

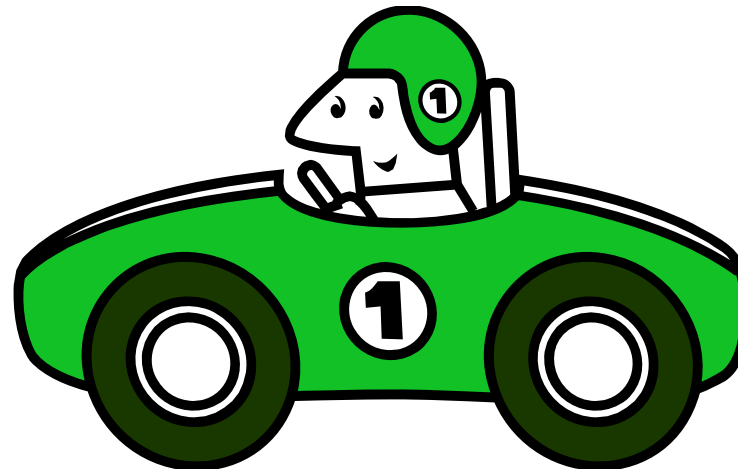


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# TA89 and the UK Annex to EN 12767



**Andrew Pledge**

The Passive Revolution

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# The First Law of Thermodynamics relates to the conservation of energy

“Energy cannot be created or destroyed”.

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## Personal Injury Accident - definition

**An unintentional energy exchange, which occurs when energy of any type reaches a susceptible structure in amounts, and at rates, in excess of those that can be tolerated without damage.**

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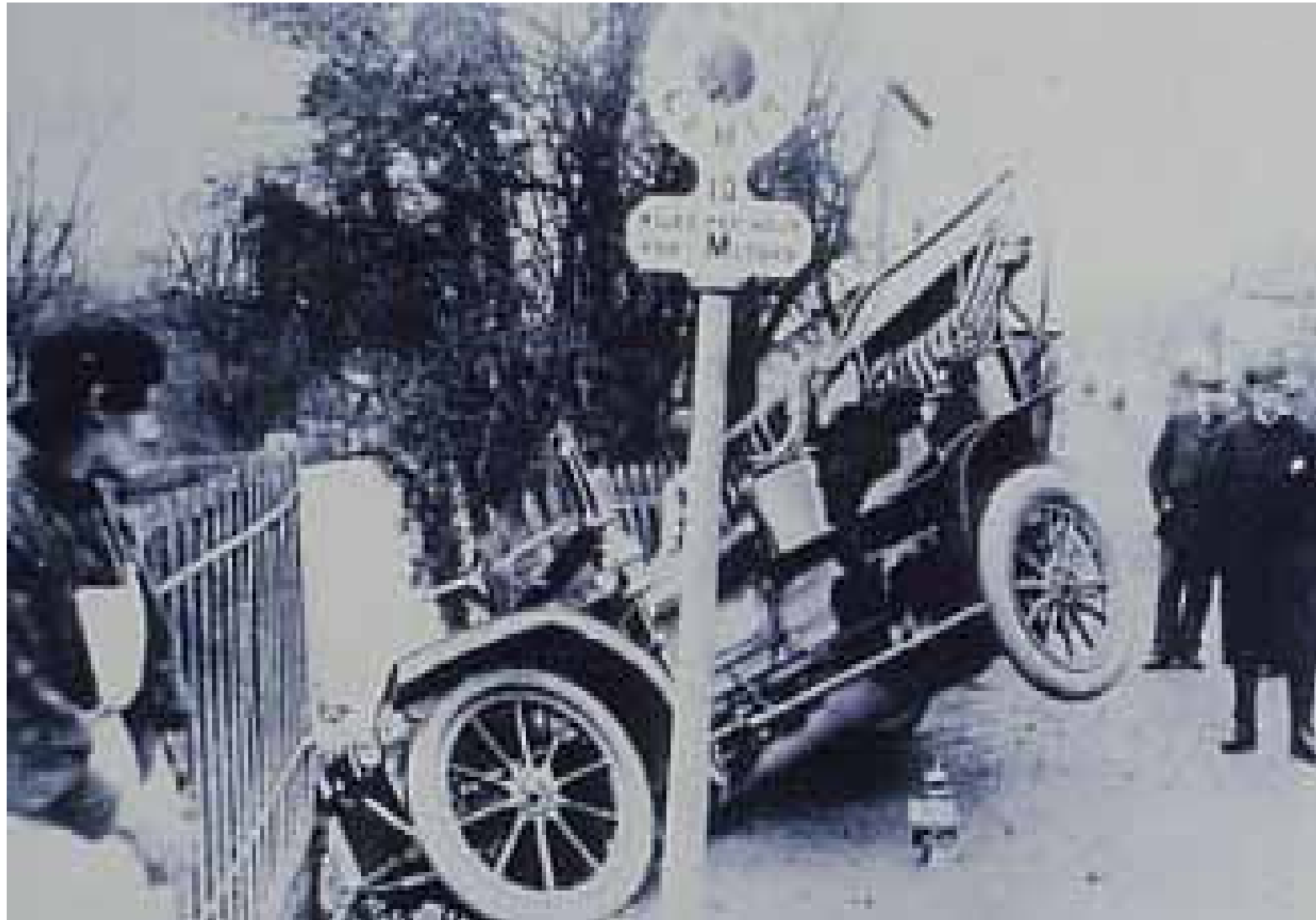
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**Nearly a fifth of UK fatalities and serious injuries involve single vehicles colliding with road side objects.**

