

Pass safely through motorway construction sites

– with mobile crash barriers





Thomas Keller
Head of Sales
AVS/Peter Berghaus

Facts and Figures

AVS Verkehrssicherung

Market leader as well as technology and quality leader

Founded in 1961

by Peter Berghaus in Kürten, Germany



11 operating companies with branches at 25 locations in Germany

More than 10 locations in Europe

Customers

- Federal Government/Federal State
- Road Construction Companies

Full service from a single source

- Trade of traffic safety products by Peter Berghaus
- Traffic safety services for large infrastructure projects by AVS
- Own development and production

Development of sales and employee numbers from 2000 up to 2019



Sales

2000: 14 million
2008: 32 million
2019: 172 million



Employees

2000: 150
2008: 220
2019: 1.100

Company-owned products

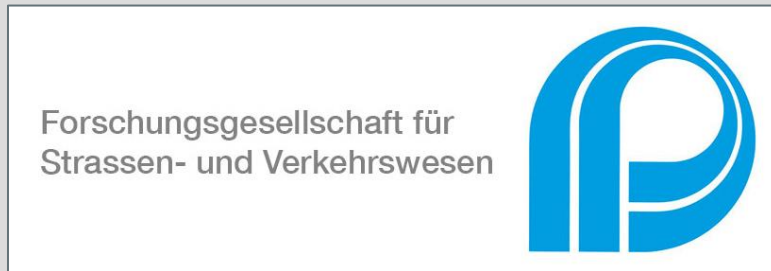


Rental and buying equipment
safety barriers



Company-owned equipment park:
radio controlled traffic lights, crossing
control units and mobile tram barriers

The AVS traffic safeguarding group plays a part in this regard:



