: ± .1 IN OR 0.7 mm			APVD: J.C. BRIETBACH		60L BATTERY COVER			
X.12: ± .030 IN OR 0.25 mm			DATE: 22SEP2021					
X.25: ± .010 IN OR 0.25 mm								
ANGULAR TOLERANCE: ±								
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BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	CHARGER, BATTERY; SENS, MICROGENIUS S4	A066U082
2	1	HARNESS, WIRING; BATTERY CHARGER S4	A066U099

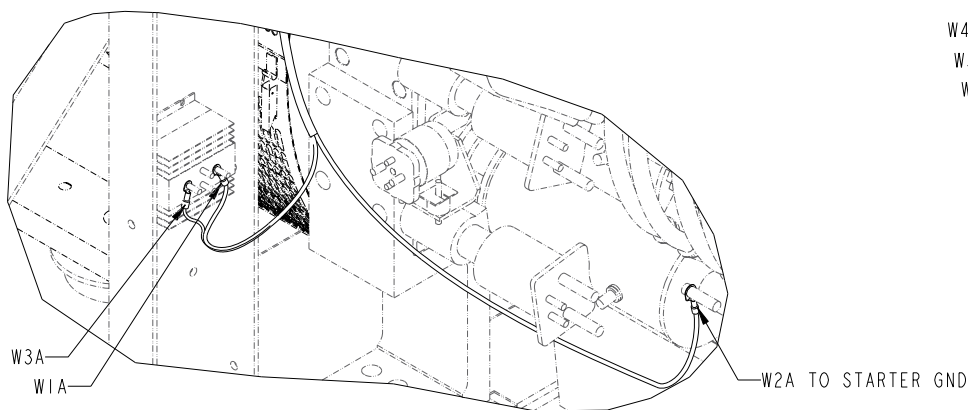
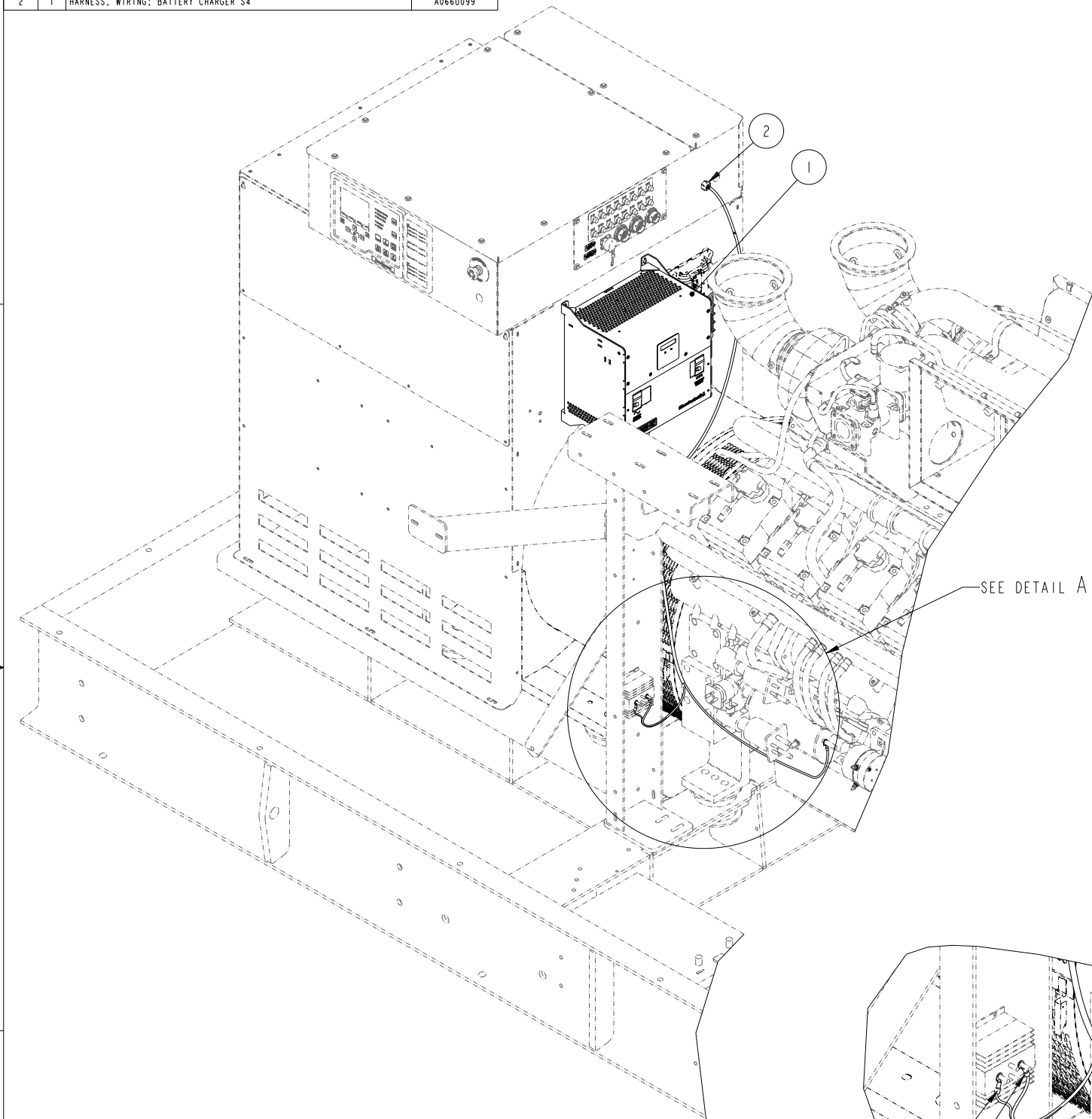
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-286	INITIAL RELEASE	CTB	KAK	KAK	06DEC21
1	2022-099	MOVED W5A AND UPDATED W4 LOCATION LABEL	CTB	KAK	KAK	05MAY22
2	2022-174	UPDATED W5A LOCATION LABEL	CTB	CTB	CTB	02SEP22

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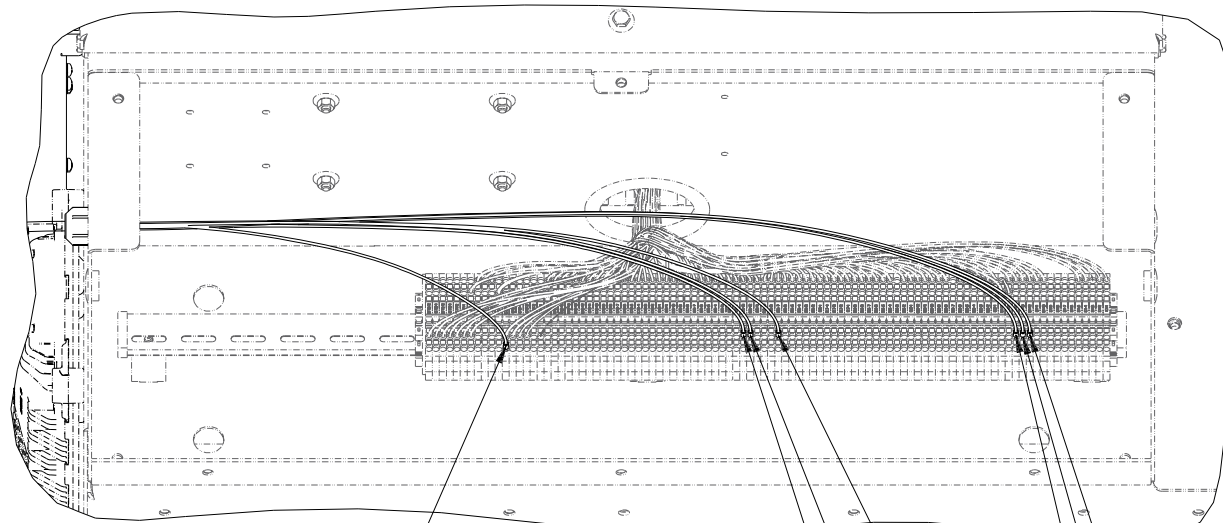
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DETAIL A
SCALE .250
POWER AND GROUND WIRING



W5A TO C20-18

CONTROL PANEL WIRING

W7A TO C8-7

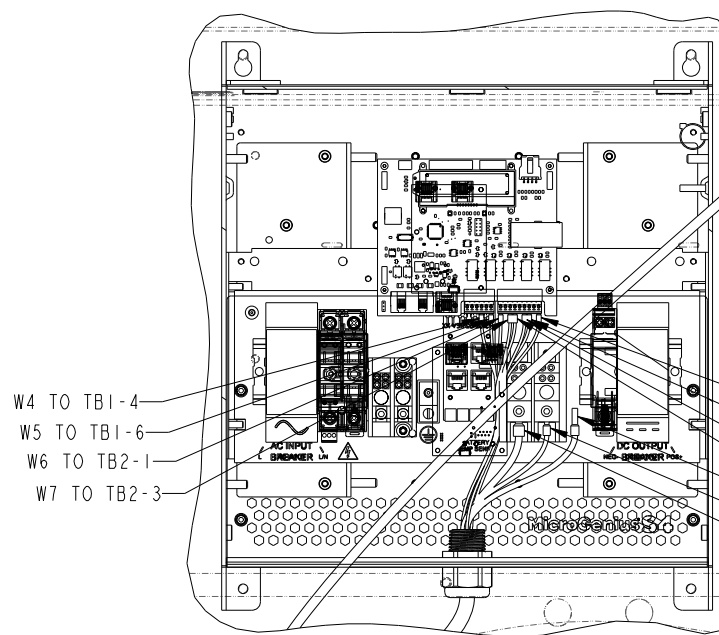
W6A TO C8-12

W4A TO C8-13

W11A TO C1-12

W9 TO C1-13

W12A TO C1-14



W4 TO TB1-4

W5 TO TB1-6

W6 TO TB2-1

W7 TO TB2-3

W11 TO TB2-9

W10 TO TB2-7

W12 TO TB2-6

W8 TO TB2-4

W1 TO DC-A

W2 TO DC-N

W3 TO DC-B

BATTERY CHARGER WIRING

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CUMINS DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED F: ± .1 IN OR 4 mm F.L: ± .1 IN OR 0.7 mm F.L.C: ± .002 IN OR 0.25 mm X: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ± 1°		SCALE 1:1000	DATE 06DEC2021		ITEM NAME ASM, ELECTRICAL GENERAL 60L BATTERY CHARGER	REV 2
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY FORM OR BY ANY MEANS, WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903		CAD SHEET 1 OF 1
						ITEM NUMBER GE100177

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	PANEL, SIDE; 60L, FRONT, GEN HSG	A065P063
2	1	PANEL, BACK; 60L, UPPER, GEN HSG	A065P066
3	1	PANEL, BACK; 60L, LOWER, GEN HSG	A065P068
4	1	BRACKET, MOUNTING; 60L, CTRL SPT, GEN HSG	A065P070
5	1	PANEL, TOP; 60L, GEN HOUSING	A065P072
6	1	PANEL, BOTTOM; 60L, ALT AIR-DAM	A065P074
7	7	BUSBAR, LOAD; 60L	A065P075

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-358	INITIAL RELEASE	DJH	JCB	JCB	26OCT20
1	2022-076	MOVED PANELS A065P059/061/073 TO CONFIG BUSBAR QTY A065P075 WAS 8X; ADDED SIDE PANEL REF NOTE.	DJH	JCB	JCB	20FEB22

BATTERY CHARGER
A066U082 SHOWN
FOR REFERENCE

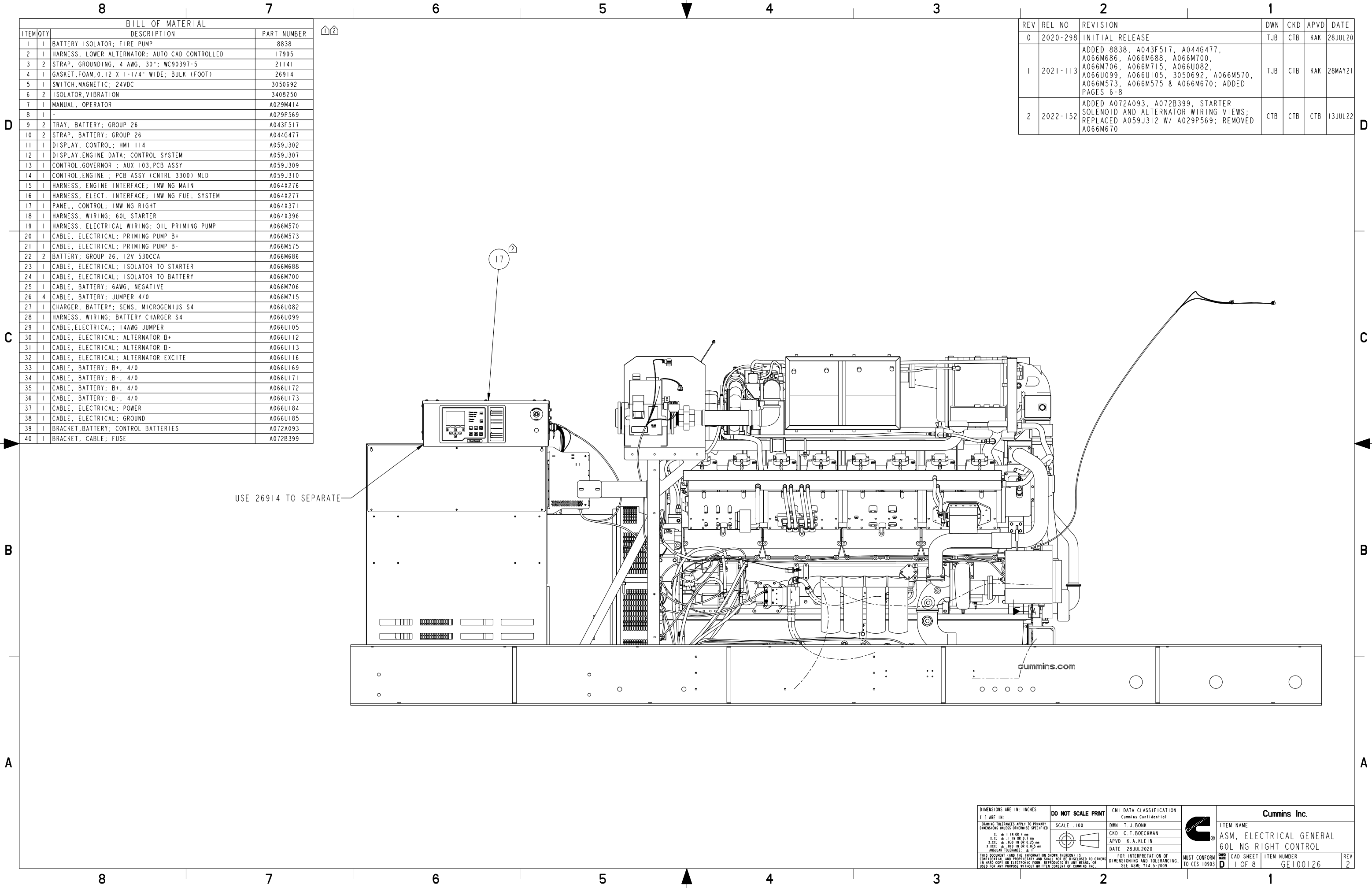
ECM 4326543_2358
SHOWN FOR REFERENCE

SIDE PANELS SHOWN FOR REF

AIR-DAM MOUNTS TO GENSET FRAME
BENEATH ALTERNATOR DISCHARGE VENT

- NOTES:
- GEN HOUSING SIDE PANELS CAN BE ASSEMBLED TO ACCOMODATE EITHER RH OR LH CB CONFIGURATION. TOP PANEL CAN ALSO BE ASSEMBLED FOR A RH OR LH FACING PCC3300 CONTROL MODULE
 - REPLACE STOCK BUSBARS ON ALTERNATOR WITH A065P075 BUSBARS

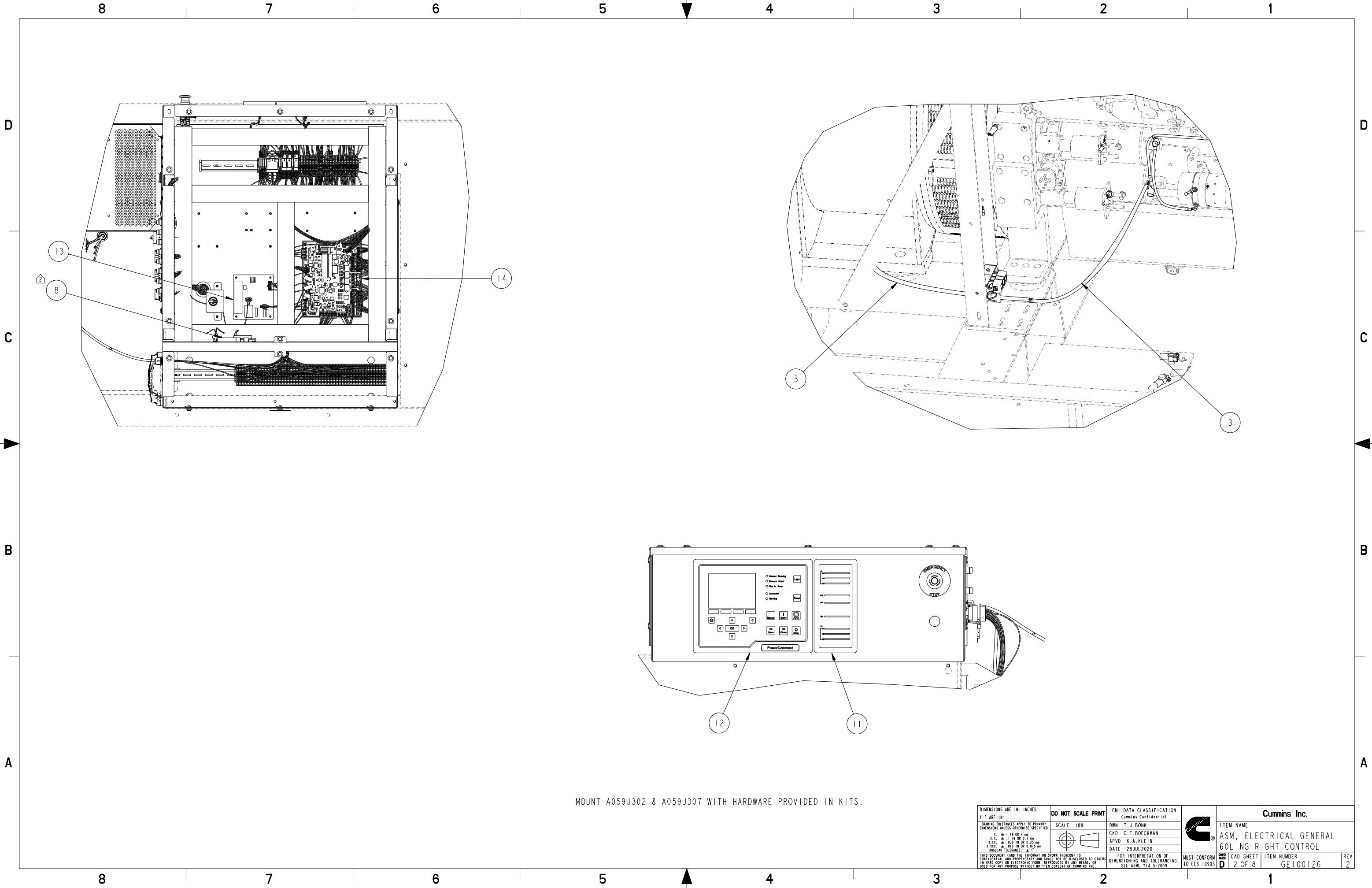
DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .125		DWN DJH		ITEM NAME	
X: ± .1 IN OR 4 mm		SCALE .125		CKD JCB		60L, GEN HOUSING	
X.XX: ± .1 IN OR 0.3 mm		SCALE .125		APVD JCB		ITEM NUMBER	
X.XXX: ± .001 IN OR 0.25 mm		SCALE .125		DATE 26OCT2020		A065P058	
ANGULAR TOLERANCE: ±		SCALE .125		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		REV	
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BILL OF MATERIAL			PART NUMBER
ITEM	QTY	DESCRIPTION	
1	1	BATTERY ISOLATOR; FIRE PUMP	8838
2	1	HARNESS, LOWER ALTERNATOR; AUTO CAD CONTROLLED	17995
3	2	STRAP, GROUNDING, 4 AWG, 30"; WC90397-5	21141
4	1	GASKET,FOAM,0.12 X 1-1/4" WIDE; BULK (FOOT)	26914
5	1	SWITCH,MAGNETIC; 24VDC	3050692
6	2	ISOLATOR,VIBRATION	3408250
7	1	MANUAL, OPERATOR	A029M414
8	1	-	A029P569
9	2	TRAY, BATTERY; GROUP 26	A043F517
10	2	STRAP, BATTERY; GROUP 26	A044G477
11	1	DISPLAY, CONTROL; HMI 114	A059J302
12	1	DISPLAY,ENGINE DATA; CONTROL SYSTEM	A059J307
13	1	CONTROL,GOVERNOR ; AUX 103,PCB ASSY	A059J309
14	1	CONTROL,ENGINE ; PCB ASSY (CNTRL 3300) MLD	A059J310
15	1	HARNESS, ENGINE INTERFACE; 1MW NG MAIN	A064X276
16	1	HARNESS, ELECT. INTERFACE; 1MW NG FUEL SYSTEM	A064X277
17	1	PANEL, CONTROL; 1MW NG RIGHT	A064X371
18	1	HARNESS, WIRING; 60L STARTER	A064X396
19	1	HARNESS, ELECTRICAL WIRING; OIL PRIMING PUMP	A066M570
20	1	CABLE, ELECTRICAL; PRIMING PUMP B+	A066M573
21	1	CABLE, ELECTRICAL; PRIMING PUMP B-	A066M575
22	2	BATTERY; GROUP 26, 12V 530CCA	A066M686
23	1	CABLE, ELECTRICAL; ISOLATOR TO STARTER	A066M688
24	1	CABLE, ELECTRICAL; ISOLATOR TO BATTERY	A066M700
25	1	CABLE, BATTERY; 6AWG, NEGATIVE	A066M706
26	4	CABLE, BATTERY; JUMPER 4/0	A066M715
27	1	CHARGER, BATTERY; SENS, MICROGENIUS S4	A066U082
28	1	HARNESS, WIRING; BATTERY CHARGER S4	A066U099
29	1	CABLE,ELECTRICAL; 14AWG JUMPER	A066U105
30	1	CABLE, ELECTRICAL; ALTERNATOR B+	A066U112
31	1	CABLE, ELECTRICAL; ALTERNATOR B-	A066U113
32	1	CABLE, ELECTRICAL; ALTERNATOR EXCITE	A066U116
33	1	CABLE, BATTERY; B+, 4/0	A066U169
34	1	CABLE, BATTERY; B-, 4/0	A066U171
35	1	CABLE, BATTERY; B+, 4/0	A066U172
36	1	CABLE, BATTERY; B-, 4/0	A066U173
37	1	CABLE, ELECTRICAL; POWER	A066U184
38	1	CABLE, ELECTRICAL; GROUND	A066U185
39	1	BRACKET,BATTERY; CONTROL BATTERIES	A072A093
40	1	BRACKET, CABLE; FUSE	A072B399

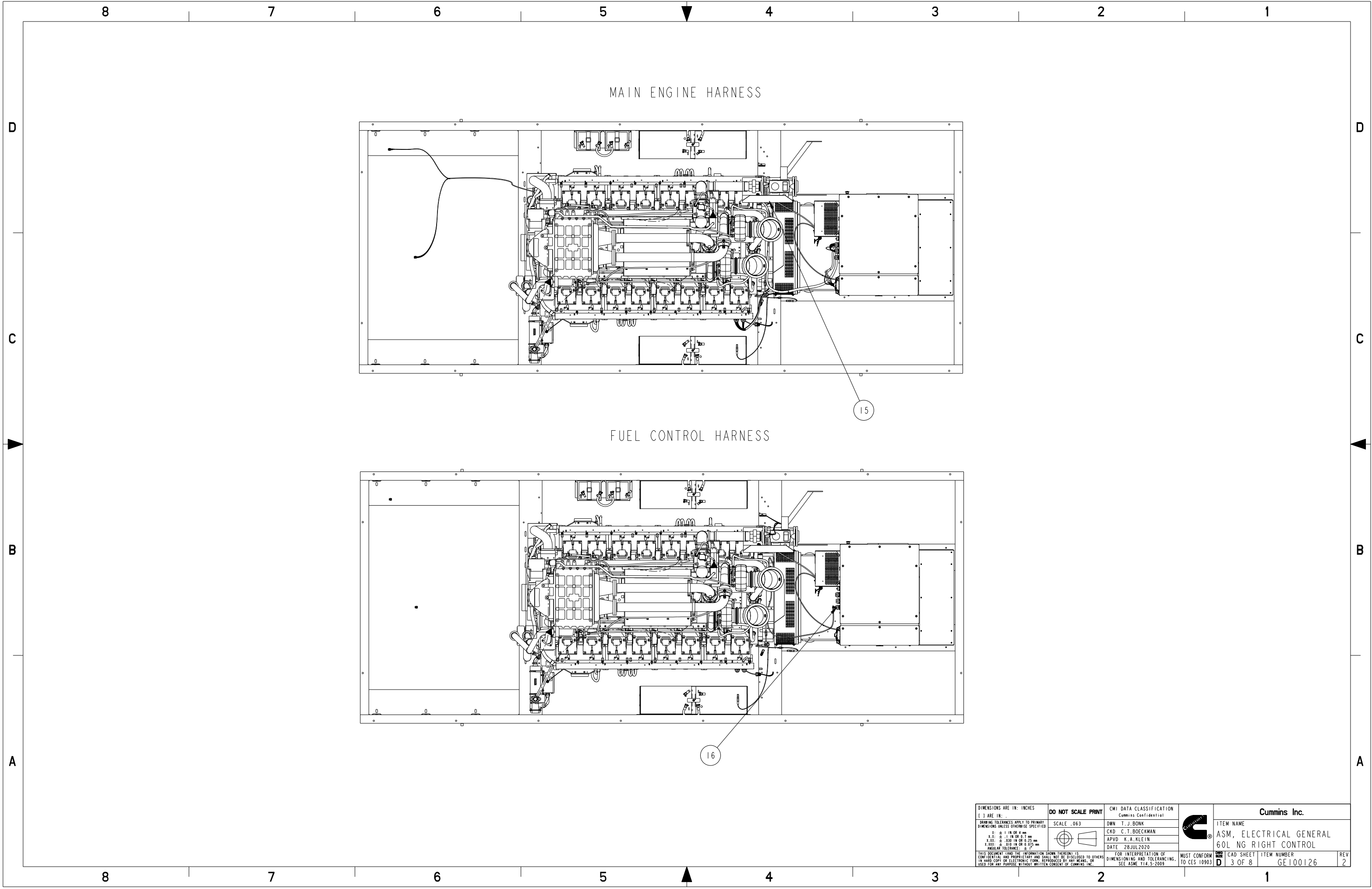
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-298	INITIAL RELEASE	TJB	CTB	KAK	28JUL20
1	2021-113	ADDED 8838, A043F517, A044G477, A066M686, A066M688, A066M700, A066M706, A066M715, A066U082, A066U099, A066U105, 3050692, A066M570, A066M573, A066M575 & A066M670; ADDED PAGES 6-8	TJB	CTB	KAK	28MAY21
2	2022-152	ADDED A072A093, A072B399, STARTER SOLENOID AND ALTERNATOR WIRING VIEWS; REPLACED A059J312 W/ A029P569; REMOVED A066M670	CTB	CTB	CTB	13JUL22

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X: ± .1 IN OR 3 mm Y: ± .1 IN OR 3 mm Z: ± .1 IN OR 3 mm ANGULAR TOLERANCE: ± 1°		SCALE .100	DWN T.J.BONK CKD C.T.BOECKMAN APVD K.A.KLEIN DATE 28JUL2020		ITEM NAME ASM, ELECTRICAL GENERAL 60L NG RIGHT CONTROL	
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						REV 2



MOUNT A059J302 & A059J307 WITH HARDWARE PROVIDED IN KITS.

