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Replacing GB14167-1993

Safety belt Anchorages for Vehicles

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Introduction

All technical contents of this Standard are mandatory.

This Standard is amended with ECE R14 Rev.3/Amend.1 of the Uniform Provisions Concerning the Approval of Vehicles with Regard to Safety belt Anchorages (English edition).

The redrafting of this Standard is based on ECE R14. Appendix F lists the cross-reference of paragraph numbering of this Standard and ECE R14.

This Standard has adapted the ECE R14 regulations to suit the conditions of this country.

The technical differences and the reasons therefor between this Standard and ECE R14 are as follows:

- National standard symbols have replaced the symbols used in order to improve the operability of this Standard.
- The minimum number of anchorages stated in Appendix C for M₂ vehicles has been adjusted in order to conform to our national standard system.
- Contents concerning ‘Three dimensional H location point determination procedure’ in Appendix 4 of ECE R14 have been deleted to avoid actual operation errors arising from differences in standard terminology. Please refer to the procedural contents of Appendix C of GB11551-2003 where this Standard refers to the contents of the above procedure.
- Paragraph 3 and 4 of ECE R14 have been deleted because of the differences between the standard system and the statutory system.

For ease of operation, the following editorial amendments have been made to the ECE R14 stipulations:

- daN changed to N;
- tonne changed to kg;
- “this Regulation” changed to “ this Standard”;
- Appendix F included for its additional information.

The main differences between this Standard and GB14167-1993 ‘Safety belt anchorages for vehicles’ are:

- Additional general requirements for anchorages (4.1 in this edition);
- Higher requirements for minimum number of anchorages (4.2 in this edition);
- Anchorage location requirements changed (4.1 in the 1993 edition; 4.3 in this edition);
- Additional stipulations for testing methods (5.4 in this edition);
- Addition of dynamic testing method (5.5 in this edition);
- Addition of appendices for standards A, B, C, D and E, and Appendix F for information. (See Appendices of standards A, B, C, D and E, and Appendix F for information).

A, B, C, D and E are appendices for standards. Appendix F is for information.

This Standard replaces GB14167-1993 ‘Safety belt anchorages for vehicles’ on the day it comes into force.

This Standard is proposed by the National Automotive Standardisation Technical Committee.

This Standard is managed centrally by the National Automotive Standardisation Technical Committee.

This Standard is drawn up by: Dongfeng Automotive Engineering Research Institute.

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This Standard was first issued in March 1993. This is its first amendment.

Safety belt anchorages for vehicles

1 Scope

This Standard stipulates the location, strength requirements and testing methods of the safety belt anchorages for vehicles.

This Standard is applicable to the safety belt anchorages for vehicles in M and N categories with forward-facing and rear-facing seats for adults.

2 Reference documents for standards

Clauses from the documents below have been adopted as clauses in this Standard through references to them. Subsequent amendments (not including errata to contents) and revised editions of dated documents are not applicable to this Standard. As to whether the consensus of various researches based on this Standard can use the latest editions of these documents, as an encouragement, the guideline is that the latest editions are applicable to this Standard provided the reference documents concerned are undated.

GB11551-2003	Passenger protection in frontal collisions of passenger vehicles
GB11552-1999	Protrusions inside saloon cars
GB/T11563	Vehicle H point determination procedure
GB 13057-2003	The strength of passenger vehicle seats and other vehicle securing components
GB14166-2003	Motor vehicle adult passenger seat belts and restraint systems

3 Terminology and definitions

The following terminology and definitions apply to this Standard.

3.1 Vehicle type

This means a category of power-driven vehicles with anchorages of the same dimensions, external appearance and materials fitted to the vehicle or seats. If dynamic testing is used, the performance of the components of the restraint system of the vehicle, and in particular, the loading limiting device capability that affects the strength loading of the safety belt should be the same.

3.2 Safety belt anchorage

This means the component parts for the fitting and securing of the safety belt assembly to the vehicle body, seat or other components of the vehicle.

3.3 Effective safety belt anchorages

This means the location point to determine the positioning of the various parts of the safety belt stipulated in 4.3 relative to the angle of the wearer. Anchoring of the strap at this point will achieve the safe wearing of the safety belt as envisaged by the design. It may, or may not, be the actual anchoring of the safety belt. The determining factor is the configuration of the metal connector at its attachment to the safety belt to the anchorage. For example:

- If the rigid link of the safety belt connects to the lower anchorages, then within the range of seat position adjustments, whether it is fixed or reeling type, the effective safety belt anchorage is where the strap connects to the hardware;
- If no strap guide has been fitted to the vehicle body or seat frame, then the effective safety belt anchorage is the centre point of the guide of the side of the strap facing the wearer.