Lane divider at construction sites in Germany

Before, Mobile Crash barrier

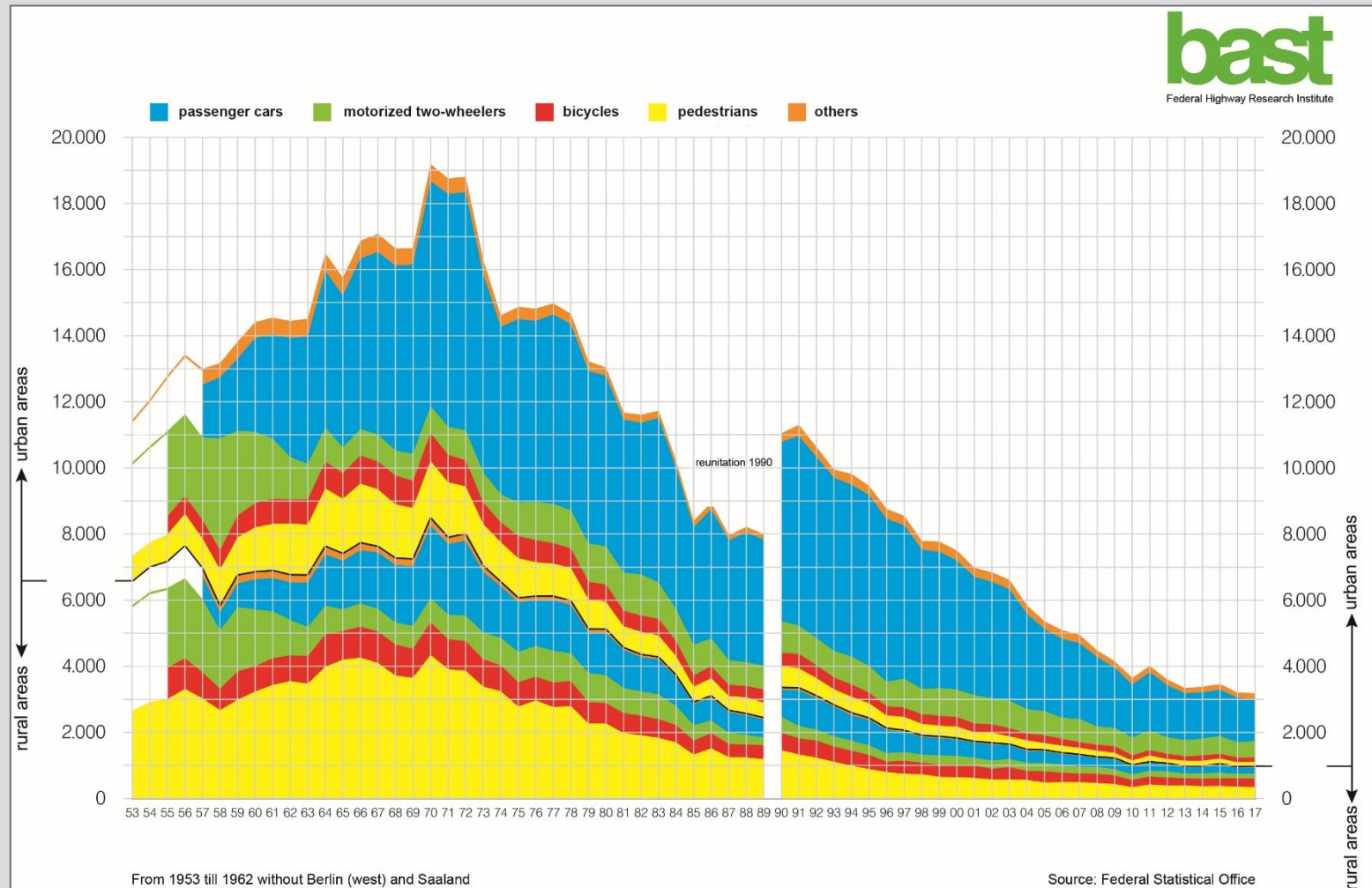


Today



Fatalities in road traffic

In the Federal Republic of Germany by location and type of traffic participation



Mobile crash barriers

The test criteria are stated in the European standard, EN 1317, and are binding for all EU countries.

DEUTSCHE NORM		Juli 1998
Rückhaltesysteme an Straßen Teil 2: Leistungsklassen, Abnahmekriterien für Anprallprüfungen und Prüfverfahren für Schutzeinrichtungen Deutsche Fassung EN 1317-2 : 1998		DIN EN 1317-2
ICS 13.200; 93.080.30		
Deskriptoren: Rückhaltesystem, Schutzeinrichtung, Verkehrssicherheit, Anprall, Prüfverfahren		
Road restraint systems — Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers; German version EN 1317-2 : 1998		
Dispositifs de retenue routiers — Partie 2: Classes de performance, critères d'acceptation des essais de choc et méthodes d'essai pour les barrières de sécurité; Version allemande EN 1317-2 : 1998		
Die Europäische Norm EN 1317-2 : 1998 hat den Status einer Deutschen Norm.		
Nationales Vorwort		
Diese Europäische Norm wurde von CEN/TC 226 „Straßenausstattung“ (Sekretariat: Frankreich) Arbeitsgruppe 1 „Rückhaltesysteme“ (Federführung: Frankreich) unter deutscher Mitwirkung erarbeitet.		
Der für die deutsche Mitarbeit zuständige Arbeitsausschuß im DIN Deutsches Institut für Normung e.V. ist der als Spiegelausschuß zu CEN/TC 226 WG 1 eingesetzte Arbeitsausschuß NABau/FGSV 10.06.01 „Passive Schutzeinrichtungen“ des Normenausschusses Bauwesen.		
Grundlage für die deutsche Mitarbeit waren folgende Vorschriften:		
— RPS, Richtlinie für passive Schutzeinrichtungen an Straßen		
— TL-SR, Technische Lieferbedingungen für Stahlschutzplanken an Bundesstraßen		
— RAL RG 820, Stahlschutzplanken, Gütesicherung		
Für die im Abschnitt 2 zitierten Internationalen Normen wird im folgenden auf die entsprechenden Deutschen Normen hingewiesen: ISO 6487 siehe DIN ISO 6487		
Nationaler Anhang NA (informativ)		
Literaturhinweise		
DIN ISO 6487 Straßenfahrzeuge — Meßmethoden für Anprallversuche — Meßgeräte		
Fortsetzung 8 Seiten EN		
Normenausschuß Bauwesen (NABau) im DIN Deutsches Institut für Normung e.V.		
© DIN Deutsches Institut für Normung e.V. - Jede Art der Vervielfältigung, auch auszugsweise, nur mit Genehmigung des DIN Deutsches Institut für Normung e.V., Berlin, gestattet. Alleinverkauf der Normen durch Beuth Verlag GmbH, 10772 Berlin		
Ref. Nr. DIN EN 1317-2 : 1998-07 Preisgr. 07 Vert.-Nr. 2307		

Mobile crash barriers

Implementation of DIN EN 1317

- **European law with EN 1317**
 - is mandatory for all EU member states,

however...