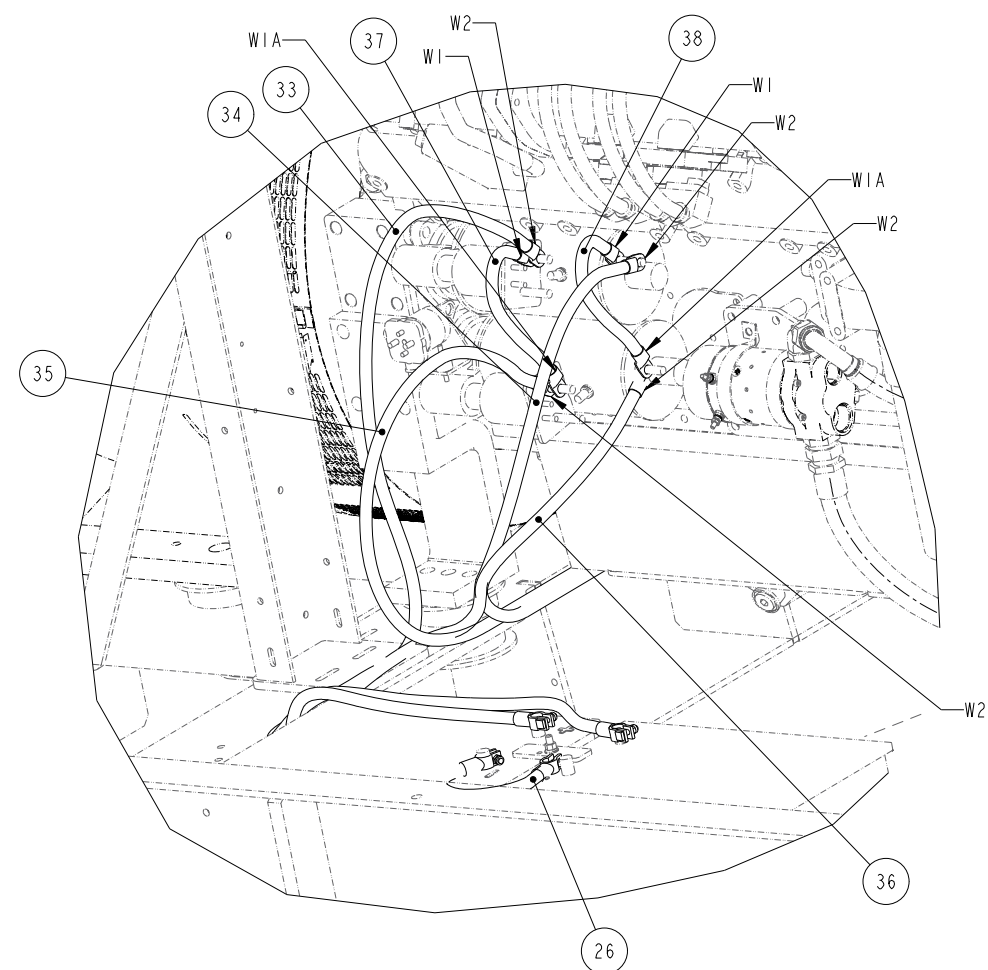
DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential	Cummins Inc.			
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .188	DWN T.J.BONK		ITEM NAME		
X: ± .1 IN OR 4 mm			CKD C.T.BOECKMAN		ASM, ELECTRICAL GENERAL		
X.Y: ± .030 IN OR 0.75 mm			APVD K.A.KLEIN		60L NG RIGHT CONTROL		
X.Z: ± .010 IN OR 0.25 mm			DATE 28JUL2020				
ANGULAR TOLERANCE: ± 1°		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009			MUST CONFORM TO CES 10903		
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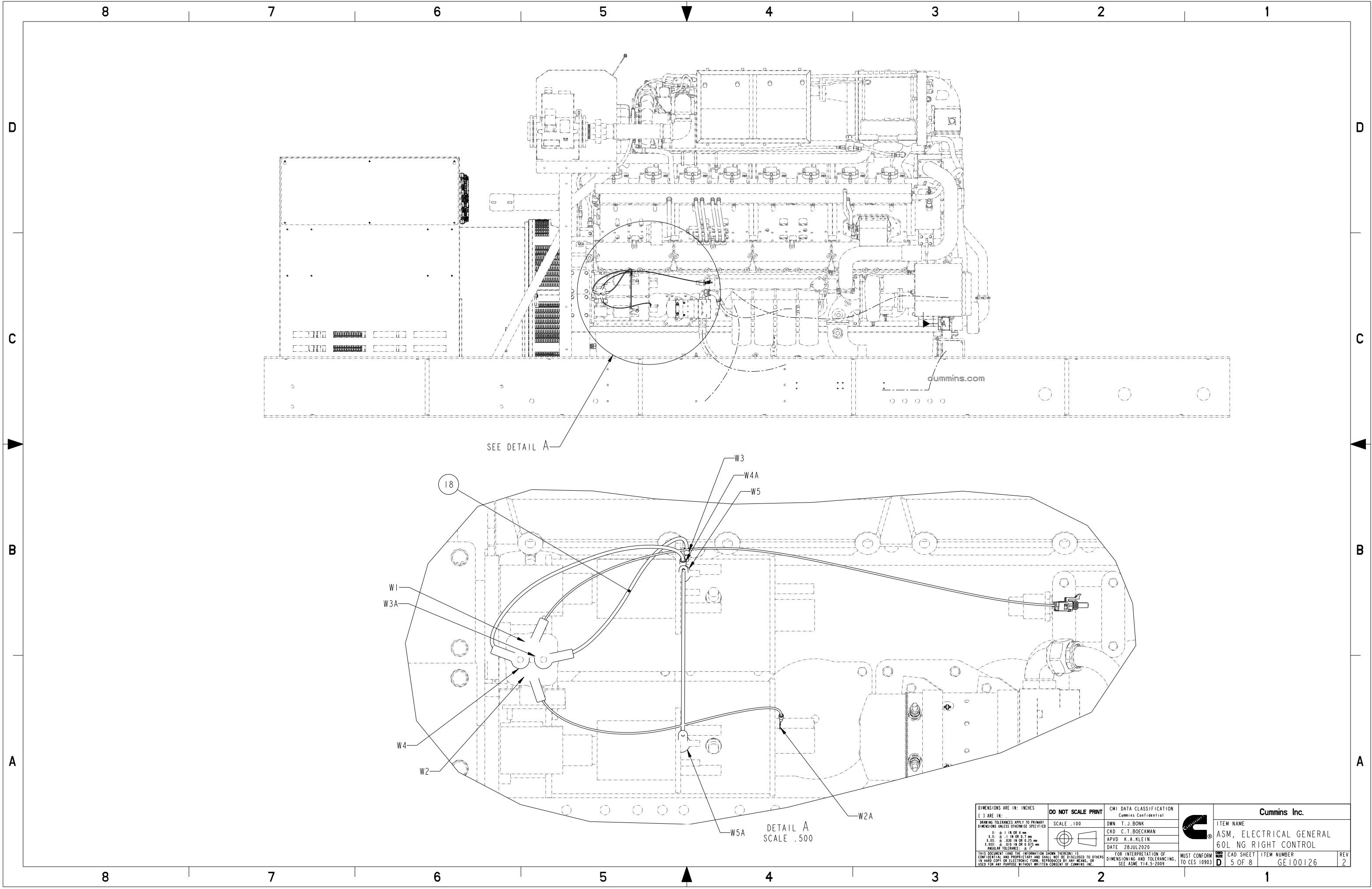
MAIN ENGINE HARNESS

FUEL CONTROL HARNESS

DIMENSIONS ARE IN: INCHES [] ARE IN: . DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X: ± .1 IN OR 4 mm X, Y: ± .1 IN OR 0.7 mm X, Y, Z: ± .005 IN OR 0.25 mm X, Y, Z: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ± 1° THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM. REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	DO NOT SCALE PRINT SCALE: .063 	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
		DWN: T.J.BONK		ITEM NAME	
		CKD: C.T.BOECKMAN		ASM, ELECTRICAL GENERAL	
		APVD: K.A.KLEIN		60L NG RIGHT CONTROL	
		DATE: 28JUL2020			
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	CAD SHEET 3 OF 8



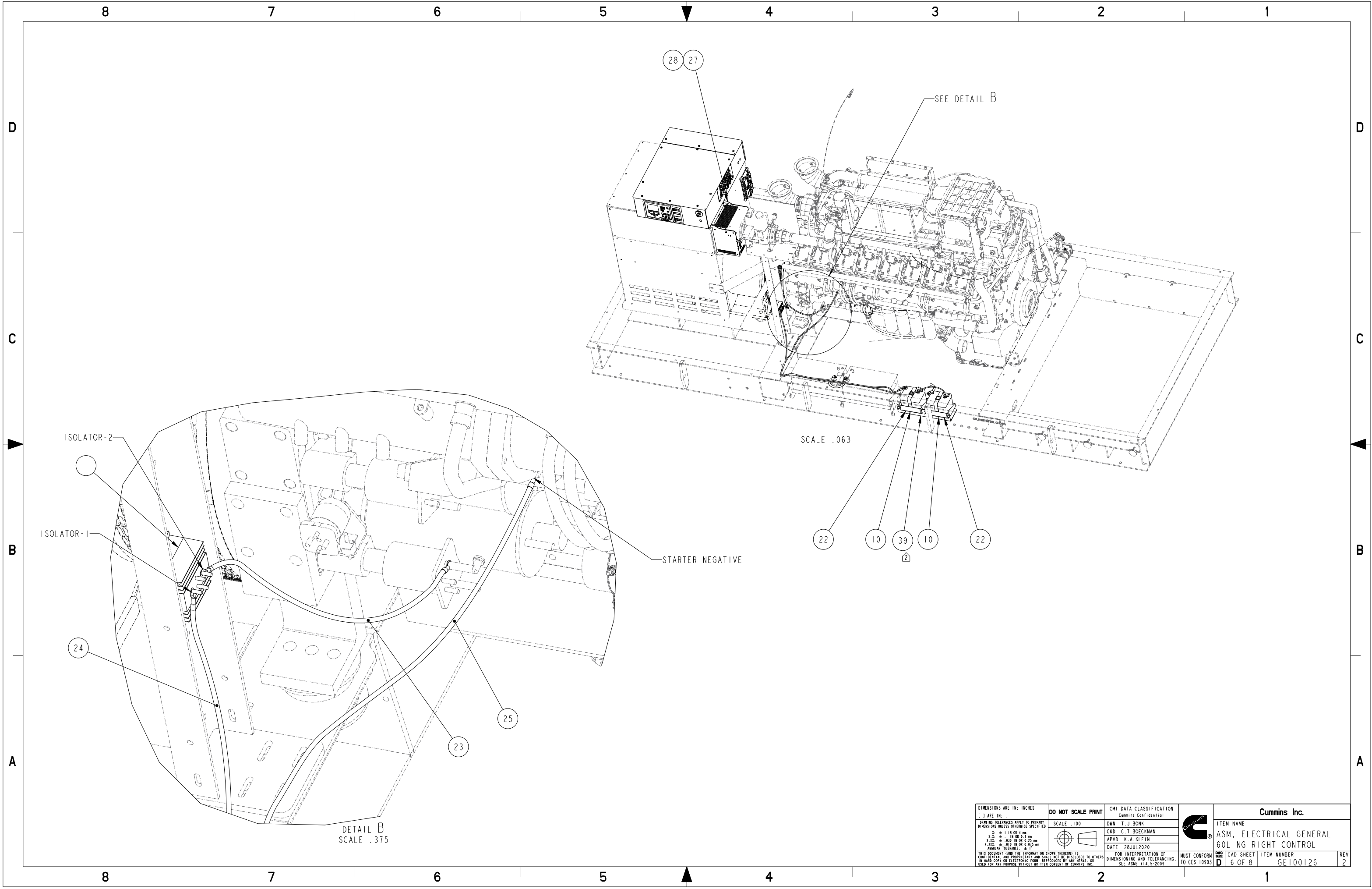
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1) ARE IN:						ITEM NAME	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .080		DWN T.J.BONK		ASM, ELECTRICAL GENERAL	
				CKD C.T.CROCKMAN		60L NG RIGHT CONTROL	
				APVD A.KLEIN			
				DATE 28 JUL 2006			
				FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE THE FOLLOWING DRAWINGS:			
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						DWG #	
						OF 8	
						ITEM NUMBER	GEI00126



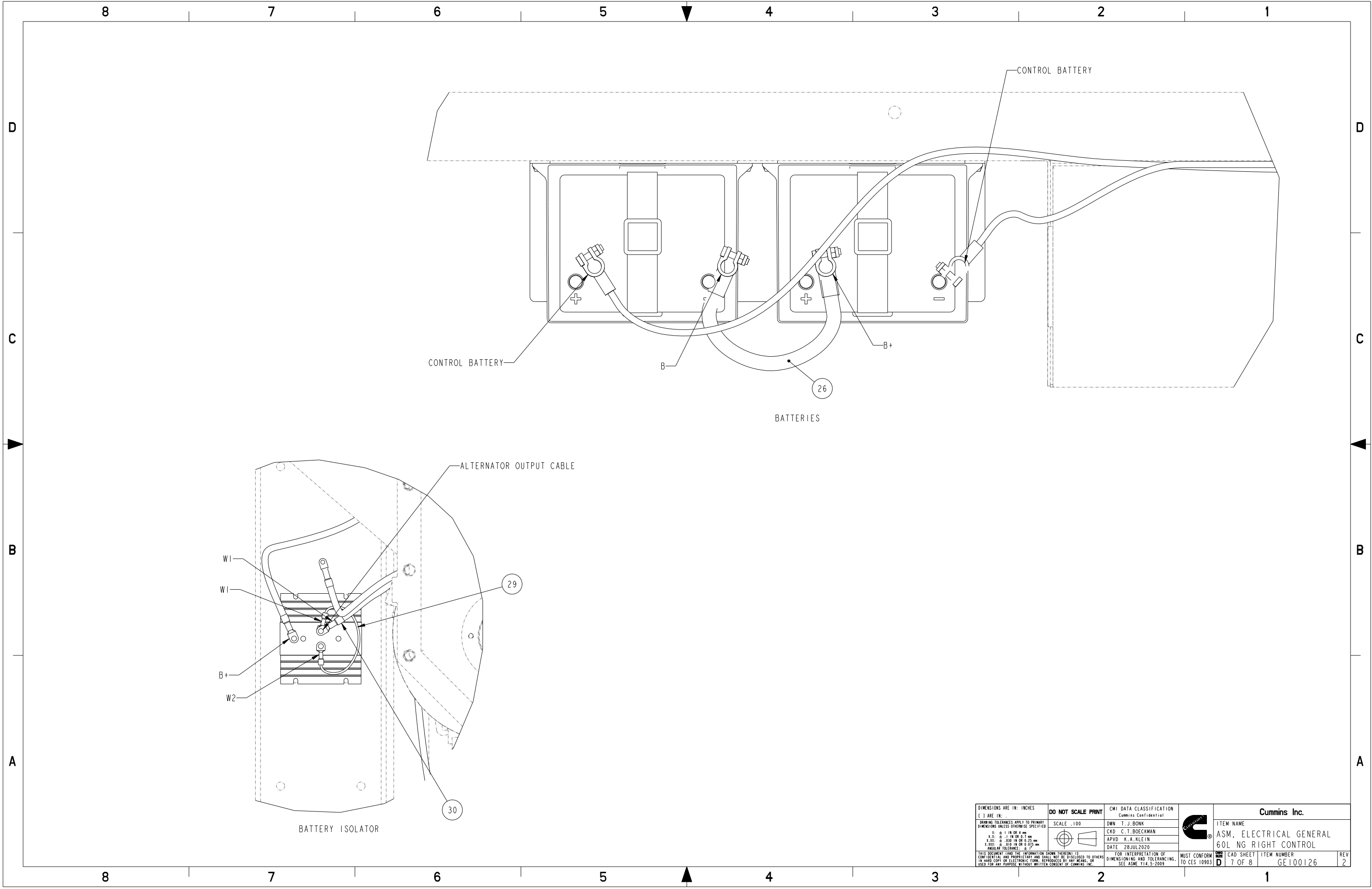
SEE DETAIL A

DETAIL A
SCALE .500

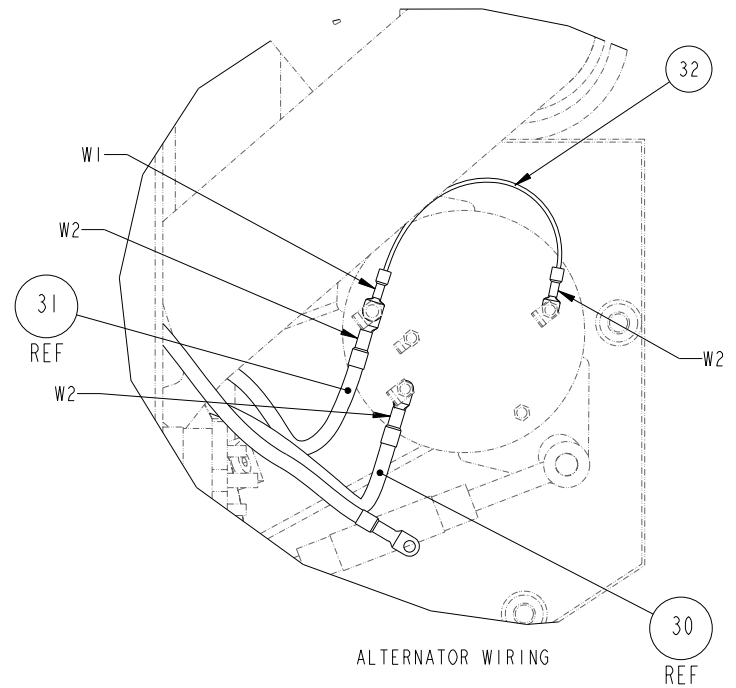
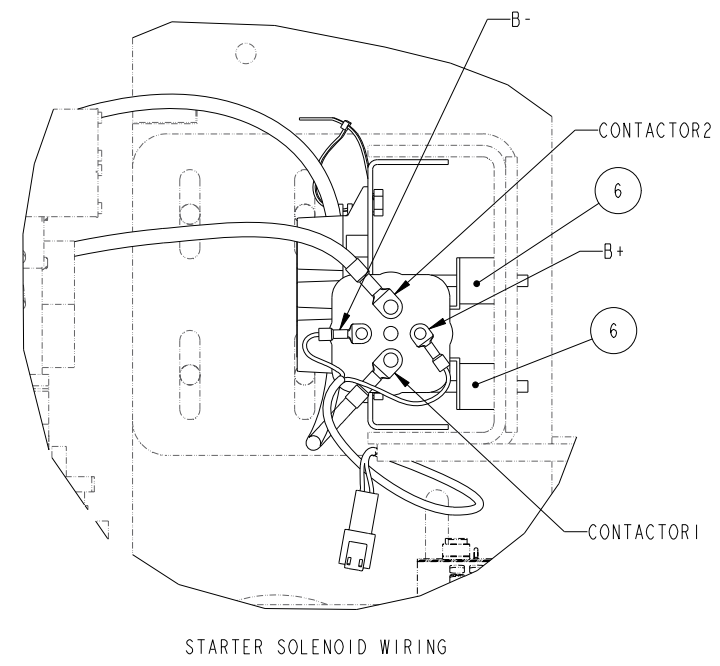
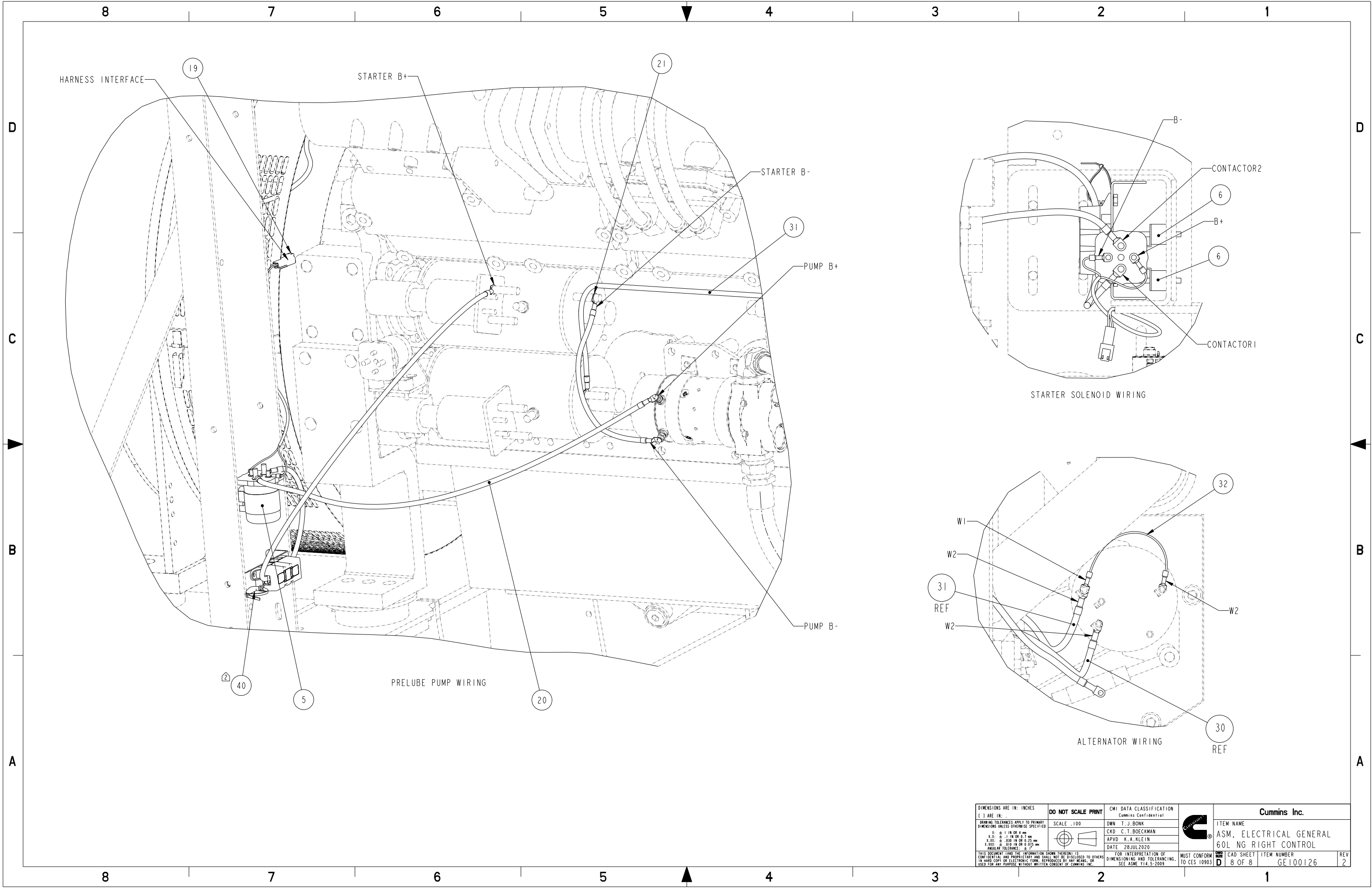
DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.		
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .100	DWN T.J.BONK		ITEM NAME		
X: ± .1 IN OR 4 mm X,LOC: ± .030 IN OR 0.75 mm X,LOC: ± .010 IN OR 0.25 mm			CKD C.T.BOECKMAN		ASM, ELECTRICAL GENERAL		
ANGULAR TOLERANCE: ± 1°			APVD K.A.KLEIN		60L NG RIGHT CONTROL		
			DATE 28.JUL.2020				
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				D	CAD SHEET 5 OF 8	ITEM NUMBER GE100126	
						REV 2	



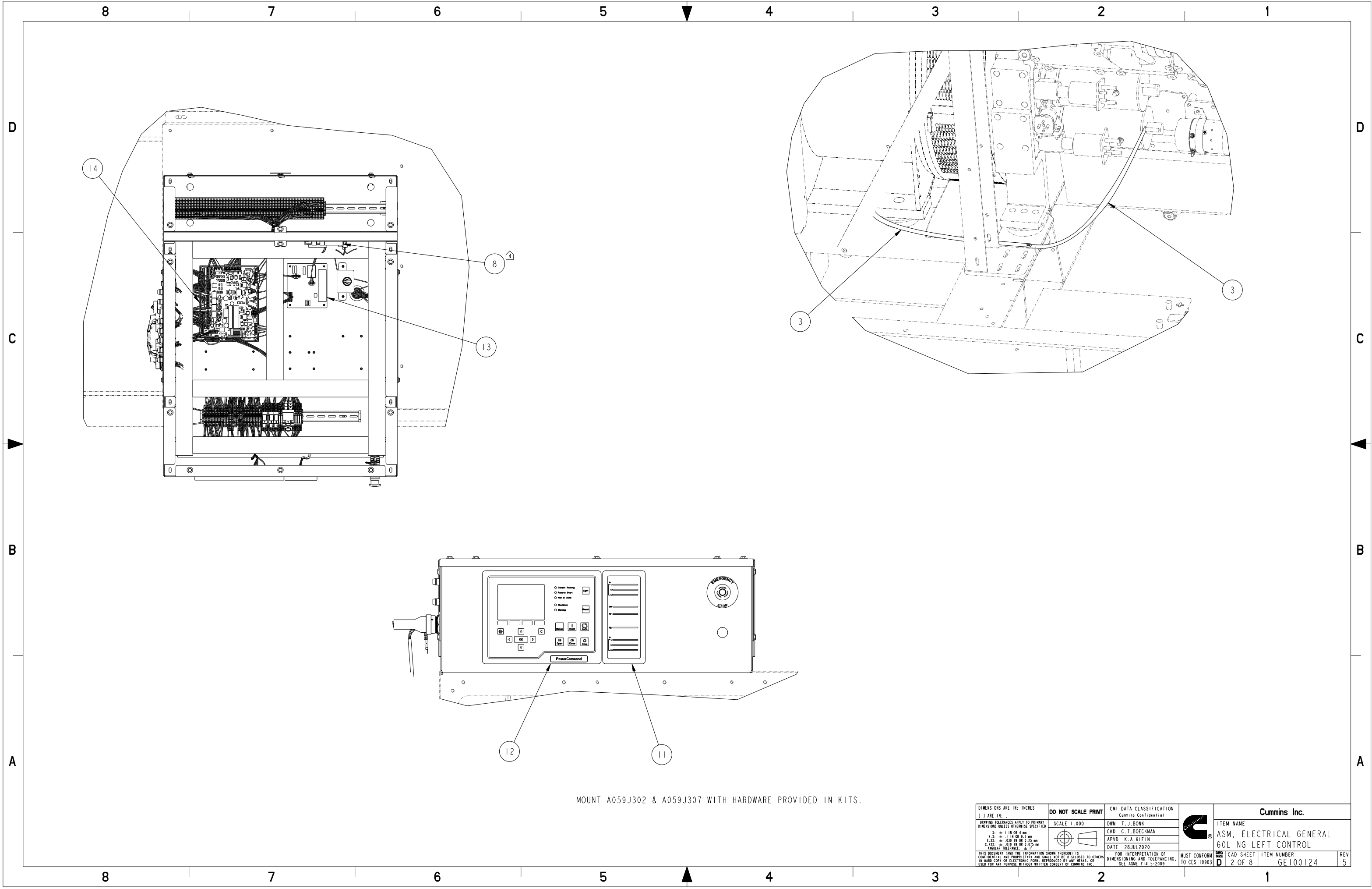
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DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .100	DWN T.J.BONK		ITEM NAME	
X: ± .1 IN OR 3 mm X.Y: ± .050 IN OR 1.25 mm X.Z: ± .010 IN OR 0.25 mm			CKD C.T.BOECKMAN		ASM, ELECTRICAL GENERAL	
ANGULAR TOLERANCE: ± 1°			APVD K.A.KLEIN		60L NG RIGHT CONTROL	
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			MUST CONFORM TO CES 10903		ITEM NUMBER GE100126	REV 2



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DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .100	DWN T.J.BONK		ITEM NAME		
X: ± .1 IN OR 4 mm			CKD C.T.BOECKMAN		ASM, ELECTRICAL GENERAL		
X.Y: ± .1 IN OR 0.7 mm			APVD K.A.KLEIN		60L NG RIGHT CONTROL		
X.Z: ± .000 IN OR 0.25 mm			DATE 28JUL2020	MUST CONFORM TO CES 10903			
ANGULAR TOLERANCE: ± 1°			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		CAD SHEET D 7 OF 8	ITEM NUMBER GE100126	REV 2
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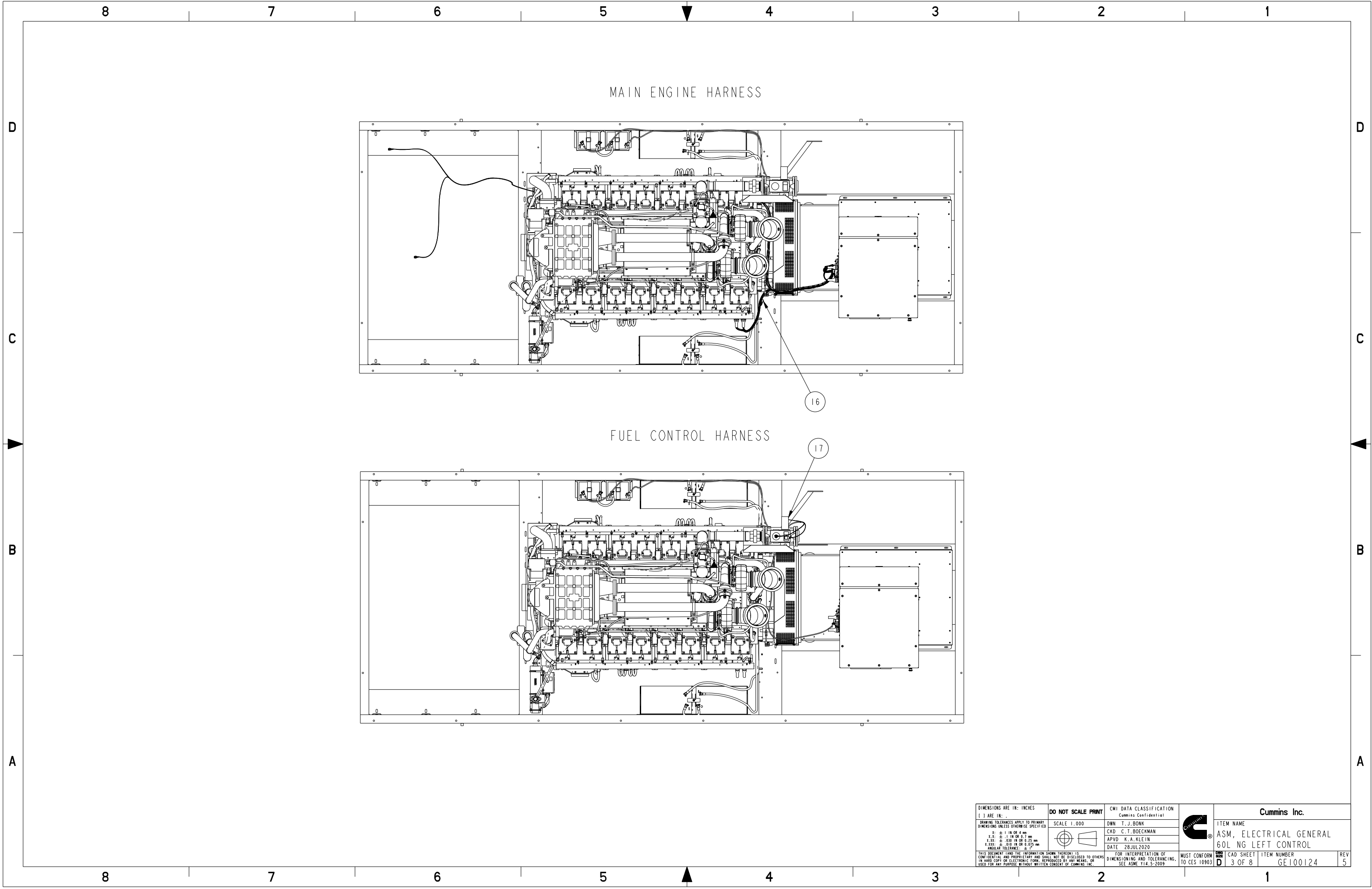


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X: ± .1 IN OR 3 mm		CKD C.T.BOECKMAN		APVD K.A.KLEIN		ASM, ELECTRICAL GENERAL	
X, Y, Z: ± .030 IN OR 0.75 mm		DATE 28 JUL 2020		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		60L NG RIGHT CONTROL	
ANGULAR TOLERANCE: ± 1°		THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		MUST CONFORM TO CES 10903		CAD SHEET 8 OF 8	ITEM NUMBER GE100126
							REV 2

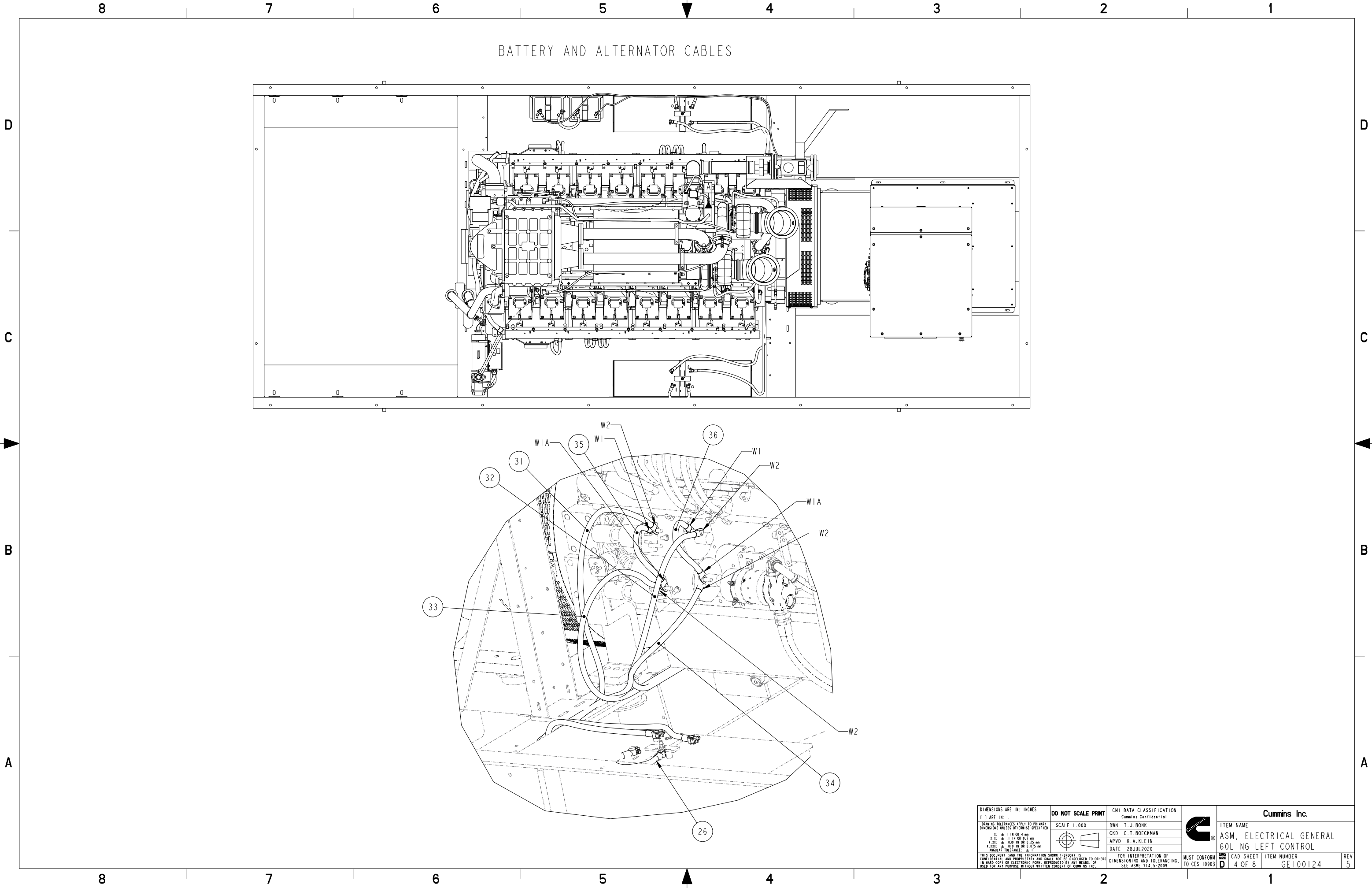


MOUNT A059J302 & A059J307 WITH HARDWARE PROVIDED IN KITS.