— If the safety belt passes over the wearer directly to the retractor without a guide, then the intersection of the retractor axis and the median line of the flat surface entering the retractor is the effective safety belt anchorage.

3.4 Floor

This means the vehicle platform adjoining the sides of the vehicle, including the reinforcing components and the longitudinal and transverse members below the platform.

3.5 Seat

This means a fixture complete with trim capable of seating an adult passenger. It may or may not be part of the vehicle structure. It can be an individual seat or part of a bench seat intended to seat one person.

3.5.1 Front passenger seat

This means any seat where the “foremost H point” of the seat is on or in front of the vertical transverse plane through the driver’s R point.

3.6 Group of seats

This means a bench seat capable of seating one or more adult passengers. It can be made up of several separate seats arranged side-by-side to form a group of seats.

3.7 Bench seat

This means a fixture complete with trim capable of seating a certain number of adults.

3.8 Folding seat

This means an occasional seat. In normal situations, it remains in a folded position.

3.9 Seat type

This refers to a category of seats, which do not differ in the following respects:

- Shape, dimensions and materials of the seat structure;
- Types and dimensions of the adjustment system and locking system;
- Types and dimensions of the safety belt anchorage, seat anchorage and the relevant parts of the vehicle body.

3.10 Seat anchorage

This means the system to secure the seat assembly onto the vehicle body, including the parts affecting the structure of the vehicle body.

3.11 Adjustment system

This means the device to adjust the positioning of the seat or components of the seat to suit the posture of the occupant, allowing the seat:

- longitudinal movement;
- vertical displacement;
- angle adjustment.

3.12 Displacement system

This means the device enabling the seat or one of its components to be displaced or rotate without a fixed intermediate position in order to permit easy access by the passengers to the seating behind the seat concerned.

3.13 Locking system

This means any device ensuring a certain user position is maintained for a seat or part of a seat, including devices locking the seat back relative to the seat and the seat relative to the vehicle.

3.14 Reference zone

This means the space between two vertical longitudinal planes, 400 mm apart and symmetrical with respect to point H. It is defined by rotation from vertical to horizontal of the head-form apparatus in the Appendix A of GB11552-1999.

3.15 Thorax load limiter function¹

This means the safety belt and the seat for limiting the level of the restraining forces exerted on the thorax during collision.

4. Requirements

4.1 General requirements

4.1.1 The design, manufacture and layout of the safety belt anchorage should meet the following requirements:

4.1.1.1 It should allow the fitting of a suitable safety belt. The seat belt anchorages (especially in respect of strength) of offside front seats should be suitable for the installation of seat belts with retractor and belt guide, except vehicles installed with other types of retractor seat belts. If the anchorages are only suitable for special types of safety belt, the type of safety belt should be specified in the test report.

4.1.1.2 There should be no danger of the safety belt slipping off when it is worn correctly.

4.1.1.3 The protrusions of the vehicle and seat frame in contact with the strap should not damage the strap.

4.1.1.4 During normal use of the vehicle, the anchorage should comply with the stipulations of this Standard.

4.1.1.5 For anchorages that can take up different positions (anchorage to facilitate passenger entry into the vehicle and to restrain passengers), the stipulations of this Standard apply when the anchorage is in its effective restraining position.

4.2 Minimum number of safety belt anchorages

4.2.1 Vehicles in M and N categories (except M₂ and M₃ city passenger vehicles permitting standing passengers) must comply with the safety belt anchorage requirements of this Standard.

¹ The English heading '*Thorax load limiter function*' is given in the original copy. The Chinese copy actually says: '*Thorax load limiter device*'. This makes more sense than the English version given.

4.2.1.1 Anchorages for harness type safety belts should comply with the stipulations of this Standard; additional anchorages or anchorages for installation of Y-configuration crotch strap safety belts do not have to satisfy the strength and location requirements of this Standard.

4.2.2 The minimum number of safety belt anchorages for all forward and rear facing seats should comply with the stipulations in Appendix C of this Standard.

4.2.3 For non offside front seats in M₁ category vehicles (Appendix C, note 1) separated from the sides of the vehicle by an aisle for passengers, having only two lower anchorages will be acceptable. If the space between the seat and the side is an aisle, the distance between the plane perpendicular to the longitudinal median line of the seat (measured from point R) and the side should be more than 500mm when the vehicle doors are closed.

4.2.4 For front middle seats (Appendix C, note 2) in vehicles with windcreens outside the reference zone as defined by Appendix A of GB11552-1999, having only two lower anchorages will be acceptable. If the windscreen is inside the reference zone, three anchorages will be required. In this instance, the windscreen will be considered as part of the reference zone.

