

Exhaust Gas Emission Standard Revision

Introduction:

LVV Standard 90-10 (Exhaust Gas Emissions) has been in use now for over two years, and as a result of information gained from the use of the standard, and a better understanding of the whole subject by the LVV Certifiers and the LVVTA team, the standard has undergone a review, principally for two key items. This Information Sheet presents and explains these two changes to the standard.

Full load air/fuel ratio for turbocharged or supercharged engines:

The issue:

It has been brought to LVVTA's attention by some well-known and experienced engine tuners, one of which is an experienced LVV Certifier and race engine builder, that there is a potential problem with one of the test parameters within the LVV Exhaust Gas Emission Standard 90-10(00). Their view has been that some turbocharged and supercharged vehicles that they have been testing under full load were struggling to meet the loaded test requirements set within the standard, and were worried that if they were to tune engines to within the loaded-condition test parameter specified in the standard, then the engine could be running leaner than ideal.

LVV Certifiers are understandably reluctant to tell customers of vehicles recently tuned by professionals with advanced tuning equipment to have their vehicles re-tuned to within the parameters of the LVV test.

LVVTA's Research:

LVVTA spoke to a range of LVV Certifiers and Engine Tuners to get their opinions on this issue. One in particular was an experienced engine tuner in Auckland who tunes a wide range of vehicles from performance Japanese to American V8s. Their view was that for most of the turbocharged and supercharged vehicles they tune, the current requirements for the loaded-condition test which are between 12.2:1 and 14.9:1 would generally be too lean. For example, late model Subarus are tuned as rich as 11.2:1 to 11.5:1.

Their view was that if these engines were run any leaner than 11.5:1 on a dyno at full load, there could be a chance of premature engine damage. This has also been confirmed by another reputable engine tuner in Wellington, who said he would be reluctant to set a turbocharged or supercharged vehicle any leaner than mid to low 11's, and 11.0:1 would be an acceptable figure for the loaded condition test.

One LVV Certifier commented that for most of the vehicles that he tests, the range of the current parameters was achievable, but that there is often a short spike in richness (which would initially fail the test) as full throttle is applied. This quickly comes right as the revs increase and the reading averages out.

LVVTA's conclusion:

The current LVV Exhaust Gas Emission test is to some extent subjective, which is confirmed by the comments about dealing with the initial spike in richness by taking an average reading from the meter when carrying out the test. It is agreed that a momentary spike in the reading should be ignored; - it is the period after full throttle has been engaged that is important.

The LVV test process is never going to be as accurate as a rolling road or hub dynamometers in terms of fine tuning, however dyno tuning is a lot more expensive and cannot be easily transported. The LVV exhaust gas emission test remains a good process by which the LVV system can ensure that a vehicle's exhaust gas emissions are reasonable, and can be carried out in a repeatable, cost-effective, and achievable manner.

The majority of experts agreed that the current requirements for the loaded-condition test for fuel injected vehicles specified too lean a condition for turbocharged and supercharged vehicles, and that an extra parameter should be provided for turbocharged and supercharged engines to be run slightly richer than naturally aspirated vehicles; - this will help safeguard these vehicles from being run too lean.

Change to Exhaust Gas Emission Standard:

LVV Standard 90-10(01) (Exhaust Gas Emissions) has been amended accordingly. Under 'Test pass/fail parameters' in section 2.6, paragraph 2.6(9)(b) has been amended by the insertion of a new item (i), which states '*...in the case of a turbocharged or supercharged engine, between 11.0:1 and 14.9:1; or...*' This effectively shifts the rich end of the parameter for turbocharged and supercharged engines from 13.8:1 (as is specified for electronically fuel-injected engines), to 11.0:1.

Catalytic converters:

The issue:

LVVTA has been in discussion with NZTA on the subject of the requirement for catalytic converters to be retro-fitted during an engine conversion.

