Correct as at 27th June 2026. It may be superseded at any time.

Extract taken from: Heavy vehicle specialist certification > Vehicle dynamic performance > PSV rollover

7-1 PSV rollover

Certifier categories: **HVEC** | **HVCD**

Reasons for rejection

1. The structural strength of a passenger service vehicle is insufficient to provide reasonable protection for the occupants in the event of roof or wall deformation resulting from the vehicle rolling over.

2. The body of a passenger service vehicle is not fit for its purpose and securely fixed to the chassis.

3. The superstructure is not of robust design, and made of materials fit for the purpose.

4. The structural strength of the vehicle has deteriorated from:

    a) corrosion, or

    b) other damage, or

    c) modifications.

5. A heavy motor vehicle which entered service as a passenger service vehicle in New Zealand on or after 1 September 1999, or whose structure was modified after that date, does not comply with the version of at least one of the following vehicle standards which was applicable at the time the vehicle entered service as a passenger service vehicle in New Zealand or at the time of the modification:

    a) one of the four options of UN/ECE Regulation No. 66, or

    b) one of the four options of Australian Design Rule 59/00, or

    c) the heavy passenger service vehicle cannot be demonstrated to withstand, without permanent deformation, the simultaneous application of forces as follows:

        i. a force, equivalent to the weight of half the gross vehicle mass, applied horizontally at right angles to the longitudinal centreline of the vehicle at the cant-rail or at the topmost corner of the body, and

        ii. a force, equivalent to the unladen weight of the vehicle, applied vertically downwards at the same cant-rail or corner, and

        iii. the distribution of these forces must be at least approximately proportional to that of the gross vehicle mass along the length of the vehicle.

6. Compliance with the PSV strength requirements, when the vehicle has not been complied to a standard, has not been established by either:

    a) a full-scale test, or

    b) calculation.

7. If compliance with the PSV strength requirements is to be established by a full-scale test on the completed frame on its chassis:

    a) the heavy passenger service vehicle was not on a level surface, or

b) if the applied forces would cause the vehicle to tilt, restraint was not applied to the chassis or running gear so that the vehicle remains approximately in its normal upright position.

8. If the body structure is wholly or partly constructed of non-metallic materials, the full-scale test required for the PSV strength requirements has resulted in:

a) a permanent deformation, or

b) a local failure point, or

c) failure of the attachment to the chassis.

9. If compliance with the PSV strength requirements was established by calculation, for a heavy passenger service vehicle with a structure composed wholly or partly of non-metallic materials or metallic materials of unknown yield stress, the calculation was not based on the aggregated strength of the vehicle's ring-frames or body sections.

10. The strength of each ring-frame or body section as required for calculations if not known, was not established by physical testing.

11. The strength rating to be assigned to the ring-frame or body section from the physical testing of a ring-frame or body section is not the load at which the first point of failure occurred.

12. The ring-frame or body section was not tested until the second and third points of failure occurred.

13. The second point of failure to the ring-frame or body section is not within 65% to 85% of the rating given to the ring-frame or body section.

14. The third point of failure to the ring-frame or body section is not within 40% to 60% of the rating given to the ring-frame or body section.

15. A ring-frame or body section that is not identical in profile and construction to one previously tested uses the same rating as the tested ring-frame or body section.

16. If compliance with the PSV strength requirements is established by calculation for a heavy passenger service vehicle with a structure composed wholly of metallic material of known yield stress, the calculation was not carried out by:

a) finite element stress analysis, or

b) the simplified calculation method, or

c) other calculation methods approved by the NZTA for this purpose.

17. If compliance with the PSV strength requirements was established by finite element stress analysis for a heavy passenger service vehicle with a structure composed wholly of metallic material of known yield stress:

a) it did not include at least the whole body-frame structure (including the side-wall-to-floor-frame attachment and the body-frame-to-chassis attachment), or

b) butt-welded and mechanical joints were not separately assessed and justified, if necessary by means of mechanical tests, or

c) any assumption made on the performance of joints or other parts of the structure were not shown to be justified, if necessary, by means of tests, or

d) the calculation did not include an appropriate allowance for deterioration during the expected life of the vehicle, having regard to the material of the structure, the specific manufacturing technology, and the conditions under which the vehicle is likely to be operated.

18. If compliance with the PSV strength requirements was established by the simplified calculation method for a heavy passenger service vehicle with a structure composed wholly of metallic material of known yield stress, the following assumptions were not justified:

a) the horizontal force is equivalent to half the unladen weight, instead of half the gross vehicle mass, or

b) the roof is a rigid structure, or

c) the body is a rigid structure below the waistline, or

d) glazing makes no contribution to the structural strength, or

e) the window pillars are encased at the waistline, or

f) the roof-to-pillar attachment is of a hinged type, or

g) the load, imposed by the horizontal force, is shared by the pillars, and the distribution of load is statically indeterminate, or

h) the load, imposed by the vertical force, is shared by the pillars which are connected to the cant-rail where the force is applied, and the distribution of the load must be proportional to the area of the cross-section of the pillars.

19. If the simplified calculation method is used, the calculation did not include an appropriate allowance for deterioration during the expected life of the vehicle, having regard to the material of the structure, the specific manufacturing technology, and the conditions under which the vehicle is likely to be operated.

20. Compliance with the PSV strength requirements was not certified by a HVEC or HMCD certifier.

21. Any test equipment has not been certified by an organisation accredited by Joint Accreditation System of Australia and New Zealand.

Summary of legislation

Applicable references

- UN/ECE Regulation No. 66
- Australian Design Rule 59/00.

