



## Tier 4 Diesel Emissions FAQs

# NAVIGATING THE EMISSIONS ENVIRONMENT



# CLEARING THE WAY

## TIER 4

Cat® Lift Trucks is committed to our customers' success. With a full complement of resources, including

customer-focused product development, sustainability expertise and a reliable dealer network, we're focused on offering products and solutions that produce significantly fewer emissions for a better environment.

Continuing in our tradition of product value and innovation, Cat Lift Trucks has established a comprehensive, ongoing program to study and follow the regulations stipulated by the U.S. Environmental Protection Agency (EPA) now and into the future. This includes a core focus on implementing the EPA Tier 4 emission regulation standards across our diesel product line. These lift trucks are designed to meet the new emissions standards while delivering increased productivity along with lower overall operating costs.

**What is Tier 4 – and what does this mean to you and your operation?** The following can be used as a general guide and overview when evaluating your application needs and requirements for the future.



### What is Tier 4?

Tier 4 is the final tier of regulations on diesel exhaust as implemented by the EPA in an effort to lower the amount of Particulate Matter (PM) or "soot" that is released into the environment. The requirement is to reduce the PM by an order of magnitude, or by 90-95%, as compared to the engine's emissions before the beginning of the regulation process.

### Who enforces the Tier 4 regulations?

The EPA is responsible for the implementation of regulations and emissions standards to protect the environment for the future of the planet. The California Air Resources Board (CARB) is responsible for setting the emissions standards for the state of California only, but has been a leading innovator in emissions regulations for many years.

## Diesel Off-Highway Emissions Regulations Schedules

		NOx / HC / PM (g/kW-hr)										[Conversion: g / kW-h]x 0.7457 = g/bhp-hr]																			
		(NOx+HC) / CO / PM (g/kW-hr)										[Conversion: g / kW-h]x 0.7457 = g/bhp-hr]																			
kW	(HP)	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017								
37-55	(50-75)	9.2 / - / - / -						(7.5) / 5.0 / 0.40						(4.7) / 5.0 / 3.0 <sup>3</sup>						(4.7) / 5.0 / 0.03 <sup>3</sup>											
														(4.7) / 5.0 / 0.4						0.40 / 0.19 / 5.0 / 0.02 <sup>4</sup>						0.40 / 0.19 / 5.0 / 0.02					
55-75	(75-100)	9.2 / - / - / 0.50						(6.6) / 5.0 / 0.30						(4.0) / 5.0 / 0.30																	
75-129	(100-175)																														
EPA		Tier 1						Tier 2						Tier 3						Tier 4 Interim						Tier 4 Final					

**Notes:**

1. Generally, effective dates of standards are for engines built on or after January 1 of the respective year, except where noted.
2. Separate NOx and HC standards are separated by a "/". Combined NOx and HC standards are denoted in parenthesis "( )".
3. 0.4 g/kWh PM (Tier 3) if manufacturer complies with the 0.03 g/kWh standard from 2012 for 37-55Kw engines.
4. NOx / HC / CO / PM (g/kW-hr) PM/CO: full compliance from 2012; NOx/HC:  
 Option 1 (if banked Tier 2 credits used) – 50% of engines must comply in 2012-2013.  
 Option 2 (if no Tier 2 credits claimed) – 25% of engines must comply in 2012-2014, with full compliance on December 31, 2014.

**When do Tier 4 regulations take effect?**

Tier 4 final regulations went into effect January 1, 2013, for all diesel engines 37-55 kw, such as Cat lift trucks 4,000 – 12,000 lb. diesel forklifts. Tier 4 interim regulations continued through 2014 for all engines 55 kw and up, including Cat lift trucks 15,500 – 36,000 lb. diesel lift trucks.

**How are manufacturers addressing the “Tier 4 challenge?”**

Cat Lift Trucks has developed and executed a very specific strategy with two customer-focused principles – deliver incremental customer value and make emissions technology transparent. We don’t want our customers or their operators to have to manage the emissions solutions. Tier 4 regulations also offer an opportunity for customers currently utilizing diesel technology to re-evaluate whether an alternative fuel type, such as LP, gasoline or electric, will work in their current application.

# STAY INFORMED



## **I'm currently operating a diesel fleet. How do I need to prepare for these standards?**

If you have an existing diesel fleet that was manufactured prior to January 1, 2013, you do not need to modify your lift truck engines to meet the Tier 4 regulations. The standards apply solely to new engines manufactured after January 1, 2013. Simply put, this means that any new diesel lift truck in this power class purchased from this date forward must operate using a Tier 4 compliant engine<sup>1</sup>. In addition, all lift truck manufacturers are required to meet these standards today and into the future.

