LOW VOLUME VEHICLE TECHNICAL ASSOCIATION Inc

Stretched Limousines that Exceed the Manufacturer's Axle Ratings

Background:

In many cases, when a production motor vehicle is converted into a stretched limousine, the addition of the weight of the materials involved in the conversion, plus the additional weight (more occupants) that the vehicle can carry in its new configuration, will cause the vehicle to exceed the vehicle manufacturer's gross vehicle mass (GVM), or one or both of the manufacturer's axle ratings (MAR), for that vehicle.

GVM is the combination of the tare (the un-laden weight of the vehicle), plus the amount of load that the manufacturer certifies that the vehicle can carry. The MAR is the combination of the vehicle's tare for a given axle, plus the amount of load that the vehicle manufacturer certifies that the axle can carry.

Note that the GVM cannot exceed the sum of the MARs for the front and rear axles.

Legal situation:

The relevant legislation that these vehicles must comply with is Land Transport Rule: Passenger Service Vehicles 1999 (PSV rule). Within this rule it states that the chassis rating and Certificate of Loading (CoL) is required for stretched limousines if they are to be used in passenger service. If the vehicle has 9 seats or less, the CoL must include the GVM. If the vehicle has more than 9 seats, the CoL needs to include the GVM and the front and rear MARs.

Any vehicle that is converted into a stretched limousine has been modified in such a way as to affect one or more safety-related legal requirements, therefore LVV Certification is required in each case.

However, neither the GVM nor either MAR may be exceeded when the vehicle is empty or in its fully laden condition. This effectively means that, by law, most stretched limousines, other than those with very minor stretches, cannot be certified under the Low Volume Vehicle Code.

This is something that we only became aware of over the past two years. LVVTA has, during the past two years, communicated this advice out to LVV Certifiers at LVV Certifier training sessions, and through the LVV Certifiers Newsletter.

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The agreements in principle between LVVTA and LTNZ:

LVVTA has been in discussion with Land Transport NZ and the stretched limousine industry over the past year on this subject in order to try and find some 'middle ground' upon which some less extreme stretched limousine conversions might be able to be certified under the LVV Code, despite exceeding the MAR to some degree.

These discussions have established that some conversions which have resulted in a minor increase over MAR may not necessarily be unsafe, particularly given the special circumstances which surround the operation of these vehicles, such as primarily urban use, lower than normal operating speeds, use on predominantly smooth roads, and the fact that they are operated by professional drivers in a typically smoother than normal manner required to ensure the comfort of the passengers.

The most difficult part of resolving this issue has centred on trying to find a point at which a vehicle exceeding its MAR could be considered acceptable, and then determining a process by which all parties involved (Land Transport NZ, LVVTA, the LVV Certifier, and the vehicle owner) can proceed with the LVV Certification of a vehicle which has exceeded its MAR, and in doing so know what is expected and required.

This problem has now been partially resolved with an agreement between LVVTA and Land Transport NZ on the process required to certify vehicles that exceed their MAR by a relatively small amount. In very general terms, the type of vehicles that are intended to be helped by this process are those that have had their wheelbase increased by an amount sufficient to increase the space for rear seat passengers, or to add one additional row of seating. It may be possible in some cases that this process could also apply to a vehicle that has had an additional two rows of seating provided. These vehicles, commonly late-model Ford Falcons and Fairlanes, usually retain their standard production axles and suspension components, although they nearly always require up-rated springs and heavy-duty shock absorbers.

It should be clarified at this point that this process is intended to apply only to stretched limousines that are based on high-volume production vehicles, typically based on a sedan-type body style, which are of a make and model that are known to have a good safety record in stretched-limousine service. Other vehicle types will need to be treated on a case-by-case basis.

Note however, that despite the resolutions provided within this LVV Information Sheet, there is still a problem with vehicles that have had a long stretch, which cause the vehicles to exceed their MAR by a substantial amount.

Establishing the amount by which MAR is exceeded:

When presented with any stretched limousine, the first job for an LVV Certifier is to establish if in fact the MAR has been exceeded, and if so, by how much. In order to do this, the following process must be applied.