Applicable legislation

- **Land Transport Rule: Passenger Service Vehicles 1999**

Passenger Service Vehicles 1999 (section 7)

Structural strength

1. The structural strength of a passenger service vehicle must be sufficient to provide reasonable protection for the occupants in the event of roof or wall deformation resulting from the vehicle rolling over.

2. The body of a passenger service vehicle must be fit for its purpose and securely fixed to the chassis. The superstructure must be of robust design, and must be made of materials fit for the purpose.

3. The structural strength must be maintained throughout the service life of the passenger service vehicle.

Additional provisions for heavy passenger service vehicles

4. A heavy motor vehicle which entered service as a passenger service vehicle in New Zealand on or after 1 September 1999, or whose structure was modified after that date, must comply with the version of at least one of the following vehicle standards which was applicable at the time the vehicle entered service as a passenger service vehicle in New Zealand or at the time of the modification:

a) one of the four options of UN/ECE Regulation No. 66, or

b) one of the four options of Australian Design Rule 59/00, or

c) the structural strength specifications in requirements 9 to 20 below.

Structural Strength specifications for heavy motor vehicles

5. The heavy passenger service vehicle must be able to withstand, without permanent deformation, the simultaneous application of forces as follows:

a) a force, equivalent to:

i. the weight of half the gross vehicle mass, applied horizontally at right angles to the longitudinal centre line of the vehicle at the cant-rail or at the topmost corner of the body, and

ii. the unladen weight of the vehicle, applied vertically downwards at the same cant-rail or corner, and

b) the distribution of these forces must be at least approximately proportional to that of the gross vehicle mass along the length of the vehicle.

6. Compliance with requirement 6 must be established by either:

a) a full-scale test, or

b) calculation.

7. If compliance with requirement 6 is established by a full-scale test on the completed frame on its chassis:

a) the heavy passenger service vehicle must be on a level surface, and

b) if the applied forces would cause the vehicle to tilt, restraint must be applied to the chassis or running gear so that the vehicle remains approximately in its normal upright position.

8. If the body structure is wholly or partly constructed of non-metallic materials, the full-scale test in requirement 8 must not result in:

a) a permanent deformation, or

b) a local failure point, or

c) failure of the attachment to the chassis.

9. If compliance with requirement 6 is established by calculation, for a heavy passenger service vehicle with a structure composed wholly or partly of non-metallic materials or metallic materials of unknown yield stress, the calculation must be based on the aggregated strength of the vehicle’s ring-frames or body sections.

10. If the strength of each ring-frame or body section as required for calculations under requirement 10 is not known, this must be established by:

a) carrying out physical testing on a ring-frame or body section to establish the load at which the first point of failure occurs, and this is the strength rating to be assigned to the ring-frame or body section,

b) testing further to establish the loads at the second and third points of failure, with the result that the load at the second point of failure must be within 65% to 85% of the rating and the load at the third point of failure must be within 40% to 60% of the rating,

c) repeating the test on any ring-frame or body section that is not identical in profile and construction to one previously tested, until the strength rating of all ring-frames or body sections of the vehicle are known.

11. If compliance with requirement 6 is established by calculation for a heavy passenger service vehicle with a structure composed wholly of metallic material of known yield stress, the calculation must be carried out by:

a) finite element stress analysis, according to requirement 12, or

b) the simplified calculation method, according to requirement 13, or

c) other calculation methods approved by the NZTA for this purpose.

12. If compliance with requirement 6 is established by finite element stress analysis for a heavy passenger service vehicle with a structure composed wholly of metallic material of known yield stress:

a) it must include at least the whole body frame structure (including the side-wall-to-floor-frame attachment and the body-frame-to-chassis attachment), and

b) butt-welded and mechanical joints must be separately assessed and justified, if necessary by means of mechanical tests, and

c) any assumption made on the performance of joints or other parts of the structure must be shown to be justified, if necessary, by means of tests, and

d) the calculation must include an appropriate allowance for deterioration during the expected life of the vehicle, having regard to the material of the structure, the specific manufacturing technology, and the conditions under which the vehicle is likely to be operated.

13. If compliance with requirement 6 is established by the simplified calculation method for a heavy passenger service vehicle with a structure composed wholly of metallic material of known yield stress, the following assumptions must be made:

a) the horizontal force is equivalent to half the unladen weight, instead of the force defined in requirement 8(a)(i),

b) the roof is a rigid structure,

c) the body is a rigid structure below the waistline,

d) glazing makes no contribution to the structural strength,

e) the window pillars are encastre at the waistline,

f) the roof-to-pillar attachment is of a hinged type,

g) the load, imposed by the horizontal force, is shared by the pillars, and the distribution of load is statically indeterminate, it must be calculated on the basis of the flexible deflection of the pillars, and the deflection of each pillar is proportional to its L/IE factor and to the load imposed on it (where L = length of the pillar, I = moment of inertia, E = Young’s modulus),

h) the load, imposed by the vertical force, is shared by the pillars which are connected to the cant-rail where the force is applied, and the distribution of the load must be proportional to the area of the cross-section of the pillars.

14. If the simplified calculation method specified in requirement 14 above is used, the calculation must include an appropriate allowance for deterioration during the expected life of the vehicle, having regard to the material of the structure, the specific manufacturing technology, and the conditions under which the vehicle is likely to be operated.

15. Compliance with the requirement 6 above must be certified by a HVEC or HMCD certifier.

16. Any test equipment must be certified by an organisation accredited by Joint Accreditation System of Australia and New Zealand.