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DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:1000		DWN T.J.BONK	
F.F. ± .1 IN OR 0.2 mm		CKD C.T.BOECKMAN		APVD K.A.KLEIN	
X.XX ± .005 IN OR 0.125 mm		DATE 28 JUL 2020		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	
ANGULAR TOLERANCE: ± 1°		MUST CONFORM TO CES 10903		CUMMINS	
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				ITEM NAME	
				ASM, ELECTRICAL GENERAL	
				60L NG LEFT CONTROL	
				CAD SHEET	
				2 OF 8	
				ITEM NUMBER	
				GE100124	
				REV	
				5	

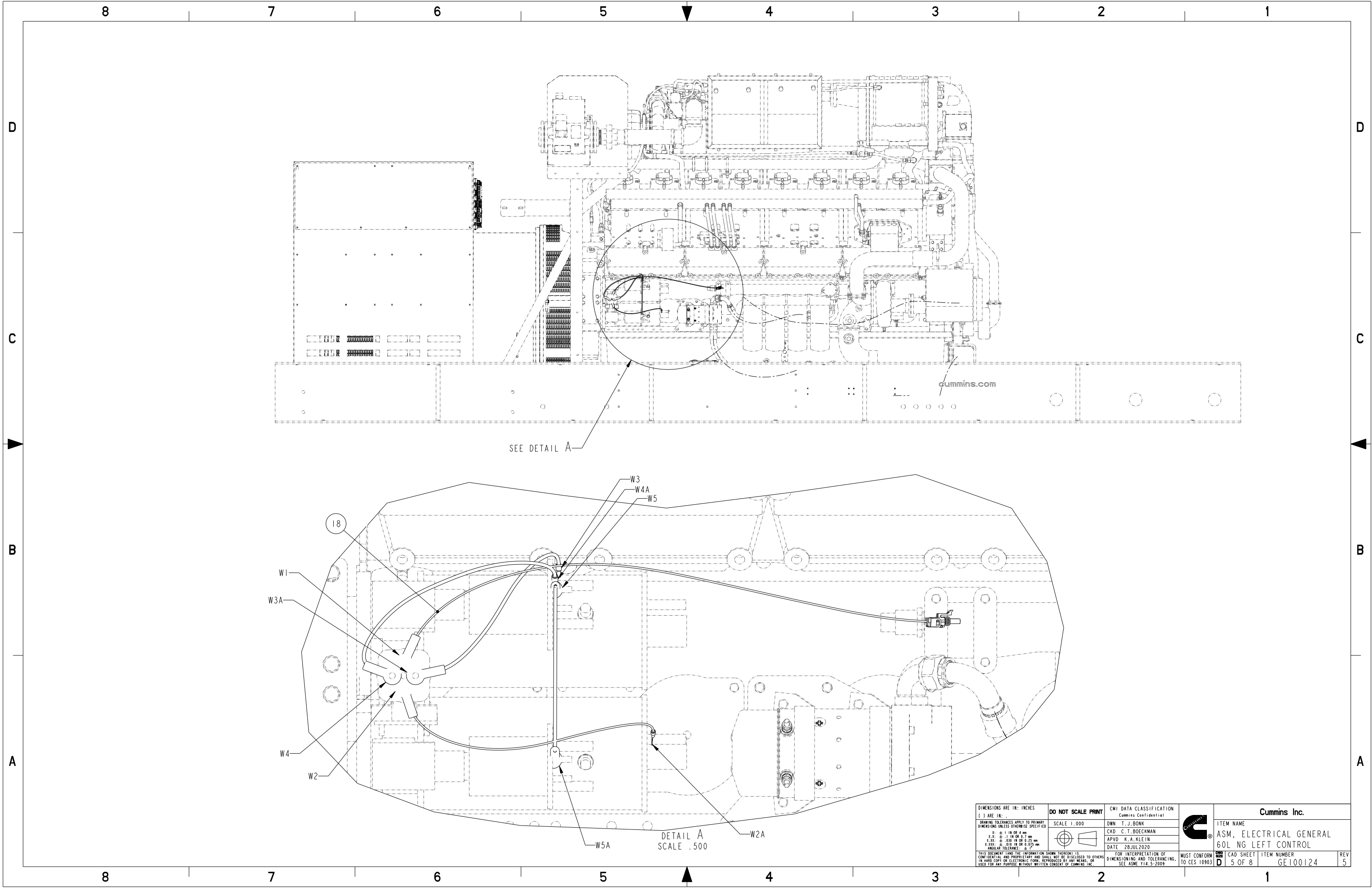


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DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:1.000	DWN T.J.BONK	ITEM NAME	
F: ± .1 IN OR 3 mm			CKD C.T.BOECKMAN	ASM, ELECTRICAL GENERAL	
F.D: ± .030 IN OR 0.75 mm			APVD K.A.KLEIN	60L NG LEFT CONTROL	
X.D: ± .010 IN OR 0.25 mm			DATE 28JUL2020		
ANGULAR TOLERANCE: ± 1°		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	REV 5
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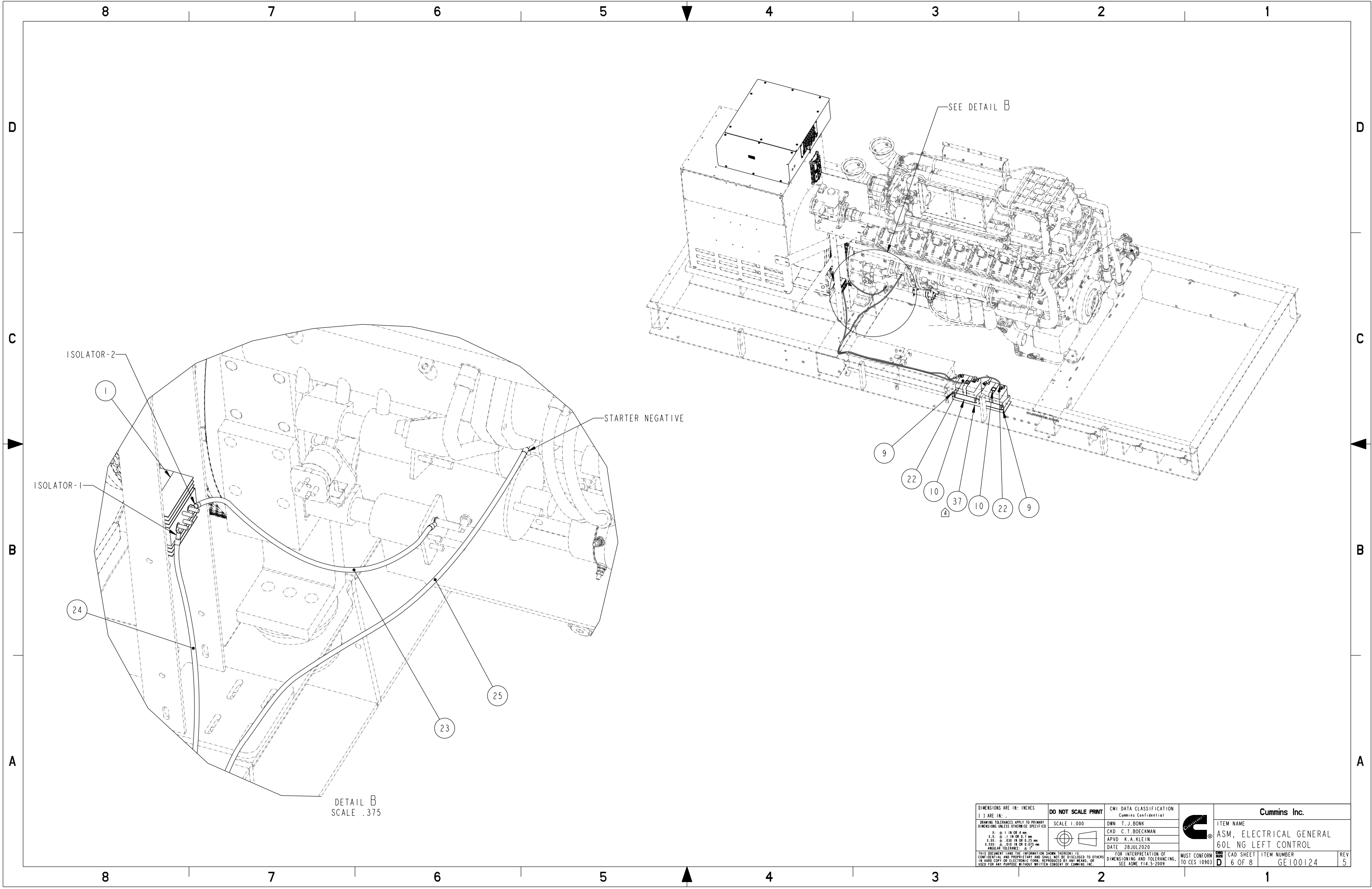


BATTERY AND ALTERNATOR CABLES

DIMENSIONS ARE IN: INCHES [] ARE IN: . DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED X: ± .1 IN OR 4 mm Y: ± .1 IN OR 6.7 mm Z: ± .030 IN OR 0.25 mm ANGULAR TOLERANCE: ± 1° THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HAND COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	DO NOT SCALE PRINT SCALE 1:1000 	CMI DATA CLASSIFICATION Cummins Confidential DWN T.J.BONK CKD C.T.BOECKMAN APVD K.A.KLEIN DATE 28 JUL 2020		Cummins Inc.				
				ITEM NAME ASM, ELECTRICAL GENERAL				
				60L NG LEFT CONTROL				
				MUST CONFORM TO CES 10903	C D	CAD SHEET 4 OF 8	ITEM NUMBER GE100124	REV 5

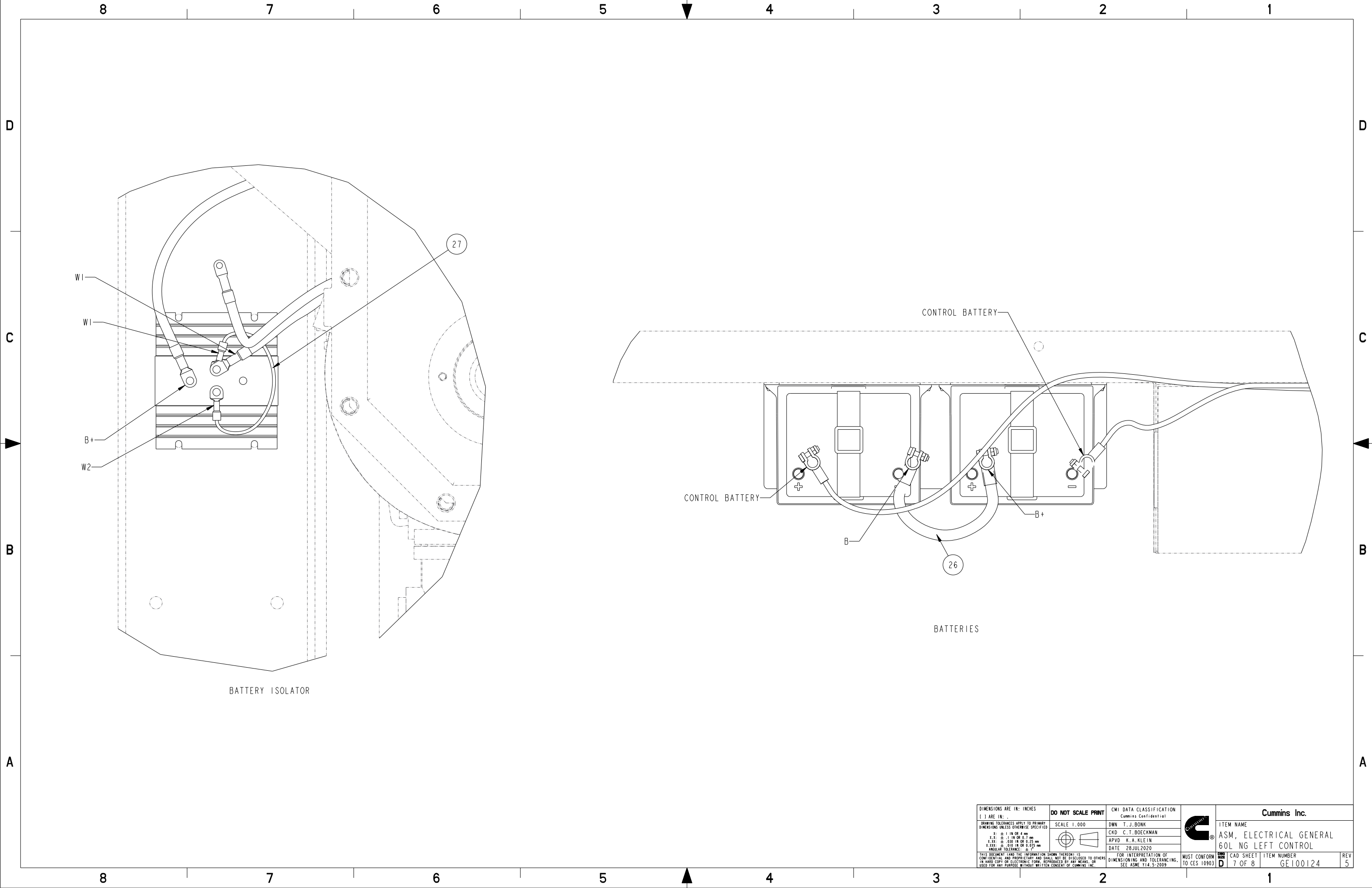


DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.		
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:1000	DWN T.J.BONK		ITEM NAME ASM, ELECTRICAL GENERAL 60L NG LEFT CONTROL		
F.F. ± .1 IN OR 3 mm F.T. ± .010 IN OR 0.25 mm X.XX ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ± 1°			CKD C.T.BOECKMAN		CAD SHEET 5 OF 8		
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY FORM OR BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.			APVD K.A.KLEIN		ITEM NUMBER GE100124		
			DATE 28 JUL 2020	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	REV 5

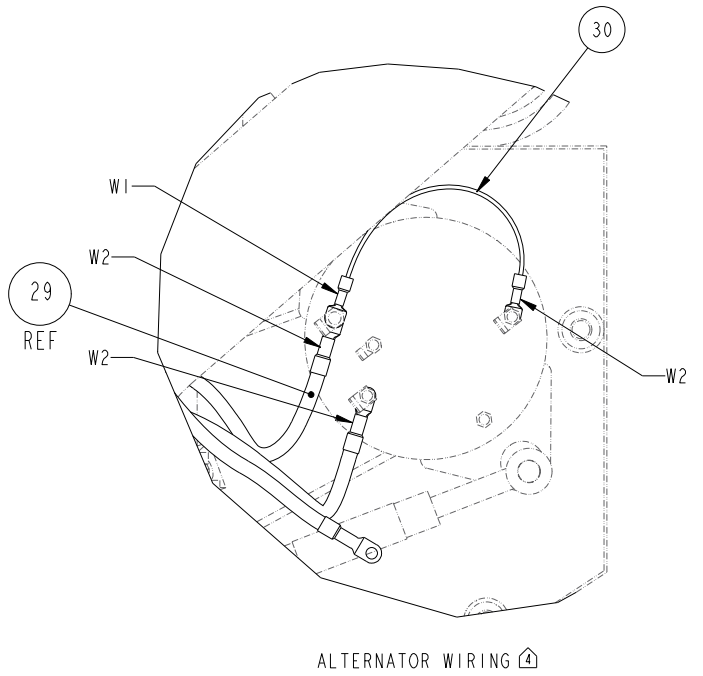
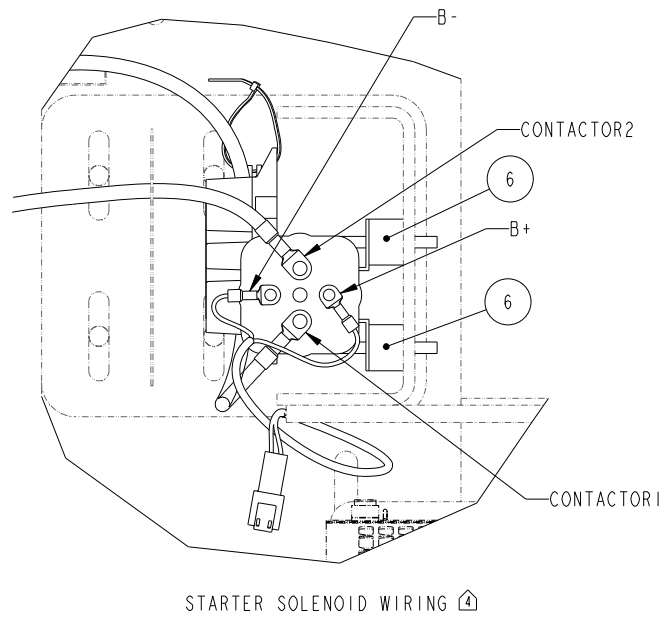
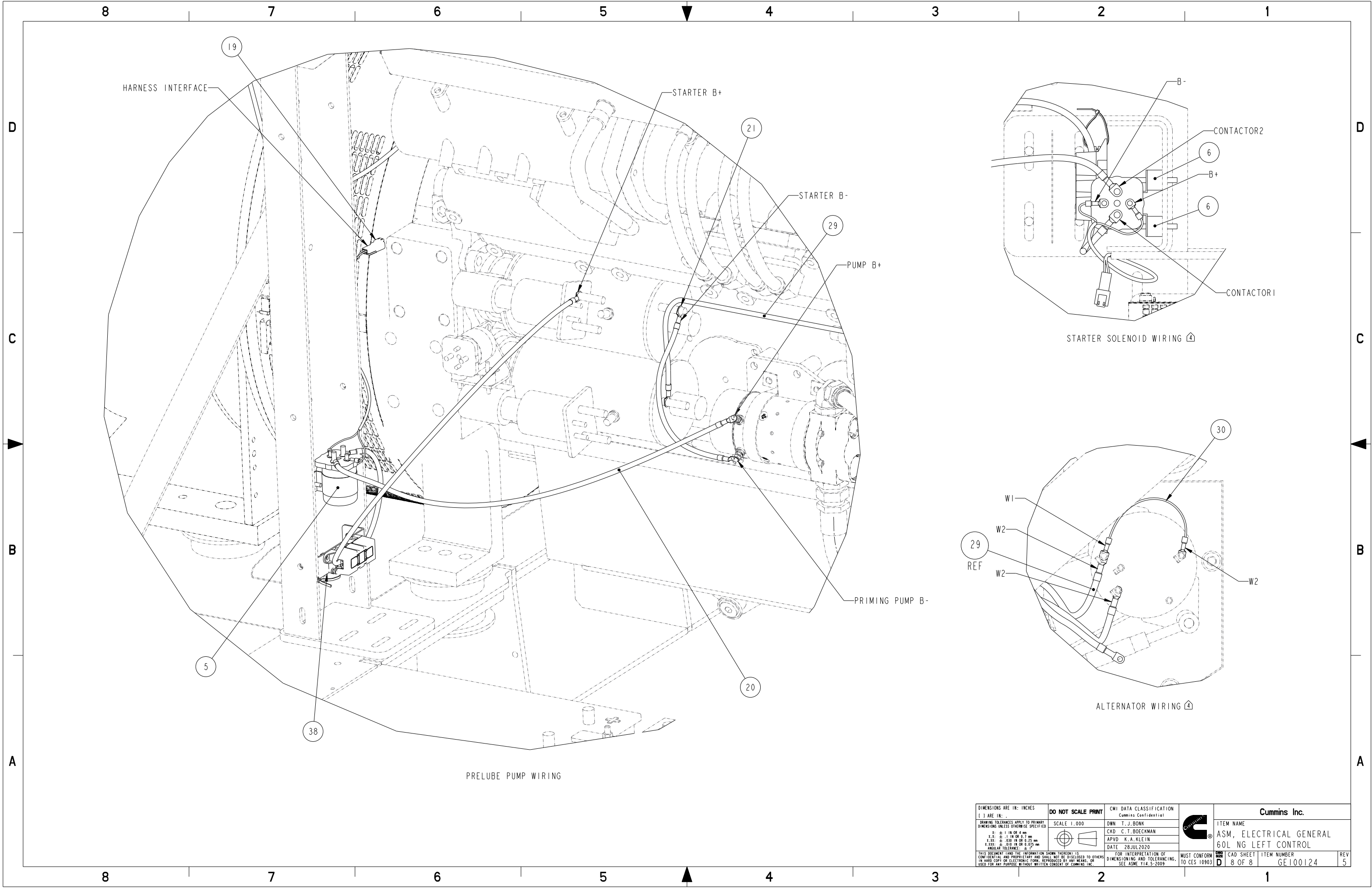


DETAIL B
SCALE .375

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1.000	DWN T.J.BONK	ITEM NAME	
F.F. ± .1 IN OR 3 mm			CKD C.T.BOECKMAN	ASM, ELECTRICAL GENERAL	
F.T.C. ± .010 IN OR 0.25 mm			APVD K.A.KLEIN	60L NG LEFT CONTROL	
X.XXX ± .010 IN OR 0.25 mm			DATE 28JUL2020		
ANGULAR TOLERANCE: ± 1°		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HAND COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		CMI		CAD SHEET 6 OF 8	ITEM NUMBER GE100124
					REV 5



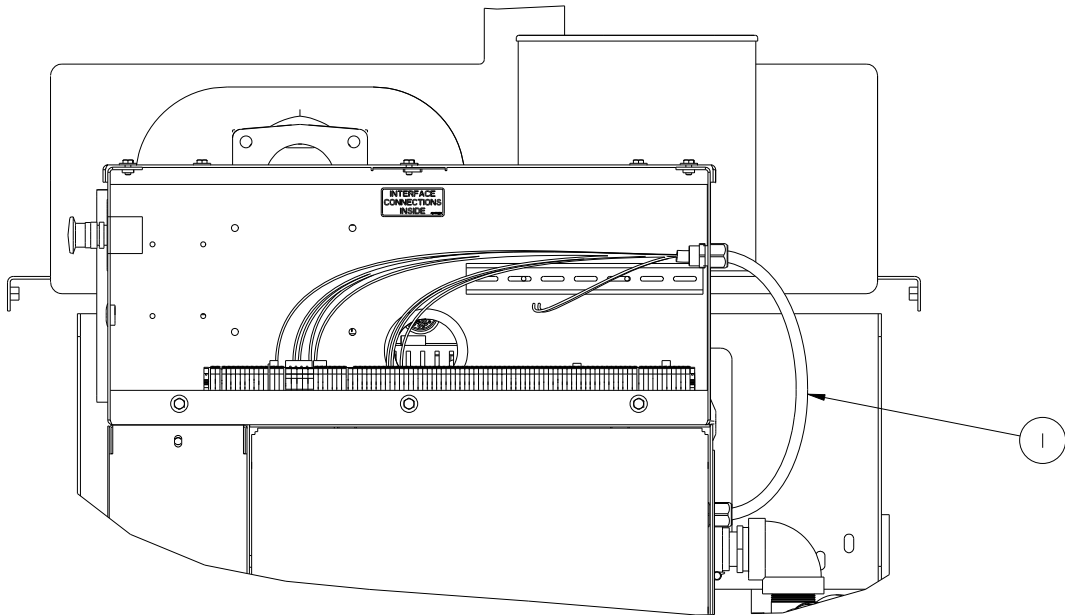
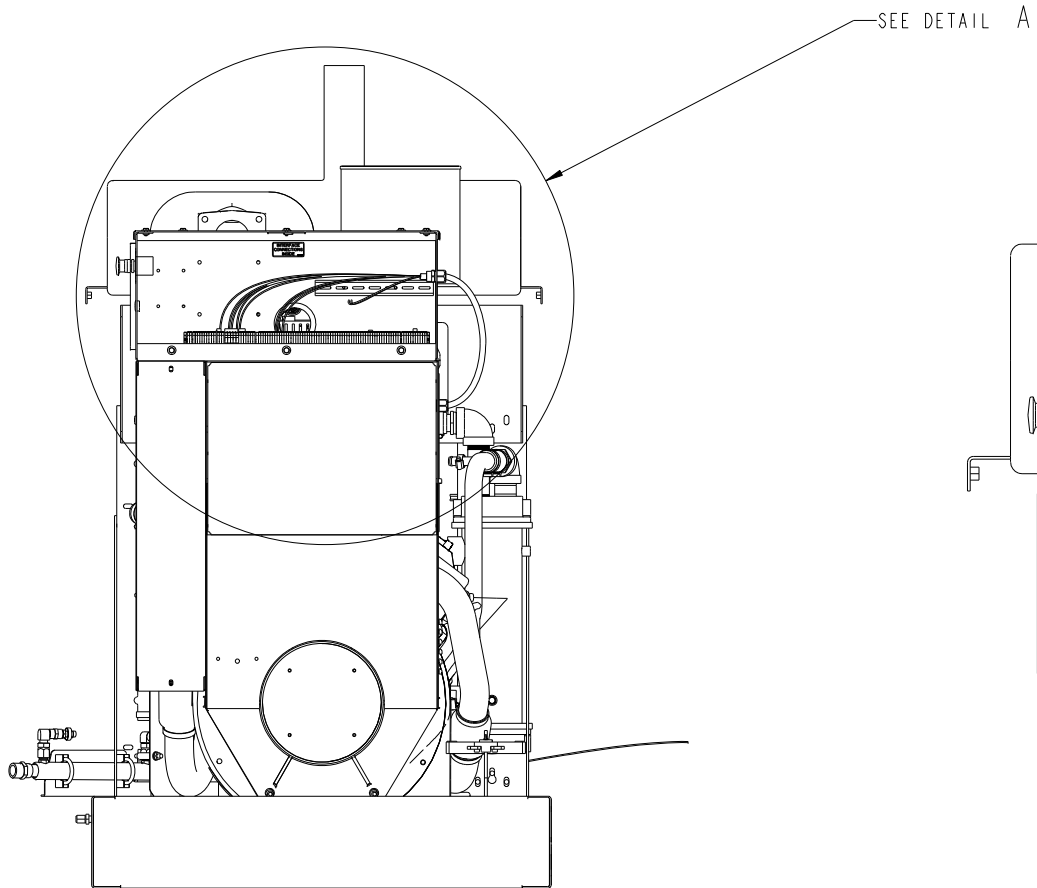
DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT		CUMMINS DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:1.000		DWN T.J.BONK		ITEM NAME	
F.F. ± .1 IN OR 3 mm		CKD C.T.BOECKMAN		APVD K.A.KLEIN		ASM, ELECTRICAL GENERAL	
X.F.C. ± .030 IN OR 0.75 mm		DATE 28.JUL.2020				60L NG LEFT CONTROL	
X.F.C. ± .010 IN OR 0.25 mm							
ANGULAR TOLERANCE: ± .5°							
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY MANNER OR BY ANY MEANS, OR REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903		CAD SHEET 7 OF 8	
						ITEM NUMBER GE100124	
						REV 5	



