



## CARB's LSI Regulations Begin January 1, 2009 – Are Your Propane Forklifts Ready?

The California Air Resources Board's large-spark ignited (LSI) regulation requires users of propane-fueled and other types of spark-ignited forklifts, sweepers/scrubbers, tow motors, and airport ground support equipment with more than 25 horsepower each to meet special fleet-averaged emission levels and record-keeping requirements.

Originally set to begin January 1, 2009, CARB recently agreed to delay enforcement until after April 1, 2009, giving fleets an extra 90 days to make sure their emission levels will meet or beat CARB's special fleet-averaged emission requirements. CARB-verified emissions-lowering retrofits for your existing lifts or newer, lower-emitting lifts must be operating or on order (with a purchase order as proof) no later than April 1. For more details, see <http://www.arb.ca.gov/msprog/offroad/orspark/enforcementdelay.pdf>.

The new regulation has lots of twists and turns, but here are some of the basic requirements affecting fleets of propane-fueled forklifts, the most popular type of LSI equipment. CARB's regulation requires that **fleets of four or more forklifts** meet specific, reduced emissions rates focused on NOx (oxides of nitrogen). If you or your customers use propane forklifts in California, familiarity and compliance is very important. Failure to comply can result in penalties of \$500 per day per piece of non-compliant equipment on or after April 1, 2009. This article will help you understand certain important portions of the regulation, but for all requirements, see the regulatory language and information at <http://www.arb.ca.gov/msprog/offroad/orspark/orspark.htm> and a "frequently asked questions" document at [http://www.arb.ca.gov/msprog/offroad/orspark/documents/faq7\\_08.pdf](http://www.arb.ca.gov/msprog/offroad/orspark/documents/faq7_08.pdf).

The LSI regulation already requires that propane forklift fleet owners keep detailed fleet records at the business' "central location" and be ready to show to CARB for each forklift or other type of covered LSI equipment. The information that must be kept includes serial numbers, model, year, and the factory emission rate or the emission rate of a retrofitted "controlled" lift. And on January 1, 2009, your "fleet" of four or more forklifts, must meet specified fleet-averaged emissions values for each one that runs more than 251 hours/year. What makes a "fleet"? Three lifts or fewer constitute a small fleet (with record-keeping requirements only), 4 – 24 pieces are a medium-sized fleet, and 25 or more is a large fleet. **Only medium and large fleets must meet the fleet-averaged emission requirements.**

If you rent or lease forklifts, the regulation applies but in different ways depending on how many you rent and for how long. If you or your customers rent or lease, the regulation still applies, so be certain to cover this with the rental or leasing company. And agricultural lifts? They have slightly different requirements. To understand them, consult the LSI regulations. Riding electric Class I or Class II forklifts reflect a zero-emission rate, so if your fleet has some electrics, you will factor in their zero-emission rate in your overall fleet average. (Class III cannot be counted in the averaging process, however.) Propane forklifts 2007 model year or later will also have lower emission rates that will help you meet the LSI regulation's fleet-averaged emission requirements. And newer "Blue Sky" propane lifts, with an emission rate one-third of the current tailpipe standard, are almost as clean as new electric lifts. The table below shows fleet emissions requirements by number of equipment AND the dates for compliance.

## ***Fleet Average Emissions Requirements For Your Forklifts***

### **Fleet Average Emission Level Standards in grams per kilowatt-hour (brake-horsepower-hour) of hydrocarbons plus oxides of nitrogen**

<b>Fleet Type</b>	<b>Initial Compliance Date</b>		
	<b>1/1/2009</b>	<b>1/1/2011</b>	<b>1/1/2013</b>
<b>Large Forklift Fleet</b>	<b>3.2 (2.4)</b>	<b>2.3 (1.7)</b>	<b>1.5 (1.1)</b>
<b>Medium Forklift Fleet</b>	<b>3.5 (2.6)</b>	<b>2.7 (2.0)</b>	<b>1.9 (1.4)</b>
<b>Non-forklift Fleet</b>	<b>4.0 (3.0)</b>	<b>3.6 (2.7)</b>	<b>3.4 (2.5)</b>

Forklifts are required to have a data plate in the engine compartment, so use it for recordkeeping and to determine your lift's emissions rate, model year, etc. Forklifts from year 2000 and before lifts, along with some "uncontrolled" lifts from 2001 – 2003 use an emission rating of 16 g/Kw-hr (12 g/bhp-hr). Lifts that came with controls from the factory in 2001 – 2003 use 4 g/Kw-hr (3 g/bhp-hr) for a rating. So do lifts built 2004 – 2006. Lifts built in or after 2007 use 2.7 g/Kw-hr (2 g/bhp-hr). Check the data plate or placard in your lift's engine compartment—it will help you determine its emission rate. If your "fleet-average" emission rate is above the values shown above, you must reduce it by replacing, repowering (new engine), and/or retrofitting (adding an aftermarket conversion system) an appropriate number of your lifts.

