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SIMEPROVI
Asociación Española de Fabricantes de Sistemas Metálicos de Protección Vial

HISTORICAL REVIEW AND CURRENT SITUATION OF ROAD RESTRAINT SYSTEMS IN SPAIN

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SIMEPROVI

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- CURRENT REGULATIONS
- IMPLEMENTATION CRITERIA
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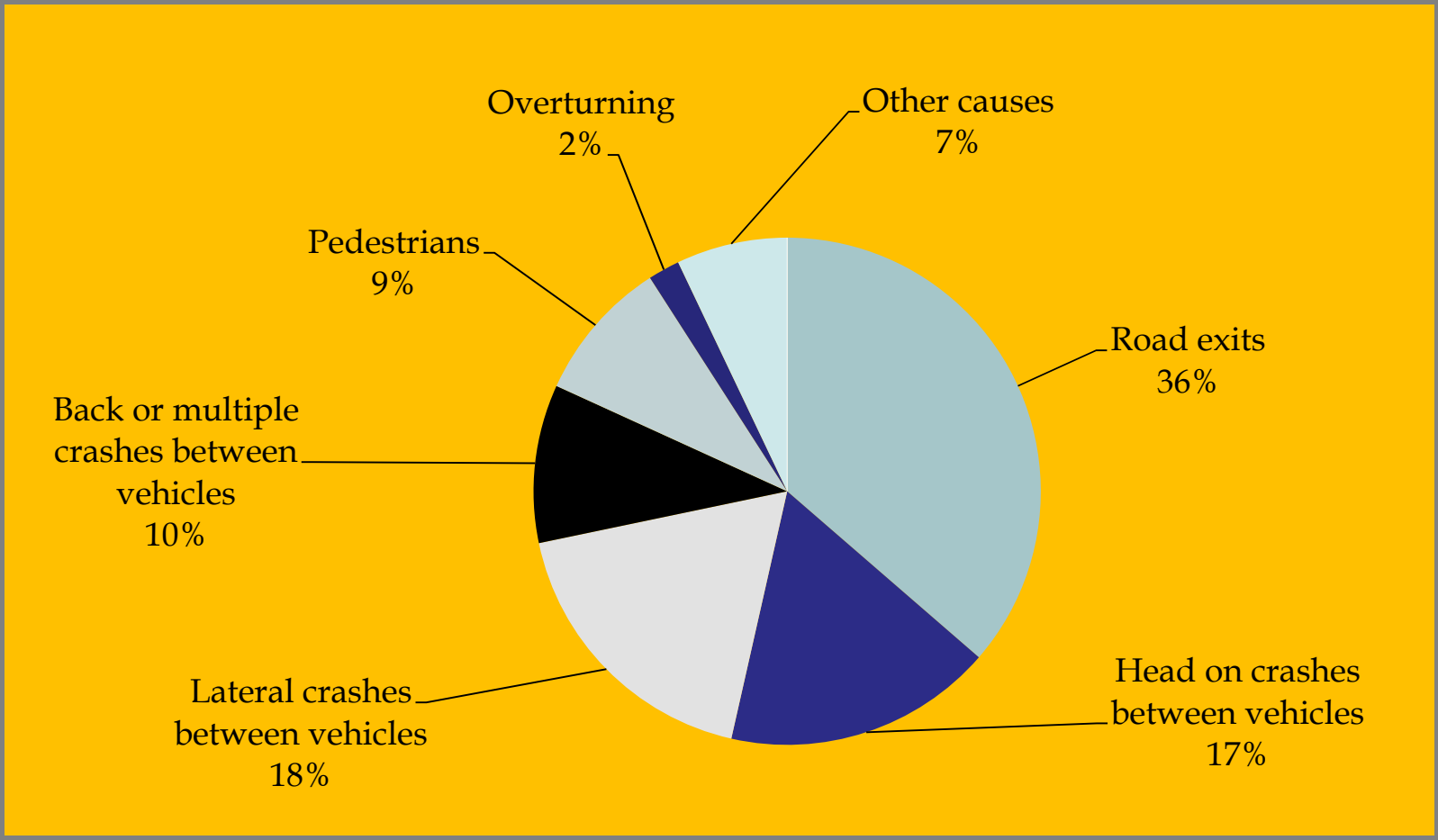
Traffic victims in Spain (Urban+interurban roads)