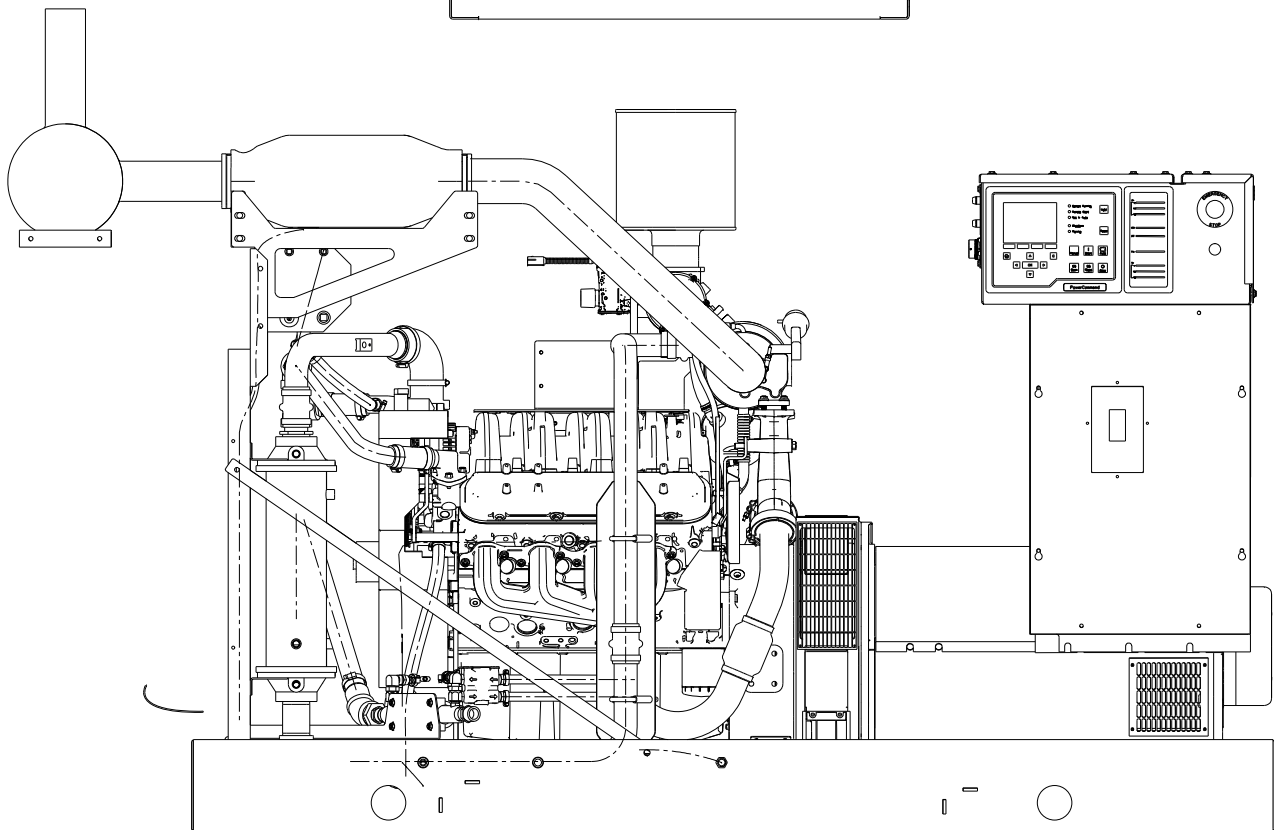
DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.		
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:1000	DWN T.J.BONK		ITEM NAME		
F.F. ± .1 IN OR 3 mm			CKD C.T.BOECKMAN		ASM, ELECTRICAL GENERAL		
F.TC. ± .030 IN OR 0.75 mm			APVD K.A.KLEIN		60L NG LEFT CONTROL		
X.XXX ± .010 IN OR 0.25 mm			DATE 28JUL2020				
ANGULAR TOLERANCE: ± 1°		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	 CAD SHEET 8 OF 8	ITEM NUMBER GE100124	REV 5
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY FORM OR BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		2		1			

BILL OF MATERIAL			PART NUMBER
ITEM	QTY	DESCRIPTION	
1	1	HARNESS, ELECTRICAL WIRING; EMAX BREAKER, PSI	A058M428

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
-	2019-225	RELEASED TO PRODUCTION	OP610	HV937	HV937	15MAY19



DETAIL A
SCALE .250



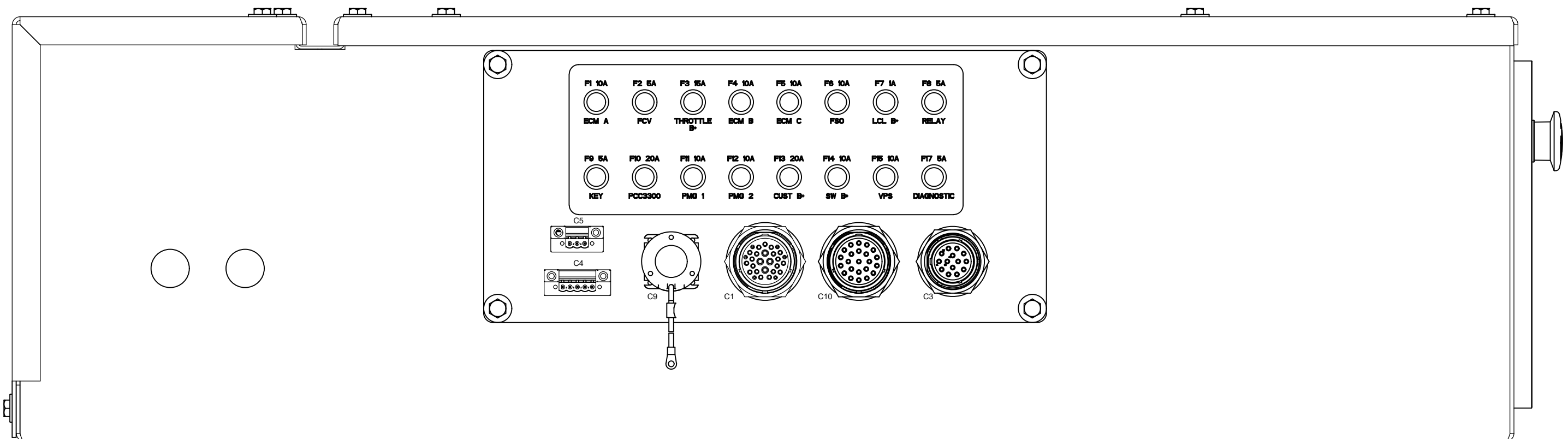
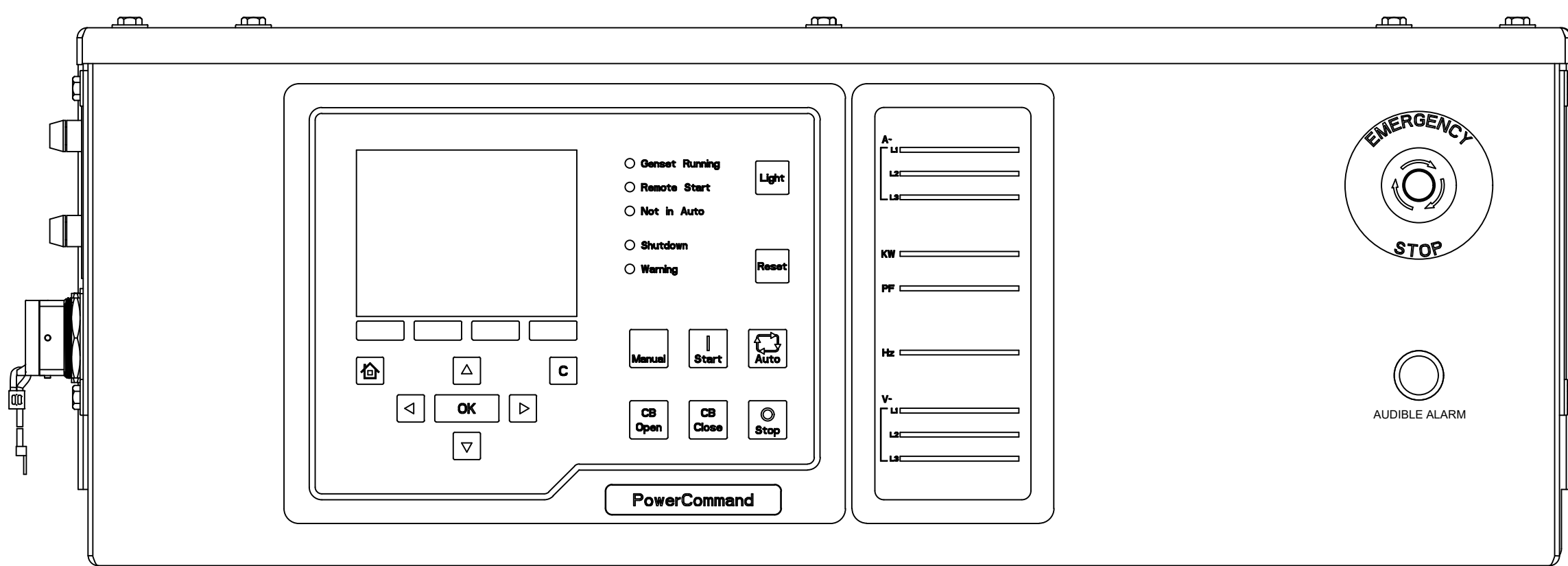
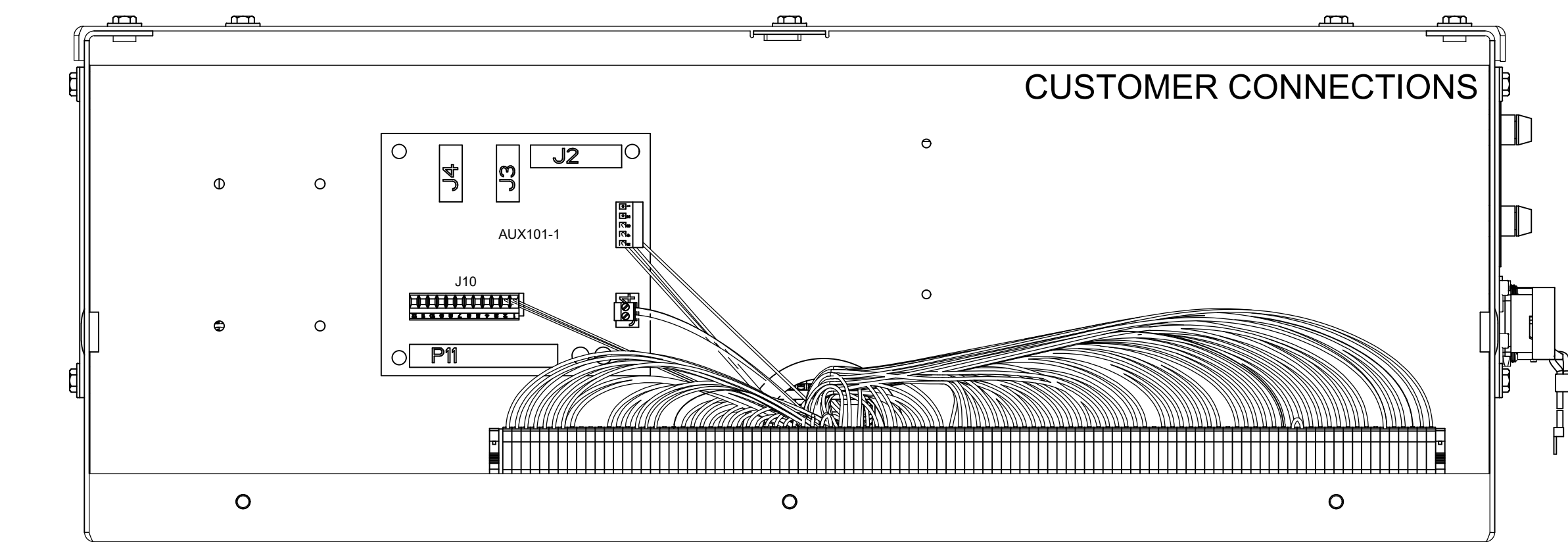
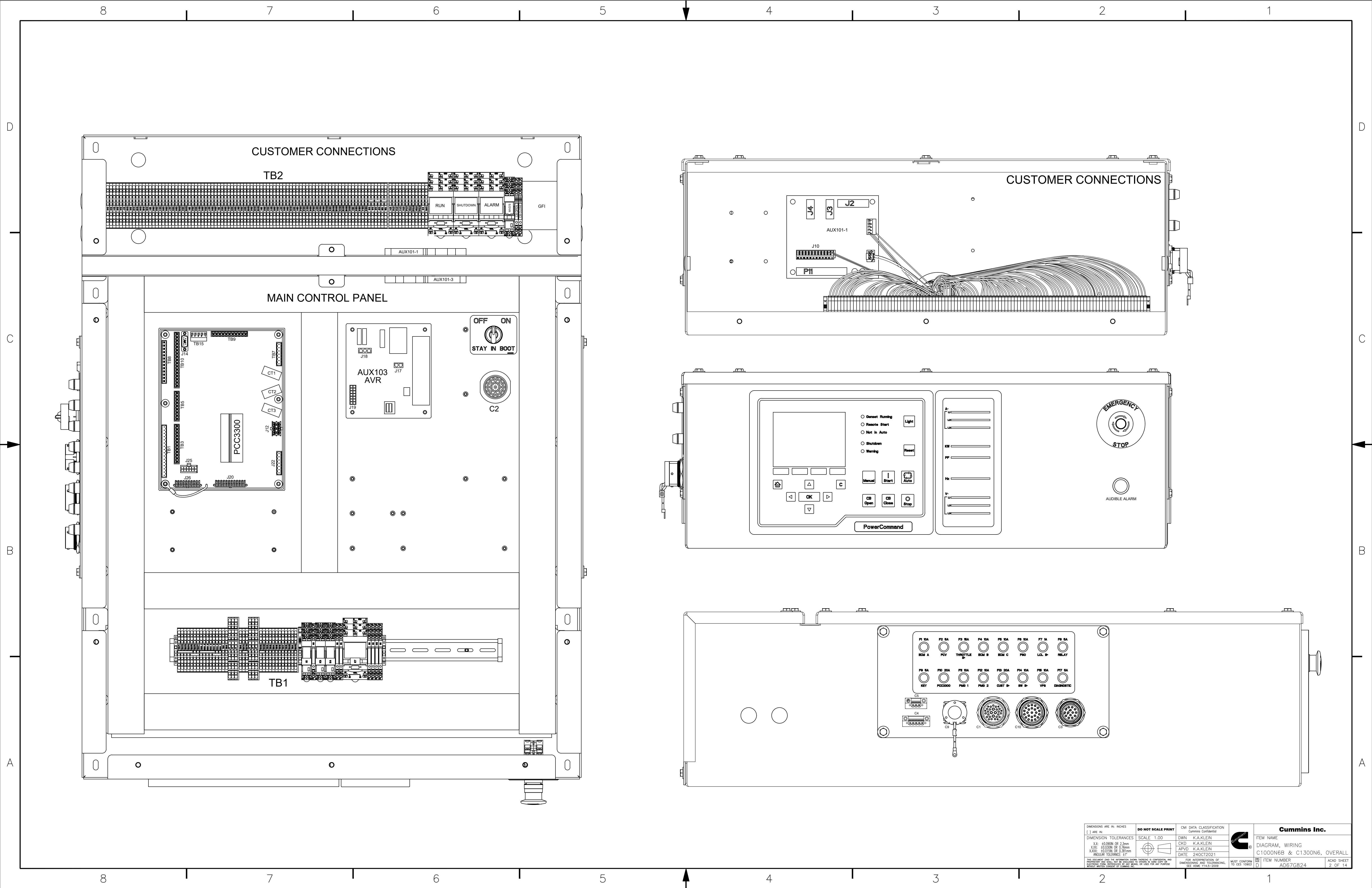
TB2-C10-7	☐	WHITE	☐	52G-14
TB2-C10-1	☐	WHITE	☐	52G-11
TB2-C10-1	☐	WHITE	☐	52G-95
TB2-C10-10	☐	WHITE	☐	52G-98
TB2-T26	☐	RED	☐	52G-D1
TB2-B+	☐	RED	☐	52G-U1
CR1-14	☐	RED	☐	52G-C2
CR2-14	☐	RED	☐	52G-C12
TB2-B-	☐	BLACK	☐	52G-D2
TB2-B-	☐	BLACK	☐	52G-U2
TB2-B-	☐	BLACK	☐	52G-C1
TB2-B-	☐	BLACK	☐	52G-C11

NOTES:
1) A 3/4" HOLE WILL NEED TO BE PUNCHED IN THE GENERATOR HOUSING TO OBTAIN ACCESS TO THE BREAKER.
1.1) DETAIL A SHOWS GENERAL LOCATION/SIDE FOR THE HOLE.

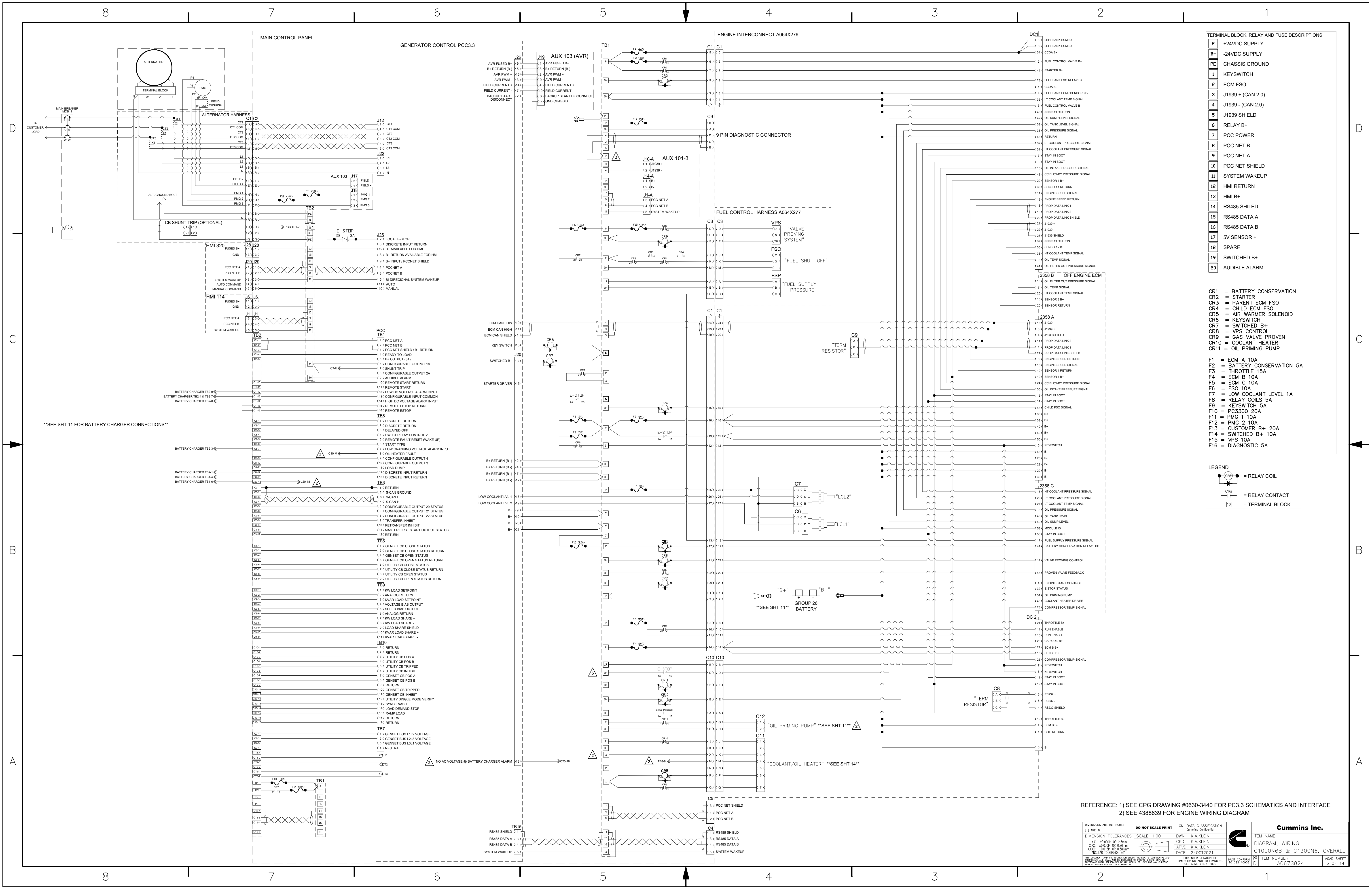
2) HARNESS IS USED ON MULTIPLE UNITS. VIEWS SHOWN MAY NOT PROVIDE ACCURATE REPRESENTATION FOR EVERY UNIT FOR ROUTING.

DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES UNLESS OTHERWISE SPECIFIED X: ± .1 IN OR 4 mm X,Z: ± .1 IN OR 2.5 mm X,Z: ± .03 IN OR 0.25 mm X,Z: ± .015 IN OR 0.15 mm ANGULAR TOLERANCE: ± 1°		SCALE .125	DWN: OP610 CKD: HV937 APVD: HV937 DATE: 15MAY19		ITEM NAME ASM, ELECTRICAL GENERAL HARNESS, EMAX BREAKER	
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903		CAD SHEET 1 OF 1
						ITEM NUMBER GE100037
						REV -

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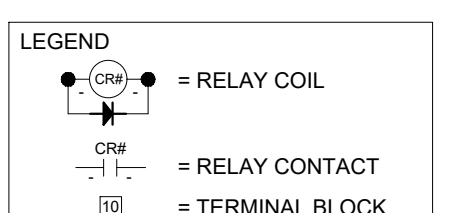
DIMENSIONS ARE IN INCHES [] ARE IN		DO NOT SCALE PRINT		CUMMINS DATA CLASSIFICATION Cummins Confidential		ITEM NAME DIAGRAM, WIRING C1000N6B & C1300N6, OVERALL	
DIMENSION TOLERANCES X.XX: ±0.0000 OR 0.0001 X.XX: ±0.0001 OR 0.0002 X.XX: ±0.0001 OR 0.0002 ANGULAR TOLERANCE: ±1°		SCALE 1:100		DWG: K.K.KLEIN APVD: K.K.KLEIN DATE: 24OCT2021		FOR INTERPRETATION OF DIMENSIONS AND TOLERANCES, SEE ASME Y14.5-2009	
THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF CUMMINS INC. AND CUMMINS INC. WILL NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION SYSTEM WITHOUT WRITTEN PERMISSION BY CUMMINS INC.		MUST CONTAIN CUMMINS LOGO		ITEM NUMBER A067G824		ACAD SHEET 2 OF 14	



TERMINAL BLOCK, RELAY AND FUSE DESCRIPTIONS	
P	+24VDC SUPPLY
B	-24VDC SUPPLY
PE	CHASSIS GROUND
1	KEYSWITCH
2	ECM FSO
3	J1939+ (CAN 2.0)
4	J1939- (CAN 2.0)
5	J1939 SHIELD
6	RELAY B+
7	PCC POWER
8	PCC NET B
9	PCC NET A
10	PCC NET SHIELD
11	SYSTEM WAKEUP
12	HMI RETURN
13	HMI B+
14	RS485 SHIELD
15	RS485 DATA A
16	RS485 DATA B
17	5V SENSOR +
18	SPARE
19	SWITCHED B+
20	AUDIBLE ALARM

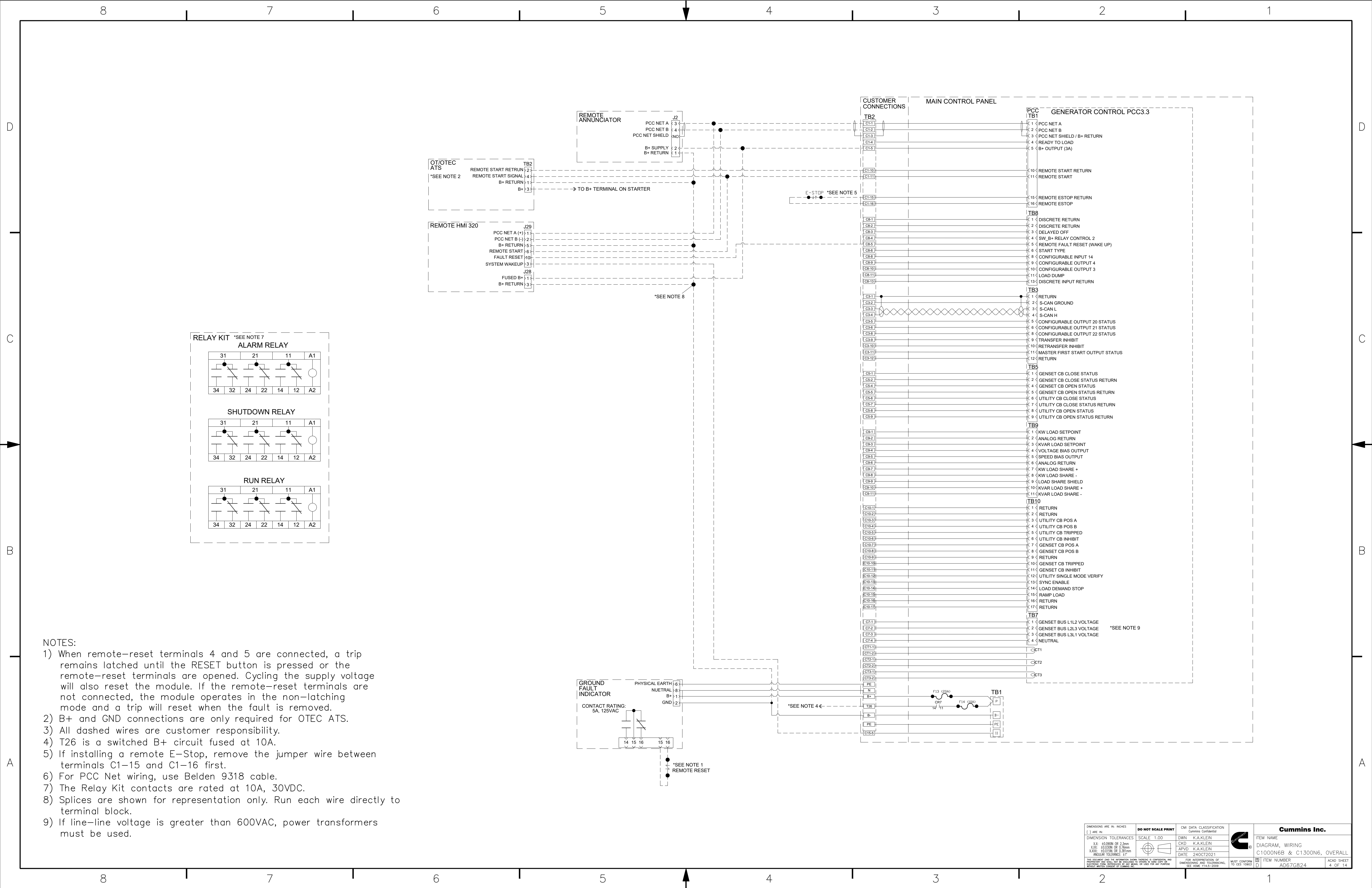
- CR1 = BATTERY CONSERVATION
CR2 = STARTER
CR3 = PARENT ECM FSO
CR4 = CHILD ECM FSO
CR5 = AIR WARMER SOLENOID
CR6 = KEYSWITCH
CR7 = SWITCHED B+
CR8 = VPS CONTROL
CR9 = GAS VALVE PROVEN
CR10 = COOLANT HEATER
CR11 = OIL PRIMING PUMP

- F1 = ECM A 10A
F2 = BATTERY CONSERVATION 5A
F3 = THROTTLE 15A
F4 = ECM B 10A
F5 = ECM C 10A
F6 = FSO 10A
F7 = LOW COOLANT LEVEL 1A
F8 = RELAY COILS 5A
F9 = KEYSWITCH 5A
F10 = PC3300 20A
F11 = PMG 2 10A
F12 = PMG 2 10A
F13 = CUSTOMER B+ 20A
F14 = SWITCHED B+ 10A
F15 = VPS 10A
F16 = DIAGNOSTIC 5A