- **National specifics are permissible:**
 - country-specific regulations

Mobile crash barriers

	Containment levels	acceptance test
Containment capacity only for temporary protective devices	T1 T2 T3	TB 21 TB 22 TB 41 + TB 21
Normal containment capacity	N1 N2	TB 31 TB 32 + TB 21
Higher containment capacity	H1 H2 H3	TB 42 + TB 11 TB 51 + TB 11 TB 61 + TB 11
Very high containment capacity	H 4a H 4b	TB 71 + TB 11 TB 81 + TB 11

Test criteria for temporary mobile crash barriers

Test	Impactspeed	Angle	Vehicle weight	Vehicle type
TB 11	100 km/h approx. 60 mph	20 °	900 Kg	Car
TB 21	80 km/h approx. 50 mph	8 °	1.300 Kg	Car
TB 22	80 km/h approx. 50 mph	15 °	1.300 Kg	Car
TB 32	110 km/h approx. 70 mph	20 °	1.500 kg	Car
TB 41	70 km/h approx. 45 mph	20 °	10.000 Kg	Truck
TB 42	70 km/h approx. 45 mph	15 °	10.000 kg	Truck
TB 51	70 km/h approx. 45 mph	20 °	13.000 Kg	Bus

Mobile crash barriers

Acceptance test car



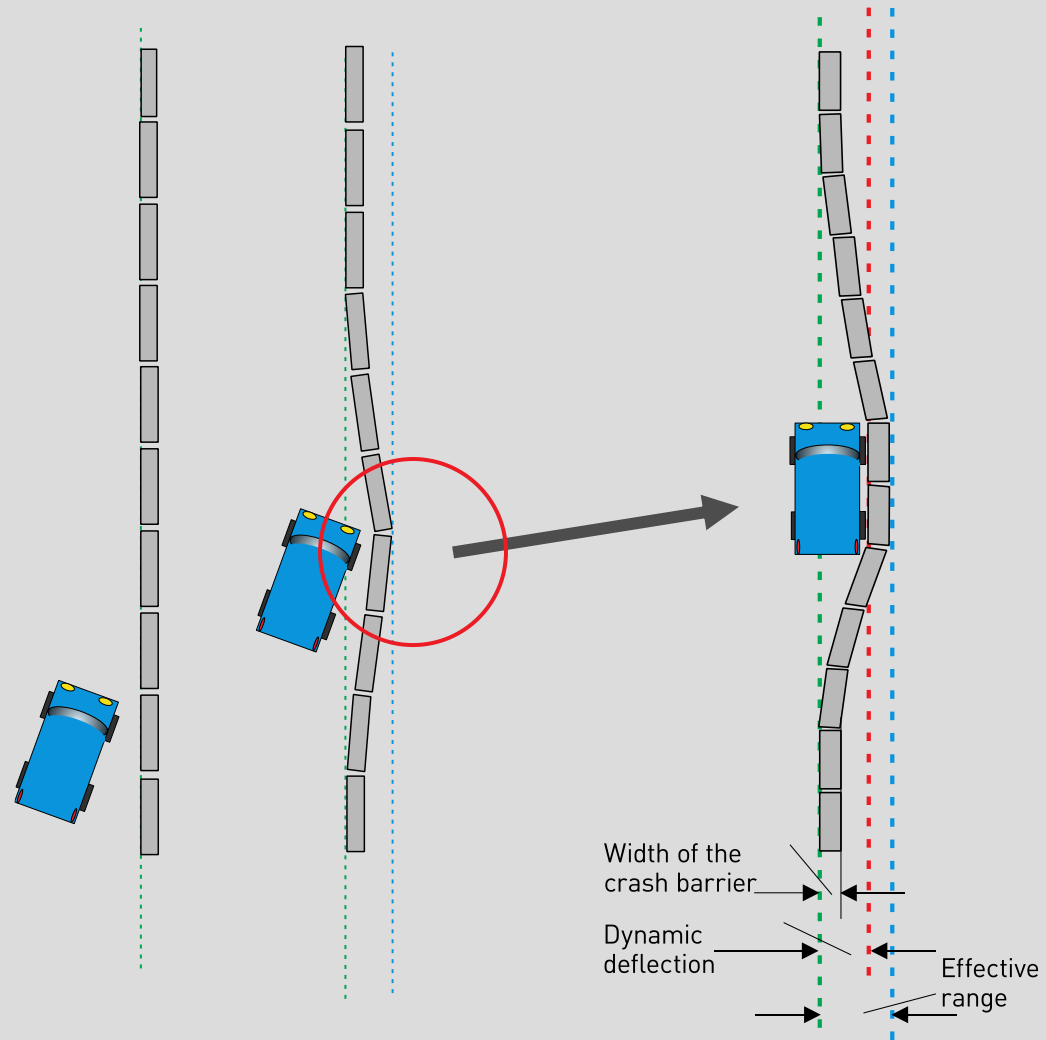
Mobile crash barriers

Acceptance test truck



Mobile crash barriers

Acceptance test



Mobile crash barriers

Levels of the range of effectiveness	
Classes of the levels of the range of effectiveness (W)	Levels of the range of effectiveness
W1	$W \leq 0,6 \text{ m}$
W2	$W \leq 0,8 \text{ m}$
W3	$W \leq 1,0 \text{ m}$
W4	$W \leq 1,3 \text{ m}$
W5	$W \leq 1,7 \text{ m}$
W6	$W \leq 2,1 \text{ m}$
W7	$W \leq 2,5 \text{ m}$
W8	$W \leq 3,5 \text{ m}$

Mobile crash barriers

Test certificate for impact test

Example:

Test certificate of the approved testing institute, TÜV Süd, Germany



Automotive

Auftraggeber / Client:

AVS Mellingen GmbH
Hirtentorstraße 2
D - 99441 Mellingen

TÜV SÜD Automotive GmbH
Straßenrückhaltesysteme
Ludwigsfelderstraße 30
80997 München
Deutschland

Tel. +49 (0) 89 818 939 - 10
