Regulatory Advisory

Last Updated January 2011

TRU Advisory 08-07:
Flexibility Engines - Retrofit with VDECS

The purpose of this advisory is to explain how to determine if your TRU has a flexibility engine.

Background

What are new diesel engine emission standard "Tiers"?

New engine standards are phased in, starting with the least stringent Tier 1 and ending with the most stringent Tier 4 Final (Tier 4f). As shown in Table 1, engines are grouped by horsepower (hp) categories and each tier generally applies to larger hp categories before they apply to the smaller hp categories. There were no Tier 3 standards for the hp categories below 50 hp. Also, the less than 25 hp category had no Tier 4 Interim (Tier 4i) new engine standard.

Table 1

HP	Engine MY																			
	1995	'96	'97	'98	'99	2000	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15+
<25						Tier 1					Tier 2			Tier 4 Final (Tier 4f)							
25-<50						Tier 1					Tier 2			Tier 4 Interim (Tier 4i)					Tier 4f		

Note: Truck TRU engines are generally in the <25 hp category. Trailer TRU engines and TRU generator sets are generally in the 25 to <50 hp category. A few TRU generator sets that are used to power multiple shipping containers during the rail portion of their multimodal transport are powered by larger hp engines. Please consult with ARB staff on these larger engines.

What is a flexibility engine?

When the U.S. Environmental Protection Agency (U.S EPA) and the California Air Resources Board (ARB) adopted new engine emission standards for non-road/off-road diesel engines, they included "flexibility" provisions (see Title 40 Code of Federal Regulations, section 89.102 (40CFR89.102), 40CFR1039.625, 40CFR1068.265, and Title 13, California Code of Regulations (CCR) section 2324(d)). The flexibility provisions are also called the Transitional Program for Equipment Manufacturers (TPEM) and allow equipment manufacturers to produce limited numbers of equipment with engines that meet no emissions standard or less stringent emission standards after a new tier of emissions standards go into effect.

When Tier 1 non-road/off-road new engine standards went into effect, the flexibility engines that were allowed to be installed in TRUs for several years were pre-Tier 1 engines that met no standard (uncertified). During Tier 2, flexibility engines could be pre-Tier 1 or Tier 1 engines. During Tier 4i, which applies to 25-50 hp engines, flexibility engines could only be certified Tier 2 engines. When the Tier 4f goes into effect for 25-50 hp engines, only certified Tier 4i engines will be allowed. There is no Tier 4i standard for less than 25 hp engines, which instead are subject to Tier 4f standards; so, only certified Tier 2 engines are allowed as flexibility engines in this hp category during Tier 4f.

How can I tell if my TRU engine is a flexibility engine?

New engines that were certified to meet Tier 1 were required to have emissions labels. However, the Tier 1 and Tier 2 regulations did not require labels if the engine was a flexibility engine. Although a U.S. EPA guidance document suggested a label for flexibility engines, most if not all, flexibility engines used in TRUs during Tier 1 and Tier 2 had no emissions labels. Therefore, the absence of emissions labels during Tier 1 and Tier 2 (MY 2000 through 2007) indicates these engines may be uncertified pre-Tier 1 engines.

Flexibility engines used in 2008 and subsequent TRU build years, during Tier 4i and Tier 4f, are required to have labels. Furthermore, the engine family designation for flexibility engines was required to be modified by eliminating the first character, a numeric character that identifies the model year. So a 2008 or later TRU model with an engine label that shows an engine family that begins with a letter instead of a number would indicate the engine is a flexibility engine.

