



## *CARB Compliance Solutions*

*Options for meeting the California Air Resources Board requirements for Transport Refrigeration Units.*



# CARB - Are You Ready?

The California Air Resource Board (CARB) has passed a series of regulations called the Airborne Toxic Control Measure (ATCM) that will affect owners/operators of transport refrigeration units (TRUs) which operate in California.


- Compliance is required by December 31, 2008 for 2001 and older engine model year transport refrigeration units
- Thermo King offers a variety of options to help your business comply with CARB regulations, including new units, Tier 4i engine kits and LETRU-compliant Diesel Particulate Filters

The TRU ATCM will require in-use TRU and TRU genset engines that operate in California to meet in-use performance standards that vary by horsepower range. These standards can be met by:

- Using an engine that meets the required engine certification standard
- Equipping the engine with the required level of verified diesel emission control strategy
- Using an Alternative Technology

## Thermo King is the Green Leader

Thermo King offers industry-leading products and solutions that enable businesses around the world to reduce energy consumption and costs and decrease harmful environmental emissions.

The  symbol indicates a feature that delivers a significant environmental advantage over previous models or the competition.



# Understanding the CARB TRU regulation

## CARB Requirements

CARB is targeting 7 year old Transport Refrigeration Units for particulate emissions reduction.

Compliance required for 2001 and older TRU beginning December 31, 2008.

Compliance is based on engine model year and occurs 7 years after the model year.

**Example:** 2002 engine model year equipment must meet LETRU standards by December 31, 2009.

**Example:** 2003 engine model year equipment must meet ULETRU standards by December 31, 2010

Equipment upgraded to LETRU status must be upgraded to ULETRU status in an additional 7 years.

There are several different methods for becoming compliant with the CARB regulation.

Operators may need to register with CARB for an identification number by January 31, 2009. This is required for California based TRUs and optional for out-of-state based TRUs that operate in California.

CARB posts the complete regulation, updates, FAQ, and other information at the following website:

<http://www.arb.ca.gov/diesel/tru.htm>

## Key Definitions

**CARB** California Air Resources Board

**TRU** Transport Refrigeration Unit

**ATCM** Airborne Toxic Control Measure

Regulation within CARB that applies to in-use diesel engines

**VDECS** Verified Diesel Emissions Control System

Approved methods for complying with ATCM for reducing diesel emissions

**PM** Particulate Matter is soot from the diesel exhaust

**DPF** Diesel Particulate Filter (Exhaust Filter)

**LETRU** Low Emission Transport Refrigeration Unit  
At least 50% particulate matter reduction, Level 2 VDECS

**ULETRU** Ultra-Low Emission Transport Refrigeration Unit  
At least 85% particulate matter reduction, Level 3 VDECS

**PDPF** Passive Diesel Particulate Filter (Thermo King's LETRU-compliant device)

## What is your CARB

# Compliance Schedule

Engine Model Year	In-use Compliance Year													
	07	08	09	10	11	12	13	14	15	16	17	18	19	20
2001 & older		L	L	L	L	L	L	L	U	U	U	U	U	U
2002			L	L	L	L	L	L	L	U	U	U	U	U
2003				U	U	U	U	U	U	U	U	U	U	U
2004					U	U	U	U	U	U	U	U	U	U
2005						U	U	U	U	U	U	U	U	U
2006							U	U	U	U	U	U	U	U
2007								U	U	U	U	U	U	U
2008									U	U	U	U	U	U
2009										U	U	U	U	U
2010											U	U	U	U
2011												U	U	U
2012													U	U
2013														U*

**L= LETRU** Low Emission Transport Refrigeration Unit

**U= ULETRU** Ultra-Low Emission Transport Refrigeration Unit

\*<25 hp engines only, >25 hp engines do not require upgrades for 2013 model year.

## Compliance Method and Recommendations

### Compliance Method

**PDPF:** Install exhaust filter to meet LETRU Requirements

**Engine:** Retrofit TRU with a new engine

**Electricity:** Use electric standby to eliminate diesel engine operation at a facility

**New Equipment:** Purchase new equipment

**Fleet Management:** Maintain 7 year trade cycle

**Fleet Management:** Move affected equipment out of California

**Alternative Fuels:** Use B100, CNG, Fuel Cells, or other CARB approved fuels

### Recommendation

Cost effective method of achieving compliance without adverse impact to service intervals or engine efficiency

Ideal solution to achieve compliance while reducing maintenance costs

Appropriate for units originally equipped with electric standby, must equip facility with plugs for each unit

New units are EPA compliant. CARB regulation requires upgrades to units 7 or more years old

Keeps equipment in compliance without upgrades, retrofits, or fuel changes

May be possible for national companies with routes or operations that do not require travel to California

Difficult to use because of additional service requirements, record keeping, and availability of fuels

# Thermo King offers several Compliance

## Passive Diesel Particulate Filter Product Characteristics



### Level 2 Diesel Particulate Filter

- 50% Reduction - LETRU Compliant
- Kit includes DPF, Insulation, Back Pressure Gauge and Control Box
- Installed by Thermo King trained technicians

### Engine Validation

Requires a pre-installation checkout to determine engine efficiency. An engine with excessive oil consumption (over 1Q in 50hrs) may result in excessive backpressure and a fouled PDPF.

If the engine does not meet this threshold, the PDPF cannot be installed. Fuel Injectors must have been serviced within the last 3000 hours, otherwise, the injectors must be cleaned or replaced. An engine with poor injector efficiency may result in excessive backpressure and a fouled PDPF.

### Installation

Engine validation tests require 1-2 hours of labor and 24 hours of runtime. PDPF installation requires 3-5 hours of labor (5-6 for Super II models). Kits are complete with all parts required outside of routine shop supplies.