Fax +49 (0) 89 818 939 - 22
road-safety@tuv-sued.de
www.tuev-sued.de/automotive

Prüfbericht Nr. / Test report No.

X82.04.M08

Name des Prüfgegenstands / Name of test item

“ProTec 50”

Anfahrversuch TB 21 nach DIN EN1317-1/2:2011-01
Collision test TB 21 in accordance with DIN EN1317-1/2:2011-01

Prüfdatum: 29.08.2012
Date of test:

Erstellungsdatum des Prüfberichts: 18.09.2012
Date of report:

Im Zweifelsfalle ist die rechtlich gültige Sprache die deutsche Sprache.
In case of doubt, the legally valid language is German.

Genehmigung des Prüfberichts: 18.09.2012
Approval of the test report


Mobile crash barriers

BAST* Approval list for temporary vehicle restraint system

Example:

Appraisal of an impact test from the approved testing institute, TÜV Süd

After receiving the appraisal the system is granted in the approval list.

Bundesanstalt für Straßenwesen 

Bundesanstalt für Straßenwesen • Postfach 100150 • D-51401 Bergisch Gladbach

AVS Mellingn GmbH
Herr Lieber
Hirtentorstraße 2
99441 Mellingn

Ihr Zeichen
Ihr Schreiben vom
Unser Zeichen V4o - II (T-ZERT) 226/10
Auskunft erteilt Dipl.-Ing. Holger Klostermeier
Telefon (0 22 04) 43- 596
Telefax (0 22 04) 43- 408
E-Mail-Adresse klostermeier@bast.de
Datum 16.07.2010

Begutachtung 2007 7E 57 auf Basis der TL-Transportable Schutzeinrichtungen
Begutachtung 2008 7E 54 auf Basis der TL-Transportable Schutzeinrichtungen
2.Revisionsfassung
Pro Tec 120
Anlage: 1. Auszug aus Liste nach TL-Transportable Schutzeinrichtungen

Sehr geehrter Herr Lieber,

mit Erscheinen der Liste transportabler Schutzeinrichtungen auf der Internetseite der BAST haben wir die Form der Begutachtung umgestellt. Anstelle der bisherigen mehrseitigen Begutachtungen tritt nun diese Bestätigung in Verbindung mit dem Eintrag in die Liste.