- Obtain the vehicle manufacturer's GVM, and the vehicle manufacturer's front and rear axle ratings. These are not always easy to obtain, but are critical to the process; – without this information the process cannot take place. The vehicle manufacturer's New

Zealand or overseas agent should be approached if the information cannot be found on the vehicle or in the vehicle's hand-books or owner's manual.

- Simulate the maximum potential occupant weight by placing 80kgs of weight in every available seating position in the vehicle.

- Weigh each axle over a commercial weighbridge with the vehicle in the fully laden condition, and obtain a weighbridge certificate applicable to that particular vehicle.

- Compare these figures with the MAR.

If the weighbridge certificate shows that either MAR has been exceeded, the next step is to establish by how much, and express this in the form of a percentage. To follow is an example:

- BA Falcon stretched limousine fully laden front axle weight over weighbridge = 1398kg;

- Manufacturer's axle rating (MAR) for BA Falcon front axle = 1165kg;

- 1398 (kg) divided by 1165 (kg) = 1.2;

- 1.2 means that 1398 kg is a 20% increase over 1165 kg. (Note that whatever the decimal point is will be the percentage by which the MAR is increased – for example, an outcome of 1.35 would mean the MAR is exceeded by 35%.)

The LVV Certification process:

Vehicles that do not exceed MAR:

If neither the front nor the rear axle weights recorded by the weighbridge exceed the respective MAR, there is no problem. The vehicle may be approved for LVV Certification under the Low Volume Vehicle Code by the LVV Certifier without any involvement from LVVTA or Land Transport New Zealand, provided that the procedural and documentation requirements specified under *'LVV Certification procedure'* and *'Documentation required'* is applied.

In other words, it's business as normal, but follow the procedures and provide the information specified in this Information Sheet.

Vehicles that exceed MAR by 20% or less:

In the case of a stretched limousine that has, when fully laden, resulted in an increase over MAR of 20% or less for one or both axles, there is nothing new or additional required other than some extra care. Again, the vehicle may be approved for LVV Certification under the Low Volume Vehicle Code by the LVV Certifier without any involvement from LVVTA or Land Transport New Zealand, provided that the procedural and documentation requirements specified under *'LVV Certification procedure'* and *'Documentation required'* is applied.

In this case, the LVV Certifier must give extra consideration to issues such as shock absorber and spring upgrades, wheel stud suitability, brake pad suitability, and wheel and tyre suitability.

Vehicles that exceed MAR by between 20% and 30%:

In the case of a stretched limousine that has, when fully laden, resulted in an increase over either or both MAR of between 20% and 30%, the vehicle may be approved for certification under the Low Volume Vehicle Code, provided that:

- LVVTA provides written endorsement for the vehicle in question (this will be considered when the Form-set and LVV Certification application arrives at the LVV Certification Plate Production office); and
- the procedural and documentation requirements specified under '*LVV Certification procedure'* and *'Documentation required'* is applied.

LVVTA's written endorsement will be based on anecdotal knowledge of that make and model of vehicle having provided good service without recorded failures, with the same increase over MAR. The LVV Certifier may be required in these cases to provide further evidence that the make and model of vehicle has a good track record in other parts of the world where the vehicle has been in operation for some time.

Note that LVVTA will not be able to provide endorsement for any vehicle which has had an increase over MAR of more than 20%, and which does not have a known successful history in operation as a stretched limousine.

Vehicles that exceed MAR by more than 30%:

In the case of a stretched limousine that has, when fully laden, resulted in an increase over either MAR of more than 30%, the vehicle may only be approved for certification under the Low Volume Vehicle Code, provided that:

- LVVTA provides written endorsement for the vehicle in question; and
- Land Transport New Zealand provides written endorsement for the vehicle in question; and
- the procedural and documentation requirements specified under 'LVV Certification procedure' and 'Documentation required' is applied.

It must be made clear here that, at this stage, it is extremely unlikely that either LVVTA or Land Transport NZ will provide endorsement for any vehicle that exceeds its MAR by over 30%. Some test cases have been applied, but in no case has anyone been able to provide sufficiently robust and convincing documented evidence to show that it is appropriate to approve such a substantial increase over MAR.