4.2.5 All seating positions specified by note 3 of Appendix C will require three anchorages. If one of the conditions below is satisfied, then having only two anchorages will be acceptable:

4.2.5.1 There is a seat or a vehicle component which satisfies 5.3.3 of GB13057-2003 directly in front of the seat.

4.2.5.2 There are no vehicle component parts in the reference zone when the vehicle is stationary or in motion.

4.2.5.3 Component parts within the reference zone satisfy the seat back energy absorption requirements of GB 13057-2003.

4.2.6 No anchorages are required for folding seats (including seats used only when the vehicle is stationary) and seats not included in 4.2.1 to 4.2.4 inclusive. If the vehicle has anchorages for these seats, then the anchorages must comply with the stipulations of this Standard. In this instance, having only two lower anchorages is acceptable.

4.2.7 The requirements for front row middle seats in upper decks of double-decker passenger vehicles are the same as those for front offside seats.

4.2.8 For seats which can be overturned or placed in other orientations while the vehicle is stationary, the requirement of this Standard is only applicable when the seats are in their normal orientation while the vehicle is motion (Specify in the test report).

4.3 Location of safety belt anchorage (See Appendix A, figure A1)

4.3.1 General provisions

4.3.1.1 Safety belt anchorages can be installed onto the vehicle frame or seat frame; they can be installed to other vehicle components, or dispersed between the above components.

4.3.1.2 Anchorages can be shared by the two ends of two adjacent safety belts provided they meet the requirements.

4.3.2 Location of lower effective safety belt anchorage

4.3.2.1 Front row seats of M₁ category vehicles

α_1 (non belt buckle side) of M_1 category vehicles should be within the 30° - 80° range; α_2 (belt buckle side) should be within the 45° - 80° range. The angle requirements for all positions within the normal range of adjustments of front row seats are the same as above. In all normal seating positions, if at least either α_1 or α_2 has a constant value (anchorage is on the seat, for example), its value should be $60^\circ \pm 10^\circ$. For adjustable seats with adjustment devices, when the angle of the seat back is less than 20° (see Appendix A, figure A1), α_1 may be below the above stipulated minimum value (30°), provided it is not less than 20° in any normal position of use.

4.3.2.2 Back row seats of M_1 category vehicles

For M_1 category vehicles, α_1 and α_2 of all back row seats should be within the 30° - 80° range. If the back row seats are adjustable, the above requirements are applicable to all normal adjustable positions.

4.3.2.3 Front row seats for vehicles other than those in M_1 category

For vehicles other than those in M_1 category, α_1 and α_2 of all front row seats in all normal adjustable positions should be within the 30° - 80° range. For vehicles with a maximum total mass not exceeding 3,500 kg with front row seats in all normal adjustable operating positions and at least either α_1 or α_2 having a constant value (anchorage is on the seat, for example), their value should be $60^\circ \pm 10^\circ$.

4.3.2.4 Back row seats and special front or back row seats for vehicles other than those in M_1 category

For vehicles other than those in M_1 category (see Appendix A, figure A1) with adjustment devices and the angle of the seat back less than 20° , and with the bench seat (front and back row) and other back row seats in normal operating positions, α_1 and α_2 within the 20° - 80° range are permitted. For vehicles with a maximum total mass not exceeding 3,500 kg with front row seats in all normal adjustable seating positions and at least either α_1 or α_2 having a constant value (anchorage is on the seat, for example), its value should be $60^\circ \pm 10^\circ$. For non front row seats in normal seating positions of M_2 and M_3 vehicles, α_1 and α_2 should be 45° - 90° .

4.3.2.5 For a safety belt with two lower anchorages L_1 and L_2 , the distance between these two points on the two vertical planes parallel to the vehicle longitudinal median plane should not be less than 350mm. For M_1 and N_1 category vehicle middle back seats then the above distance should not be less than 240mm, provided its position relative to other seat position cannot be changed. The longitudinal median plane of the seat should be between points L_1 and L_2 , with a minimum distance of 120mm.

4.3.3 Location of the upper effective safety belt anchorage (see Appendix A)

4.3.3.1 If the use of a strap guide or similar installation affects the location of the upper effective anchorage, the effective anchorage location should be determined by the position of the anchorage when the longitudinal median line of the strap passes through anchorage point J_1 . Starting from point R, use the three line segments below to determine point J_1 :

RZ: From point R, proceed upward along the torso line to a distance of 530mm;

ZX: From point Z, proceed along the line perpendicular to the plane of the longitudinal median line of the vehicle towards the anchorage up to a distance of 120mm;

XJ1: From point X, proceed forward along the line perpendicularly determined by vertical planes RZ and ZX up to a distance of 60mm.