Die Begutachtung der Prüfberichte

X82.03.H06 (TB 41)	Prüfinstitut: TÜV Süd SZA Österreich
X82.04.H06 (TB 21)	Prüfinstitut: TÜV Süd SZA Österreich
X82.07.H09_Rev02 (TB42)	Prüfinstitut: TÜV Süd SZA Österreich
X82.08.H09_Rev02 (TB11)	Prüfinstitut: TÜV Süd SZA Österreich

der transportablen Schutzeinrichtung **ProTec 120** für die Aufhaltestufen T1, T3 und H1 ist abgeschlossen.

Brüderstraße 53
51427 Bergisch Gladbach
Postfach 10 01 50
51401 Bergisch Gladbach
Telefon: 0 22 04 / 43 - 0
Telefax: 0 22 04 / 43 - 673
Internet: www.bast.de

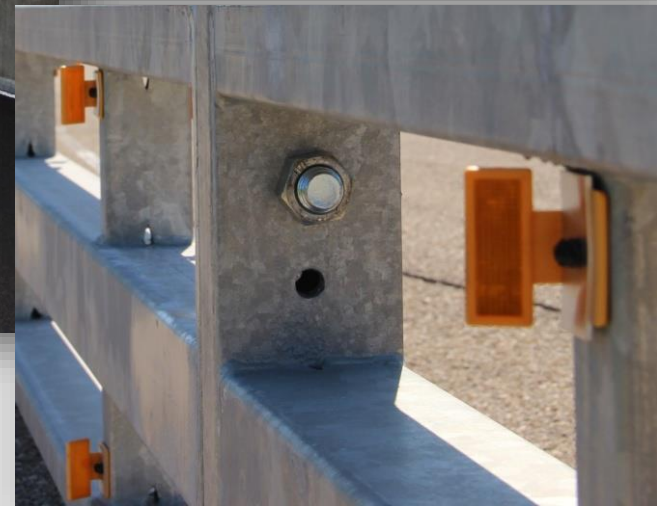
Seite 1 von 2 Seiten des Schreibens Az. V4o - II (T-ZERT) 226/10 vom 16.07.2010