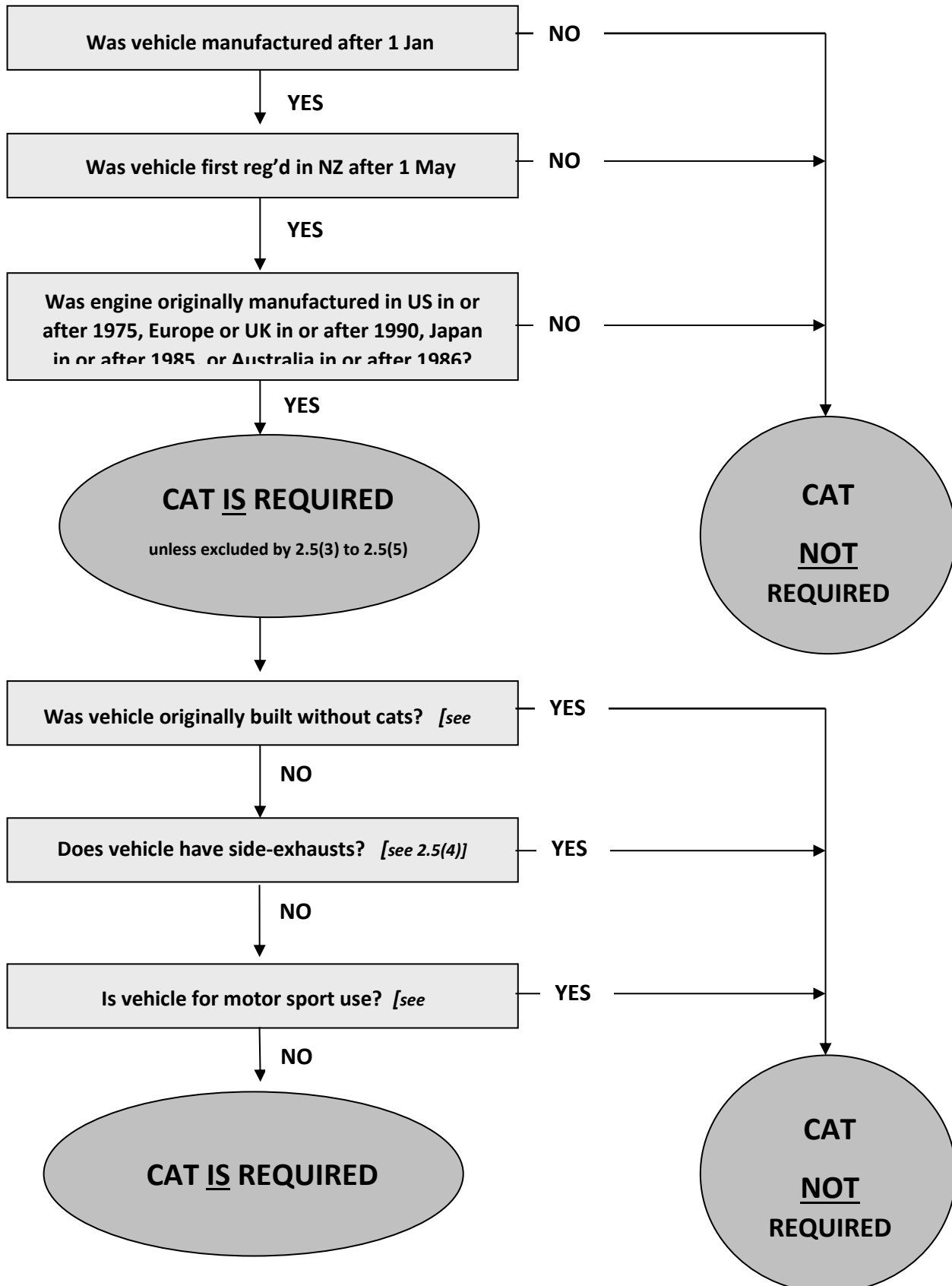
The requirements in the original version of LVV Standard 90-10 (Exhaust Gas Emissions) specify that one or more catalytic converters must be fitted [apart from those vehicles specified in 2.5(3) to 2.5(6) (which are those vehicles with side exhausts, motorsport vehicles, 'Historic Replica' or 'Reproduction' scratch-builts, and production vehicles never originally equipped with catalytic converters)] to all production vehicles that undergo an engine swap after 1 May 2010.

Relaxation of requirement:

This requirement has been relaxed to some extent, and now [within the latest version of LVV Standard 90-10(01)] requires for catalytic converters to be fitted to only those production vehicles that undergo an engine swap, if the vehicle was manufactured after 1990, and the vehicle was first registered in New Zealand after 1 May 2012.

A flowchart follows to make this new requirement easier to understand. Also, this will be discussed at the next round of LVV Certifier Training sessions during March/April 2012.

Catalytic Converter Requirement Flow-chart (for modified production vehicles)



Please note that the requirements relating to catalytic converters for scratch-built vehicles are unaffected by this latest change.

Although the effect date of the standard is not until 1 February 2012, LVV Certifiers may (and should) apply these changes with immediate effect.

As always, to enable quick identification of the changed or additional areas, all new additions and changes are denoted by a dotted vertical stroke in the left margin and the use of grey highlight over the affected text.

If any assistance in the use of this Information Sheet is needed, please contact an LVVTA technical team member at the Wellington LVVTA office on 04 238-4343.