YEAR	FATALITIES	SERIOUS INJURIES	SLIGHT INJURIES
2001	5.517	26.566	123.033
2002	5.347	26.156	120.761
2003	5.399	26.305	124.330
2004	4.741	21.805	116.578
2005	4.442	21.859	110.950
2006	4.104	21.382	122.068
2007	3.823	19.295	123.226
2008	3.100	16.488	114.459
2009	2.714	13.923	111.043
2010	2.478	11.995	108.350

2010

ROAD FATALITIES ACCIDENT CAUSES



Year	Fatalities (all kind of accidents)	Fatalities (road exits)	%
2001	4.543	1.737	38,2%
2002	4.435	1.691	38,1%
2003	4.480	1.707	38,1%
2004	3.841	1.466	38,1%
2005	3.652	1.386	38,0%
2006	3.367	1.191	35,4%
2007	3.082	1.063	34,5%
2008	2.466	975	39,5%
2009	2.130	834	39,1%
2010	1.928	690	35,8%

Fatalities after 30 days of the accident in interurban roads

EVOLUTION OF RRS IN SPAIN

1971

OC 229/71 C.V.
"Standards regarding safety barriers"

- First regulatory document in Spain.
- Based on the experience of USA and other European countries.
- Implementation criteria for Spanish roads.
- Description and classification of models of RRS used at that time.

EVOLUTION OF RRS IN SPAIN

1990-1994

Standardization process starts

- 1990: AEN/CTN 135 is created
  (mirror committee of CEN/TC226).
  Subcommitte 1 deals with safety barriers.
  Members: Road Administrations, manufacturers, test houses, users.
- 1994: First versions of descriptive standards for steel and concrete barriers are published.

EVOLUTION OF RRS IN SPAIN

1995

OC 321/95 T. y P.
"Recommendations about road restraint systems"

- Implementation criteria based on road characteristics, traffic and hazards close to the road.
- Catalogue of road restraint systems recommended for state roads.
- Classification of the systems based on performance under impact.

EVOLUTION OF RRS IN SPAIN

1996

SIMEPROVI is created

- Spanish Association of steel road restraint systems manufacturers.
- Main Objectives:
  - Promotion of the use of these products.
  - Quality assurance.
- In 2013 all the Spanish manufacturers are members of SIMEPROVI.

EVOLUTION OF RRS IN SPAIN

1998-2001

First european standards are adopted

- EN 1317 parts 1 and 2 are published as Spanish standards in 1999.
- EN 1317 part 3 is published as Spanish standard in 2000.
- ENV 1317 part 4 is published as Spanish standard in 2001.

EVOLUTION OF RRS IN SPAIN

2003-2005

UNE 135 900

- Road and traffic Administrations promote the creation of a working group aimed to elaborate a test standard for motorcyclist protection devices.
- 2003: publication of Technical Report 135 900, which includes test methods (impact tests with dummies) and classification of the systems.
- 2005: the document is revised and published as UNE 135 900. (New revision issued in 2008)

EVOLUTION OF RRS IN SPAIN

2004-2008

OC 18/2004 and OC18bis/2008
Implementation criteria for MPS

- Published by Spanish Road Directorate.
- Criteria for the installation of motorcyclist proteccion devices, based on the risk of accidents for these users.
- All the products must be certified according to EN1317 and UNE 135 900.
- Other regional administrations developed their own criteria.

EVOLUTION OF RRS IN SPAIN

2008-2011

CE-Marking co-existence period

- 2008: EN 1317-5 is published and co-existence period for CE-Marking starts.
- Manufacturers and notified bodies carry out the tasks specified in Annex ZA.
- 1-1-2011: End of co-existence period. CE-Marking is mandatory.