Point J_2 and J_1 lie symmetrical to the longitudinal vertical plane of the torso line. The torso line means the torso line of the manikin block placed on the seat. If double doors are used to access the front and back seats and the anchorages are on the B-pillar, the anchorage system should not hinder passenger ingress to and egress from the vehicle.

4.3.3.2 The location of the upper effective safety belt anchorage should be below the plane FN, which runs perpendicular to the longitudinal median plane of the seat and is at an angle of 65° to the torso line. For back row seats, this angle can be reduced to 60° . The plane FN should be so placed as to intersect the torso line at point D, so that $DR = 315\text{mm} + 1.8S$ is guaranteed. But where $S \leq 200\text{mm}$, then $DR = 675\text{mm}$.

4.3.3.3 The location of upper effective safety belt anchorage should be behind the plane FK, which runs perpendicular to the longitudinal median plane of the seat and intersects the torso line at an angle of 120° at point B so that $BR = 260\text{mm} + S$ is guaranteed. Where $S \leq 280\text{mm}$, the manufacturer can opt for $BR = 260\text{mm} + 0.8S$.

4.3.3.4 The value of S should not be less than 140mm.

4.3.3.5 The location of the upper effective safety belt anchorage should be to the rear of the vertical plane perpendicular to the vertical longitudinal median plane of the vehicle passing through point R as shown in Appendix A.

4.3.3.6 The location of the upper effective safety belt anchorage should be above the horizontal plane passing through point C as stipulated by A.1.3.

4.3.3.7 Apart from the upper effective anchorage stipulated by 4.3.3.1, additional effective anchorages can be installed if one of the following conditions is satisfied:

4.3.3.7.1 The additional anchorage complies with the requirements of 4.3.3.1 to 4.3.3.6 inclusive.

4.3.3.7.2 No tool shall be required in order to use the additional anchorage. The anchorage conforms to the requirements of 4.3.3.5 to 4.3.3.6 inclusive and it is located within the designated area in Appendix A, figure 1, vertically 80mm above or below.

4.3.3.7.3 The anchorage of the harness type safety belt which conforms to the stipulations of 4.3.3.6 should be located behind the transverse plane of the torso line and should be located as below:

4.3.3.7.3.1 For a single anchorage, it is located within the area common to two dihedrals defined by the verticals passing through points J_1 and J_2 as stipulated by 4.3.3.1. Please see the horizontal section diagram A2 of Appendix A.

4.3.3.7.3.2 For two anchorages, the anchorage can be located within one of the above dihedrals, provided that each anchorage is not more than 50mm from the symmetrical position of the other anchorage from plane P as stipulated in A.1.5.

4.4 Threaded hole dimensions of the anchorage

4.4.1 The threaded hole of the anchorage should be 7/16" (20UNF2B)

4.4.2 If the anchorage and the safety belt have been installed by the vehicle manufacturer and the anchorages complied with other stipulations of this Standard, there is no need to satisfy the requirement of 4.4.1. In addition, the requirement in 4.4.1 is not applicable to the requirements for additional anchorages in 4.3.3.7.3.

4.4.3 The safety belt anchorage should not be damaged by the removal of the safety belt.

4.5 Strength of safety belt anchorage

4.5.1 All anchorages should be tested as stipulated in 5.3 and 5.4. If the stipulated load is sustained for the specified time, then permanent deformation, including partial fracture or fissure lines, of the anchorage or its surrounding area is acceptable. During the test, the minimum spacing of the lower effective anchorage should satisfy the requirements of 4.3.2.5; the upper effective anchorage should satisfy the requirements of 4.3.3.6.

4.5.1.1 For M_1 category vehicles with a maximum total mass not exceeding 2,500 kg, if the upper anchorage is on the seat frame, during the test, the upper effective anchorage forward displacement should be within the transverse plane of point R and point C (See Appendix A, diagram A1). For other vehicles, the upper effective anchorage forward displacement should not exceed a 10° forward tilting angle from point R plane. The maximum displacement magnitude should be measured during the test. If the upper effective anchorage displacement exceeds the above-mentioned range, the manufacturer should prove to the testing organisation that it will not harm the passenger.

4.5.2 Upon removal of loading, it must be guaranteed that all seat passengers can leave the vehicle immediately after operating the displacement system and locking system manually.

4.5.3 After the test, record all damage to load-bearing components and anchorages which occurred during the test.

4.5.4 For M_3 category vehicles and M_2 category vehicles with a maximum total design mass not exceeding 3,500 kg conforming to the requirements of GB 13057, if the upper anchorage is located on the seat, it is not necessary to satisfy the requirements in 4.3.3.6 and 4.5.1.