To summarize, any of the following are indications that a unit is equipped with a flexibility engine:

1. Engines with no labels that were installed on TRUs built during Tier 1 and Tier 2, in effect from 2000 through 2007.
2. Engines with labels that include language the same as, or similar to the following:

   "THIS EQUIPMENT HAS AN ENGINE THAT MEETS U.S. EPA AND CA EMISSIONS STANDARDS UNDER 40 CFR 1039.625 AND 13 CCR 2324(d). SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN FOR THE EQUIPMENT FLEXIBILITY PROVISIONS CITED MAY BE A VIOLATION OF FEDERAL OR STATE LAW SUBJECT TO CIVIL PENALTY", or
3. Engines with labels that include the terms "FLEXIBILITY", "TPEM", or "TRANSITIONAL PROGRAM FOR EQUIPMENT MANUFACTURERS", or
4. Engines with labels that mention the federal or state regulation sections that apply to flexibility engine provisions:
   a. 40CFR 89.102,
   b. 40CFR 1039.625,
   c. 40CFR 1068.265, or
   d. 13CCR 2324(d).
5. A 2008 or later TRU model with the installed engine label showing an engine family that begins with a letter instead of a number.

What is a verified diesel emissions control strategy and what does it mean to be verified?

One way to comply with the Transport Refrigeration Unit (TRU) Airborne Toxic Control Measure's (ATCM) in-use performance standards is to retrofit the engine with a verified diesel emissions control strategy (VDECS). Before a diesel emission control strategy can be used to comply with the TRU ATCM, it must be verified by ARB in accordance with title 13 CCR section 2700, et seq. Verification means, in part, that: the diesel PM emission reductions have been confirmed by emissions testing to be within a specific classification level (e.g. Level 2 is 50 percent or greater and Level 3 is 85 percent or greater); durability testing shows the strategy will continue to reduce PM emissions within the verified classification level after a minimum durability period (1,000 hours

for the TRU application); and the manufacturer is providing the minimum warranty required by law (e.g. 3 years or 1,600 hours for under 25 hp TRU engines and 4 years or 2,600 hours for 25 hp to under 50 hp TRU engines). ARB issues a verification Executive Order for the VDECS that includes, among other things, the terms and conditions that the verification is subject to, the verified level of emissions reductions, and a list of engines (make, model, model year, and engine family) that the VDECS is approved for use on.

What are ARB's policies?

Are Verified Diesel Emissions Control Strategies (VDECS) compatible with flexibility engines?

TRU owners should be careful to ensure the VDECS they retrofit their TRU with is compatible with the TRU engine. Only engines that are listed in the VDECS' verification EO should be matched with the VDECS and the terms and conditions listed in the EO must be met. Flexibility engines would most likely not be listed in the VDECS verification EO.

There are two cases where incompatibility may result from the use of flexibility engines.

1. The flexibility engine is a pre-Tier 1 engine that is identical with respect to all emissions-related criteria that may affect the VDECS function and/or durability, and therefore the engine-VDECS match should be compatible. ARB may approve the flexibility engine to be compatible with the VDECS, provided the VDECS manufacturer can show this to be true.

2. The flexibility engine has a higher PM emissions rate or differs in other criteria that may affect the VDECS functionality and/or durability. Such a flexibility engine can not be matched with the VDECS without proper evaluation, possibly including field demonstrations and/or additional emissions and durability testing.

In both cases, if a flexibility engine is not listed on the verification EO, ARB would require a verification extension application to be submitted by the VDECS manufacturer to extend the verification to the flexibility engine before the VDECS would be allowed to be used on the flexibility engine.

What do I need to report in my ARB IDN application regarding flexibility engines?

Owners of TRUs that apply for ARB Identification Numbers (IDN) will be required to look at the engine emissions labels for indications that a flexibility engine is being used and check a box on the application if the unit is equipped with a flexibility engine.

Related ARB Policies

If the TRU owner cannot find the engine serial number, there is no way to reliably track this engine in the ARB registration system. If such a TRU is to continue to operate in California, the engine must be replaced by December 31, 2008 (enforcement delayed until December 31, 2009).

For more information

To obtain a copy of the regulation or other related compliance assistance documents, visit the TRU website at http://www.arb.ca.gov/diesel/tru/tru.htm. Additional questions may be addressed by calling the toll-free TRU Help Line at 1-888-878-2826 (1-888-TRU-ATCM).

If you require special accommodation or language needs, please call 1-888-878-2826 or email tru@arb.ca.gov. TTY/TDD/Speech users may dial 711 for a California Relay Service.

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