* Federal Highway Research Institute, Germany

Mobile crash barriers



Important requirements – Protected mounted reflectors



Important requirements – Large water drainage



Important requirements – Narrow structural width = wide driving lanes



Important requirements – Quick to assemble



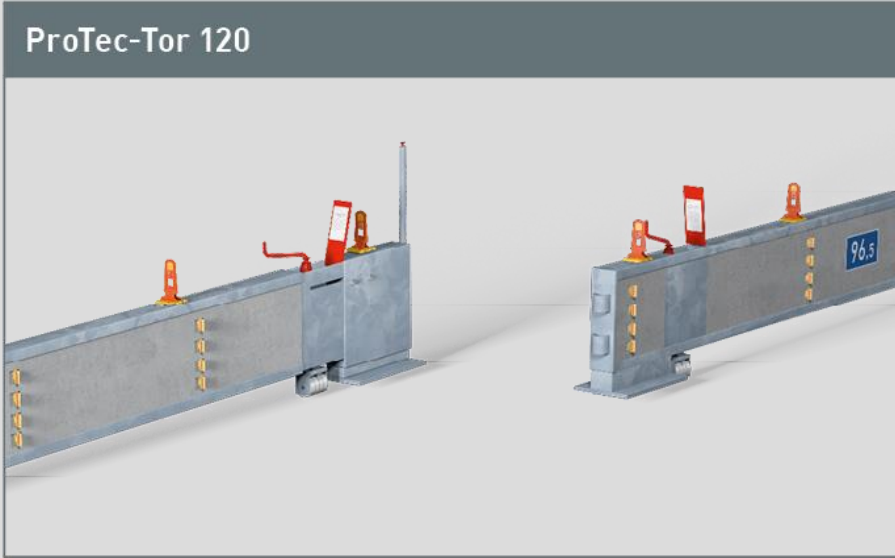
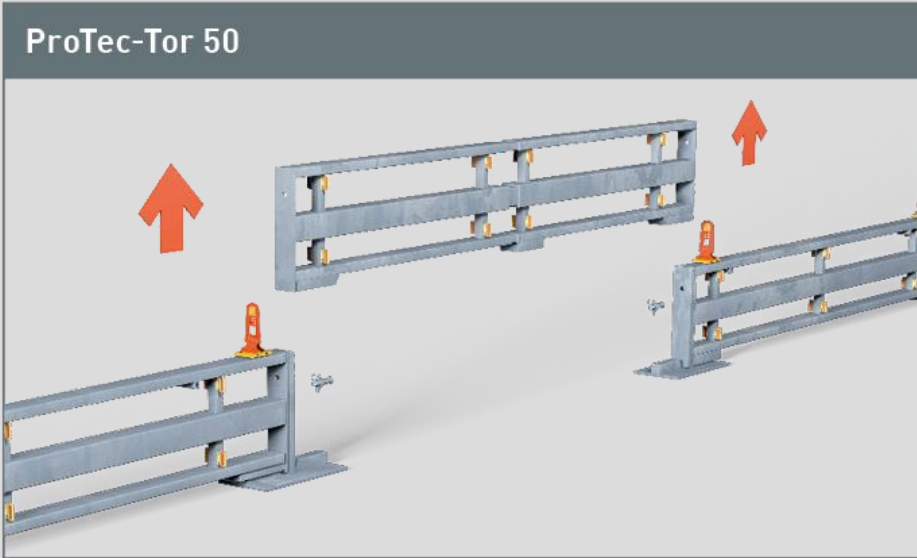
Emergency Exits— quick access for emergency services

Easily detachable elements for lightning-fast manual emergency opening of mobile ProTec crash barriers by rescue services – without tools!

Reflective visual signs also enable the beginning and end of the ProTec-Tor to be clearly seen in the crash barrier at night or in adverse weather, if the elements' short construction design alone doesn't make it evident.



Emergency Exits— quick access for emergency services



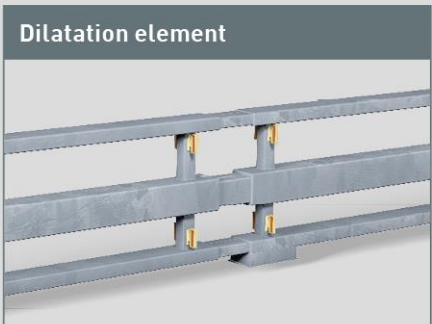
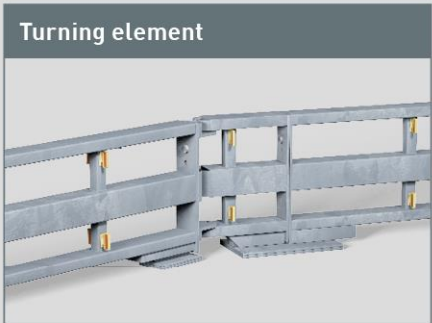
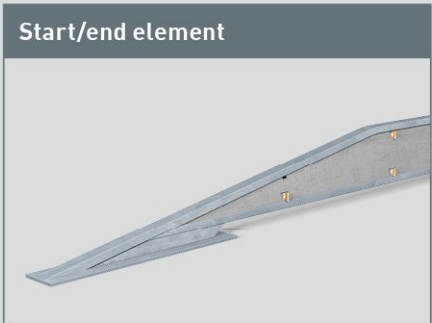
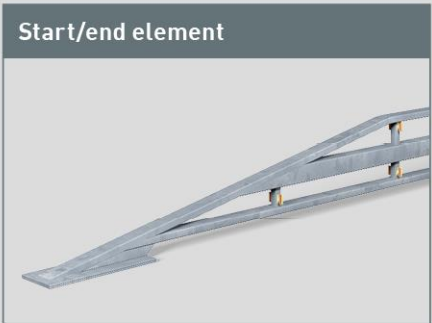
Example