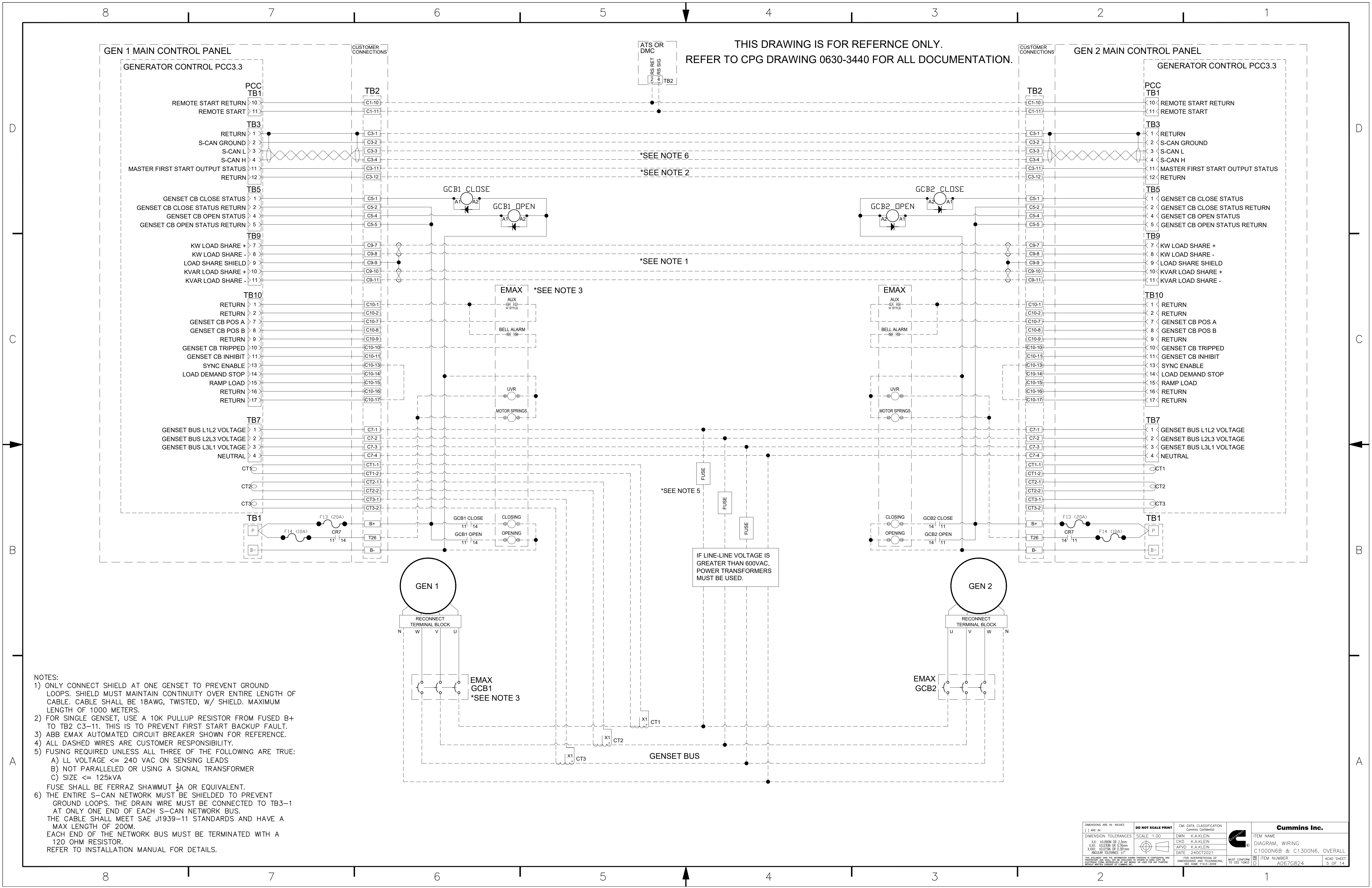


REFERENCE: 1) SEE CPG DRAWING #0630-3440 FOR PC3.3 SCHEMATICS AND INTERFACE
2) SEE 4388639 FOR ENGINE WIRING DIAGRAM

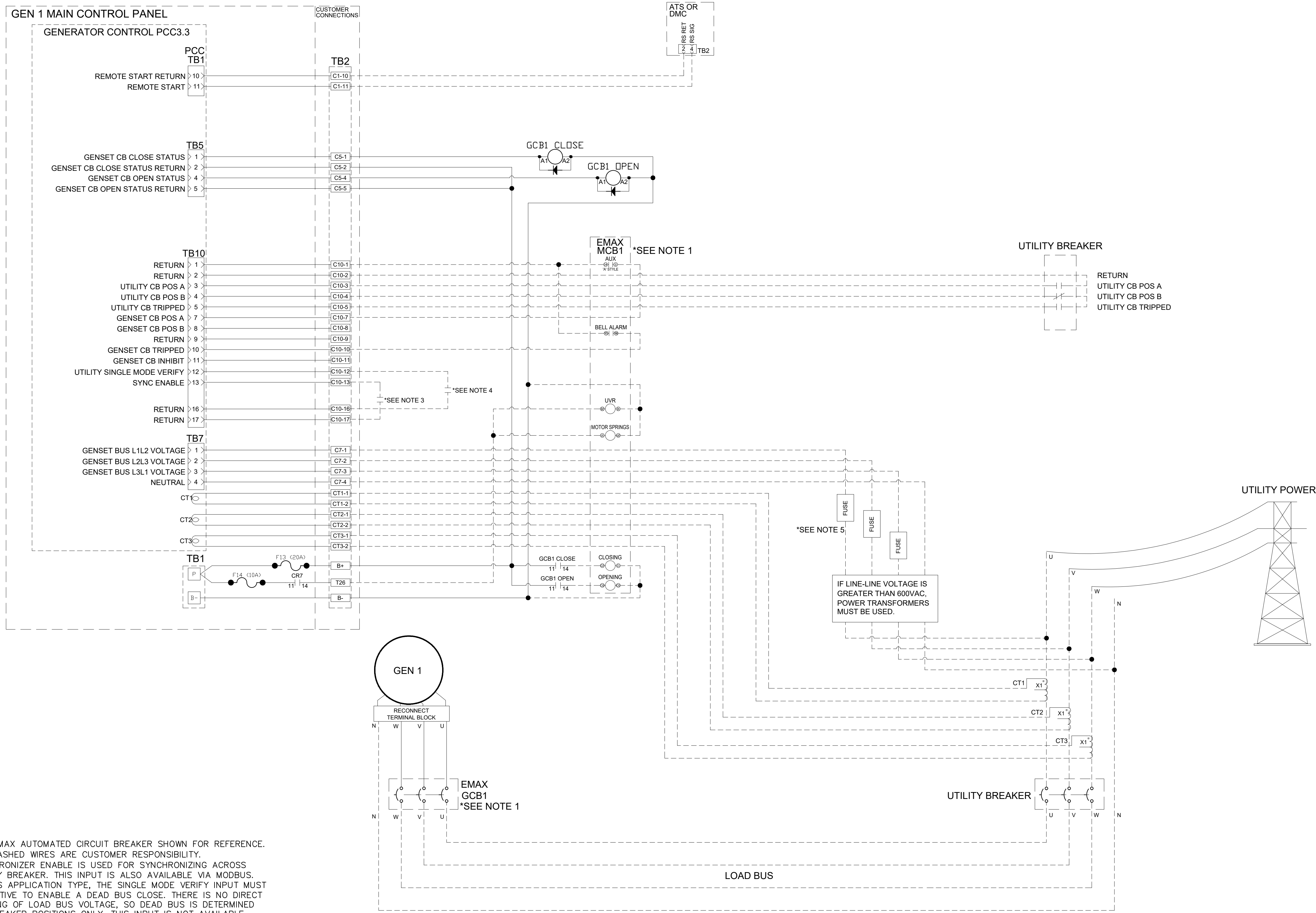
DIMENSIONS ARE IN INCHES [] ARE IN	DO NOT SCALE PRINT SCALE 1:100	CMV DATA CLASSIFICATION Cummins Confidential	Cummins Inc.
DIMENSION TOLERANCES LVL: 0.0006 IN OR 2.5mm XXX: 0.0031 IN OR 0.78mm XXX: 0.0031 IN OR 0.78mm ANGULAR TOLERANCE: 1°	DWN: K.A.KLEIN APVD: K.A.KLEIN DATE: 24OCT2021	ITEM NAME DIAGRAM, WIRING C1000N6S & C1300N6, OVERALL	ITEM NUMBER A067G824
MUST CONFORM TO ALL APPLICABLE STANDARDS AND REGULATIONS SEE: ASME Y14.5-2009			ACAD SHEET 3 OF 14



- NOTES:
- 1) When remote-reset terminals 4 and 5 are connected, a trip remains latched until the RESET button is pressed or the remote-reset terminals are opened. Cycling the supply voltage will also reset the module. If the remote-reset terminals are not connected, the module operates in the non-latching mode and a trip will reset when the fault is removed.
 - 2) B+ and GND connections are only required for OTEC ATS.
 - 3) All dashed wires are customer responsibility.
 - 4) T26 is a switched B+ circuit fused at 10A.
 - 5) If installing a remote E-Stop, remove the jumper wire between terminals C1-15 and C1-16 first.
 - 6) For PCC Net wiring, use Belden 9318 cable.
 - 7) The Relay Kit contacts are rated at 10A, 30VDC.
 - 8) Splices are shown for representation only. Run each wire directly to terminal block.
 - 9) If line-line voltage is greater than 600VAC, power transformers must be used.

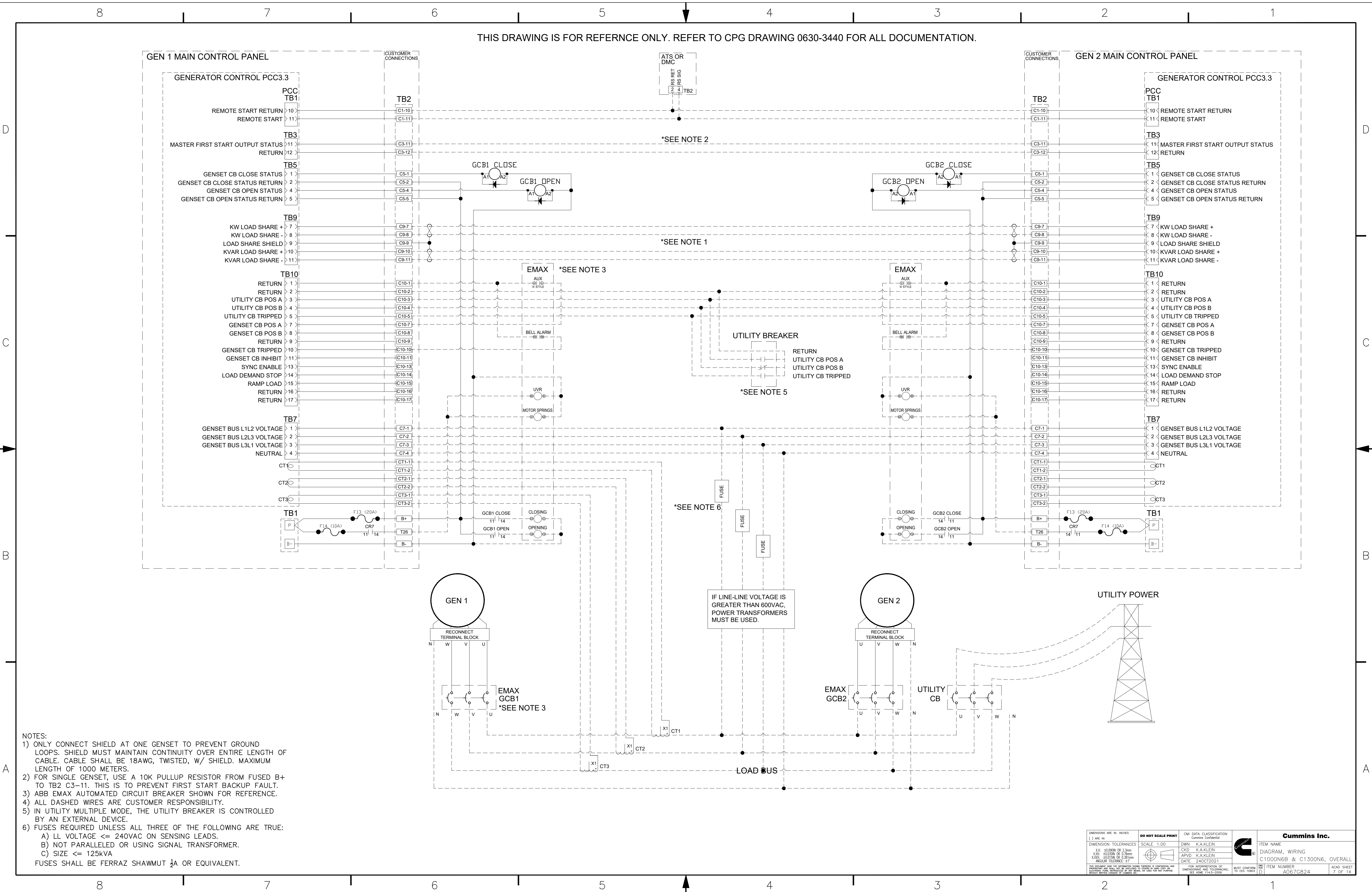


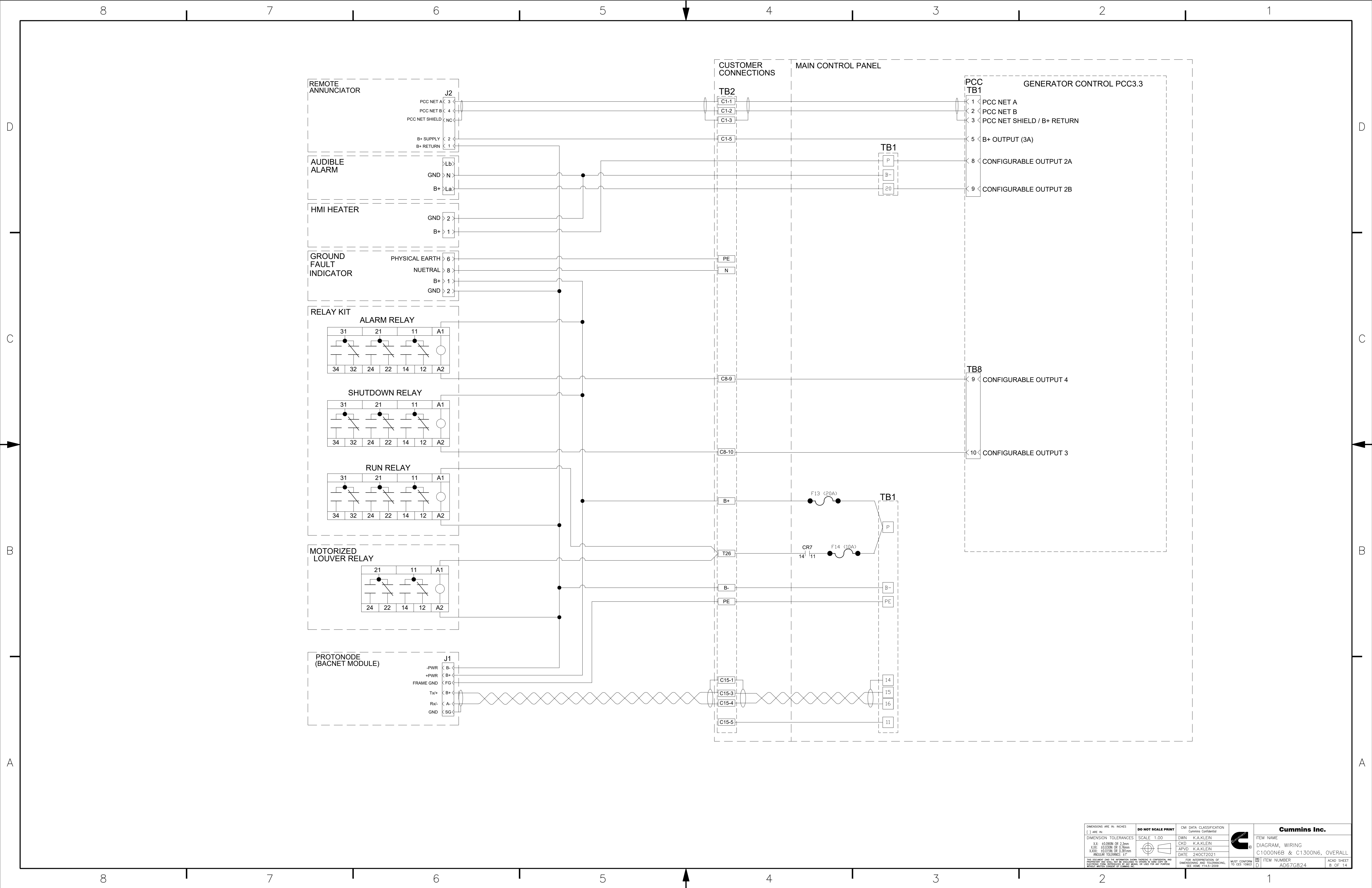
THIS DRAWING IS FOR REFERENCE ONLY. REFER TO CPG DRAWING 0630-3440 FOR ALL DOCUMENTATION.

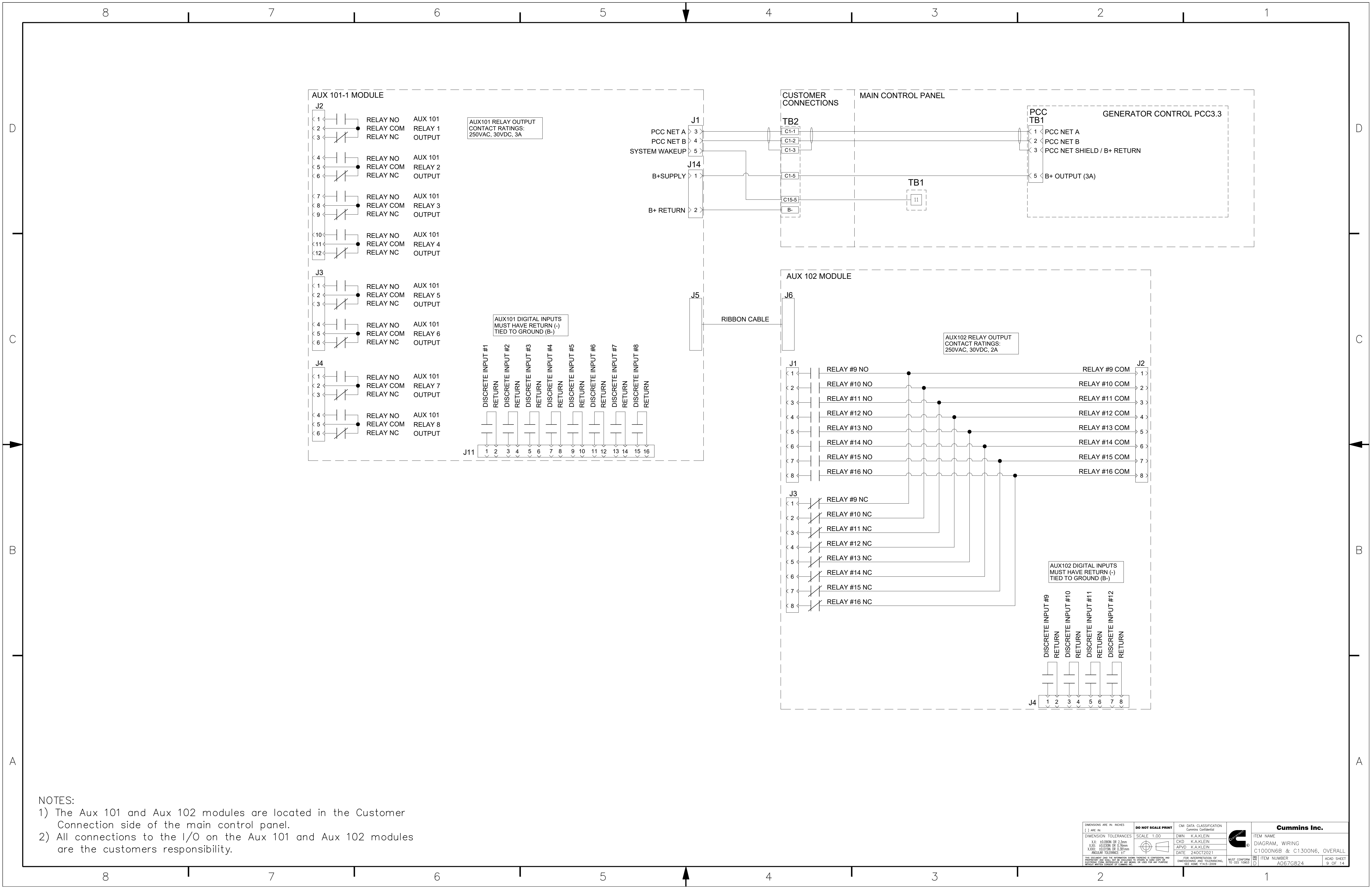


- NOTES:
- 1) ABB EMAX AUTOMATED CIRCUIT BREAKER SHOWN FOR REFERENCE.
 - 2) ALL DASHED WIRES ARE CUSTOMER RESPONSIBILITY.
 - 3) SYNCHRONIZER ENABLE IS USED FOR SYNCHRONIZING ACROSS UTILITY BREAKER. THIS INPUT IS ALSO AVAILABLE VIA MODBUS.
 - 4) IN THIS APPLICATION TYPE, THE SINGLE MODE VERIFY INPUT MUST BE ACTIVE TO ENABLE A DEAD BUS CLOSE. THERE IS NO DIRECT SENSING OF LOAD BUS VOLTAGE, SO DEAD BUS IS DETERMINED BY BREAKER POSITIONS ONLY. THIS INPUT IS NOT AVAILABLE VIA MODBUS.
 - 5) FUSES REQUIRED UNLESS ALL THREE OF THE FOLLOWING ARE TRUE:
A) LL VOLTAGE $\leq$ 240VAC ON SENSING LEADS.
B) NOT PARALLELED OR USING SIGNAL TRANSFORMER.
C) SIZE $\leq$ 125KVA.
FUSES SHALL BE FERRAZ SHAWMUT $\frac{1}{2}$ A OR EQUIVALENT.

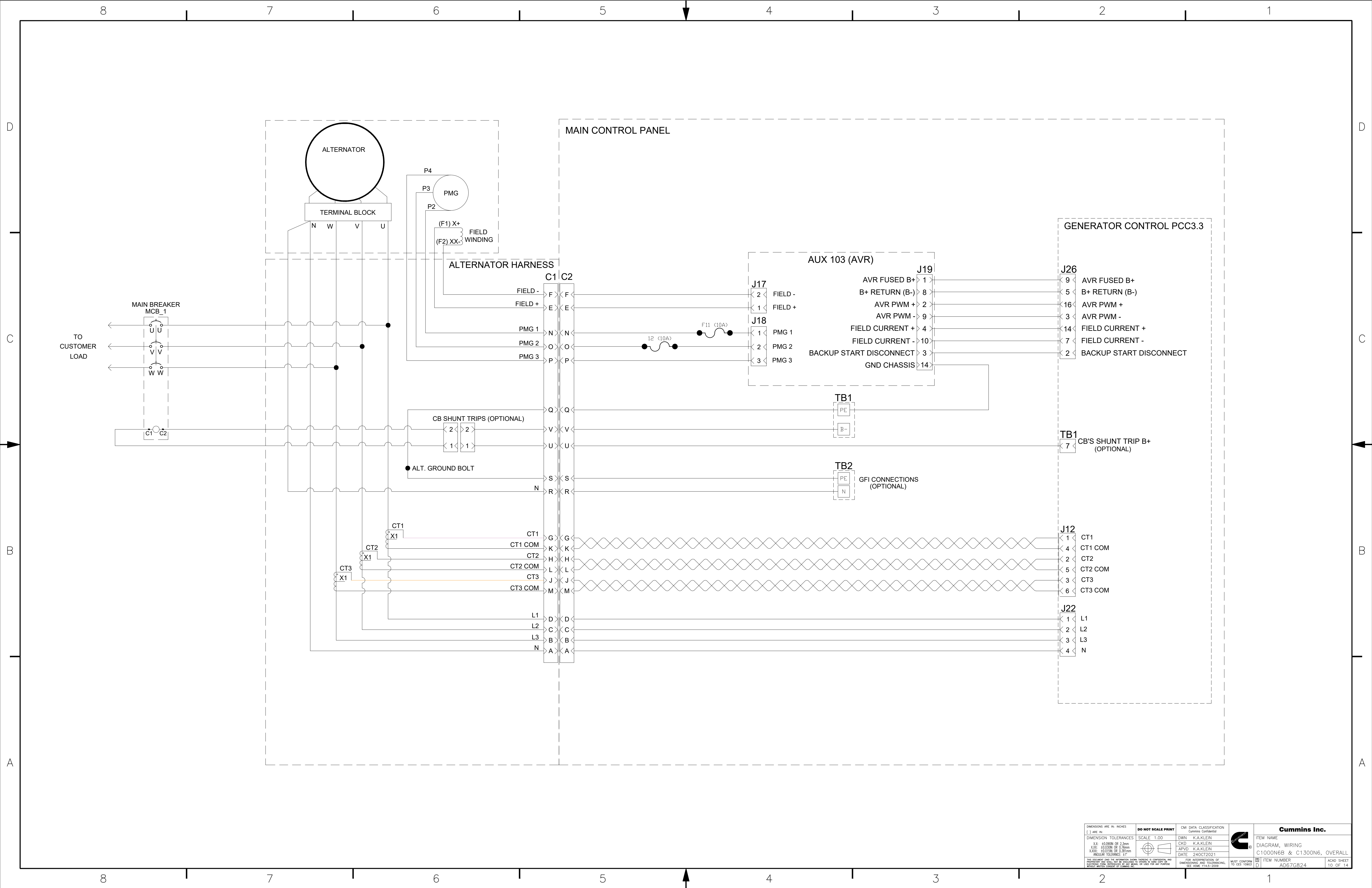
DIMENSIONS ARE IN INCHES [] ARE IN		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		ITEM NAME	
DIMENSION TOLERANCES X1: .0100IN OR 2.5mm X2: .0030IN OR 0.76mm X3: .0100IN OR 0.25mm ANGULAR TOLERANCE: 1°		SCALE 1:00	DWN: K.K.KLEIN CHKD: K.K.KLEIN APVD: K.K.KLEIN DATE: 24OCT2021		DIAGRAM, WIRING C1000N6B & C1300N6, OVERALL	
THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF CUMMINS INC. AND ARE NOT TO BE REPRODUCED, COPIED, OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT WRITTEN CONSENT OF CUMMINS INC.		FOR INTERPRETATION OF DIMENSIONS AND TOLERANCES, SEE ASME Y14.5-2009		MUST CONFORM TO CUMMINS SPECIFICATIONS		ITEM NUMBER A067G824
						ACAD SHEET 6 OF 14