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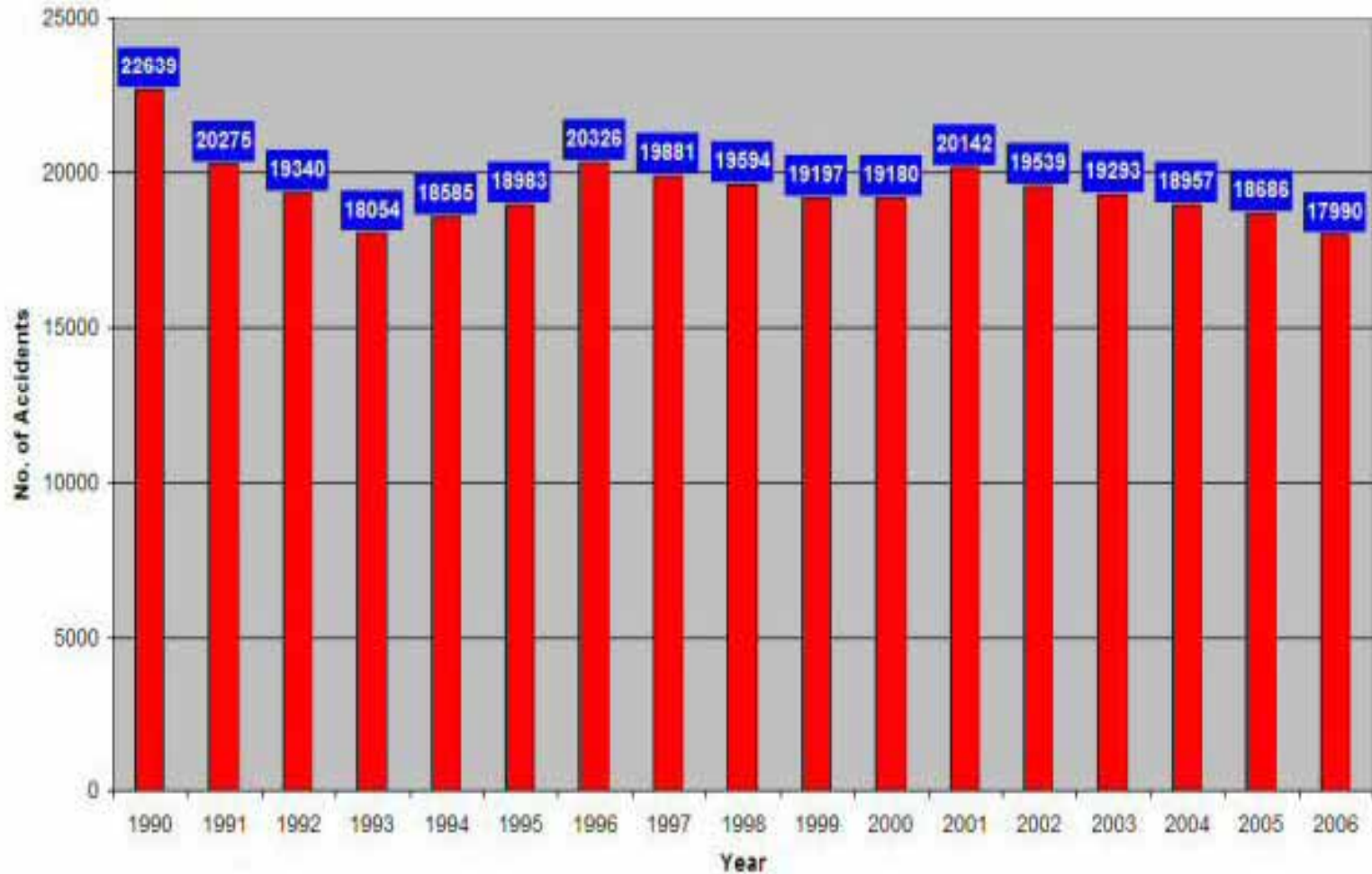