5. Testing method

5.1 General provisions

5.1.1 Procedures stipulated in 5.2 can be used at the request of the manufacturer.

5.1.1.1 Testing can be carried out using the frame of a vehicle, or it can be carried out using a complete vehicle.

5.1.1.2 Only the safety belt anchorages of a seat or a group of seats will need to be tested if the following conditions are satisfied:

5.1.1.2.1 The structural characteristics of the anchorages are the same as those corresponding to other seats or groups of seats;

5.1.1.2.2 The structural features of the anchorages wholly or partially fitted to seats or group of seats are the same as those fitted to other seats or group of seats.

5.1.1.3 Doors and windows may or may not be installed; doors and windows may be closed or open.

5.1.1.4 Standard structural reinforcements fitted to a vehicle may be left in place.

5.1.2 The seat should be placed in a driving or operating position most disadvantaged from the point of view of strength. The test report should specify the seat position. If the angle of the back of the seat is adjustable, it should be adjusted to the position specified by the manufacturer. Alternatively, the actual seat back of M_1 and N_1 category vehicles should be as near to 25° as possible; it should be 15° for other vehicles.

5.2 Securing vehicle into position

5.2.1 During testing , all vehicle securing methods must not strengthen the anchorage or its surrounding area. At the same time, it must not lessen the normal deformation of the frame structure.

5.2.2 All devices for securing the vehicle should not be less than 500mm in front of, or less than 300mm behind, the anchorage to be tested. They must not affect the frame structure.

5.2.3 It is suggested that the frame structure should be secured near the wheel axis line or the suspension attachment support members.

5.2.4 If the securing method differs from those used in 5.2.1 to 5.2.3, then its equivalent effectiveness must be proved.

5.3 Testing requirements

5.3.1 All safety belt anchorages of the same group of seats should be tested simultaneously. If it is possible that failure is caused by the asymmetrical loading to the seats or anchorages, one repeat testing is permitted.

5.3.2 Loading should be applied along the direction on the plane parallel to the vehicle longitudinal median plane and $10^{\circ}\pm 5^{\circ}$ above horizontal.

5.3.3 Increase load to the stipulated value in the shortest possible time and maintain it for at least 0.2s.

5.3.4 See 5.4 and Appendix B for manikin blocks for use in tests.

5.3.5 Conditions for testing upper safety belt anchorages are as follows:

5.3.5.1 Offside front seats

Safety belt anchorage should be tested according to the stipulations in 5.4.1. For tests using a retractor or an upper strap guide to simulate a three-point type safety belt, the load should be transmitted to these three anchorages. Furthermore, if the number of anchorages is more than that stipulated in 4.2, these anchorages should be tested according to the stipulations of 5.4.5. During testing, use the simulated safety belt to apply load.

5.3.5.1.1 If the offside lower safe belt anchorage has not been fitted with a retractor or the retractor is fitted to the upper anchorage, the lower anchorage should also be tested according to stipulations in 5.4.3.

5.3.5.1.2 In the above circumstances, tests according to the stipulations in 5.4.1 and 5.4.3 can be carried out separately on different vehicle frames at the request of the manufacturer.

5.3.5.2 Rear offside seats and all middle seats

The anchorages should be tested according to the stipulations in 5.4.2. Tests should use a simulated retractor three-point type safety belt to apply load. Test should also be done according to stipulations in 5.4.3; tests should use a simulated lap belt with two anchorages to apply load. The two tests can be carried out separately on different frames at the request of the manufacturer.

5.3.5.3 If the manufacturer provides a vehicle fitted with safety belts, then tests can be carried out using the vehicle's safety belts at the request of the manufacturer.

5.3.6 If the offside and middle seats do not have upper anchorages, the lower anchorages should be tested according to the stipulations in 5.4.3, using a simulated lap belt to apply load to the anchorages.

5.3.7 If the vehicle is designed to accept other fittings and these fittings require the strap to go through a guide before fitting to the anchorage, or fitting to anchorages outside the range stipulated in 4.2, then these fittings should be used to fit the safety belt or simulated belt to the vehicle's safety belt anchorage. In this instance, the corresponding test stipulated in 5.4 should be carried out for the anchorages.

5.3.8 Testing methods which can be proved to be as effective as the above tests are permitted.

5.4 Testing methods

5.4.1 Upper anchorage fitted with three-point type safety belt with a guide or strap direction slip-ring retractor

5.4.1.1 The upper anchorage should be fitted with a cable suitable for transmitting the test load or strap direction guide or direction slip-ring; or the manufacturer can provide the direction guide or strap direction slip-ring.