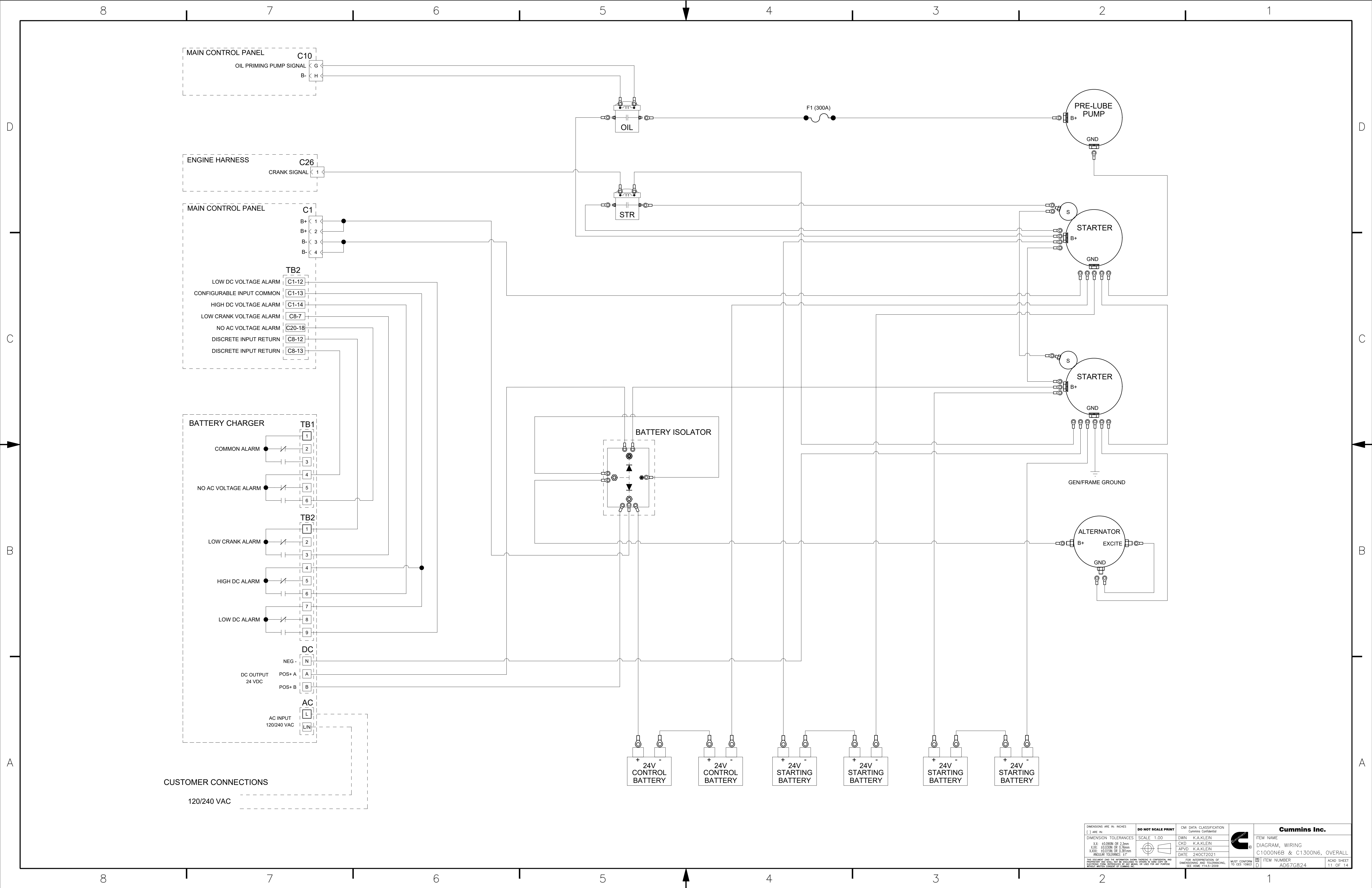


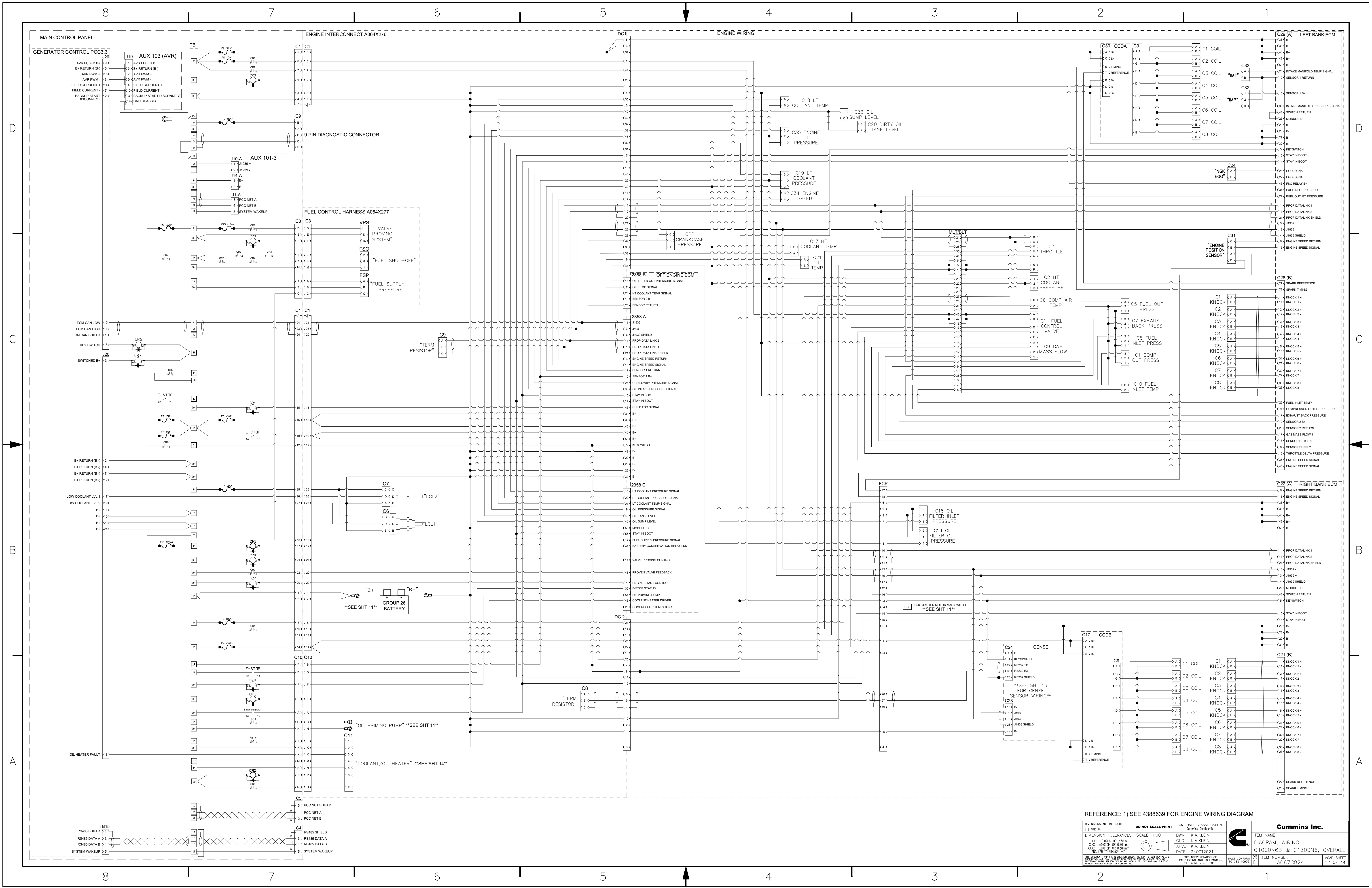


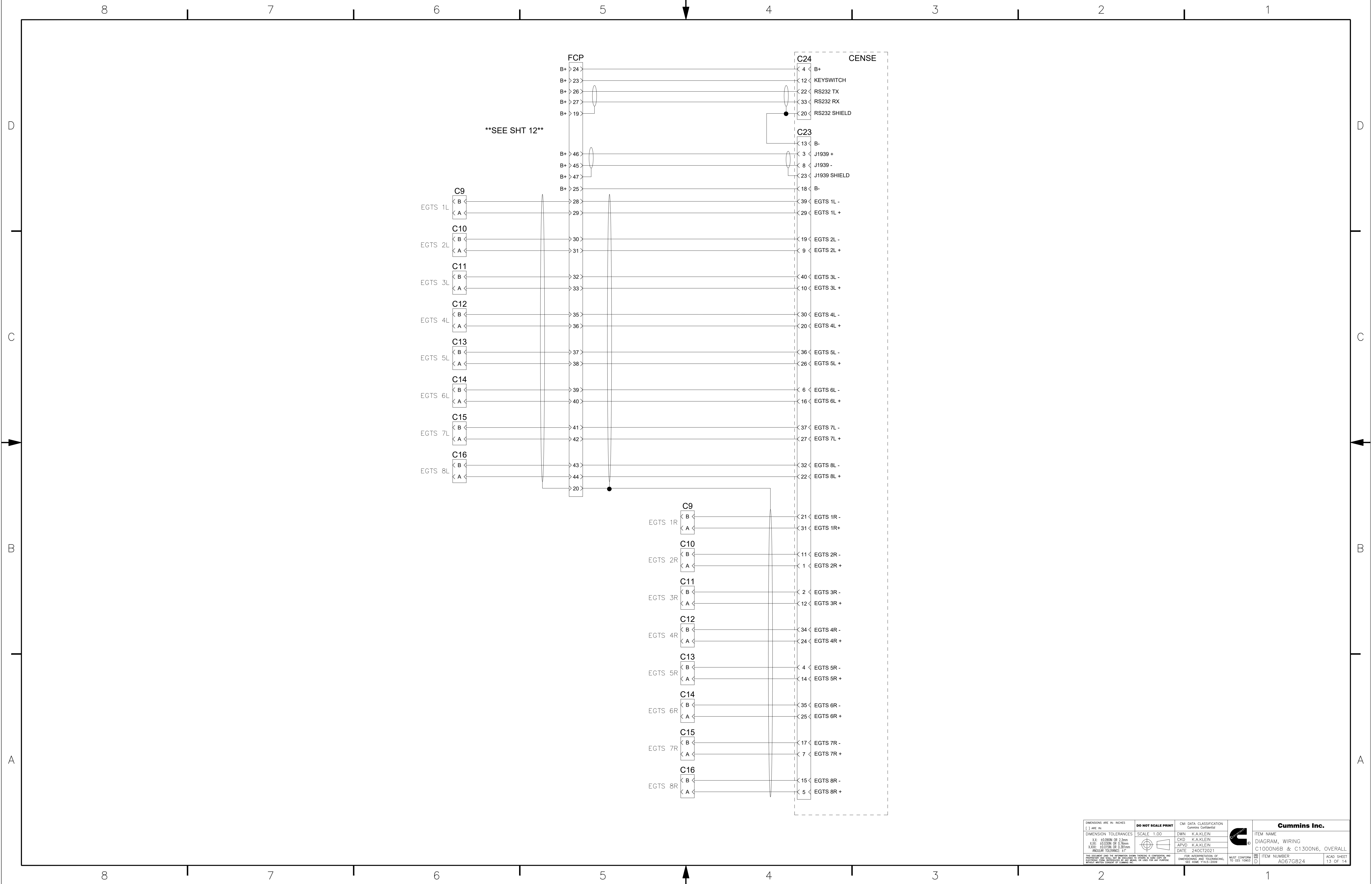


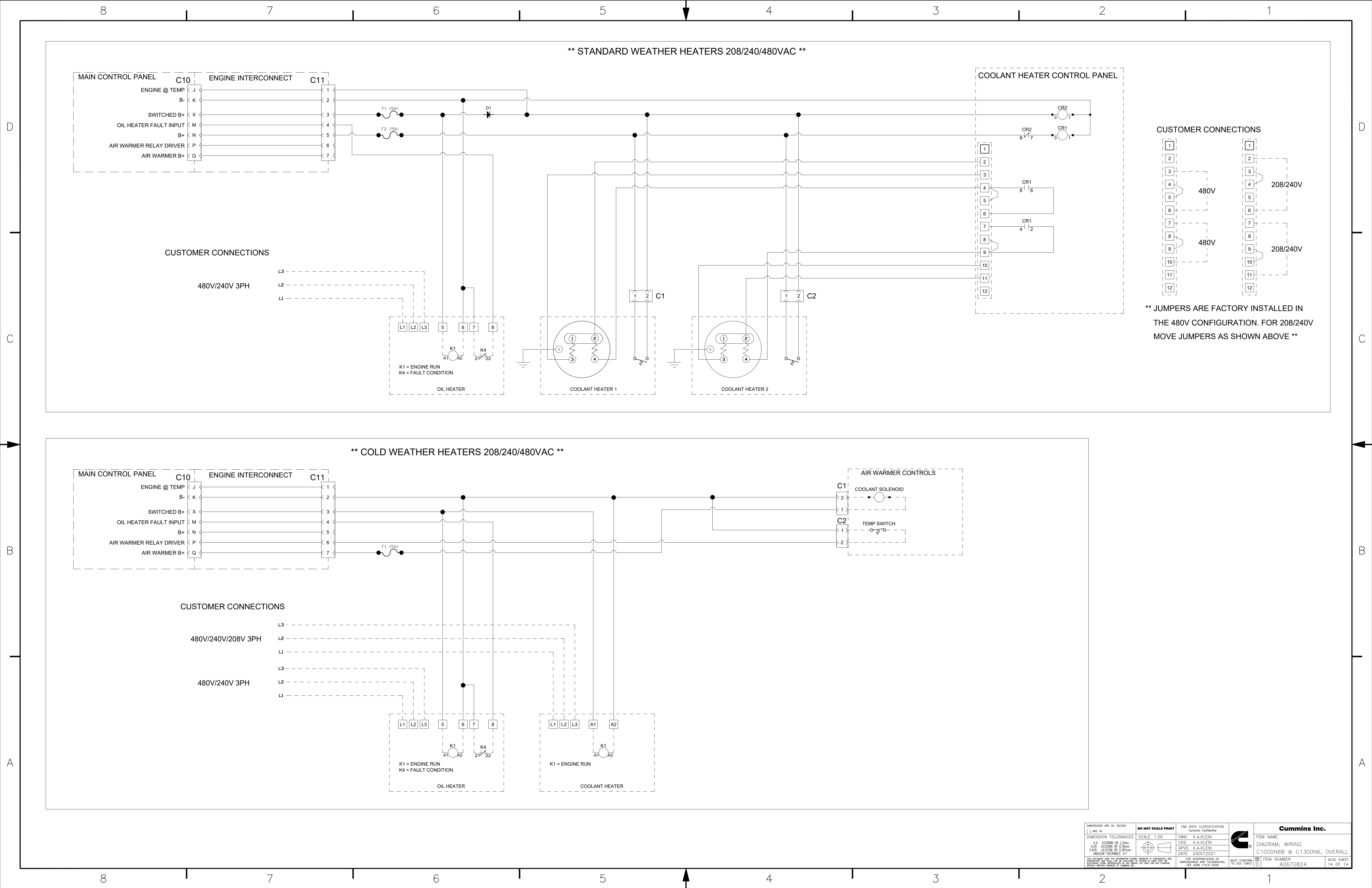
NOTES:
1) The Aux 101 and Aux 102 modules are located in the Customer Connection side of the main control panel.
2) All connections to the I/O on the Aux 101 and Aux 102 modules are the customers responsibility.





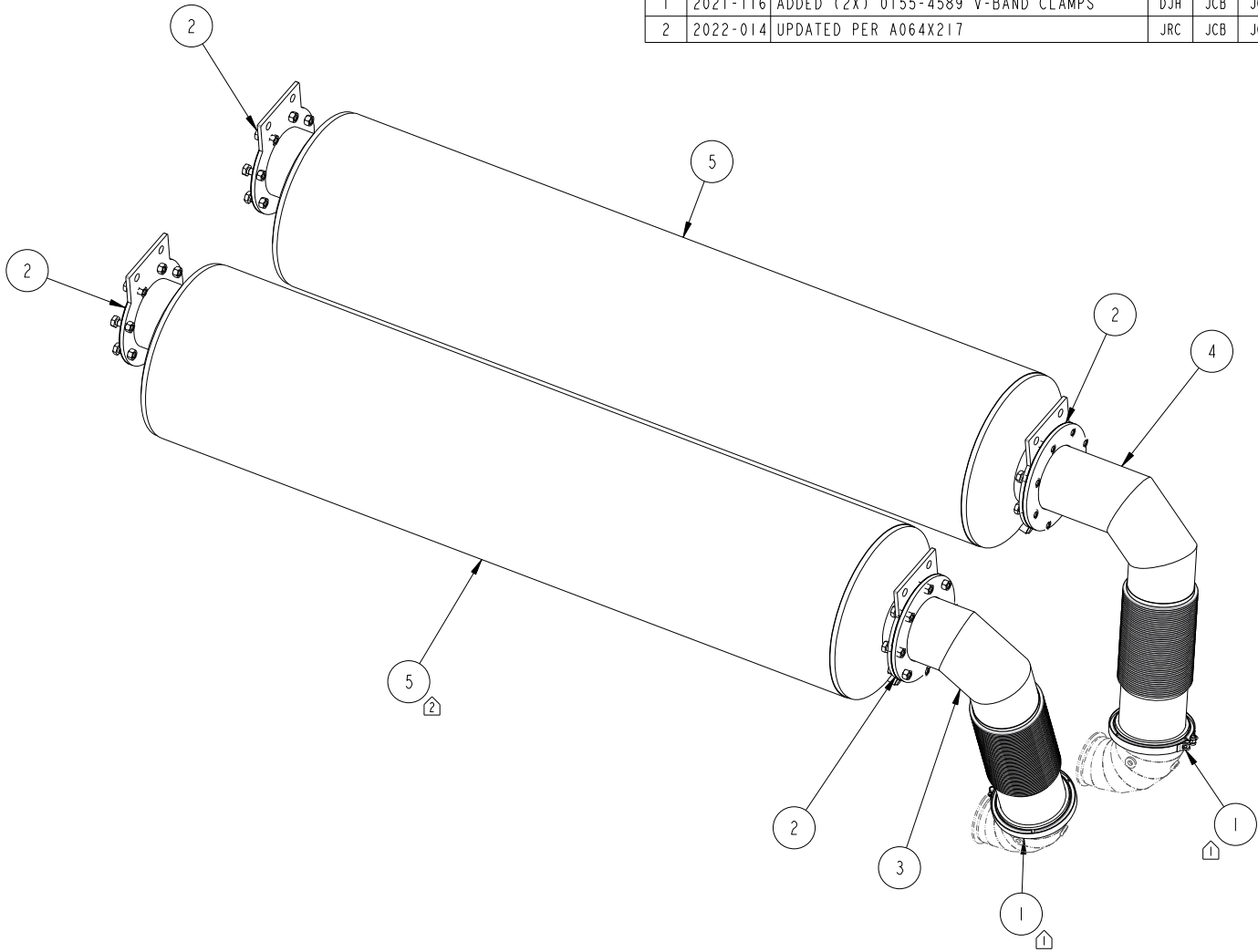
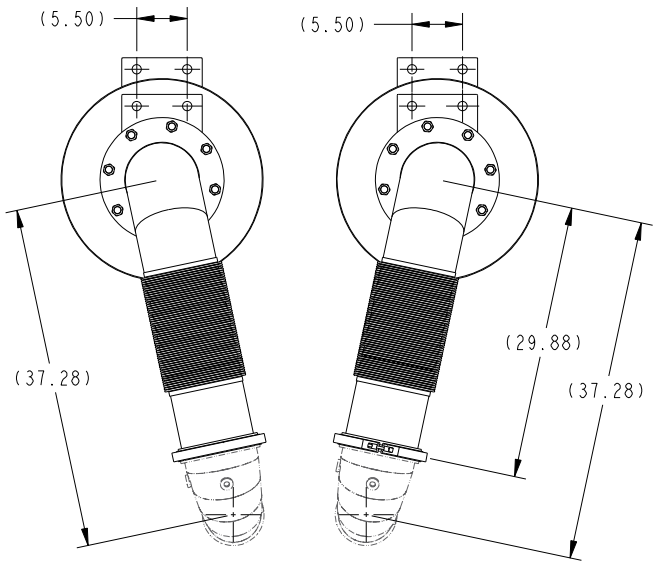
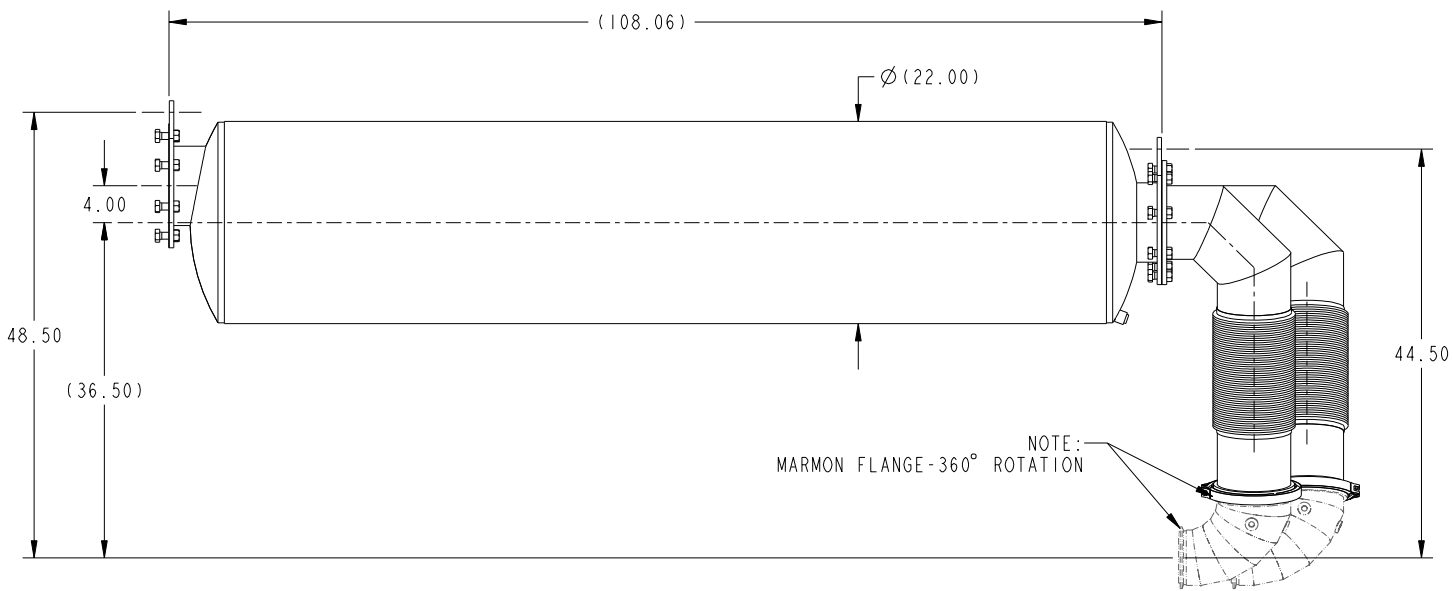
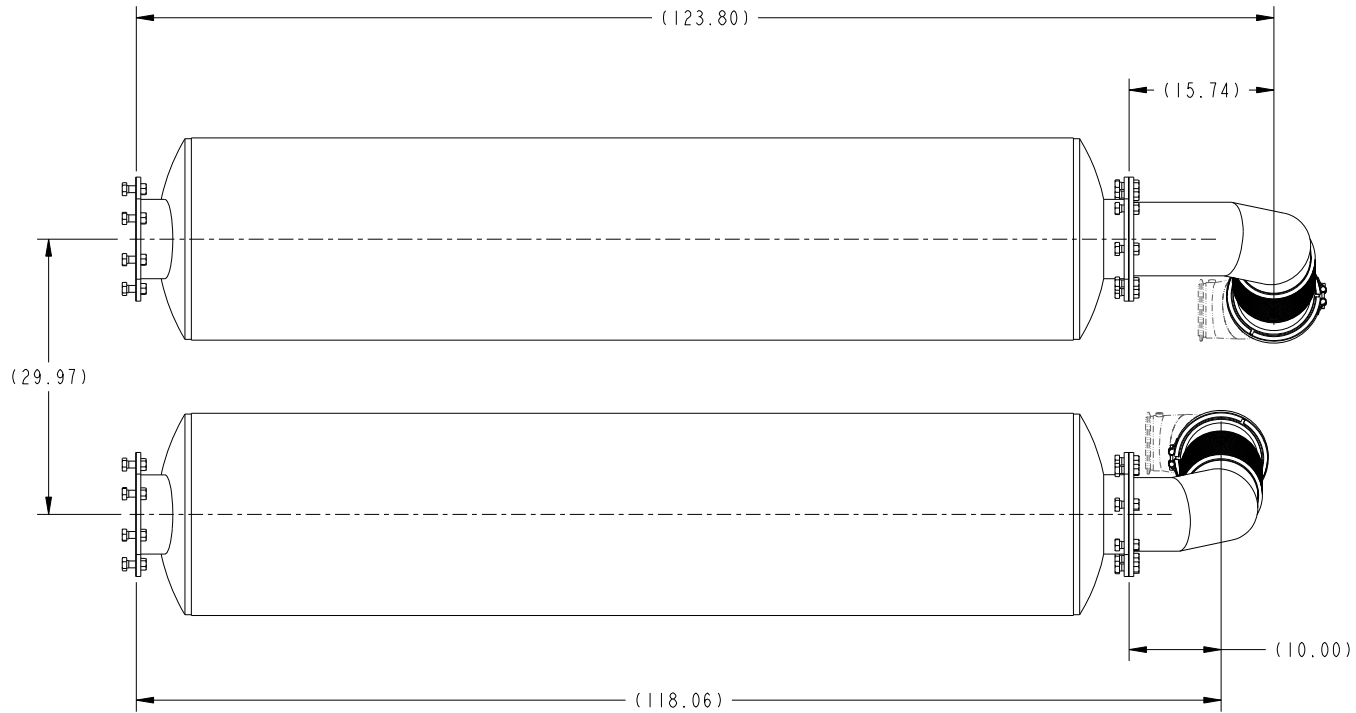




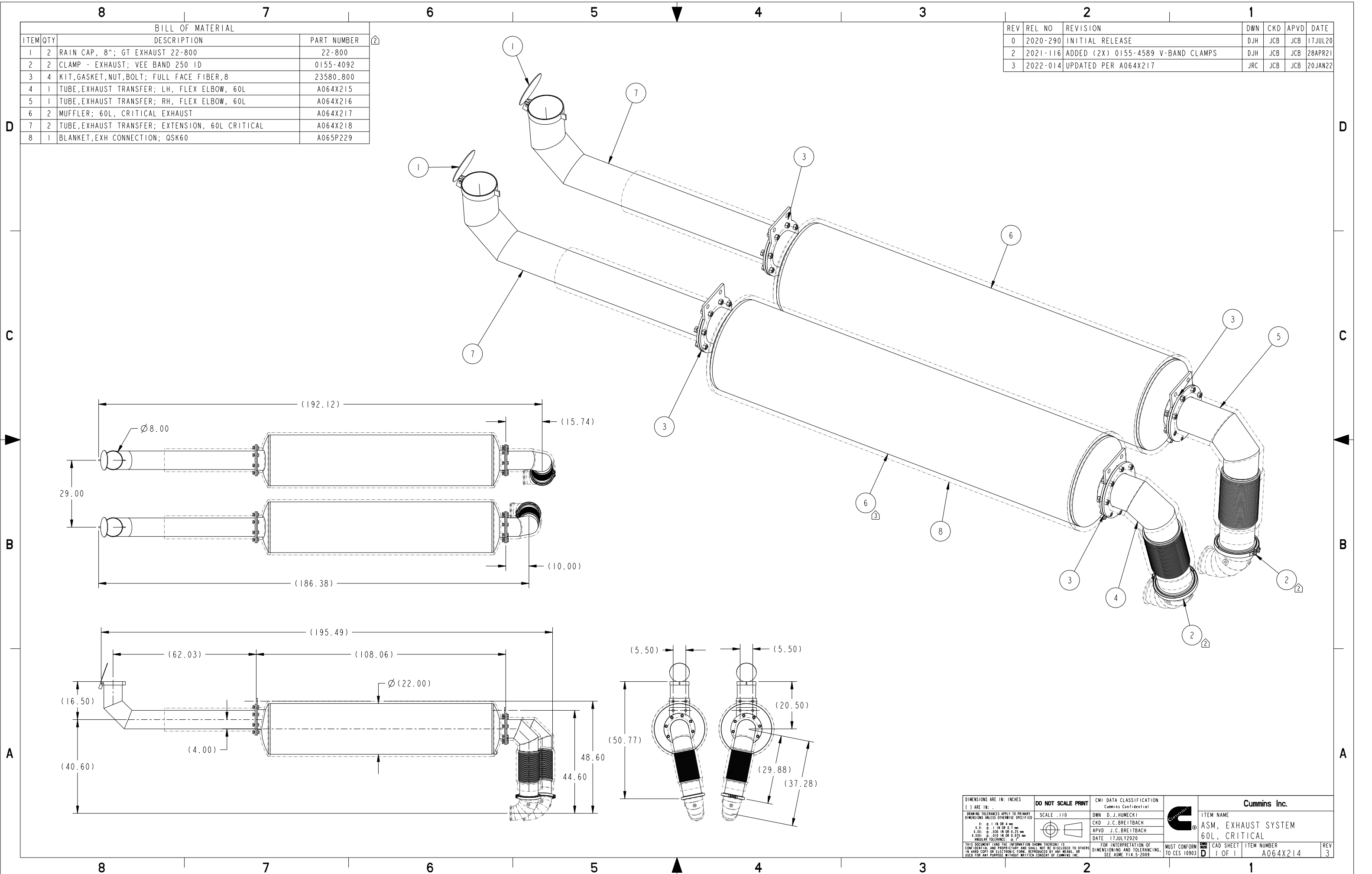


BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	CLAMP - EXHAUST; VEE BAND 250 ID	0155-4092
2	4	KIT,GASKET,NUT,BOLT; FULL FACE FIBER,8	23580-800
3	1	TUBE,EXHAUST TRANSFER; LH, FLEX ELBOW, 60L	A064X215
4	1	TUBE,EXHAUST TRANSFER; RH, FLEX ELBOW, 60L	A064X216
5	2	MUFFLER; 60L, CRITICAL EXHAUST	A064X217

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-356	INITIAL RELEASE	JRC	JCB	JCB	23OCT20
1	2021-116	ADDED (2X) 0155-4589 V-BAND CLAMPS	DJH	JCB	JCB	28APR21
2	2022-014	UPDATED PER A064X217	JRC	JCB	JCB	20JAN22



DIMENSIONS ARE IN: INCHES 1.1 ARE IN: -		DO NOT SCALE PRINT	CWI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE: 1:100	DWN: J.R.CIBULKA	CKD: J.C.BREITBACH	ITEM NAME ASM, EXHAUST SYSTEM 60L, CRITICAL, OPEN	
X: ± 1/16 IN OR 1.6 mm X.L: ± 1/16 IN OR 1.6 mm X.H: ± 1/16 IN OR 1.6 mm X.H: ± 1/16 IN OR 1.6 mm ANGULAR TOLERANCE: ± 1°			APVD: J.C.BREITBACH	DATE: 23OCT20	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	
THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN ANY MANNER OR FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.			MUST CONFORM TO CES 10903		CAD SHEET 1 OF 1	ITEM NUMBER A065P242
					REV 2	