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# Single Vehicle Off Road Object Collisions 1990 - 2006



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# Crash Demonstration



100 km/h, 140mm steel post

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# Honda Legend



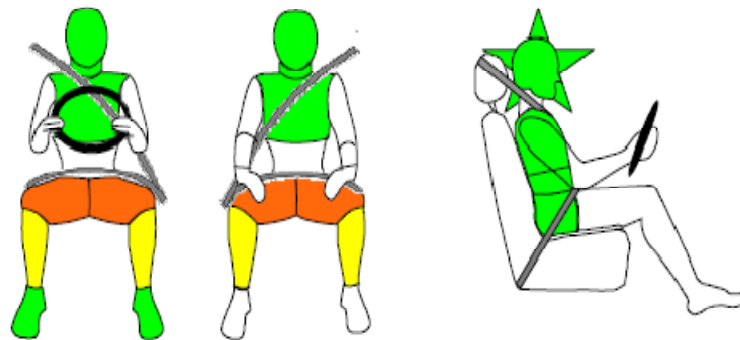
Euro NCAP Category  
**EXECUT**



### TEST RATINGS

<b>ADULT OCCUPANT PROTECTION</b>	<b>SCORES:</b>	FRONT	13 (60%)
★★★★★		SIDE	17 (85%)
		SEATBELT REMINDER	3
		<b>OVERALL</b>	<b>33</b>
<b>CHILD OCCUPANT PROTECTION</b>	<b>SCORE:</b>		40 (80%)
★★★★☆			
<b>PEDESTRIAN PROTECTION</b>	<b>SCORE:</b>		22 (44%)
★★★☆☆			

### ADULT OCCUPANT PROTECTION

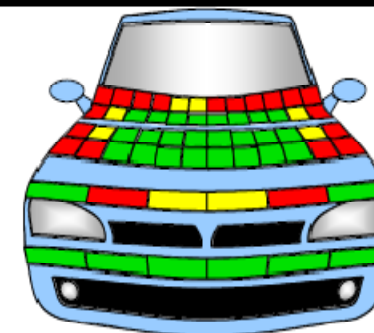


Above: driver and passenger injury risks in 64km/h frontal impact

Green	GOOD
Yellow	ADEQUATE
Orange	MARGINAL
Red	WEAK
Dark Red	POOR

Above: driver injury risks in 50km/h side impact with head protection in pole test

### PEDESTRIAN PROTECTION



Green	FAIR
Yellow	WEAK
Red	POOR

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# Injury Causation and Prevention

## Causation:

- massive deceleration forces
- intrusion into vehicles
- ejection from vehicles
- unrestrained occupants

## Prevention:

- engineer 'long, slow crashes'
- provide plenty of space
- move objects
- protect occupants with passive devices or restraint systems