5.4.1.2 Use a simulated strap to apply $13,500\text{N} \pm 200\text{N}$ to the upper manikin block (see Appendix B, diagram B2). The test load for M_2 and N_2 category vehicles should be $6,750\text{N} \pm 200\text{N}$; the test load for M_3 and N_3 category vehicles should be $4,500\text{N} \pm 200\text{N}$.

5.4.1.3 At the same time as that of the above test, a test load of $13,500 \pm 200\text{N}$ should be applied to the lower manikin block (see Appendix B, figure B1). The test load for M_2 and N_2 category vehicles should be $6,750\text{N} \pm 200\text{N}$; the test load for M_3 and N_3 category vehicles should be $4,500\text{N} \pm 200\text{N}$.

5.4.2 Three-point type safety belt without retractor or with retractor fitted to the upper anchorage

5.4.2.1 A test load of $13,500 \pm 200\text{N}$ should be applied to the upper safety belt anchorage and the corresponding lower anchorage with the upper manikin block (see Appendix B, figure B2). If the upper anchorage is fitted with a retractor, the retractor should be tested simultaneously. The test load for M_2 and N_2 category vehicles should be $6,750\text{N} \pm 200\text{N}$; the test load for M_3 and N_3 category vehicles should be $4,500\text{N} \pm 200\text{N}$.

5.4.2.2 At the same time as that of the above test, a test load of $13,500\text{N} \pm 200\text{N}$ should be applied to the lower manikin block (see Appendix B, figure B1). The test load for M_2 and N_2 category vehicles should be $6,750\text{N} \pm 200\text{N}$; the test load for M_3 and N_3 category vehicles should be $4,500\text{N} \pm 200\text{N}$.

5.4.3 Two-point type safety belt (lap belt) anchorage

A test load of $22,250\text{N} \pm 200\text{N}$ should be applied to the lower manikin block in contact with the lap belt (see Appendix B, figure B1). The test load for M_2 and N_2 category vehicles should be $11,100\text{N} \pm 200\text{N}$; the test load for M_3 and N_3 category vehicles should be $7,400\text{N} \pm 200\text{N}$.

5.4.4 Anchorages installed on the seat frame or separately installed on the seat frame and the vehicle frame

5.4.4.1 At the time of carrying out tests according to stipulations in 5.4.1, 5.4.2 and 5.4.3, the following stipulated load should be applied to each seat or each group of seats:

5.4.4.2 Apart from the loads stipulated in 5.4.1, 5.4.2 and 5.4.3, a load equivalent to 20 times the total mass of the seat should be applied. Inertia load equivalent to the actual mass of the corresponding seat should be applied to the seat or the components relevant to the seat. Additional load and load distribution should be determined by the manufacturer with the approval of the inspection authority. For M₂ and N₂ category vehicles, the load should be 10 times the total mass of the seat; for M₃ and N₃ category vehicles it should be 6.6 times the total mass of the seat.

5.4.5 Testing other types of safety belt anchorage

5.4.5.1 Using a simulated strap fitting, apply a test load of $13,500\text{N} \pm 200\text{N}$ to the upper manikin block connected to the anchorage (see Appendix B, figure B2).

5.4.5.2 At the same time as the above test, apply a test load of $13,500\text{N} \pm 200\text{N}$ to the lower manikin block connected to the lower anchorage (see Appendix B, figure B3).

5.4.5.3 The test load for M₂ and N₂ category vehicles should be $6,750\text{N} \pm 200\text{N}$; the test load for M₃ and N₃ category vehicles should be $4,500\text{N} \pm 200\text{N}$.

5.4.6 Testing of rear-facing seats

5.4.6.1 Apply load according to requirements in 5.4.1, 5.4.2 or 5.4.3. The values of the test loads are the same as those stipulated for M₃ or N₃ category vehicles.

5.4.6.2 Applied load direction is the same as the seat facing direction. Testing procedures are the same as those in 5.3.

5.5 For groups of seats as defined by D1 of Appendix D, the dynamic test in Appendix D can be carried out in lieu of the static test in 5.3 and 5.4 at the request of the manufacturer.

Appendix A

(Appendix of standard)

Effective anchorage location

A.1 Definition

A.1.1 Point H is the reference point; it must be determined according to the stipulations in Appendix C of GB11551-2003. Point H' is the reference point determined by the corresponding seat position of every normal seating position corresponding to point H. Point R is the reference point of the seat.

A.1.2 Points L_1 and L_2 are the lower effective safety belt anchorages.

A.1.3 Point C is situated 450mm vertically above point R. If the distance S as defined by A.1.6 is less than 280mm and the manufacturer uses the formula $BR = 260 + 0.8S$ stipulated in 4.3.3.3, then the vertical distance between C and R should be 500mm.