Example

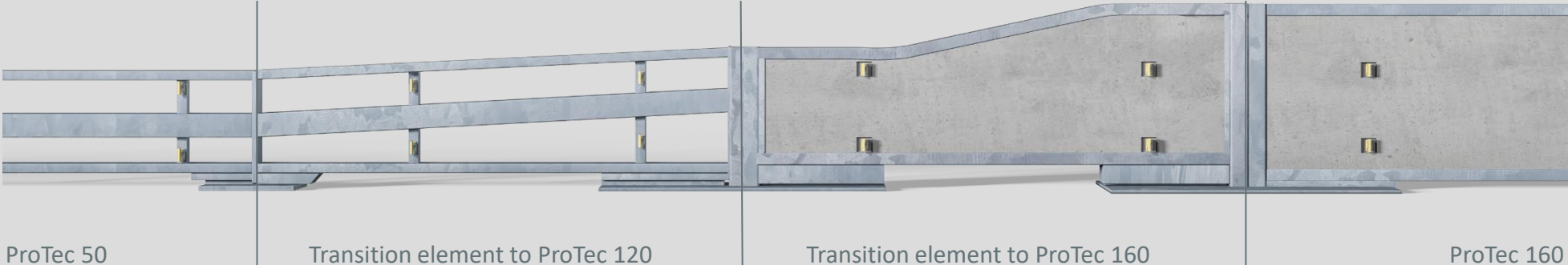


Special solutions



Combination/Connectivity

Combination example for a force-fit connection across the whole ProTec family.



ProTec 121: additional security aspects

On-top fence, and visual screen and security element

ProTec 121 on-top fence

The on-top fence was successfully tested in combination with our ProTec 121 for containment level T3 with a truck and a car according to the test criteria and requirements of DIN EN 1317. The on-top fence comes with reach-through protector and square mesh openings. It is fastened to the restraint system on the working zone side. The fence is fitted with a non-transparent net that acts as visual screen to let the wind through. The structure is fastened to the ProTec 121 with a force-fit connection consisting of a specially developed bracket. The complete structure consisting of ProTec 121 and on-top fence is 1.50 m high.

ProTec 121 visual screen and security element

The series is rounded off by another new development consisting of visual screen and security element. It provides construction site workers with effective protection from grit, flying stones or spray caused by passing traffic. Furthermore, the flow of traffic is not distracted by the work taking place behind the visual screen. In another impact series which was again carried out with our mobile crash barrier ProTec 121, the visual screen and security element with a total height of 1.15 m was successfully tested for containment level T3 according to the stipulations of DIN EN 1317.