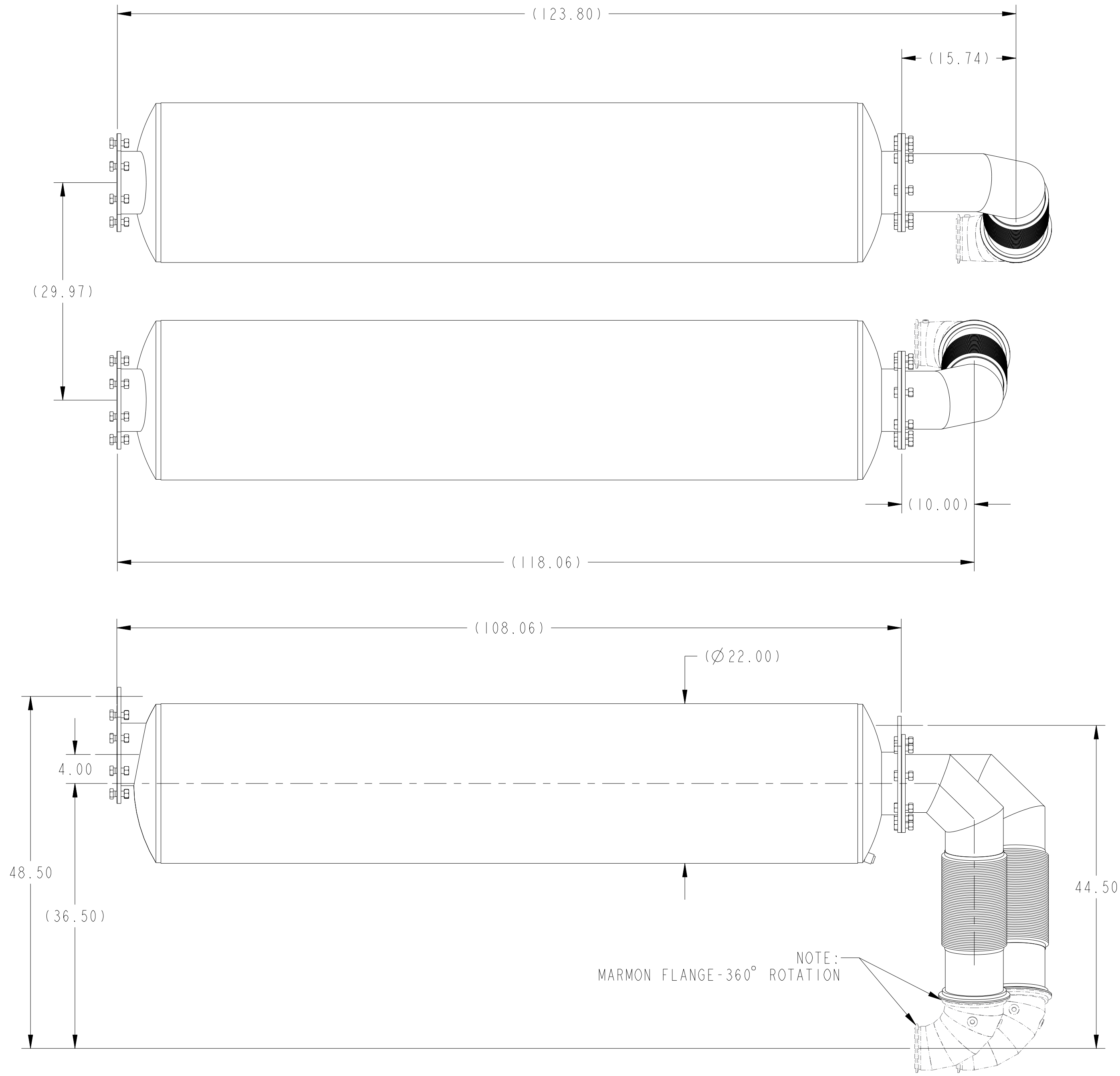
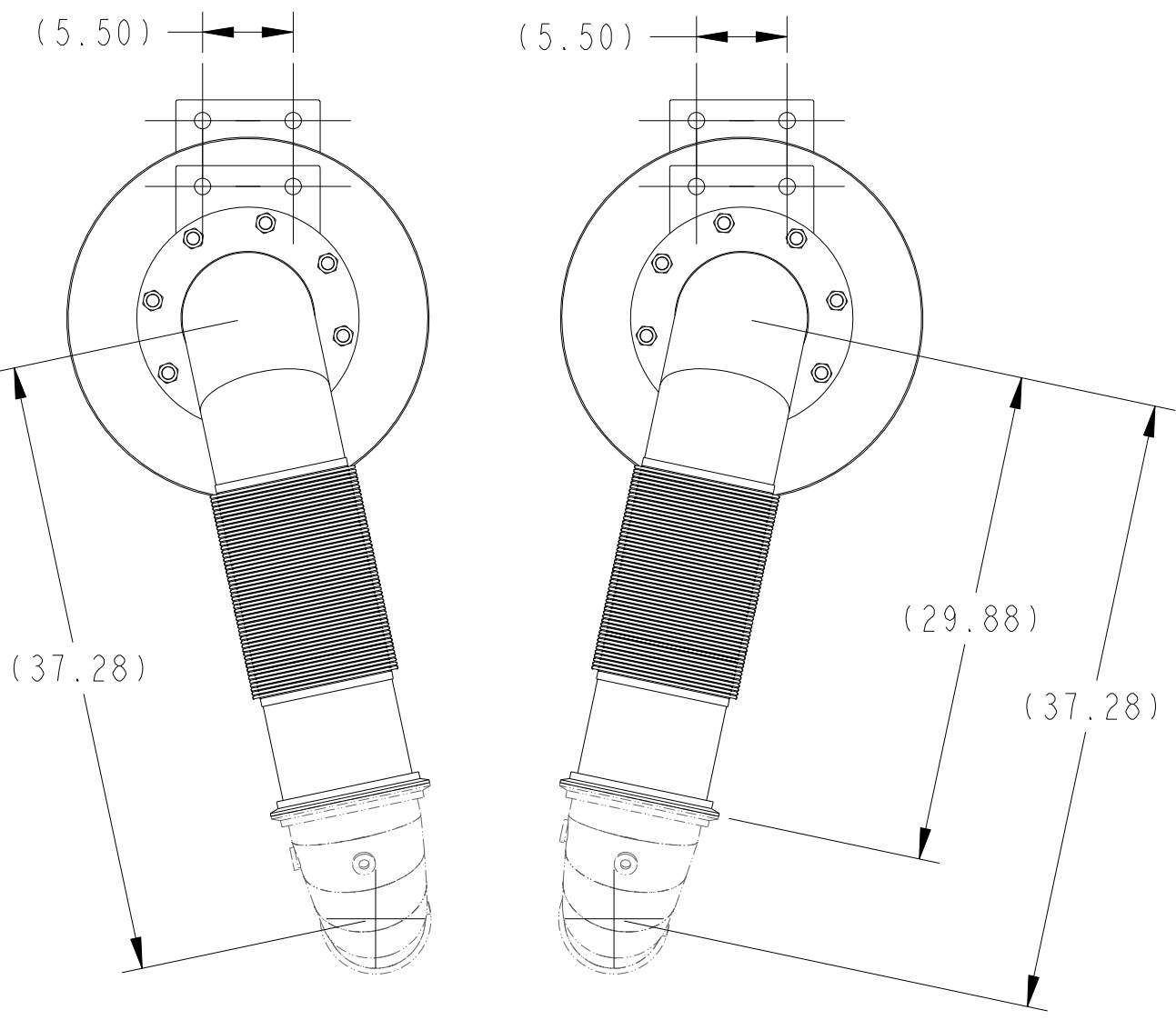
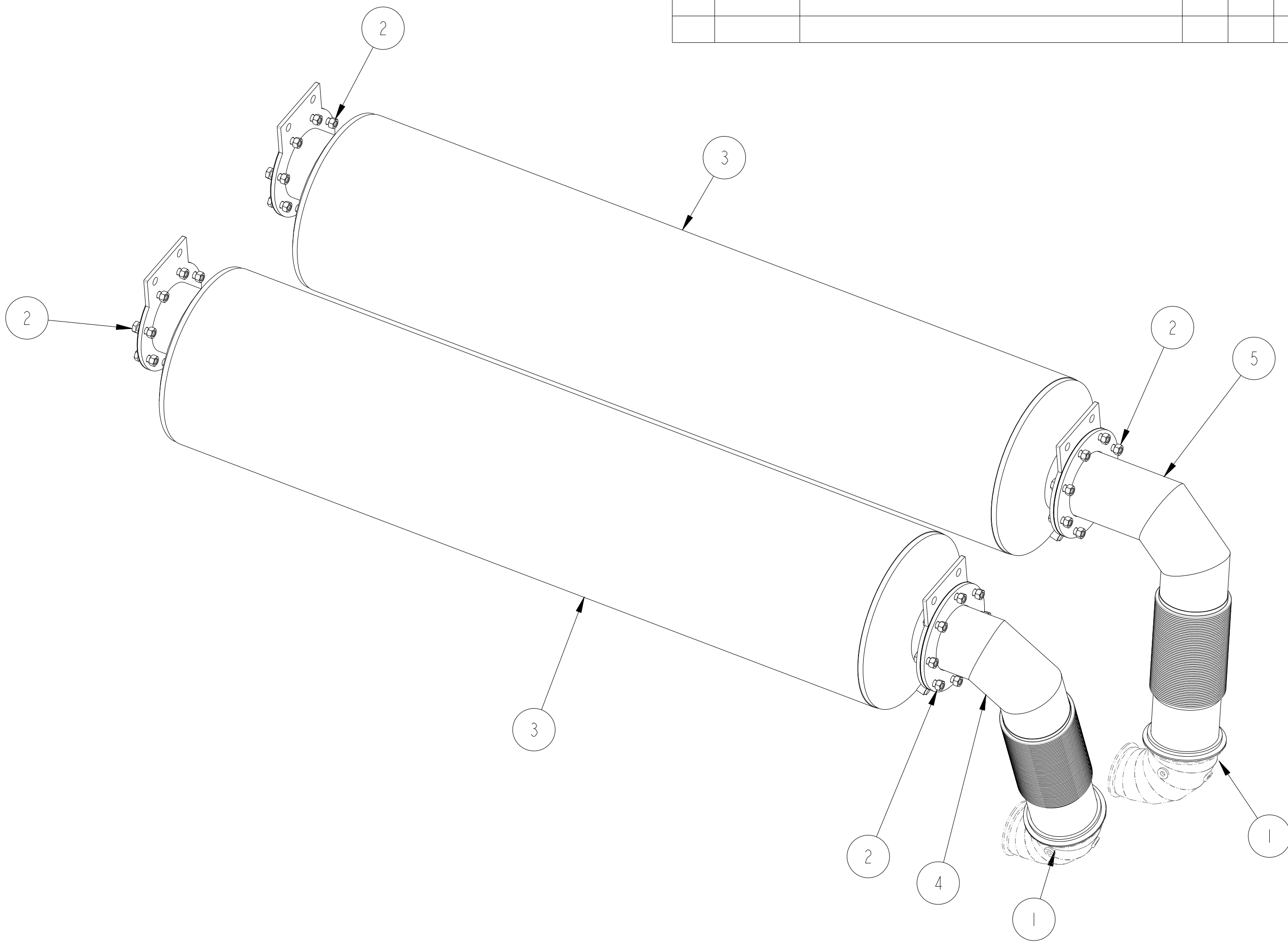
BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	RAIN CAP, 8"; GT EXHAUST 22-800	22-800
2	2	CLAMP - EXHAUST; VEE BAND 250 ID	0155-4092
3	4	KIT,GASKET,NUT,BOLT; FULL FACE FIBER,8	23580-800
4	1	TUBE,EXHAUST TRANSFER; LH, FLEX ELBOW, 60L	A064X215
5	1	TUBE,EXHAUST TRANSFER; RH, FLEX ELBOW, 60L	A064X216
6	2	MUFFLER; 60L, CRITICAL EXHAUST	A064X217
7	2	TUBE,EXHAUST TRANSFER; EXTENSION, 60L CRITICAL	A064X218
8	1	BLANKET,EXH CONNECTION; QSK60	A065P229

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-290	INITIAL RELEASE	DJH	JCB	JCB	17JUL20
2	2021-116	ADDED (2X) 0155-4589 V-BAND CLAMPS	DJH	JCB	JCB	28APR21
3	2022-014	UPDATED PER A064X217	JRC	JCB	JCB	20JAN22

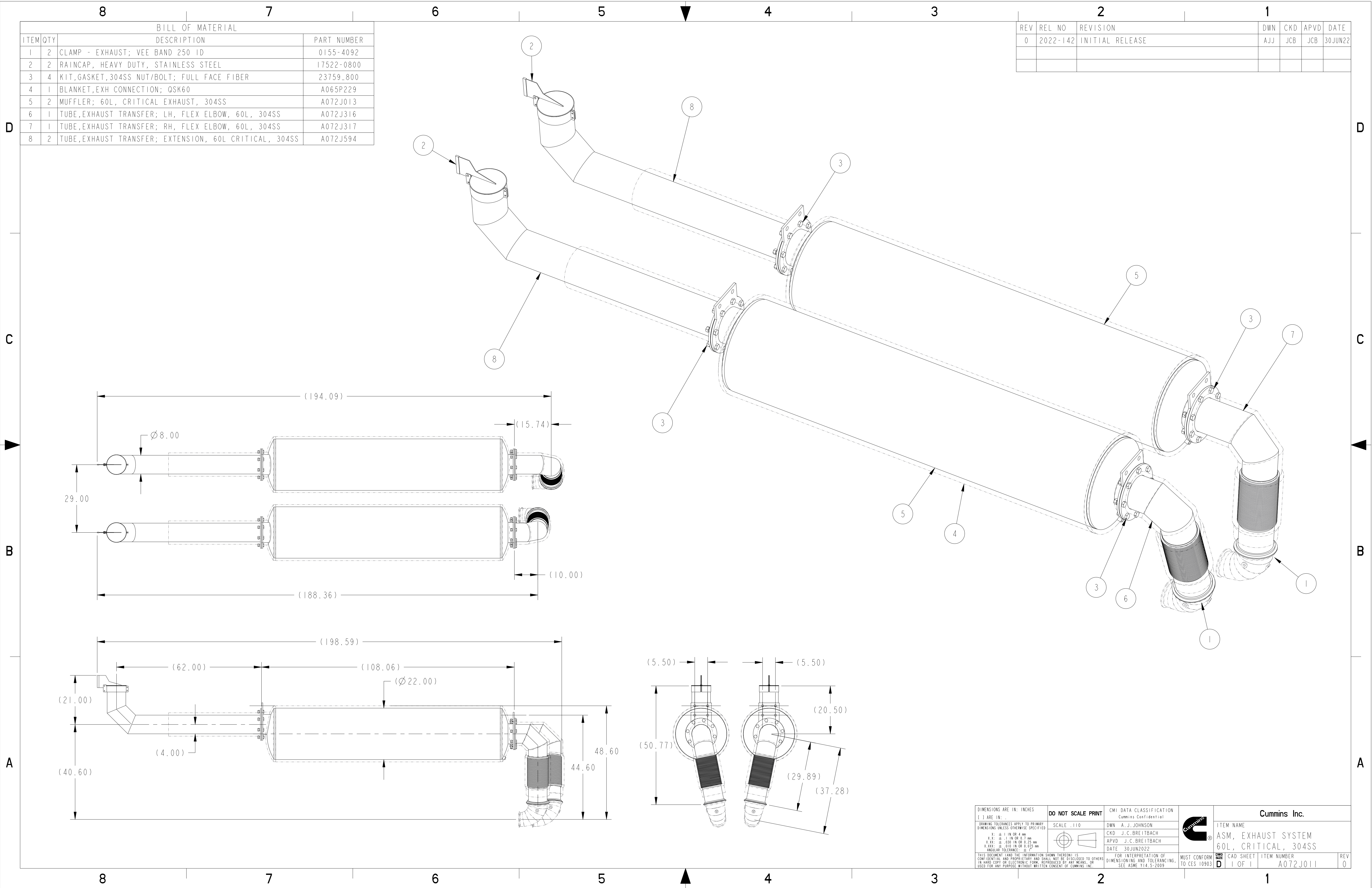
DIMENSIONS ARE IN: INCHES [] ARE IN: -		DO NOT SCALE PRINT		CWI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE: 1:10		DWN: D.J. HUMECKI		ITEM NAME	
X: ± 1/16 IN OR 1.6 mm		CKD: J.C. BREITBACH		APVD: J.C. BREITBACH		ASM, EXHAUST SYSTEM	
X: ± 1/32 IN OR 0.7 mm		DATE: 17 JULY 2020		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		60L, CRITICAL	
X: ± 0.01 IN OR 0.25 mm		MUST CONFORM TO CES 10903		CAD SHEET		ITEM NUMBER	
ANGULAR TOLERANCE: ±		1 OF 1		D		A064X214	
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BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	CLAMP - EXHAUST; VEE BAND 250 ID	0155-4092
2	4	KIT,GASKET,304SS NUT/BOLT; FULL FACE FIBER	23759-800
3	2	MUFFLER; 60L, CRITICAL EXHAUST, 304SS	A072J013
4	1	TUBE,EXHAUST TRANSFER; LH, FLEX ELBOW, 60L, 304SS	A072J316
5	1	TUBE,EXHAUST TRANSFER; RH, FLEX ELBOW, 60L, 304SS	A072J317

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2022-142	INITIAL RELEASE	AJJ	JCB	JCB	30JUN22



DIMENSIONS ARE IN: INCHES [] ARE IN:	DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TECHNIQUE APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED	SCALE = 1:00	DWN A. J. JOHNSON CKD J.C. BREITBACH APVD J.C. BREITBACH DATE 30JUN22	ITEM NAME ASM, EXHAUST SYSTEM 60L, CRITICAL, OPEN, 304SS	
X=1.1 IN OR 8 mm Y=0.75 IN OR 19 mm Z=0.30 IN OR 7.6 mm R=0.12 IN OR 3.0 mm ANGULAR TOLERANCE 0.015 mm		MUST CONFORM TO TO CES 10903	D CAD SHEET I OF I	
THE LOCATION AND THE DIMENSION FOR DOWN HEREIN IS CONFIDENTIAL AND NOT BE DISCLOSED TO OTHERS WITHOUT WRITTEN PERMISSION FROM CUMMINS INC.		SEE ASME Y14.5-2009	ITEM NUMBER A072J012	REV

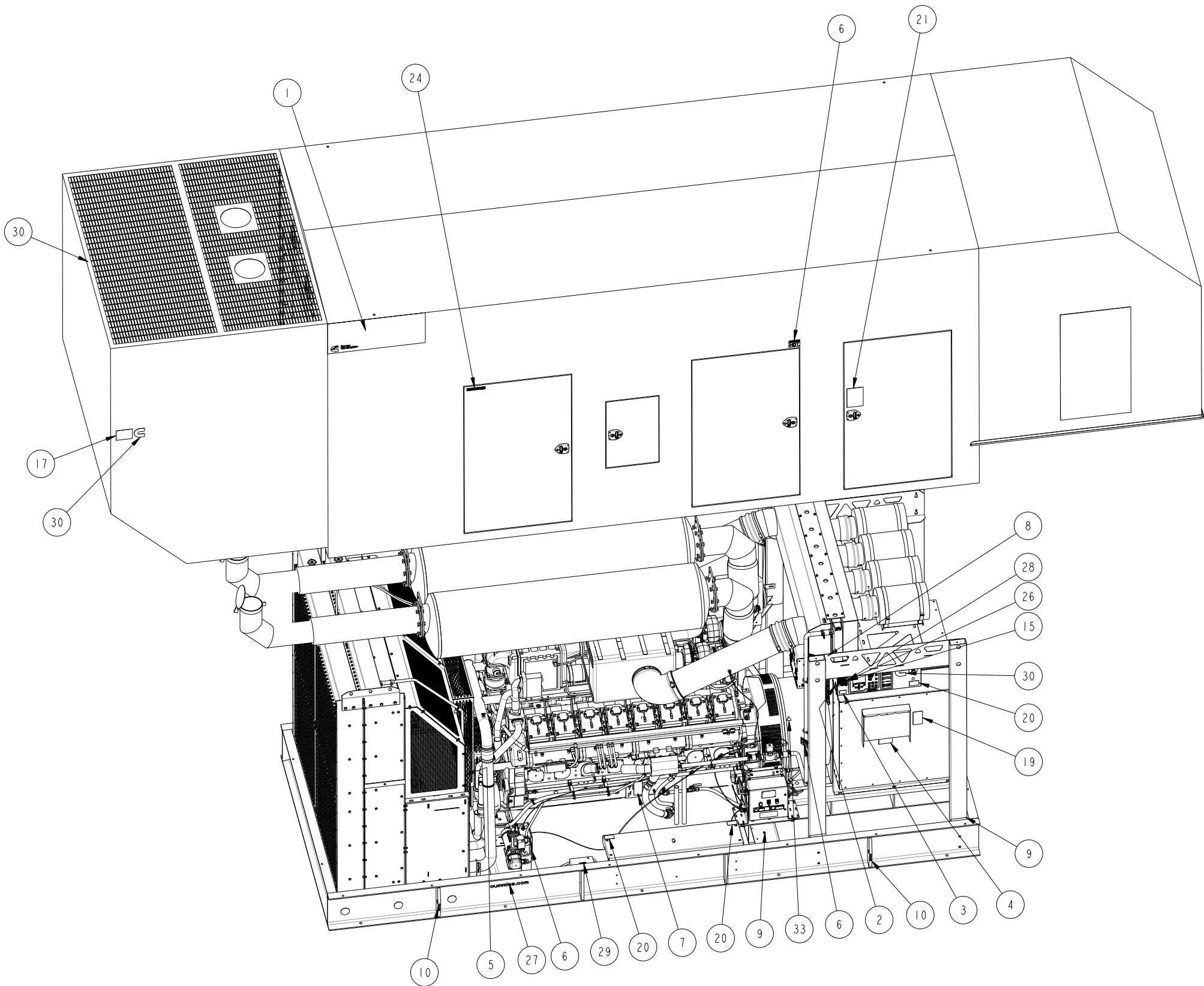


BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	CLAMP - EXHAUST; VEE BAND 250 ID	0155-4092
2	2	RAINCAP, HEAVY DUTY, STAINLESS STEEL	17522-0800
3	4	KIT,GASKET,304SS NUT/BOLT; FULL FACE FIBER	23759-800
4	1	BLANKET,EXH CONNECTION; QSK60	A065P229
5	2	MUFFLER; 60L, CRITICAL EXHAUST, 304SS	A072J013
6	1	TUBE,EXHAUST TRANSFER; LH, FLEX ELBOW, 60L, 304SS	A072J316
7	1	TUBE,EXHAUST TRANSFER; RH, FLEX ELBOW, 60L, 304SS	A072J317
8	2	TUBE,EXHAUST TRANSFER; EXTENSION, 60L CRITICAL, 304SS	A072J594

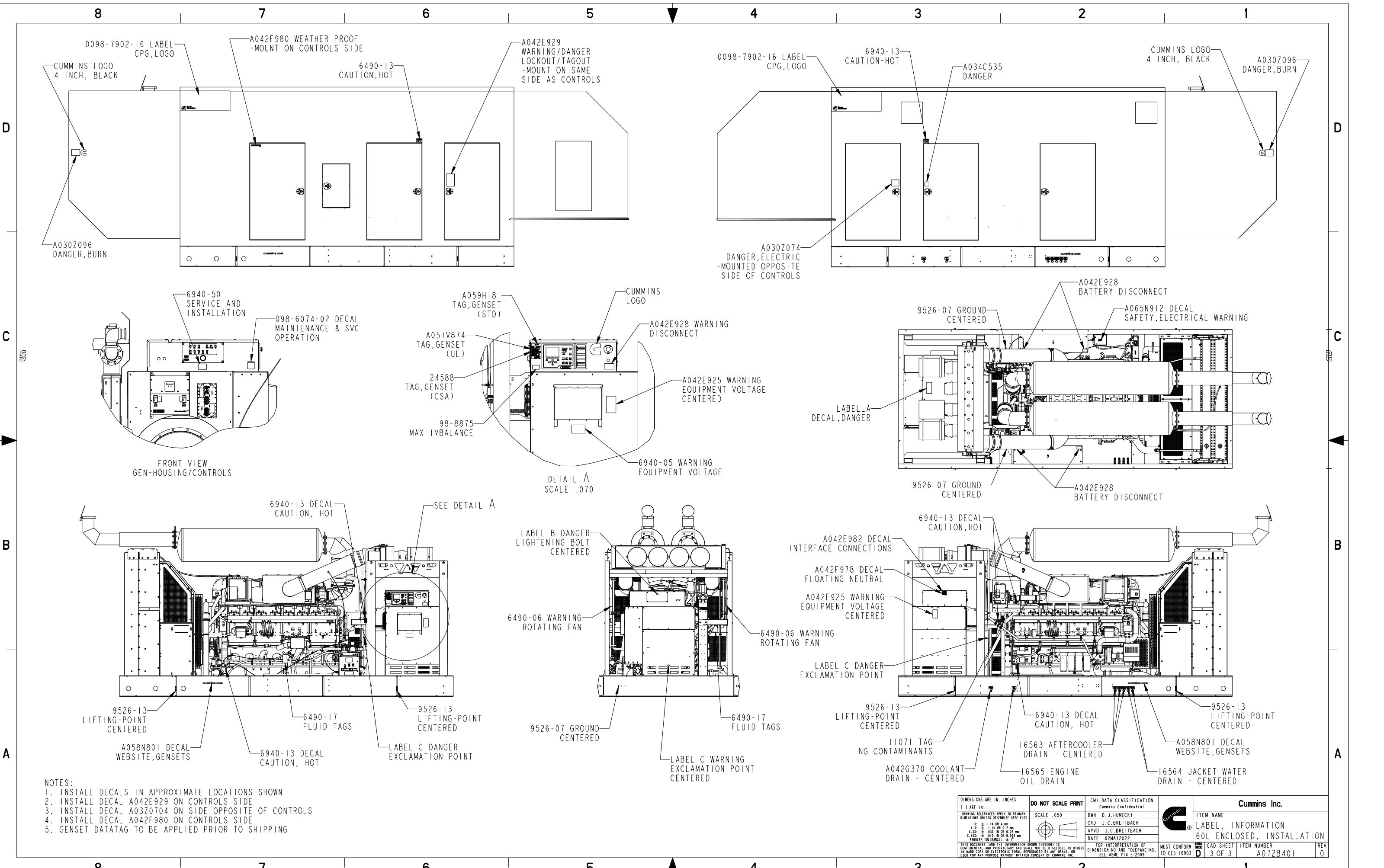
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2022-142	INITIAL RELEASE	AJJ	JCB	JCB	30JUN22

DIMENSIONS ARE IN: INCHES () ARE IN: mm		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE: 1:10		DWN: A.J. JOHNSON		ITEM NAME	
X: ± .1 IN OR 4 mm				CKD: J.C. BREITBACH		ASM, EXHAUST SYSTEM	
X.X: ± .030 IN OR 0.25 mm				APVD: J.C. BREITBACH		60L, CRITICAL, 304SS	
X.XX: ± .010 IN OR 0.025 mm				DATE: 30JUN2022		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	
ANGULAR TOLERANCE: ± .5°				MUST CONFORM TO CES 10903		CMI DATA CLASSIFICATION	
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						1 OF 1 A072J011	
						REV	

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	LABEL, LOGO	0098-7902-16
2	1	DECAL, OPERATION; MAINTENANCE & SERVICE	098-6074-02
3	1	DECAL, MAX IMBALANCE; -	98-8875
4	1	DECAL, WARNING; EQUIPMENT VOLTAGE	6940-05
5	2	DECAL, WARNING; ROTATING FAN	6940-06
6	7	DECAL, CAUTION HOT; -	6940-13
7	2	TAG, FLUIDS; -	6940-17
8	1	DECAL, SERVICE & INSTALLATION; -	6940-50
9	3	DECAL, GROUND; -	9526-07
10	4	DECAL, LIFTING POINT; -	9526-13
11	1	TAG, WARNING; NG CONTAMINATES	11071
12	3	DECAL, LTA DRAIN LABEL; -	16563
13	2	DECAL, JW DRAIN LABEL; -	16564
14	1	DECAL, ENGINE OIL DRAIN LABEL	16565
15	1	TAG, GENSET; -	24588
16	1	DECAL, 133009; DANGER-ELEC	A030Z074
17	2	DECAL, 133012 ; DANGER-BURN	A030Z096
18	1	DECAL, 114258 ; DANGER, NO	A034C535
19	2	LABEL, WARNING; EQUIPMENT VOLTAGE	A042E925
20	5	LABEL, WARNING; DISCONNECT BATTERY	A042E928
21	1	LABEL, WARNING/DANGER; LOCKOUT/TAGOUT	A042E929
22	1	DECAL, INTERFACE CONNECTIONS	A042E982
23	1	DECAL, FLOATING NEUTRAL; -	A042F978
24	1	DECAL; WEATHER PROTECTIVE	A042F980
25	1	DECAL, COOLANT DRAIN	A042G370
26	1	DECAL, DATATAG, GENSET; UL LISTED (IH)	A057V874
27	2	DECAL, WEBSITE; GENSETS	A058N801
28	1	DECAL, DATATAG, GENSET; UNLISTED NG (IH)	A059H181
29	1	DECAL, SAFETY; ELECTRICAL, WARNING	A065N912
30	3	CUMMINS LOGO; 4 INCH, BLACK	CUMMINS-LOGO
31	1	DECAL, DANGER; REFERENCE MANUAL	LABEL_A
32	1	DECAL, DANGER; LIGHTNING BOLT	LABEL_B
33	3	DECAL, WARNING; EXCLAMATION POINT	LABEL_C

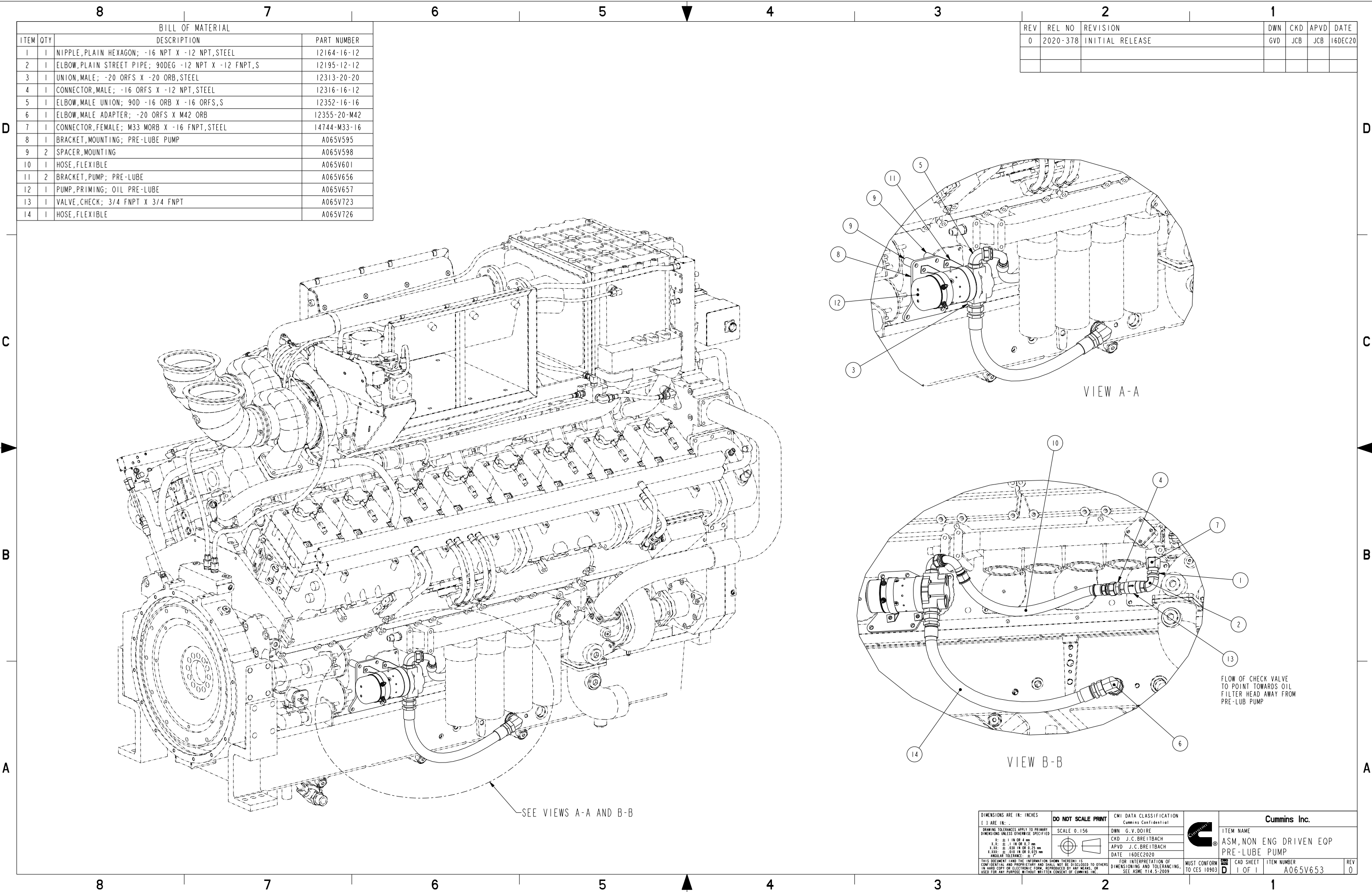


DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .050		DWN D.J.HUMECKI		ITEM NAME	
X: ± .1 IN OR 4 mm				CND J.C.BREITBACH		LABEL, INFORMATION	
X.Y: ± .1 IN OR 2.7 mm				APVD J.C.BREITBACH		60L ENCLOSED, INSTALLATION	
X.Z: ± .000 IN OR 0.25 mm				DATE 02MAY2022		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	
ANGULAR TOLERANCES: ± 1°				MUST CONFORM TO CES 10903		CMI CAD SHEET ITEM NUMBER	
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- NOTES:
1. INSTALL DECALS IN APPROXIMATE LOCATIONS SHOWN
 2. INSTALL DECAL A042E929 ON CONTROLS SIDE
 3. INSTALL DECAL A0320704 ON SIDE OPPOSITE OF CONTROLS
 4. INSTALL DECAL A042F980 ON CONTROLS SIDE
 5. GENSET DATATAG TO BE APPLIED PRIOR TO SHIPPING

