Selection of Appropriate Road Restraint Systems on the road network

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General Remarks

• EN1317 is mandatory for all CEN-Members and is automatically transferred into a national standard.

• EN´1317 regulates the CE-marking of safety barriers and sets the respective conditions.

• EN1317 is performance driven, only. Barrier design and implementation are not harmonized within the EU.

• The systems can be made of steel, wood or concrete, can be rammed, plugged or free-standing, as long as they meet the requirements of EN 1317
National Decision

- EN1317 stipulates the conditions under which a certain system is allowed on EU market
- The National Road Authorities have to select any of the certified restraint systems and to decide on where to install it
- The National Road Authorities have to decide which protection level resp. which performance classes for which hazard / danger or situation on the road should be used
Approach to System Selection

The selection process of a suitable barrier system can be approached by the following proceeding:

- Identification of the dangerous area (black spots)
- Hazard identification (kind of common accidents, obvious dangers)
- Hazard elimination (optimizing the design of the road, eliminating obstacles)
# Safety Barriers: Selection Criteria

<table>
<thead>
<tr>
<th>Criterion</th>
<th>EN 1317</th>
<th>National Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containment capacity</td>
<td>Definition of 9 containment levels (EN1317-2)</td>
<td>Choosing any of the given levels</td>
</tr>
<tr>
<td>Deflection</td>
<td>Definition of 8 working width classes (EN1317-2)</td>
<td>Choosing any of the given classes or levels</td>
</tr>
<tr>
<td>Impact severity</td>
<td>Definition of 3 Impact severity levels (EN1317-2)</td>
<td>Choosing any of the given levels</td>
</tr>
<tr>
<td>Barrier design</td>
<td>No design specified</td>
<td>Choosing any design that matches the criteria above</td>
</tr>
<tr>
<td>Manufacturer’s performance</td>
<td>Production control by notified bodies and self assessment (EN1317-5)</td>
<td>Choosing any certified manufacturer</td>
</tr>
</tbody>
</table>
German Guidelines

The general conditions for choosing a system in Germany are prescribed by the Guidelines for Passive Protection on Roads using Vehicle Restraint Systems (short: RPS).

Following the parts of EN1317, the RPS makes dispositions concerning the implementation of safety barriers on the road side edge and the median, crash cushions, transitions and terminals for different installing situations.
Safety Barriers: Containment Level

According to the RPS, the suitable containment level for barriers on road side edge is mainly dependent of

- Type and severity of the hazard
- Average speed level
- Density of traffic
- Road design
Protection level: Passengers vs. Third Parties

Generally, the need of protection of uninvolved others is considered higher than that of the driver and the passengers of the car actually having the accident. Therefore, the required containment levels in vulnerable areas are generally higher than those in dangerous areas.
SUPER-RAIL PP
(Plinth Protector)
H2 - W3 - A

SUPER-RAIL
H2 - W4 - A
H4b - W7 - A
“In principle, the safety barrier chosen shall be such that the working width is less than or equal to the distance between the front face of the safety barrier and the front edge of the danger spot”
Distance from reference line to the obstacle

Surface = 0

Height where the obstacle is placed
Example: Obstacle 4 meter deeper than the surface of the street.

Distance to the reference line or to the surface of the street is 22 meter

Protection of third parties

Solution: red X is in the green area.

Protection required for third parties.

Protection not required for passengers.
Working Width Practice

There is a tendency to consider a lower W as better. This is not necessarily right in every case, because a lower W also stands for a lower energy absorption capacity of the barrier - a W1 or W2 mean that almost the full impact energy has to be taken by the impacting car and its passengers.

Therefore, in spots with sufficient space a larger working width should be preferred for a higher grade of safety for all persons involved.
Impact Severity

According to this conception, the impact severity of a certain barrier is a subordinated criterion and in the end subject of the individual decision of the planner:

“The impact severity level A represents a lower burden for passengers in an errant vehicle than impact severity level B and is preferred in comparable circumstances. In particularly dangerous places, where containment of an errant vehicle (e.g. a heavy goods vehicle) is a matter of priority, a safety barrier of impact severity level C, which represents the highest burden for vehicle passengers, may be chosen.”
**Impact Severity Level**

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<tr>
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<tr>
<td>A</td>
<td>ASI \leq 1,0</td>
</tr>
<tr>
<td>B</td>
<td>ASI \leq 1,4</td>
</tr>
<tr>
<td>C</td>
<td>ASI \leq 1,9</td>
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- ASI A = 0,1
- 14 kg

**Weights:**
- 14 kg
- 70 kg
### Impact Severity Level

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- ASI A = 0,1  14 kg
- ASI A = 0,5  350 kg

70 kg
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- ASI A = 0,1 14 kg
- ASI A = 0,5 350 kg
- ASI A = 0,75 560 kg
- ASI A = 1,0 770 kg
- ASI B = 1,4 1106 kg
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Start Film - ASI

- ASI A = 0,1 14 kg
- ASI A = 0,5 350 kg
- ASI A = 0,75 560 kg
- ASI B = 1,4 1106 kg
- ASI C = 1,9 1526 kg

70 kg
Impact Severity: Practice

In practice, this is often interpreted broadly with the result that e.g. large stretches of motorways are virtually embedded in very rigid barriers such as concrete walls.

After a couple of heavy accidents that echoed in public and media, there are chances that this subject will be given a more significant status in a renewed edition of the RPS.
Many Thanks for your Attention!

For questions please contact:
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