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The constructor and the LVV Certifier should avoid the construction and LVV Certification of these vehicles until a resolution on how vehicles that exceed MAR by more than 30% might be approved has been agreed to between LVVTA and Land Transport NZ. Such a resolution may take some time yet, or in fact, may never be achieved.

Vehicles that exceed 3500 kg when fully laden:

In addition to the issues above, the LVV Certifier must also watch out for situations where a passenger vehicle exceeds 3500 kg when fully laden. If such a vehicle has 9 seating positions or less, it remains an MA-class vehicle. An MA-class vehicle can exceed 3500 kg when fully laden and still remain a light vehicle, and therefore is subject to the LVV Code.

However, if a passenger vehicle has more than 9 seating positions, it becomes an MD1 or MD2-class vehicle, or in other words, an omnibus. If an MD1 or MD2-class vehicle exceeds 3500 kg when fully laden, it becomes a heavy vehicle. A heavy vehicle cannot be certified to the LVV Code.

In short, if a vehicle has more than 9 seating positions, and exceeds 3500 kg when fully laden, it must either have its number of available seating positions reduced to 9, or alternatively, be referred to a Heavy Vehicle Specialist Certifier.

LVV Certification procedure:

The following inspection procedure must be applied on all vehicles that have undergone a stretched limousine conversion.

Establishing new axle ratings and GVM

Once the new fully laden weight of each axle has been established, and the LVV Certifier is satisfied that the new fully laden weight for each axle is within the allowable limits (specified above), those new fully laden axle weights become the new 'Low Volume Axle Ratings' (LVAR) for the vehicle.

In addition, the new total fully laden weight (both axles) becomes the new 'Low Volume GVM' (LVV GVM), established by the sum of the vehicle's two LVARs.

Test Driving procedure

1. Test-drive the vehicle extensively in its fully-laden condition over a variety of road surfaces in both urban and rural environments. During this test-drive the certifier must establish that:

    (a) the spring rate is suitable for the increased vehicle mass (apply LVV Standard 195-00 Suspension Systems); and

(b) the shock absorbers provide sufficient damping for the increased mass of the vehicle (apply LVV Standard 195-00 Suspension Systems); and

(c) the vehicle's braking performance, both in one-off emergency braking and cyclic fade resistance brake-testing, is sufficient for the increased mass of the vehicle (apply LVV Standard 35-00 Braking Systems); and

(d) the vehicle's steering characteristics are as good as would be expected from the vehicle in its unmodified condition.

2. Thoroughly inspect the vehicle for quality of construction and modification. Remove interior trim as necessary in order to be able to assess that the design and construction methods involved in the conversion process follows sound design principles, and to assess the quality of the welding that has been carried out.

3. Ensure that the amount of deflection, both in bending and twisting, does not exceed that of the same make and model of vehicle in an unmodified form. The vehicle should be checked prior to the stretch commencing. Alternatively a vehicle of the same make and model may be used for comparative purposes if the conversion is presented to the LVV Certifier already completed.

4. Consider the vehicle's wheel-stud number and size, and ensure they are adequate for the vehicle's increased mass.

5. Ensure that the increased fully laden mass of the vehicle has not caused the load rating of the tyres to be exceeded.

6. Provide a schematic diagram of the seating positions and approximate locations in relation to the vehicle wheelbase.

Documentation required

The LVV Certifier, upon being satisfied of the vehicle's safety in every respect, is required to supply the following LVV documentation:

1. The weigh-bridge certificate;

2. Details of the manufacturer's GVM and MAR;

3. In the case of vehicles that exceed MAR, calculations that establish the percentage by which each MAR is exceeded;

4. F000-MN Certification Plate Order Form;

5. F001-MN LVV Statement of Compliance Certificate;

6. F002-MN LVV Data Form;

7. F003-MN LVV Safety Item Form;

8. F004-MN LVV Rectification Form;

9. F005-MN LVV Plate Attachment Delegation Form if required;

10. Form-set FS009 - Brake Performance Test;

11. Form-set FS011 – Modified Suspension Systems;

12. A schematic diagram of the seating positions and approximate locations in relation to the vehicle wheelbase;

13. A hand-written report describing the modification process, and explaining the design and construction principles;

14. A hand-written report describing the process by which the vehicle's bending and torsional strength has been assessed.