In some cases, retrofitting a lift makes good sense if CARB-verified aftermarket conversion kits are available for it. But be certain because those retrofitted lifts must only use CARB-verified systems with a placard affixed to the engine on installation. Retrofits can reduce emissions down to 1.3 g/Kw-hr for many older lifts—1990 through 2000, with some uncontrolled lifts 2001 through 2003—if they have 3-liter or smaller engines. For larger engines of the same vintage, retrofits will provide a 4 g/Kw-hr emission rate. If you bought a 2001 – 2006 lift with factory emission controls, no CARB-verified retrofit system is currently available to reduce its emissions even more, and unfortunately, forklifts in these years will not by themselves be able to meet the LSI regulation's fleet-average emission requirements. However, IF you have older lifts (1990 – 2000, or 2001 – 2001 uncontrolled), you have a good chance of finding a very-low emission retrofit system. Retrofitting older lifts may make sense to achieve the CARB fleet-average emission value. Or you may wish to add 2007 or later propane lifts, or a few electric lifts. And if you over-comply with newer lifts or retrofits not required by the LSI regulation, incentive funds (Moyer Program, etc.) may be available from your local air district.

#### ***LPG Forklift Retrofits—Cost and Availability***

Two manufacturers currently sell CARB-verified retrofits for forklifts. Not all models of lifts are covered, so you'll need to contact the retrofit manufacturers to determine if they have product that can work on yours or your customers' lifts. Nett Technologies ([www.nett.ca](http://www.nett.ca)) sells the "Blue Cat" system. Contact Wayne Borean at Nett in Canada at (800) 361-6388, ext. 124. Nett Technologies has a helpful spreadsheet available online that you can use to enter your equipment numbers and emission rates, and to calculate the numbers of lifts you'll have to retrofit, repower, or replace. Another company, Engine Control Systems (ECS), ([www.enginecontrolsystems.com/terminox](http://www.enginecontrolsystems.com/terminox)) sells the TermiNox system. Contact Wayne Cochrane in Reno at (775) 376-2664. Costs for the kits from these two companies and what you will pay locally for installation vary. We've been told they range from about \$2,500 to nearly double that for some lifts.

Depending on the forklift's year of manufacture and its engine size, these systems can deliver large emission reductions so that your equipment can better meet the CARB fleet-averages. Three-liter and smaller engines, 1990 – 2000 (or uncontrolled engines 2001 – 2003) drop from 16 g/Kw-hr to 1.3 g/Kw-hr. Larger engines (over 3 liters) in the same age ranges will see their emissions go from 16 g/Kw-hr down to 4 g/Kw-hr. Note however, that 4 g/Kw-hr is not, by itself, low enough to meet the CARB fleet-averaged emissions requirements.

For more information on the LSI requirements, please see CARB's website at <http://www.arb.ca.gov/regact/lore2006/lore2006.htm>, contact WPGA at (916) 447-9742 or contact WPGA's air quality consultant Greg Gilbert at (916) 663-2222.



5. \*\*For your LSI equipment's NOx emission rate, see the emissions label in the engine compartment. For retrofitted equipment, see retrofit manufacturer's emissions label. If you cannot find the emissions levels, original emission standards by model year are shown below. If the forklift has been retrofitted for emissions, retrofit kits MUST be CARB-certified for each application and their emission levels will vary. See the kit manufacturer or call CARB's LSI hotline at (800) 378-2992 for retrofit emission ratings, requirements, coverage models and years.

**LSI Emission (NOx) Standards by Year**

<b>1990 – 2003 Uncontrolled Lifts:</b>	<b>16 g/kW-hr (12 g/bhp-hr)</b>
<b>2001 – 2006 Controlled Lifts:</b>	<b>4 g/kW-hr (3 g/bhp-hr)</b>
<b>2007 – 2009 Controlled Lifts:</b>	<b>2.7 g/kW-hr (2 g/bhp-hr)</b>
<b>2010 – later Controlled Lifts:</b>	<b>.8 g/kW-hr (.6 g/bhp-hr)</b>
<b>Retrofitted Forklift Emission Levels: See Mfr Data—must be CARB-approved for each piece of equipment.</b>	

6. Fleets of four or more forklifts and other equipment covered under the regulation are required to meet fleet-averaged emissions levels by certain dates. The types are emission-averaged separately. Calculate fleet-average emissions only for 4 or more pieces of equipment of the same type that operate >251 hrs/year each. Fleet average emissions levels and compliance years are shown below:

**Fleet Average Emissions Requirements For Your Forklifts, GSE, Etc.**

<b>Fleet Average Emission Level Standards in grams per kilowatt-hour (brake-horsepower-hour) of hydrocarbons plus oxides of nitrogen</b>			
<b>Fleet Type</b>	<b>Initial Compliance Date</b>		
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If you or your LPG customers need additional help calculating fleet-average emission levels, acquiring LPG forklift retrofit kits, or general information regarding the regulation, contact WPGA at (916) 477-9742 or WPGA consultant Greg Gilbert at (916) 663-2222.