Making headway

An example of professional traffic safety



Mobile crash barriers

Application areas for transportable road restraint systems on two-lane roads

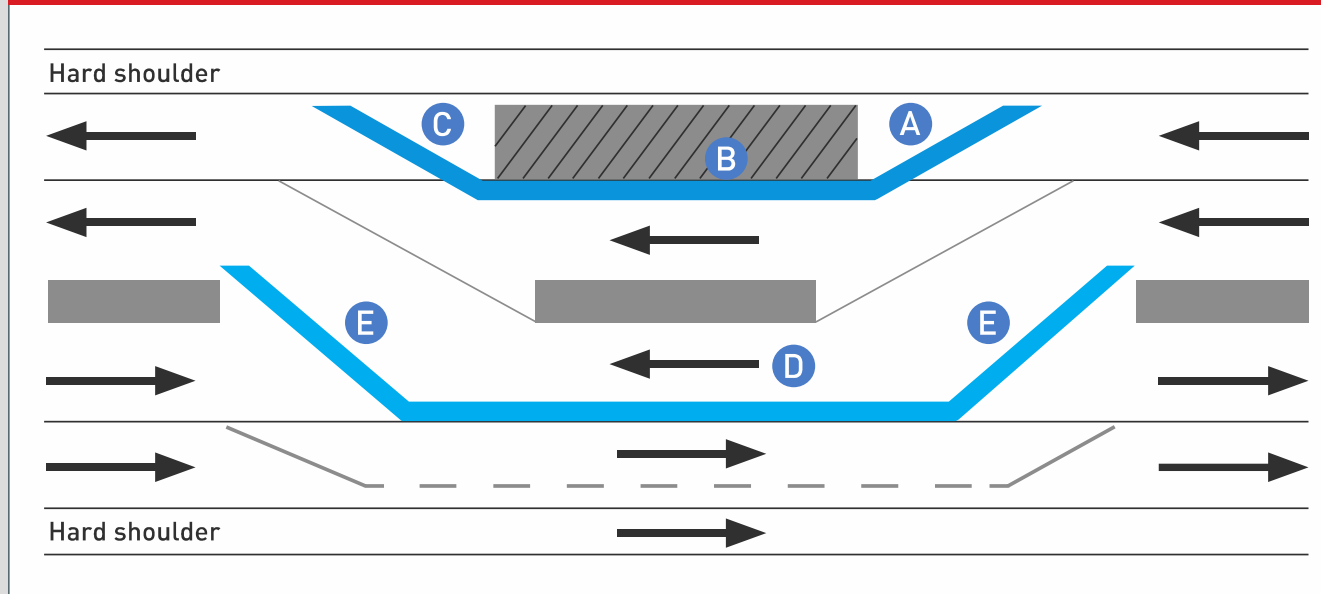
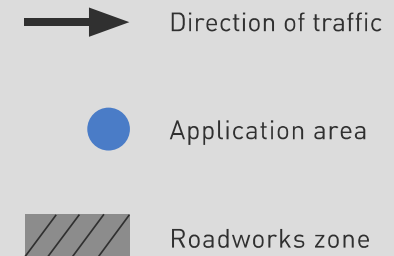






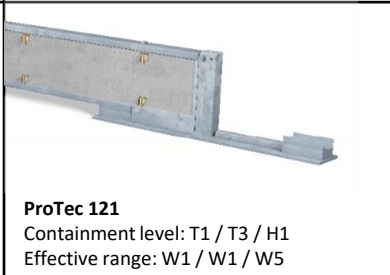

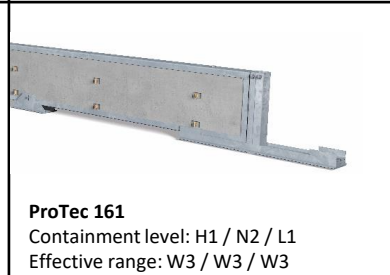


Table 5: Suitable mobile protective devices

Application areas according to Figure 2 (ZTV-SA)		Relevant vehicle type	Proved containment level acc. to DIN EN 1317-2	Proved level of the range of effectiveness
Dis.	Location of road restraint system			
A	Between roadwork site and oncoming traffic	Passenger car	> T2	< W4
		Lorry	> H1	Adapted to location (< W8)
B	Adapted to location (W8)	Passenger car	> T1	< W3
		Lorry	> T3	Adapted to location (< W8)
C	Between roadwork site and flowing-off traffic	No road restraint system required		
D	Between roadwork site and opposite flows of traffic	Passenger car	> T1	< W3
		Lorry	> T3	< W4
E	Between opposite flows of traffic in the diversion area	Passenger car	> T2	< W4
		Lorry	> H1	< W4

The ProTec Family

 <p>ProTec 50 City Containment level: T1 Effective range: W2</p>	 <p>ProTec 50 Containment level : T1 Effective range: W2</p>	 <p>ProTec 51 Containment level: T1 / T3 Effective range: W2 / W3</p>	 <p>ProTec 80 Containment level: T1 / T3 / H1 Effective range: W1 / W2 / W6</p>	 <p>ProTec 100 Containment level: T1 / T3 / H1 Effective range: W1 / W2 / W6</p>
 <p>ProTec 120 Containment level: T1 / T3 / H1 Effective range: W1 / W2 / W5</p>	 <p>ProTec 121 Containment level: T1 / T3 / H1 Effective range: W1 / W1 / W5</p>	 <p>ProTec 160 Containment level: H1 Effective range: W4</p>	 <p>ProTec 161 Containment level: H1 / N2 / L1 Effective range: W3 / W3 / W3</p>	

Also with On-top
fence, and visual
protection & security
element



Example



Example



Example



Example



Example



Example



Thank you for your attention!

Thomas Keller

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