### Operation

The Thermo King PDPF requires no fuel additives or plug in regeneration – it automatically regulates engine speed to develop sufficient heat to clear the filter as buildup occurs. There should be no impact on fuel economy or TRU operating characteristics.

### Service

Engine requires fuel injector servicing every 3000 hours. The PDPF does not require scheduled maintenance, although if fuel injectors are replaced or the engine begins to burn oil, the PDPF may need to be removed for cleaning.

### Warranty

4 years or 2600 engine hours. See full text in PDPF manual.

### Applications

Kits are available to fit all SB and Super II models with Isuzu SE or Yanmar engines through 2002. Be sure to order both the PDPF and the install kit.

Product	Part #
<b>PDPF</b> (PDPF only)	120912
<b>SB Install Kit</b> (install kit only)	100400
<b>Super II Install Kit</b> (install kit only)	100391



PDPF installs in place of the muffler on SB units, externally on Super II (shown)



# General Options



## Tier 4i Engine Retrofit Kits

### Product Characteristics

**Installation:** Engine installation typically requires 10-12 hours. Most kits are complete with all parts required outside of routine shop supplies. Some kits require software chip or drive plate change.

**Operation:** Operates normally

**Service:** Normal engine service guidelines apply

### Available for these applications

SB, SB III, SB III King of the Road, SB 100, SB 190, SB 200 / 300 / 400, SB Classic, Super II, Super II, Super II 190



### Engine Retrofit Kits

#### Part Numbers

Tier 4i Engine ..... 1010363

#### Install Kit

SB ..... 100397

Super II ..... 100398

#### Coupler

Large Shaft Compressor ..... 772506

Small Shaft Compressor ..... 772358

#### Software

Must use the right version for the controller

Controller	Required Software	Part #
TGVI	V1091	400896
MPIV	V0472	400671
Note: Solution for MPIV with V03xx software currently in development. These units will need additional modifications.		
MPIV MT	V2041	400946
MPIV	V06xx	not necessary
MPVI	V40xx	not necessary



## Upgrade to EMI-3000

### Extended Maintenance Interval Filters

**Engine Retrofit Kits come equipped with EMI-3000 oil filters. Upgrade your fuel and air filters for maximum benefits!**

- Reduces maintenance costs
- Reduces clean up and disposal costs
- Reduces environmental impact with less spillage and less waste
- Extends engine life

EMI-3000 Fuel Filter **100325**

EMI-3000 Air Filter **119299**

# New Thermo King Equipment Compliance Options

## Purchase New Units -

Purchase options are available through IR Financial Services and other organizations

## Trade In -

Thermo King offers trade or outright purchase bids on used equipment.

## What can a New Unit do for you?

- Meet all CARB regulations
- Increase efficiency and uptime
- Decrease maintenance and fuel consumption
- Offer you the latest technology



## Finance your new equipment with Ingersoll Rand Financial Services

Thermo King and Ingersoll Rand Financial Services offer very competitive financing solutions for all types of customers — from owner/operators to the largest fleets in North America. You can choose from a wide range of smart, flexible financing products to fit your unique and changing business needs. Programs include lease and loan financing for refrigeration units with trailers or trucks. For fleet customers, we also offer a Cold Air Lease Program for refrigeration units alone.

## Benefits of Financing through Ingersoll Rand Financial Services

- Improved Cash Flow
- Flexibility
- Full Range of Financing Vehicles
- Operating Income is easier to Forecast
- Convenience of One-Stop Shopping
- Competitively Priced Financing
- Balance Sheet Benefits
- Professional Service

## Cold Air Lease Program

A transportation fleet's needs can be complex. Sometimes, keeping the same reefer and trailer together for the fleet's trade cycle is less than optimum. Thermo King and Ingersoll Rand Financial Services can help you meet your complex needs, helping you control your expenses and extend the life of your trailers by offering financing solutions for the refrigeration units only.



## Thermo King Truck Units with Electric Standby

An alternative strategy for complying with the CARB regulations is to use electric standby at facilities where 3 or more refrigeration units operate. An electric standby equipped reefer can make short duration stops without plugging in when two or less TRUs are present at a time and the delivery stop is 30 minutes or less. This is a good option for truck fleets making deliveries to convenience stores and restaurants. See CARB regulation and FAQ for more information on electric standby record keeping and operation requirements.

**See your Thermo King dealer** for more information on new truck refrigeration units with Electric Standby.



# Engine Identification



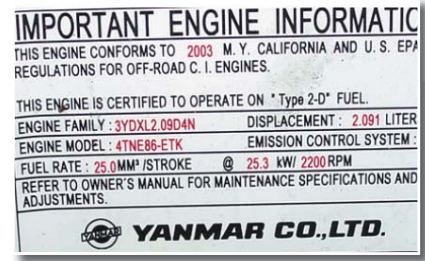
CARB regulations are based on engine model year. Below are model identification photos for Tier I and Tier II models. Pre-Tier engines (1998 and older) do not have sticker identification

## Tier I

Tier I engines have stickers generally installed on the unit frame rail and valve cover



2000 Tier I Isuzu



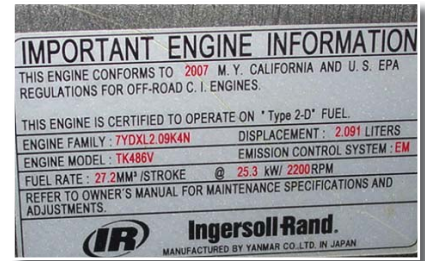
2003 Tier I Yanmar

## Tier II

Tier II engines have stickers installed on the front of the oil pan and valve cover



Tier II Yanmar sticker location



2007 Tier II Yanmar

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**find one nearby at [www.thermoking.com](http://www.thermoking.com)**



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