A.1.4 α_1 and α_2 are the respective angles between a horizontal plane and planes perpendicular to the vehicle longitudinal median plane and passing through point R and the points L_1 and L_2 .

A.1.5 S is the distance in mm between the upper effective safety belt anchorage point and the reference plane P parallel to the vehicle longitudinal median plane. The position of plane P is defined as follow:

A.1.5.1 If the seating position is defined by the shape of the seat, plane P is the median plane of the seat.

A.1.5.2 In circumstances where the seating position cannot be defined: For driver seats, plane P is the vertical plane passing through the centre of the steering wheels and is also parallel to the vehicle longitudinal median plane (adjustable steering wheel should be adjusted to the middle position). For front offside passenger seats, plane P should be the plane symmetrical to the plane P of the driver seat. For rear offside seats, plane P should be the plane which is a distance A from the vehicle longitudinal ² plane. A is to be determined by the manufacturer according to the following conditions:

A > 200mm (only for bench seats accommodating 2 persons)

A > 300mm (for bench seats accommodating more than 2 persons)

A.2 Position

² The word 'median' may be missing.

Unit: mm

Area for additional anchorage stipulated in 4.4.3.7.2

Torso reference line

Permitted area

Distance stipulated in A.1.4

Angle stipulated in 5.1.2

Seat longitudinal median plane

Torso line

Upper effective anchorage

Left-facing offside seat

Figure A1 Effective anchorage range

Figure A2 Upper effective anchorage area

Appendix B
(Appendix of standard)

Manikin block schematic

Unit: mm

25mm thick foam cover

Figure B1 Lower torso manikin block

25mm thick foam cover

Strap fitted to anchorage

Figure B2 Upper torso manikin block

Unit: mm

25mm thickness foam cover

Figure B3 Lower manikin block

Appendix C

(Appendix of standard)

Minimum number of anchorages and lower anchorage locations

Table C1 Minimum number of anchorages

Vehicle category	Forward facing position				Rear facing
	Offside seat position		Middle seat position		
	Front row	Non front row	Front row	Non front row	
M ₁	3	3 or 2 ¹	3 or 2 ²	3 or 2 ³	2
M ₂ ≤ 3.5t	3	3 or 2 ³	3 or 2 ³	3 or 2 ³	2
M ₃ , M ₂ > 3.5t	3 ⁴	3 or 2 ³	3 or 2 ³	3 or 2 ³	2
N ₁ , N ₂ , N ₃	3	2	3 or 2 ³	2	2

Notes:

- 1: See 4.2.3 (two anchorages permitted if the seat is on the inside of the aisle).
- 2: See 4.2.4 (two anchorages permitted if windscreen is outside the reference zone).
- 3: See 4.2.5 (two anchorages permitted if there are no protrusions within the reference zone).
- 4: See 4.2.7 (special requirements for upper deck seats in double-decker passenger vehicles).

Table C2 Lower anchorage angle

Seat		M ₁ category vehicles	Non M ₁ category vehicles
Front row	Belt buckle side (α_2)°	45° - 80°	30° - 80°
	Non belt buckle side (α_1)°	30° - 80°	30° - 80°
	Angle constant value	50° - 70°	50° - 70°
	Bench seat belt buckle side (α_2)°	45° - 80°	20° - 80°
	Bench seat non belt buckle side (α_1)°	30° - 80°	20° - 80°
	Adjustable seat with seat back angle < 20°	α_1 : 20 – 80 ⁵ α_2 : 45 – 80 ⁵	20° - 80°
Back row seats ⁷		30° - 80°	20° - 80° ⁶
Folding seats		No requirements for anchorages; if there are anchorages, see corresponding front row or back row angle requirements.	

Notes:

- 5: If the angle is not constant, see 4.3.2.1.
6: The value for M₃ and M₂ category vehicles is 45° - 90°.
7: Including offside and middle seat positions

Appendix D

(Appendix of standard)

Dynamic testing — an alternative to static testing

D1. Scope

The dynamic testing of this appendix can replace 5.3 and 5.4 of this Standard. This test is suitable for seat groups where all seats have three-point type body restraint safety belts fitted, including those with a safety belt anchorage fitted to the seat frame. The manufacturer can opt for dynamic testing or static testing.

D2. Requirements

D2.1 After testing, the anchorage and the surrounding area should not have any fracture. Certain damage to the load limiter is permitted. The minimum spacing of the lower effective anchorage stipulated by 4.3.2.5 and the requirements of the upper effective anchorage as stipulated by 4.3.3.6 should be considered in conjunction with the following requirements.

D2.1.1 For M1 category vehicles with a total mass not exceeding 2,500 kg, if the upper anchorage is on the seat frame, the forward displacement after the test should be within the transverse plane of point R and point C (see Appendix A, figure 1). For non-M1 vehicles, the forward displacement of the upper anchorage should not incline forward more than 10° from the point R plane.