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# The Passive Theory

**Human tolerance for biomechanical forces should be the starting-point for design**

**Aim:** to create an error-tolerant transport system, where mistakes can happen without severe injury

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# The Passive Theory

**While road-users are responsible for following the rules for using the road, designers should employ measures to prevent those who fail to obey these rules, for whatever reason, from being killed or seriously injured**

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# The Passive Standards & Advice

## EN 12767

- crash test standard
- first issued in 2001 (although dated 2000)
- subsequent UK application guidance given for traffic sign supports in **TA 89/04**, amended to include traffic signals and lighting columns in **TA 89/05**

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# The Passive Standards & Advice

## TA 89

- written by the HA in conjunction with the national highway authorities
- only a requirement for organisations working on the Trunk Road network, but
- most of the advice equally applicable to the roads of other highway authorities.
- Additional advice on passively safe design is also provided by the Highways Agency in **BD 94** and **TD 19**.

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# The Passive Standards & Advice

## EN 12767

- revised 2007 version now issued (in early 2008)
- performance criteria has not changed, but
- meaning of some text is clarified, and
- a **UK National Annexe** has been created

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# The Passive Standards & Advice

## UK National Annexe

- developed from **TA 89**
- amended to take account of more recent information
- extended to include other product types and roads other than high speed roads

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# The Passive Standards & Advice

## UK National Annexe

- perceived benefit over **TA 89** of being seen to apply to roads managed by all highway authorities rather than just the TR network
- very desirable shift of emphasis, given that many single vehicle injury accidents with road furniture occur on non-TR roads
- **TA 89** will be withdrawn very soon; some general text not used in the National Annexe is covered in **TD 19**

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## TA 89 Contents

1.3 The document provides designers and highway maintenance organisations with advice on:

- i. where passively safe signposts, lighting columns and traffic signal posts may be used;
- ii. selection of appropriate post or column type to BS EN 12767;
- iii. size limits for tubular steel or aluminium posts without safety barrier provision;
- iv. designing for wind loading;
- v. foundation requirements;
- vi. specification of signposts, lighting columns and traffic signal posts to BS EN 12767;
- vii. sign face requirements;
- viii. specification of lighting columns to BS EN 40; and
- ix. specification for traffic signal posts.

Appears in UK  
National Annexe?

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

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# The Passive Standards & Advice

## EN 12767

- different performance classes for each property to enable purchasers in different Member States to select a performance class appropriate to the conditions in that State
- recommended classes for performance properties considered most suitable for UK practice in various road and traffic situations are given in the UK National Annexe

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# EN 12767 & UK National Annexe

The performance class designations to be used when specifying products consist of three elements:

1. impact speed
2. energy absorption category
3. occupant safety level

Purchasers should be aware of these and ensure that they specify their requirements correctly, following the recommendations of this National Annexe.

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# EN 12767 & UK National Annex

## Table NA.1 Recommended speed classes

Situation of use	Speed class km/h
Non-built up roads <sup>(1)</sup>	100
Locations where road layout imposes speed restriction <sup>(2)</sup>	70
Built up roads	70

*(1) Roads with a speed limit greater than 40 mph*

*(2) Examples are some roundabouts and junctions and roads with 50 mph speed limit*

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# EN 12767 & UK National Annex

## Energy absorption categories

### Non Energy (NE)

- generally designed to fail and detach at base
- lighting columns or tall signs or signals normally fall back over impacting vehicle, landing in approximately the original position
- smaller traffic signs may fall a short distance from foundation, usually in direction of travel, and may be passed over by impacting vehicle

### Low Energy (LE)

- generally designed to yield in front of and under impacting vehicle, before shearing/detaching towards the end of impact event

### High Energy (HE)

- generally designed to yield in front of and under impacting vehicle
- usually wrap around vehicle
- may straighten out again as the impact event proceeds

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# EN 12767 & UK National Annex

## Energy absorption – appropriate uses

### Non Energy (NE)

- provide a lower risk of injury to vehicle occupants than HE or LE
- most appropriate choice on non-built up roads with insignificant volumes of non-motorised users (NMUs).