## **How do I determine what percentage of my fleet may need to be converted to Tier 4?**

This depends on your location. There are varied regulation conversion timelines that exist from region to region depending on the state. Contact your local Cat lift truck dealer, who can work with you to determine the best conversion process for your fleet.

## **What technology is used to meet Tier 4 emissions regulations?**

There are various systems and technology in place that help to meet the emissions requirements. One or any combination of the methods listed below can be used to ensure Tier 4 regulations are met.

- **Diesel Particulate Filters (DPF):**  
These filters are designed to trap particulate matter from the exhaust of diesel engines and burn it off to prevent matter from being released into the atmosphere.
- **Selective Catalyst Reduction (SCR) Systems:**  
SCR systems provide an effective engine emissions NOx reduction technology, which usually features a catalyst such as urea or Diesel Exhaust Fluid (DEF) to further help clean the emissions.
- **Diesel Oxidation Catalysts (DOC):**  
This system relies on an oxidation process that utilizes a catalyst to convert certain emissions in the diesel engine exhaust into unregulated emissions, such as water.
- **Turbochargers:**  
A very common technique is the use of a smaller engine with the addition of a turbocharger to retain similar torque and power characteristics. As a general rule, smaller engines use less fuel, which yields lower emission levels.



### What are the benefits of the Cat Lift Trucks Tier 4 engines?

By design, the new Tier 4 engines provide added benefits for your operation, such as:

- Precise control over the combustion process
- Increased engine performance
- Improved fuel efficiency
- Reduced carbon monoxide emissions
  - 8,000 - 12,000 lb. Series / 854E Diesel Engine:  
Reduced CO emissions by up to 91%
  - 15,500 lb. Model / 854F Diesel Engine:  
Reduced CO emissions by up to 92%
  - 22,000 - 36,000 lb. Series / 1204E Diesel Engine:  
Reduced CO emissions by up to 99%

By precisely matching a torque converter with the engine, you'll benefit from controlled, powerful acceleration – turning power into performance. And, testing on the 8,000 – 12,000 lb. capacity series of diesel Cat lift trucks has shown a significant reduction (21.6%) in fuel consumption compared to our previous diesel engines.



\*Customers can currently purchase lift trucks with Tier 3 or Tier 4 interim engines if that engine was manufactured before the regulations went into effect or if the engine is being manufactured under the Small Volume Allowances (SVA) that the government is allowing during the transition.

# GET THE FACTS



## **How much will the new emissions controls cost me?**

Costs will vary depending on the engine size. However, depending on the manufacturer, the costs of converting your fleet could be more than offset by improved performance along with reduced maintenance and fuel consumption costs.<sup>2</sup>

## **What happens if I don't convert my fleet?**

Conversion regulations vary depending on where you are located. Your local Cat lift truck dealer can help you identify the specific standards that may exist for your area and a proper plan of action for your operations.

## **How do I determine the best solution for my business?**

Although there are a variety of emissions solutions to consider, Cat Lift Trucks meets the emissions regulations without some of the drawbacks of other systems.

In addition, recent advances in technology mean that customers now have a wide range of lift truck fuel types to choose from, including electric, LP, gasoline and diesel. In certain applications, the use of electric pneumatic tire lift trucks is a viable option in place of previous internal combustion (IC) lift trucks. Electric lift trucks offer an alternative solution, while continuing to provide the same performance that IC lift trucks are known for today.

Your local Cat lift truck dealer can help you determine the best solution for your specific application, taking into consideration your current business needs, environment and required lift capacities.



For more information on these standards or the Cat Lift Trucks range of products, contact your local dealer at **1-800-CAT-LIFT** or visit **[www.cat-lift.com](http://www.cat-lift.com)**.

**Additional Resources:**

- [EPA:](http://www.epa.gov/nonroad/)  
<http://www.epa.gov/nonroad/>
- [CARB:](http://www.arb.ca.gov/homepage.htm)  
<http://www.arb.ca.gov/homepage.htm>
- [CARB Diesel Regulation:](http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm)  
<http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm>
- [EPA Diesel Regulations:](http://www.epa.gov/oms/fuels/dieselfuels/regulations.htm)  
<http://www.epa.gov/oms/fuels/dieselfuels/regulations.htm>
- [CARB Engine Certifications Directory:](http://www.arb.ca.gov/msprog/offroad/cert/cert.php)  
<http://www.arb.ca.gov/msprog/offroad/cert/cert.php>
- [CARB Retrofit Directory:](http://www.arb.ca.gov/msprog/offroad/orspark/verdev.htm)  
<http://www.arb.ca.gov/msprog/offroad/orspark/verdev.htm>





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