



## European New Car Assessment Program (EuroNCAP) and Crash Test Ratings of New Vehicles

Car safety is now an important issue that many people consider when buying a new car. There are crash test standards defined in legislation that dictates the minimum performance in a crash, which cars have to pass to be approved for use in the UK. The results are not released, however, and therefore this does not tell the public about relative performances of vehicles in crash scenarios.

The European New Car Assessment Program (EuroNCAP) ratings provide car buyers with a good indication of which cars give the best protection for drivers, pedestrians and children. The information is impartial and easy to understand. The tests are sponsored by several of the larger transport departments of governments across Europe and companies who have an interest in vehicle safety, car manufacturers – who frequently use the results of the tests in advertising literature – also support the project.

It would be impossible to test a car for every circumstance in which a crash may occur – so instead the tests simulate a wide range of common accidents as well as accidents which result in high fatality rates. A good performance in the EuroNCAP tests is an accurate indication of which cars offer best protection in a collision.

### How the points system works

In order to rate cars, a points system has been developed and points can be achieved in several ways, all of which relate to preventing injury to an occupant in a collision.

Points are awarded for good designs that prevent contact between the crash test dummy and any part of the vehicle – which could be from the movement of the dummy into the car or by parts of the vehicle intruding into where the dummy sits. Airbags will improve the performance of a car by helping to cushion any hard areas of a car that a driver or passenger would come in to contact.

Points are also awarded for designs that preventing large amounts of movement by an occupant during the collision. The more that a crash test dummy moves during the impact, it means more of energy has been transferred into it and not dissipated by the vehicle's structural design – and therefore the greater the risk of personal injury.

Further points are awarded for design features that have been developed for the safety of the car's occupants. For example, if a manufacturer designs a system for preventing the doors and boot opening in a crash then there is less chance of an occupant being ejected from the vehicle – which can lead to a very serious injury – and so points are awarded.



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## **Star Category**

In order to simplify the points system, a star rating is given based on how many points a vehicle achieves during the tests. This is to give an easy-to-display and easy-to-understand comparative rating between cars of the same class; they cannot be compared between vehicles of different classes.

A comparison between vehicles with high and low star ratings was conducted in 2000, which concluded that occupants of vehicles with a high star rating were 30% less likely to suffer a serious or fatal injury in a crash.

In some vehicle ratings, the final star has a cross through it which indicates that although a vehicle has achieved the necessary amount of points to achieve that rating, the occupant was put at risk due to a life threatening injury in one of the tests.

## **Frontal impact test**

The frontal impact test simulates a collision with another structure that overlaps 40% of the cars bonnet on the drivers' side. The structure made out of a deformable mesh with a stiffness representative of a car bonnet, impacts the vehicle at 40mph and is.

The purpose of this test is to simulate a partially offset collision between the tested vehicle and an oncoming vehicle and this type of collision accounts for a large percentage of all car crashes on the road. It is therefore important that a car's ability to withstand this type of impact is tested.

A crash test dummy known as the Hybrid III is used in this test and the results are measured by taking readings from accelerometers within the dummy to see the movement of important body parts and also if the dummy has struck the side of the vehicle or if any of the cars structure has intruded into the drivers' compartment.

## **Side impact test**

The side impact test represents another important simulation of an accident that commonly occurs in the real world. A deformable crash barrier, approximately the width of the bonnet of a car, is impacted into the side of the tested vehicle. This is a representation of the type of collision that may occur if a driver were to pull out at a junction without making necessary observations.

Because the impact is perpendicular to the direction that the car is facing a different dummy called the EUROSID is used, this differs in design to the Hybrid III used in frontal impacts as it contains rib sections that can move sideways. Thus the movement of the dummy and the risk of injury are calculated from this.

## **Pedestrian test**

In 2003, there were 36,405 recorded incidents of pedestrians being hit by a car in Great Britain, of whom 774 were killed and 7,933 were seriously injured. This highlights that pedestrians are still very vulnerable on the roads.



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The potential injuries that could be suffered by a pedestrian in a collision with the vehicle are measured by impacting the bumper and bonnet with a legform and headform respectively. The head and legforms are made out of aluminium and are coated with polypropylene to represent the skin, which makes the impactors more realistic. Taking a reading of the accelerations and relating it back to scientifically defined risk of injury criteria again measures the potential chances of injury.

The pedestrian testing procedure was changed to a more stringent test in 2002 and the star's colour used in the rating was changed from dark blue to green to indicate the difference between cars tested before and after this change. Due to the differences in the tests the relative safety of vehicles with different star colours cannot be compared.

**Pole test**

A pole test is a representation of what would happen if the vehicle impacted with a thin pole (e.g. a road sign or tree). In the UK, in 2003, there were 8071 single vehicle accidents involving this type of impact, which resulted in 363 fatalities, and this is the reason why this important test is carried out.

The main difference between the pole test and the other tests is that due to the pole being much thinner, the energy of the collision concentrated in a much smaller area and the crush depth measured on the vehicle is greater than in other tests. Without appropriate airbags and car designs, the type of accident that this represents can result in a severe injury.

**Child test**

The child test was introduced more recently than the other tests and involves the use of a crash test dummy the size of a 3-year-old in a child seat specified by the manufacturer.

Points are gained again by limiting the potential injury that a child would suffer in a collision with emphasis placed on the protection of the child's head, zero points are awarded if the child is thrown out of the seat.

Further points are awarded if several IsoFIX positions are available and also if the car clearly displays warning labels to indicate that the dangers of placing a rear facing child seat in the front of a car could be death or serious injury to the child.

There are limitations to this test; because every car is designed differently, the same car seat will not fit as safely into every model of vehicle. The star rating only applies to the specific vehicle and child seat combination tested – not the child seat and vehicle separately. A different child seat to that specified, in the same car might give completely different results.



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## **EuroNCAP and Your Car**

EuroNCAP is an accurate comparison of which cars offer better protection to an occupant due to their repeatability and their proven relationship with real world trends.

The data is easy to come by and detailed descriptions of how the car performs in each test are available on the website at <http://www.euroncap.com> - along with comments of what the cars performance would mean to an occupant.