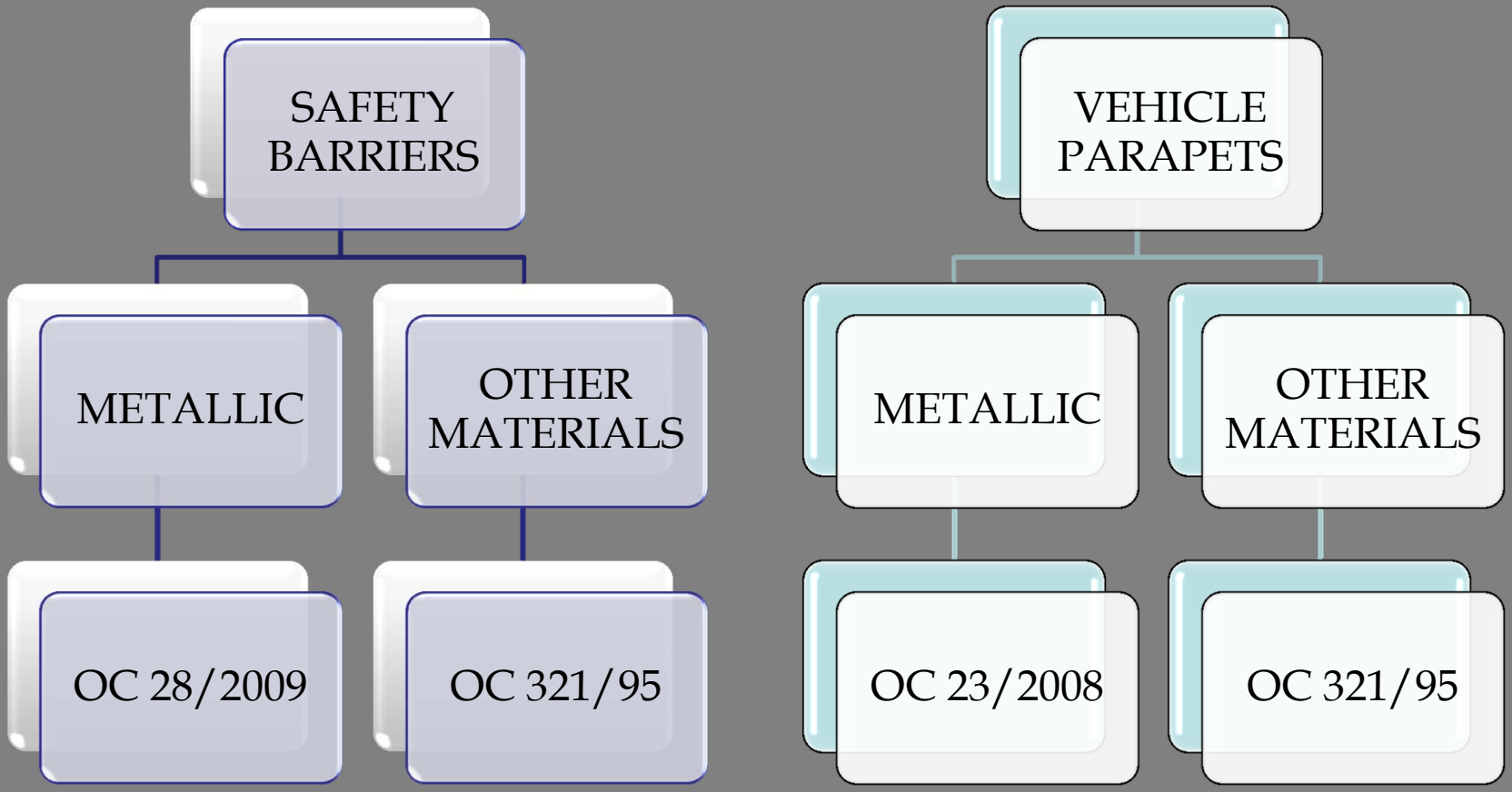
EVOLUTION OF RRS IN SPAIN

2008-2009

Implementation criteria for specific products

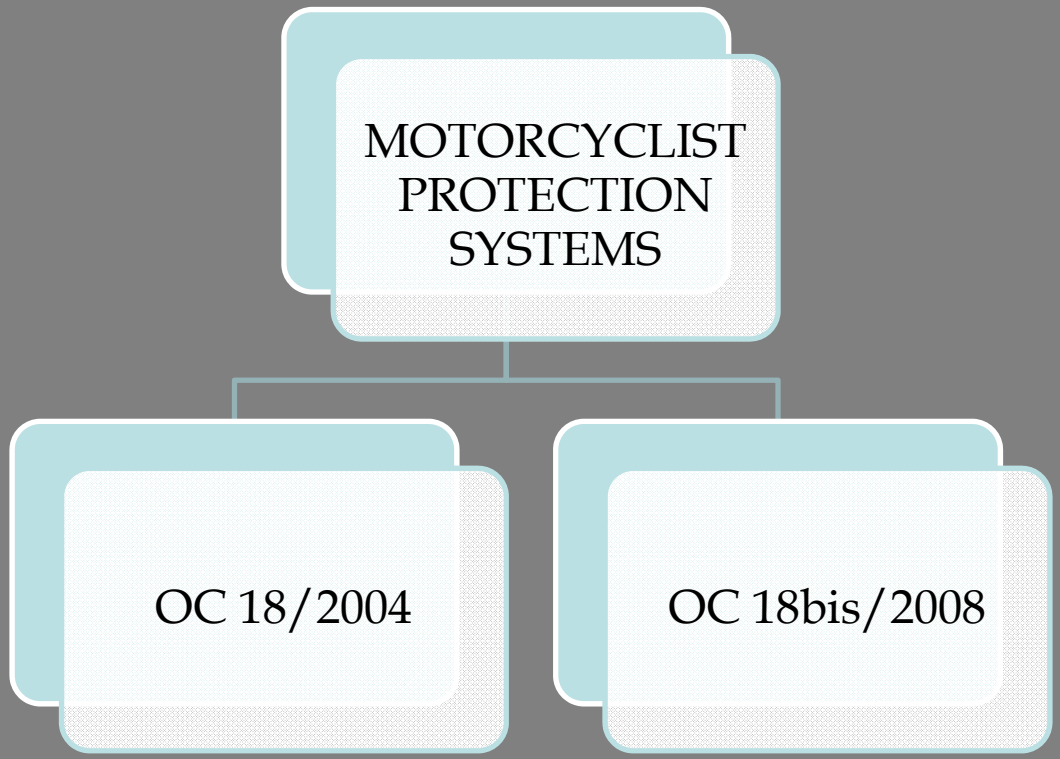
- OC 23/2008: steel parapets
- OC 28/2009: steel safety barriers.
- Criteria and classification of the products are based on EN1317.
- Include requirements about technical classes, soils, test vehicles, etc.
- CE-Marking is mandatory.

CURRENT REGULATIONS (SPANISH ROAD DIRECTORATE)



These criteria are applicable to State Roads. Other administrations can define their own criteria for roads within its jurisdiction.

CURRENT REGULATIONS (SPANISH ROAD DIRECTORATE)



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BEFORE 1-1-2011

- Catalogues of products recommended by the Administration.
- Traditional products are primarily used, as defined in descriptive standards (which define types of fence, post, spacer, etc.).

AFTER 1-1-2011

- Catalogues no longer apply.
- All CE-marked products are valid.
- Implementation criteria based on performance parameters (EN 1317).

IMPLEMENTATION CRITERIA

- Methodology used to define in which road sections RRS shoud be installed.
- Based on the analysis of the following factors:
  - Road characteristics (type, speed).
  - Traffic (composition and intensity).
  - Type of possible accident (classified according to risk for people or installations located near the roadside).
  - Distance of obstacles or danger zones to the road.
  - Possibilities to remove previously the hazards.

