

TIER 4 ARE YOU READY?

FREQUENTLY ASKED QUESTIONS
REGENERATION QUICK REFERENCE
SERVICE INTERVAL COMPARISON

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TIER 4

QUESTIONS & ANSWERS:

What is Tier 4?

Tier 4 is a government mandated reduction in harmful exhaust gases for diesel powered equipment. Tier 4 standards will require significant emission reductions of particulate matter (PM) and Nitrogen Oxides (NOx). PM is defined as the black smoke/soot found in engine diesel engine exhaust, and NOx is defined as nitrogen monoxide and nitrogen dioxide.

What is the time table for Tier 4?

Tier 4 is comprised of two significant stages for different engine horsepower ratings. The first stage is a significant reduction of PM and NOx. The second stage is a further but substantial reduction of NOx only emissions.

Will all manufacturers be on the same timeline?

The schedule is consistent for all manufacturers, however, each manufacturer has the ability to use "flex credits" on individual product lines.

Did all products come out Tier 4 compliant on January 1, 2011?

No, select machines will phase in over the year. There is also a provision for certain machines to be sold under a Flex program until they are changed to Tier 4 (final stage).

What do machine owners need to do to comply with the EPA guidelines?

Machine owners don't need to do anything, because all the changes impact the manufacture of equipment. All heavy equipment manufacturers who sell new equipment in North America must change over to Tier 4 compliant emissions during the next few years. They are phasing in various product families in 2011.

How will Tier 4 affect my overall owning and operating costs?

Actually, both might rise. Ownership costs could increase if manufacturers try to recoup some of their Tier 4 development and implementation costs. Your operating costs might also increase, due to Tier 4 engines' requirement for Ultra Low Sulfur Diesel and after-treatment chemicals. *However*, some of these expenses will be offset by Tier 4's improved fuel efficiency, which is as much as 5% greater than that of Tier 3 models.

If I don't own a Tier 4 compliant fleet, will it affect my ability to bid and perform work?

Throughout the country and within our local and state governments, emission requirements are rapidly changing. Compliance with emissions regulations is not a choice. In fact, it is mandatory in some places.

Noncompliance penalties can include:

- Hefty fines
- Stepped-up enforcement by local and state agencies
- Bid specifications and site permits that require diesel emissions reductions
- Decreased profit margins and potential job loss
- Legal actions, litigation costs and lost time.

Will I continue to be able to buy replacement engines and repair/rebuild non-Tier 4 engines?

While we see the government restricting the sales on non-compliant Tier 4 replacement engines, we do not foresee the government limiting the sale of replacement parts for non-Tier 4 engines.

Will the Tier 4 machines need special diesel fuel?

Yes, Tier 4 machines will only be able to use Ultra Low Sulfur Fuel (ULSF) and will require CJ-4 Low Ash Oil. It's important to note that CJ-4 Low Ash Oil will run in all prior Tier machines, so owners only need to keep one type of oil on hand.

How will Tier 4 affect my fuel economy?

Tier 4 engines will deliver an increase of up to 5% in fuel efficiency over Tier 3 models.

What happens if fuel with higher sulfur content is used?

Ultra Low Sulfur Diesel fuel is required to be used in all Tier 4 Interim/Stage IIIB engines for both regulatory and technical reasons. Higher-sulfur fuel will cause operational problems and jeopardize component life.

TIER 4 TIMELINE:



**Service Intervals & Maintenance Activity:
C9.3 ACERT - C18 ACERT**

Fuel & Maintenance	Tier 3	Tier 4 Interim
Fuel Spec (sulfur ppm)	500 ppm (mg/kg)	15 ppm (mg/kg) EU~10 ppm (mg/kg)
Bio Fuel	B20	B20
Fuel Consumption	Base	Up to 5% improvement (machine and application specific)
Required Oil Spec	ECF-2 (CI-4)	ECF-3 (CJ-4) (ACEA E9 or JASO DH-2 that meet CJ-4)
Oil Change Interval	Base	Same
Cost of Oil Filter	Base	Similar
Cost of Fuel Filters (Dual)	Base	Similar
Valve Lash	500/2,500 hours	2,500 hours
DPF Ash Service Interval	N/A	5,000 hours
OCV Filter	N/A	2,000 hours
CRS Spark Plug	N/A	5,000 hours
Overhaul Life	Base	Same

- Eliminated 500-hour initial valve lash service requirement.
- Basic oil and filter change intervals have not changed.
- Engines are required for use with Ultra Low Sulfur Diesel (ULSD) fuel and also accommodate B20 biodiesel when blended with ULSD.
- New emissions standards drive new service intervals and maintenance activity:
 - 5,000 hours (C7.1 ACERT - C18 ACERT) for DPF ash removal. Removal options:
 - ◆ Mobile ash-removal tool
 - ◆ Stationary ash-removal tool
 - ◆ Cat Reman exchange
 - 2,000 hours for Open Crankcase Ventilation filter
- CEM aftertreatment is designed with a removable center section to allow easy access to the DPF for ash service.