D2.2 After testing, all passengers on the seats should be able to leave the vehicle after operating the displacement and locking systems without any tools.

D3 Dynamic testing

D3.1 General Provisions

The test conditions in 5.1 of this Standard are equally applicable to this test.

D3.2 Installation and preparation

D3.2.1 Sled

The construction of the sled should ensure that it is not deformed by the test. Upon impact, the deviation from vertical should not be more than 5°; the deviation from horizontal should not be more than 2°.

D3.2.2 Securing vehicle body structure in position

According to the requirements in 5.2 of this Standard, secure the vehicle basic structure associated with the seat-securing device and the safety belt anchorage to the sled.

D3.2.3 Restraint systems

D3.2.3.1 The restraint systems (the complete seat, safety belt assembly and load limiting device) should be secured to the vehicle structure according to the manufacturer's requirements. The vehicle cabin environment (e.g. instrument panel, seats, etc) facing the test seat can be mounted onto the sled. If front air bags are fitted, the trigger mechanisms should be disabled.

D3.2.3.2 If the complete seat, safety belt assembly and certain restraint system components of the load limiting device are not fitted onto the sled, component parts of equivalent effectiveness can

be used in lieu at the request of the manufacturer with the agreement of the inspection organisation. Dimensions of the equivalent component parts should be close to those of the original parts. The type of structure selected should be the one giving the worst test results.

D3.2.3.3 When adjusting the seats according to 5.1.2 of this Standard, the position most adverse to the strength of the anchorage should be selected, taking into consideration the placement of the manikin in the vehicle.

D3.2.4 Manikin

A manikin satisfying the requirements of Appendix E should be placed onto each seat to be tested with the safety belt fastened.

D3.3 Testing method

D3.3.1 During testing, the sled speed should be 50km/h; the sled deceleration speed should be within the range stipulated in GB14166-2003.

D3.3.2 Additional restraining devices (such as pre-tensioning devices, but not including air bags) fitted should trigger according to the manufacturer's instruction manual.

D3.3.3 The safety belt anchorage displacement should not exceed the range stipulated in D2.1 and D2.1.1.

Appendix E

(Appendix of standard)

Manikin specifications

Mass	97.5kg ± 5kg
Seated height	965mm
Hip width	415mm
Hip circumference	1,200mm
Waist circumference	1,080mm
Chest depth	265mm
Chest circumference	1,130mm
Shoulder height	680mm
Dimension tolerance	± 5%

Chest depth

Chest circumference

Shoulder height

Seated height

Waist circumference

Hip circumference

Hip width

Side view

Front view

Note: Equivalent to a 95-centile combination Type III manikin

Appendix F

Informative Appendix

Cross reference of paragraph numberings of this Standard and ECE R14

Table F.1 gives the cross reference of paragraph numberings of this Standard and that of ECE R14

Table F.1 Cross reference of paragraph numberings of this Standard and that of ECE R14

Paragraph numbers of this Standard	Paragraph numbers of corresponding International Standard	Paragraph numbers of this Standard	Paragraph numbers of corresponding International Standard
1	----	4.2.6	5.3.6
2	----	4.2.7	5.3.7
3	2	4.2.8	5.3.8
3.1	2.1	4.3	5.4
3.2	2.2	4.3.1	5.4.1
3.3	2.3	4.3.2	5.4.2
3.4	2.4	4.3.3	5.4.3
3.5	2.5	4.4	5.5
3.6	2.6	4.4.1	5.5.1
3.7	2.7	4.4.2	5.5.2
3.8	2.8	4.4.3	5.5.3
3.9	2.9	4.5	7
3.10	2.10	4.5.1	7.1
3.11	2.11	4.5.2	7.2
3.12	2.12	4.5.3	7.3
3.13	2.13	4.5.4	7.4
3.14	2.14	5	6
3.15	2.15	5.1	6.1
----	3	5.2	6.2
----	4	5.3	6.3
----	5.1	5.4	6.4
4	5	5.5	6.5
4.1	5.2	----	Appendix 1
4.1.1	5.2.1	----	Appendix 2
4.2	5.3	Appendix A	Appendix 3
4.2.1	5.3.1	----	Appendix 4
4.2.2	5.3.2	Appendix B	Appendix 5
4.2.3	5.3.3	Appendix C	Appendix 6
4.2.4	5.3.4	Appendix D	Appendix 7
4.2.5	5.3.5	Appendix E	Appendix 8
		Appendix F	----
Note: Paragraph numbers of this Standard not included in this table are the same as those in ECE R14 and they have the same corresponding contents.			