SAFETY BARRIERS (OC 28/2009)

TYPE OF ACCIDENT	CONTAINMENT	DAILY AVERAGE TRAFFIC OF HEAVY VEHICLES	CONTAINMENT LEVEL
VERY SERIOUS	VERY HIGH		H3-H2-H1
SERIOUS	HIGH	IMDp ≥ 5000	H2-H1
		400 ≤ IMDp ≤ 5000	H1
		IMDp < 400	H1-N2
NORMAL	NORMAL		H1-N2

To select the specific containment level, at least parameters such as design speed and average intensity of heavy vehicles traffic (including coaches) in each direction of the road should be taken into account.

VEHICLE PARAPETS (OC 23/2008)

SPEED AND TRAFFIC OF HEAVY VEHICLES	DAILY AVERAGE TRAFFIC OF HEAVY VEHICLES	TYPE OF ACCIDENT	CONTAINMENT	CONTAINMENT LEVEL
	IMDp ≥ 2000	Very serious	Very high	H4
	IMDp < 2000			H3
IMDp ≥ 10000		Serious	High	H3
V_p ≥ 60 km/h	IMDp ≥ 2000			H3
	400 ≤ IMDp < 2000			H2
	IMDp < 400			H1
V_p ≥ 80 km/h	IMDp ≥ 2000			H3
	IMDp < 2000			H2
Lack of any requirement for serious accident	IMDp ≥ 400	Normal	Normal	H1
	IMDp < 400			N2
V_p ≥ 80 km/h	IMDp ≥ 400			H1
	IMDp < 400			N2

SELECTION OF PERFORMANCE PARAMETERS

SEVERITY LEVELS

Severity classes are recommended to be as safer as possible.

The use of Class C is generally not allowed.

DEFORMATION PARAMETERS

Defined taking into account the distances from the hazard to the road:

Slopes: dynamic deflection of the barrier must be lower than the distance from the slope to the road.

Obstacles: working width of the barrier must be lower than the distance from the barrier to the road.

MANDATORY TECHNICAL SPECIFICATIONS

CE Marking (EN 1317-5)

PG3 : general specifications for road works

Article 704 is related to safety barriers.

Includes conditions for quality control on site.

It is advisable that manufacturers provide technical information about the main characteristics of the barrier, the performance parameters and the conditions under which the crash tests were performed.

OTHER SPECIFICATIONS

Soils: tests have to be performed to evaluate if the resistance of the ground is appropiate, in case of rail-post barriers.

Detached parts: limitation of mass for metallic parts (0,5 kg) and not metallic parts (2 kg).

Vehicles (H2 systems): in state roads H2 barriers can only be installed if TB51 test was performed with a coach.

Vehicle parapets: maximum forces that can be transmitted by the parapet to the structure through the anchorages, which must be provided by the manufacturer, shall be taking into account to calculate the structure.

MOTORCYCLIST PROTECTION SYSTEMS

- When a MPS is installed on a safety barrier or parapet, the whole set is considered a new product, which must meet the mandatory requirements for these elements, as well as specific regulations for MPS.
- In Spain UNE 135900 is mandatory. This standard classifies products according to their behavior in full scale impact tests with dummies.
- The test criteria and classification included in UNE 135900 have been adopted in TS EN1317-8.

MOTORCYCLIST PROTECTION SYSTEMS

	NORMATIVE REFERENCE	REQUIREMENTS
PERFORMANCE UNDER VEHICLE IMPACT	UNE EN 1317-5	CE MARKING
PERFORMANCE UNDER MOTORCYCLIST IMPACT	UNE 135 900	CERTIFICATE ISSUED BY A CERTIFICATION BODY RECOGNIZED BY ROAD ADMINISTRATION

IMPLEMENTATION CRITERIA (OC 18/2004 & OC 18bis/2008)

- Criteria for the installation of MPS are defined taking into account the following data:
  - Type of road (double or single carriageway).
  - Hard shoulder.
  - Design speeds.
  - Radius of the curves.
  - Number of accidents in which motorcyclists are involved.

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