REGENERATION FUNDAMENTALS

- Always operate the system in **Automatic mode** if the machine is so equipped.
- The system monitors soot levels in the Diesel Particulate Filter (DPF) and automatically initiates regeneration when conditions are optimal. **The operator does not have to do anything to initiate regeneration.**
- The **operator can interrupt regeneration** at any time by returning to work.
- Regenerating during normal idle times throughout the shift is sufficient to continue **uninterrupted operation.**
- The system **may regenerate during operation** if necessary, but the operator does not have to take any action.
- Regeneration can always be **initiated manually by the operator** if the soot level in the DPF is at least 15 percent.

QUICK REFERENCE CARD

Cat® Regeneration System
(7L to 18L engines)

REGENERATION LAMPS

Lamps	Event	Operator Action
	Active regen in process	<ul style="list-style-type: none">• No action required
	Active regen needed	<ul style="list-style-type: none">• Make sure Regen Switch is in Auto-matic position (middle), not Disabled position (bottom)
	Warning: Active regen required	<ul style="list-style-type: none">• Stop machine• Put transmission in neutral• Apply parking brake• Press and hold top position of Regen Switch for at least 2 seconds
	Warning: Active regen required within 10 minutes	<ul style="list-style-type: none">• Stop machine• Put transmission in neutral• Apply parking brake• Press and hold top position of Regen Switch for at least 2 seconds
	Active regen disabled	To reenable system: <ul style="list-style-type: none">• Cycle engine start switch key OR• Press and hold top position of Regen Switch for at least 2 seconds

OTHER ACTIONS

To FORCE a regeneration:

1. Stop machine
2. Put transmission in neutral



3. Check soot level monitor to make sure DPF is at least 15% full



Parking Brake

4. Apply parking brake



Regen Switch

5. Press and hold top position of the Regen Switch for a minimum of 2 seconds

To DISABLE a regeneration:



Regen Switch

Press and hold bottom position of the Regen Switch for a minimum of 2 seconds



This machine requires **Ultra Low Sulfur Diesel fuel** (≤ 15 ppm or mg/kg) and **low-ash oil** (Cat ECF-3 spec - API CJ-4 and ACEA E9).

WARNING

DO NOT OPERATE OR WORK ON THIS EQUIPMENT UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND WARNINGS IN THE OPERATION AND MAINTENANCE MANUALS. FAILURE TO FOLLOW THE INSTRUCTIONS OR HEED THE WARNINGS COULD RESULT IN INJURY OR DEATH. CONTACT ANY CATERILLAR DEALER FOR REPLACEMENT MANUALS. PROPER CARE IS YOUR RESPONSIBILITY.

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Tier 4 Compliance: Did you Know?

- Fleet compliance gives your company an edge in the bid process. It communicates your high standards, your understanding of today's regulatory challenges, and your commitment to maintaining the highest levels of productivity and reliability on the job.
- The Empire Rental fleet is 100% compliant with California Air Resources Board (CARB) standards. Tier 4 machines are added to the fleet as they become available.
- Some older machines can be retrofitted to the Best Available Control Technology (BACT) for a specific machine and engine combination. This will increase the emissions tier level of an individual machine and could bring a fleet into regulatory compliance.
- Empire has committed extensive time and resources to training our sales and support teams in Tier 4 technology, regulations and applications. In addition, we have instituted a continual training program for Empire technicians and technical service team members.
- Tier 4 machines operate just like their predecessors, so operators should not need additional training to run them. However, operators **will** need to be aware that Tier 4 machines have a couple of new and important switches and dash lights, and that care **must be** taken to use the proper fuel and oil for machine operation. Empire offers Tier 4 operator training to improve productivity and ensure equipment reliability.
- Tier 4 emission standards for manufacturing new equipment will impact everyone in the industry. Fortunately, fleet owners have a variety of options available to help them achieve compliance over the next few years.

The Empire team can help! We are here to answer your questions, help you explore your options, and find the best solutions for your fleet and your business.



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