### Low and High Energy (LE & HE)

- reduce the risk of secondary incidents and collision with NMUs, as the vehicle exit speed is lower
- have advantages on built-up roads where there is a significant volume of NMUs

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# EN 12767 & UK National Annex

## Table NA.2 Recommended energy absorption category

### Traffic sign and traffic signal supports

Situation of use	Energy absorption
Non-built up roads (1)	NE
Locations with significant volume of NMUs (2)	LE (4)
Locations where major risk of items falling on other c/way	LE (4)
Built up roads (3)	LE (4)

(1) Drogi z limitem powyżej 40 mph

(2) Użytkownicy niezmotoryzowani

(3) Drogi z limitem wyższym lub równym 40 mph

(4) Dopuszczalna jest kategoria NE jeżeli zastosowano stalowe słupy standardowe uznane za zgodne z Aneks F lub w przypadku podpór dla których obecnie brak jest produktów zgodnych z Kategorią LE.

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# EN 12767 & UK National Annex

## Table NA.3 Recommended energy absorption category

### Lighting Columns

Situation of use	Energy absorption
Non-built up roads (1)	NE
Locations with significant volume of NMUs (2)	LE/HE
Locations where major risk of items falling on other c/way	LE/HE
Built up roads (3)	LE/HE

(1) Roads with a speed limit greater than 40 mph

(2) Non-motorised users

(3) Roads with a speed limit less than or equal to 40 mph

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# EN 12767 & UK National Annexe

Table NA 4 Summary of performance class recommendations

Situation	Location	Type of support structure		
		Lighting column	Sign or signal support <sup>(1)</sup>	Non-harmful support structures
Non-built up all-purpose roads and motorways with speed limits > 40 mph	Generally in verges of motorways, dual carriageways and single carriageway roads	100:NE:1-3 <sup>(3)</sup>	100:NE:1-3 <sup>(3)</sup>	100:NE:4
	With significant volume of NMUs <sup>(2)</sup>	100:LE:1-3 <sup>(3)</sup> or 100:HE:1-3 <sup>(3)</sup>	100:LE:1-3 <sup>(3) (4)</sup>	100:NE:4
	Where major risk of items falling on other carriageways	100:LE:1-3 <sup>(3)</sup> or 100:HE:1-3 <sup>(3)</sup>	100:LE:1-3 <sup>(3) (4)</sup>	100:NE:4 or 70:NE:4
Built up roads and other roads with speed limits ≤ 40 mph	All locations	70:LE:1-3 <sup>(3)</sup> or 70:HE:1-3 <sup>(3)</sup>	70:LE:1-3 <sup>(3) (4)</sup>	100:NE:4 or 70:NE:4

(1) Can include other items such as variable message sign and speed camera supports

(2) Non-motorized users

(3) All safety levels 1, 2 and 3 are acceptable

(4) can be accepted where the standard steel posts defined as 'deemed to comply' in Annex F are used, or for supports where suitable Category LE products are currently not available

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# EN 12767 & UK National Annex

## Points to remember:

- it is the responsibility of the purchaser to specify which performance class is required
- if a class is not given but the requirement to meet EN 12767 is specified, then manufacturers may supply the lowest level in the standard, which is Class 0, Non-performance determined
- this may not be suitable, as the products will not have been tested to determine that they are passively safe

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# EN 12767 & UK National Annex

**The decision to specify products complying with a performance class from BS EN 12767: 2006 in a particular situation, rather than class 0, is a matter for the road authority.**

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# Other Relevant Standards

<b>IAN 85/07</b>	Passive gantries
<b>IAN 86/07</b>	Portal gantries
<b>EN 1317-1:1998</b>	Road restraint systems part 1 - Terminology and general criteria for test methods
<b>EN 1317-2:1998</b>	Performance classes, impact test acceptance criteria and test methods for safety barriers
<b>EN 1317-3:2000</b>	Performance classes, impact test acceptance criteria and test methods for crash cushions
<b>EN 1317-4:2002</b>	Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers
<b>EN 40-1 to 40-7:1992</b>	Lighting columns
<b>TD 19</b>	Requirements for road restraint systems
<b>BD 94/07</b>	Design of Minor Structures
<b>Gantry Risk Model</b>	

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