The LVV Certifier may also need to supply any other relevant Form-sets that might relate to any other modifications present on the vehicle, which may include:

15. Form-set FS016 - Seatbelt Anchorage Retro-fitting;

16. Form-set FS030 - Seats & Seat Anchorages;

17. Form-set FS021-Interior Impact;

18. FS023 Wheels & Tyres.

LVV Certification Plate issues

The new 'Low Volume Axle ratings' (LVARs) and 'LVV GVM' are to be recorded on the LVV Certification Plate. These should be entered somewhere under item *6 Construction:* on the F002-MN LVV Data form, in a clear and legible manner, so that the LVV Plate Production staff can recognise the new LVARs, and record them on the Exemption Field at the bottom of the plate.

It should read, for example, as follows: *F LVAR 1296kg/R LVAR 1475kg/LVGVM 2771kg.*

This information must be very accurate, as it will be entered into the Land Transport New Zealand database by a Used or New Entry Certifier.

Remember that in the case of vehicles which exceed MAR by between 20% and 30%, LVVTA has to endorse your application. Because more information may be required as a result of that process, more time than usual might be required between forwarding the plate application and receiving the LVV certification plate.

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Other situations:

LVV requirements if more than one stretched limousine is being certified

In the case of a situation where an LVV Certifier is certifying more than one stretched limousine, and all of the stretched limousines are identical vehicles, have had exactly the same conversion carried out, have the same seating number and arrangement, and were converted by the same company and at the same time, the following process shall apply:

- Apply the process specified in *'Establishing the amount by which MAR is exceeded'* for the first vehicle.

- For each subsequent vehicle, only weigh the vehicle in its un-laden condition, record axle weights and total weight.

- If each subsequent vehicle's un-laden weight is the same as the first vehicle of that group, the LVV Certifier is not required to simulate the occupant weight in each individual case. After establishing each subsequent vehicle's tare, the LVV Certifier is then required to apply the process specified under *'LVV Certification procedure'* and *'Documentation required'*, depending on the amount by which the vehicle exceeds the MAR.

Vehicles upgraded for stretched limousine conversion by the vehicle manufacturer

Some stretched limousines are based on luxury vehicles, such as Lincolns and Cadillacs, which are intended for such end-purposes by the vehicle manufacturer. In these cases, the vehicles are fitted by the vehicle manufacturer with up-graded suspension components, and in some cases also have upgraded brakes, increased wheel-stud size or number, and steering components, which make the vehicle suitable for the increased GVM and MAR it will need once it has been converted into a stretched limousine.

These vehicles are issued by the vehicle manufacturer with a higher GVM and MAR than other vehicles of the same make and model which are not intended for stretched limousine conversion. A physical inspection will often show bigger than normal components, particularly in the suspension area. Confirmation of the higher GVM and MAR must be provided by the vehicle manufacturer, which is usually by way of a decal or label affixed to the vehicle structure. Note that the MAR of these vehicles may not be exceeded.

Note also that LVV Certification is not required for the stretched limousine conversion on these vehicles, provided that the stretched limousine conversion was carried out by the vehicle manufacturer, or under its supervision, or with its endorsement. Vehicles of the type described here are typically converted into a stretched limousine in the vehicle's country of origin (usually the United States of America) by a company endorsed by the vehicle manufacturer. This means that upon arrival into New Zealand, such vehicles undergo a right-hand drive conversion, which must be LVV Certified.

Although LVV Certification is not required for the stretched limousine conversion on such vehicles, in each case the vehicle should have its maximum potential occupant weight simulated, and then weighed and compared against the manufacturer's GVM and MAR to ensure that the GVM and MAR is not exceeded.

Finally:

More work will be done in the future for vehicles which exceed the MAR by more than 30%, however at this stage, we at least now have a process by which to inspect and approve, if appropriate, stretched limousines that exceed the MAR by up to 30%.

If you have any queries or require any further clarification relating to this Information Sheet, please feel free to contact Kendall Bradley at the Wellington LVVTA office on (04) 477-4372.

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