DIMENSIONS ARE IN: INCHES () ARE IN: . . .		DO NOT SCALE PRINT		CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE .050		DWN D.J. HUMECKI		ITEM NAME	
X: ± .1 IN OR 4 mm		APVD J.C. BREITBACH		DATE 02MAY2022		LABEL, INFORMATION	
X.Y: ± .01 IN OR 0.25 mm		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903		60L ENCLOSED, INSTALLATION	
X.XXX: ± .001 IN OR 0.025 mm						D CAD SHEET ITEM NUMBER	
ANGULAR TOLERANCE: ±						3 OF 3 A072B401	
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BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	NIPPLE,PLAIN HEXAGON; -16 NPT X -12 NPT,STEEL	I2164-16-12
2	1	ELBOW,PLAIN STREET PIPE; 90DEG -12 NPT X -12 FNPT,S	I2195-12-12
3	1	UNION,MALE; -20 ORFS X -20 ORB,STEEL	I2313-20-20
4	1	CONNECTOR,MALE; -16 ORFS X -12 NPT,STEEL	I2316-16-12
5	1	ELBOW,MALE UNION; 90D -16 ORB X -16 ORFS,S	I2352-16-16
6	1	ELBOW,MALE ADAPTER; -20 ORFS X M42 ORB	I2355-20-M42
7	1	CONNECTOR,FEMALE; M33 MORB X -16 FNPT,STEEL	I4744-M33-16
8	1	BRACKET,MOUNTING; PRE-LUBE PUMP	A065V595
9	2	SPACER,MOUNTING	A065V598
10	1	HOSE,FLEXIBLE	A065V601
11	2	BRACKET,PUMP; PRE-LUBE	A065V656
12	1	PUMP,PRIMING; OIL PRE-LUBE	A065V657
13	1	VALVE,CHECK; 3/4 FNPT X 3/4 FNPT	A065V723
14	1	HOSE,FLEXIBLE	A065V726

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2020-378	INITIAL RELEASE	GVD	JCB	JCB	16DEC20

VIEW A-A

VIEW B-B

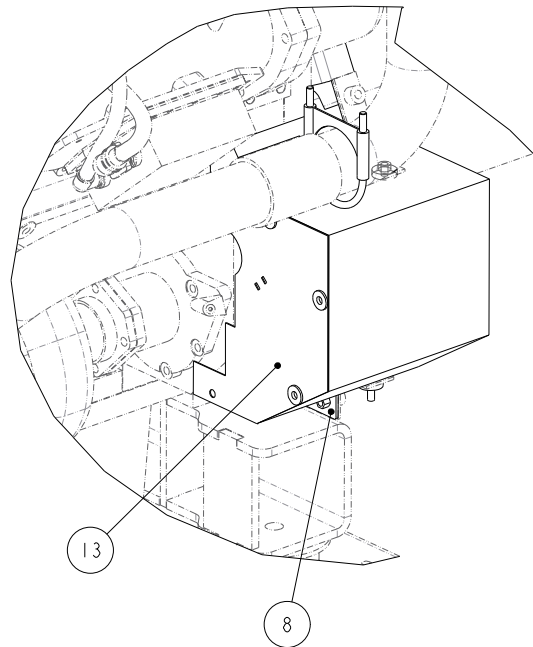
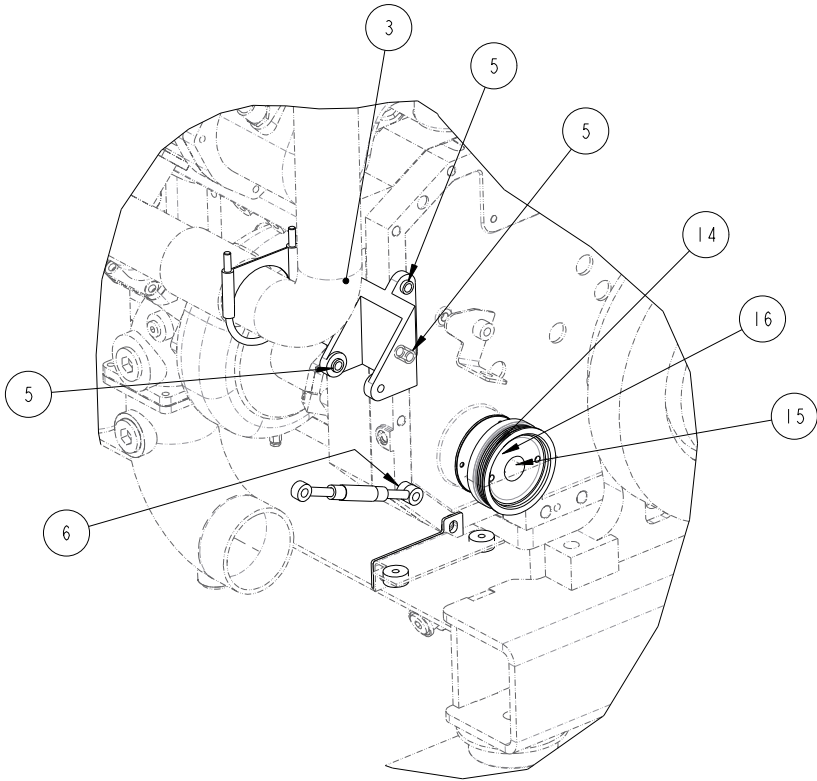
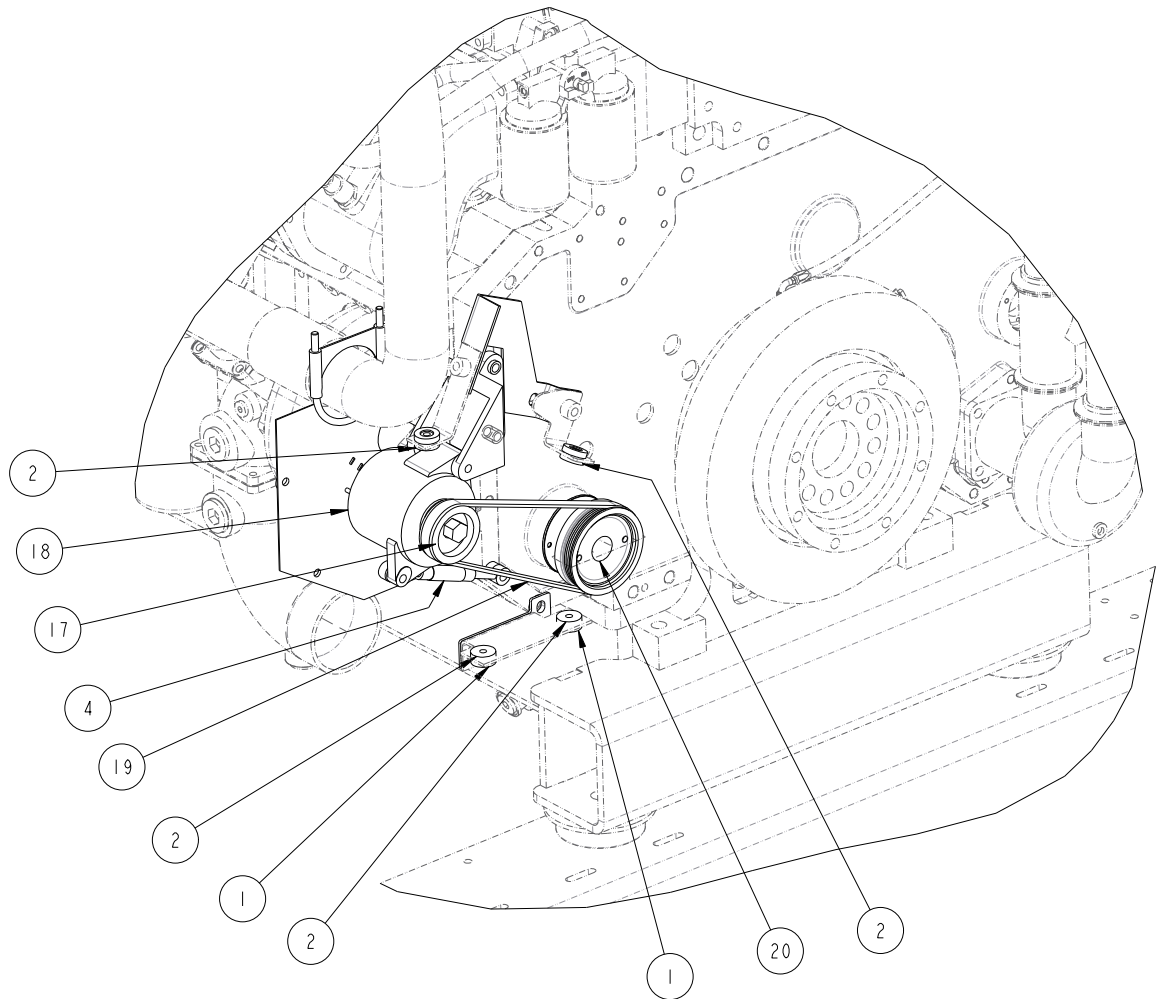
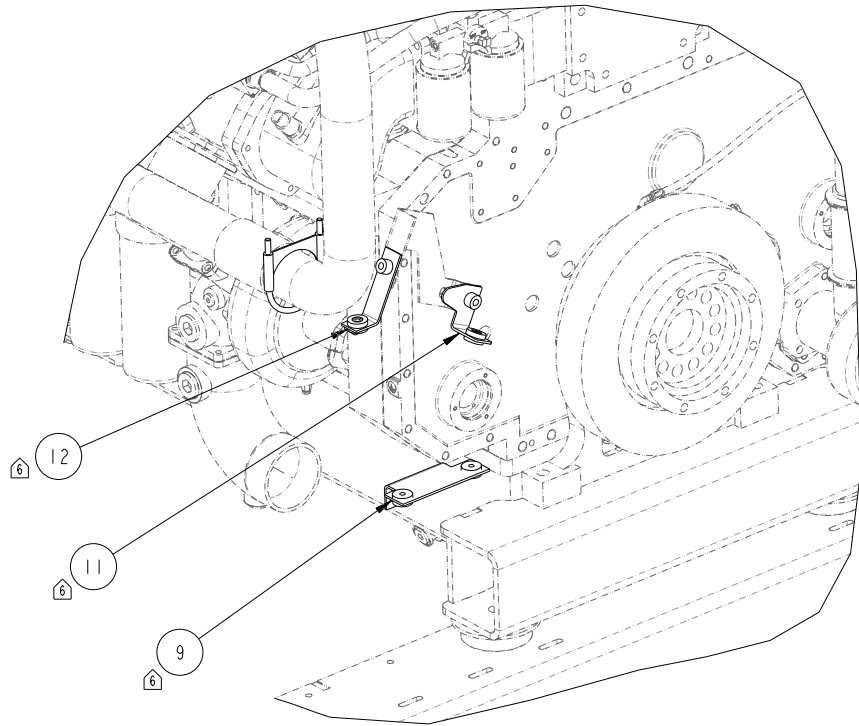
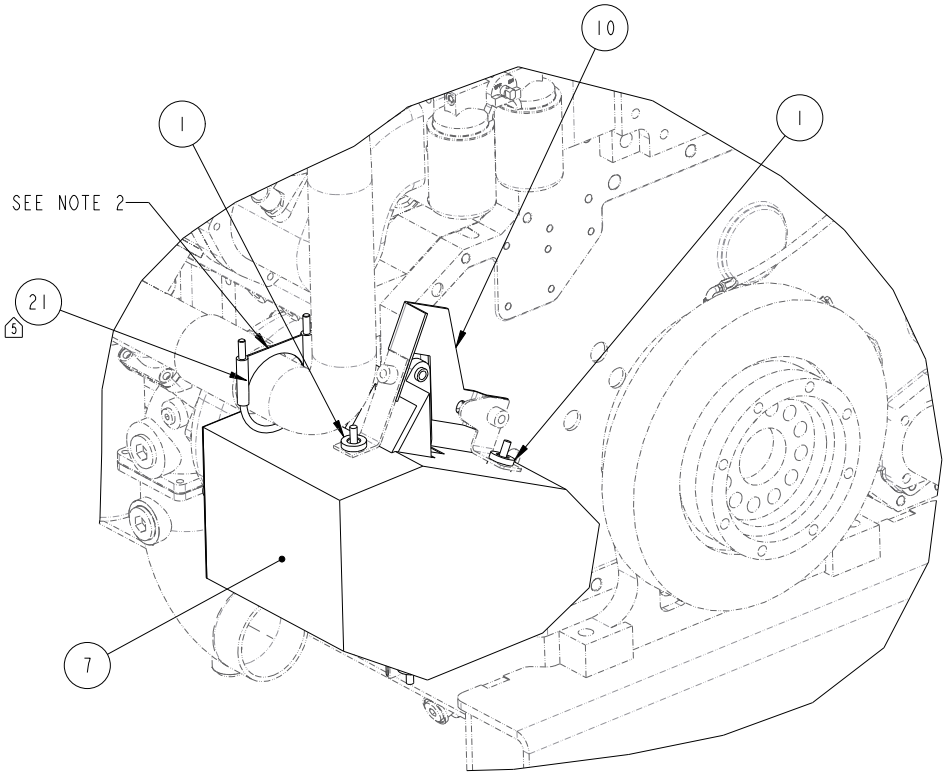
FLOW OF CHECK VALVE
TO POINT TOWARDS OIL
FILTER HEAD AWAY FROM
PRE-LUBE PUMP

DIMENSIONS ARE IN: INCHES [] ARE IN: .		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 0.156	DWN G.V.DOIRE	ITEM NAME	
F: ± .1 IN OR 3 mm			CKD J.C.BREITBACH	ASM, NON ENG DRIVEN EOP	
F.LC: ± .010 IN OR 0.25 mm			APVD J.C.BREITBACH	PRE-LUBE PUMP	
X: ± .010 IN OR 0.25 mm			DATE 16DEC2020		
ANGULAR TOLERANCE: ± 1°					
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MUST CONFORM TO CES 10903			CAD SHEET 1 OF 1	ITEM NUMBER A065V653	REV 0

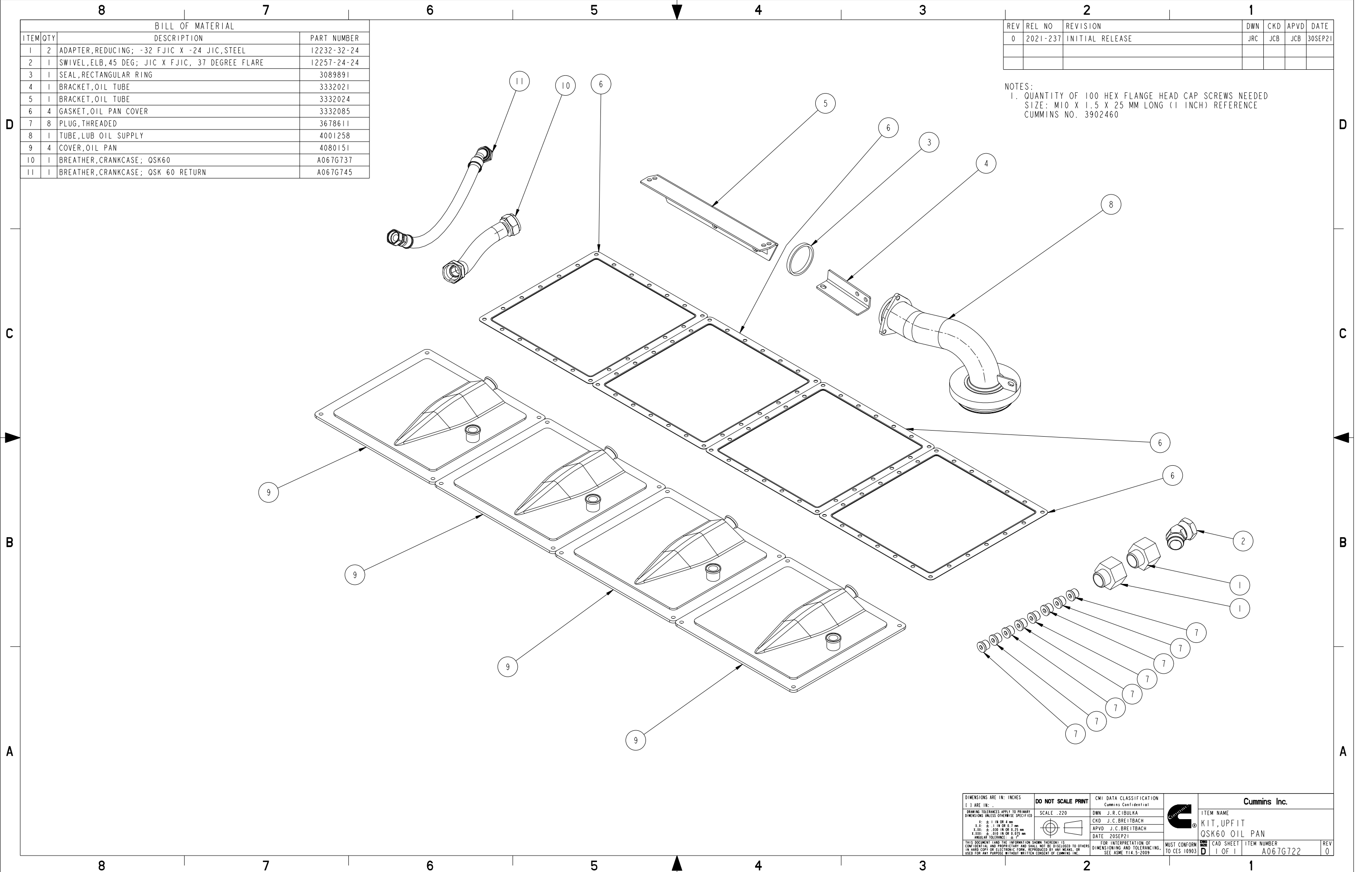
BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	4	ISOLATOR,VIBRATION	3035083
2	4	ISOLATOR,VIBRATION	3035084
3	1	SUPPORT,ALTERNATOR	3332187
4	1	LINK,ADJUSTING	3332206
5	3	SLEEVE	3332237
6	1	SPACER,ACCESSORY DRIVE	3332241
7	1	GUARD,ALTERNATOR	3642982
8	1	BRACKET,BELT GUARD	3642988
9	1	BRACKET,BELT GUARD	3642991
10	1	BRACKET,BELT GUARD	3642993
11	1	BRACKET,BELT GUARD	3642995
12	1	BRACKET,BELT GUARD	3642997
13	1	PLATE,COVER	3643008
14	1	SPACER,MOUNTING	4080395
15	1	SEAL,OIL	4080404
16	1	SPACER,MOUNTING	4085923
17	1	PULLEY,ALTERNATOR	4101077
18	1	ALTERNATOR	4381504
19	1	BELT,V RIBBED	5412990
20	1	PULLEY,ACCESSORY DRIVE	5580811
21	1	CLAMP, U-BOLT, GUILLOTINE; 4.00", PLATED	89548K

NOTES:
1. REMOVE LOWER PIECE OF PILLOW BLOCK THAT IS SUPPLIED WITH ENGINE (NOT SHOWN) AND ADD ITEM 89548K

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-001	INITIAL RELEASE	JRC	JCB	JCB	04JAN21
5	2022-055	ADDED 89548K; UPDATED NOTES	JRC	JCB	JCB	04MAR22
6	2022-178	REMOVED NOTE "3642991/9958997 INCLUDED W/THE GUARD 3642982"& ADDED THEM BACK INTO BOM	DJH	JCB	JCB	13OCT22



DIMENSIONS ARE IN: INCHES () ARE IN: .		DO NOT SCALE PRINT	CM1 DATA CLASSIFICATION Cummins Confidential	Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED: X: ±.1 IN OR 4 mm X.12: ±.1 IN OR 3.2 mm X.125: ±.001 IN OR 0.25 mm X.125: ±.001 IN OR 0.25 mm ANGULAR TOLERANCES: ±		SCALE: .200	DWN: J.R.CIBULKA CKD: J.C.BREITBACH APVD: J.C.BREITBACH DATE: 04JAN21	CAD SHEET: 1 OF 1	ITEM NUMBER: A065Z312.DRWSUP
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BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	ADAPTER,REDUCING; -32 FJIC X -24 JIC,STEEL	12232-32-24
2	1	SWIVEL,ELB,45 DEG; JIC X FJIC, 37 DEGREE FLARE	12257-24-24
3	1	SEAL,RECTANGULAR RING	3089891
4	1	BRACKET,OIL TUBE	3332021
5	1	BRACKET,OIL TUBE	3332024
6	4	GASKET,OIL PAN COVER	3332085
7	8	PLUG,THREADED	3678611
8	1	TUBE,LUB OIL SUPPLY	4001258
9	4	COVER,OIL PAN	4080151
10	1	BREATHER,CRANKCASE; QSK60	A067G737
11	1	BREATHER,CRANKCASE; QSK 60 RETURN	A067G745

REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2021-237	INITIAL RELEASE	JRC	JCB	JCB	30SEP21

NOTES:
1. QUANTITY OF 100 HEX FLANGE HEAD CAP SCREWS NEEDED
SIZE: M10 X 1.5 X 25 MM LONG (1 INCH) REFERENCE
CUMMINS NO. 3902460

DIMENSIONS ARE IN: INCHES
1.1 ARE IN: -

DO NOT SCALE PRINT

SCALE: 220

CUMMINS DATA CLASSIFICATION
Cummins Confidential

DWN: J.R.CIBULKA
CKD: J.C.BREITBACH
APVD: J.C.BREITBACH
DATE: 20SEP21

Cummins Inc.

ITEM NAME
KIT,UPFIT
QSK60 OIL PAN

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FOR INTERPRETATION OF
DIMENSIONING AND TOLERANCING
SEE ASME Y14.5-2009

MUST CONFORM
TO CES 10903

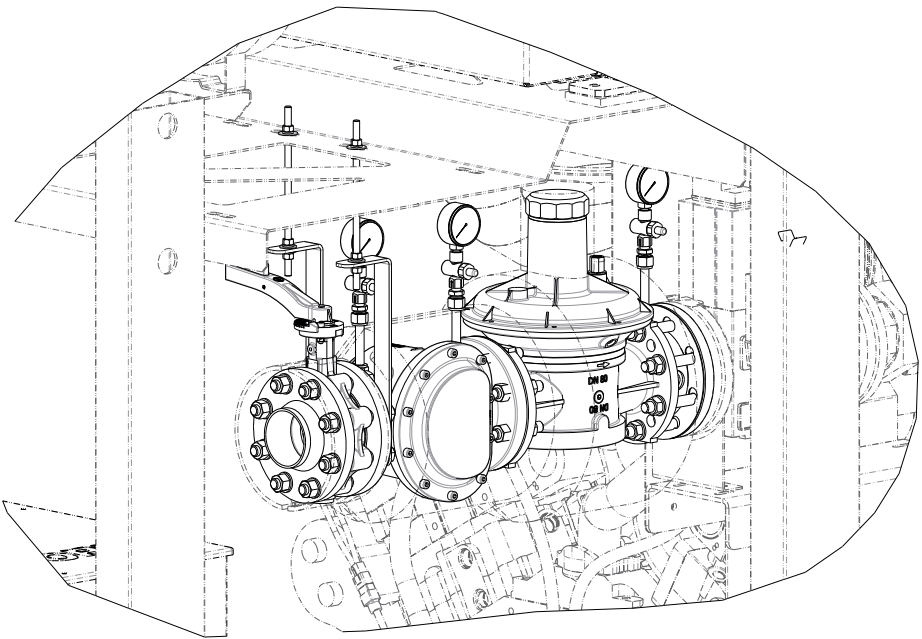
CAD SHEET
1 OF 1

ITEM NUMBER
A067G722

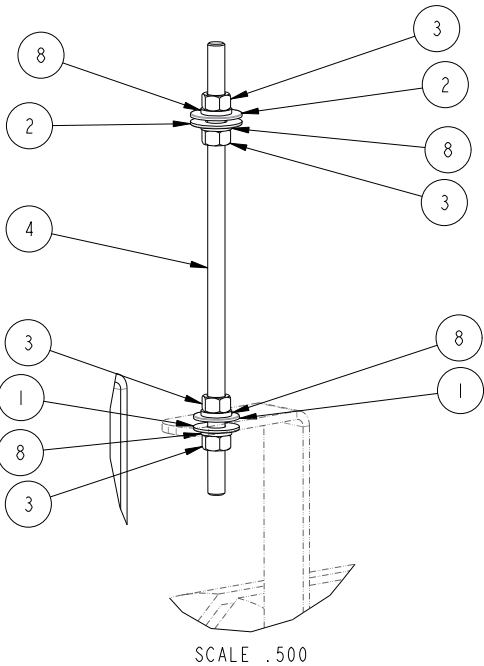
REV
0

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	4	WASHER,PLAIN; 0.38, B18.21.1 TYPE B,REG	20000-038
2	4	WASHER,PLAIN; 0.44, B18.21.1 TYPE B,REG	20000-044
3	8	NUT,REGULAR HEXAGON; 0.38-16,ZN,GR 5	20100-038
4	2	ROD, THREADED, 3/8"-16 X 10" LG; McMASTER-CARR 95475A660	23966
5	2	BRACKET,MOUNTING; GAS VALVE	A068K691
6	1	ELEMENT,HEATING; GAS TRAIN HEAT TAPE	A068K694
7	1	INSULATION,TUBE; DUNGS VALVE BLANKET	A071S805
8	8	WASHER, LOCK; 3/8	WASHER_LOCK_3-8

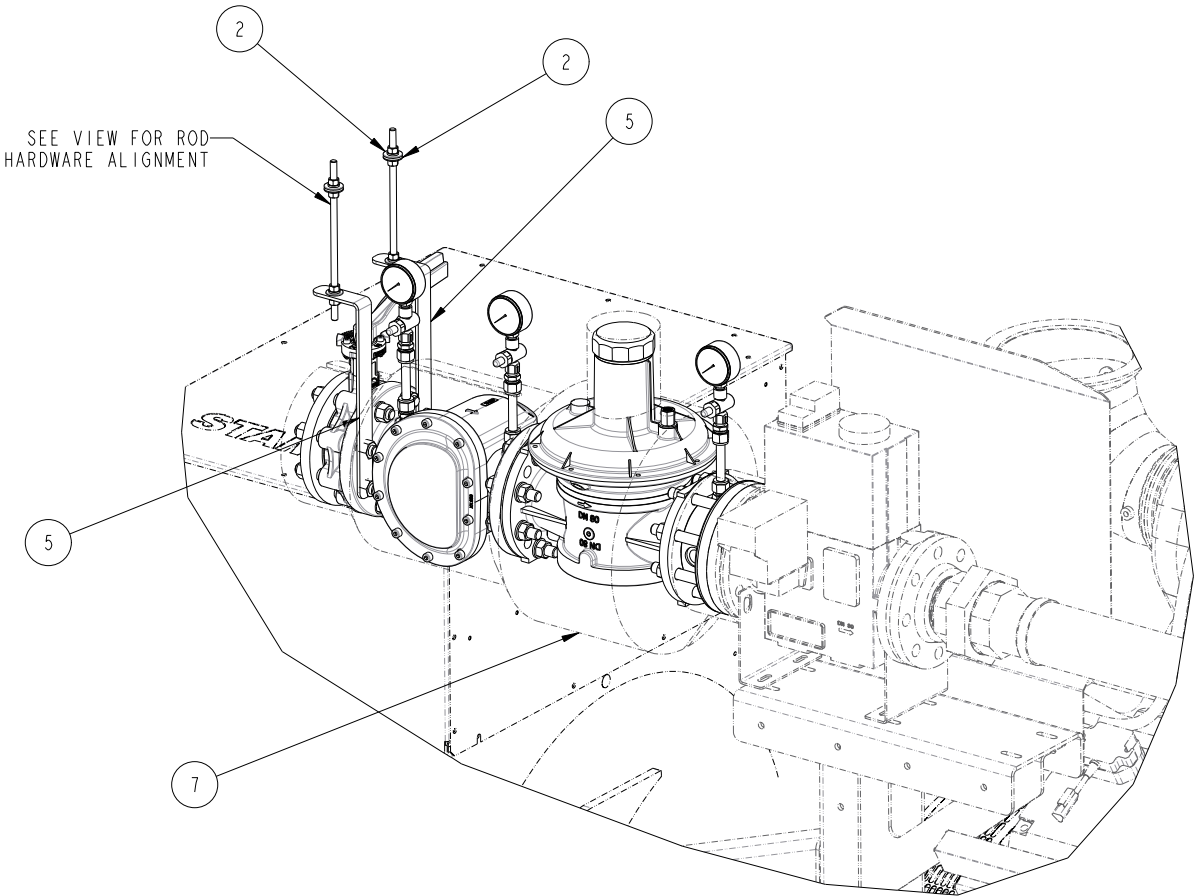
REV	REL NO	REVISION	DWN	CKD	APVD	DATE
0	2022-020	INITIAL RELEASE	JRC	JCB	JCB	27JAN22



VIEW OF ASSEMBLED VALVE & COMPONENTS



SCALE .500



SEE VIEW FOR ROD
HARDWARE ALIGNMENT

NOTES:
1. ITEMS 20000-038 & 044, 20100-038 & WASHER_LOCK_3.8 ARE SHOP SUPPLY
2. ITEM A068K694 NOT SHOWN. ITEM IS TO BE WRAPPED AROUND REGULATOR ASSEMBLY

DIMENSIONS ARE IN: INCHES 1 ARE IN: -		DO NOT SCALE PRINT	CMI DATA CLASSIFICATION Cummins Confidential		Cummins Inc.	
DRAWING TOLERANCES APPLY TO PRIMARY DIMENSIONS UNLESS OTHERWISE SPECIFIED		SCALE 1:88	CUMMINS DWN J.R.CIBULKA CKD J.C.BREITBACH APVD J.C.BREITBACH DATE 27JAN22		ITEM NAME ASM,FUEL SYSTEM 60L W/ PRESSURE REGULATOR	
X.1: ± .1 IN OR 4 mm X.2: ± .1 IN OR 0.7 mm X.3: ± .030 IN OR 0.25 mm X.4: ± .010 IN OR 0.25 mm ANGULAR TOLERANCE: ±			FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING SEE ASME Y14.5-2009		MUST CONFORM TO CES 10903	CAD SHEET 1 OF 1
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			ITEM NUMBER A068K700	REV 0		