

ADAC

ADAC position HGV underrun protection

ADAC position: HGV underrun protection

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<http://youtu.be/A5hm8NEImuk>

Requirements for effective occupant protection

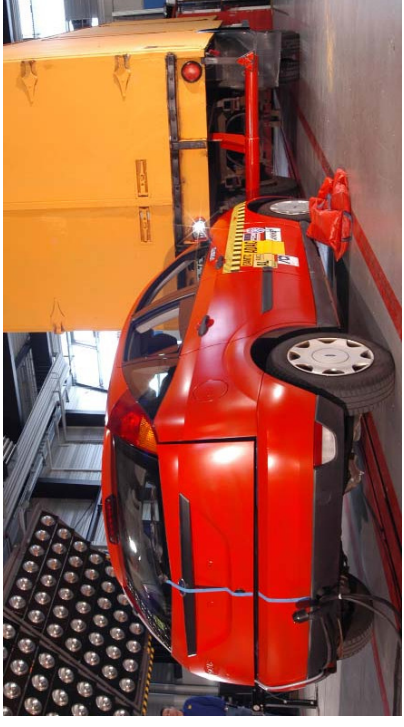


- The “crumple zone” must absorb the impact energy
- The cabin must remain stable, maintaining “survival space” for the occupants

HGV rear underrun protection



- A rear underrun protection system is the rear “bumper” of an HGV
- It is designed to prevent the impacting vehicle from getting wedged under the HGV
- It is designed to cause the crumple zone of the impacting car to absorb energy
- The approval of underrun protection systems is based on ECE-R 58
 - Underrun protection systems must comply with certain geometrical requirements (e.g. max. 550 mm ground clearance)
 - In a static test where the underrun protection system is mounted to a test stand and impacted in five different areas, deflection must not exceed 400 mm. If deflection is lower, the underrun protection system may be mounted closer to the HGV’s rear end.



ADAC accident research



ADAC accident research is a cooperation between

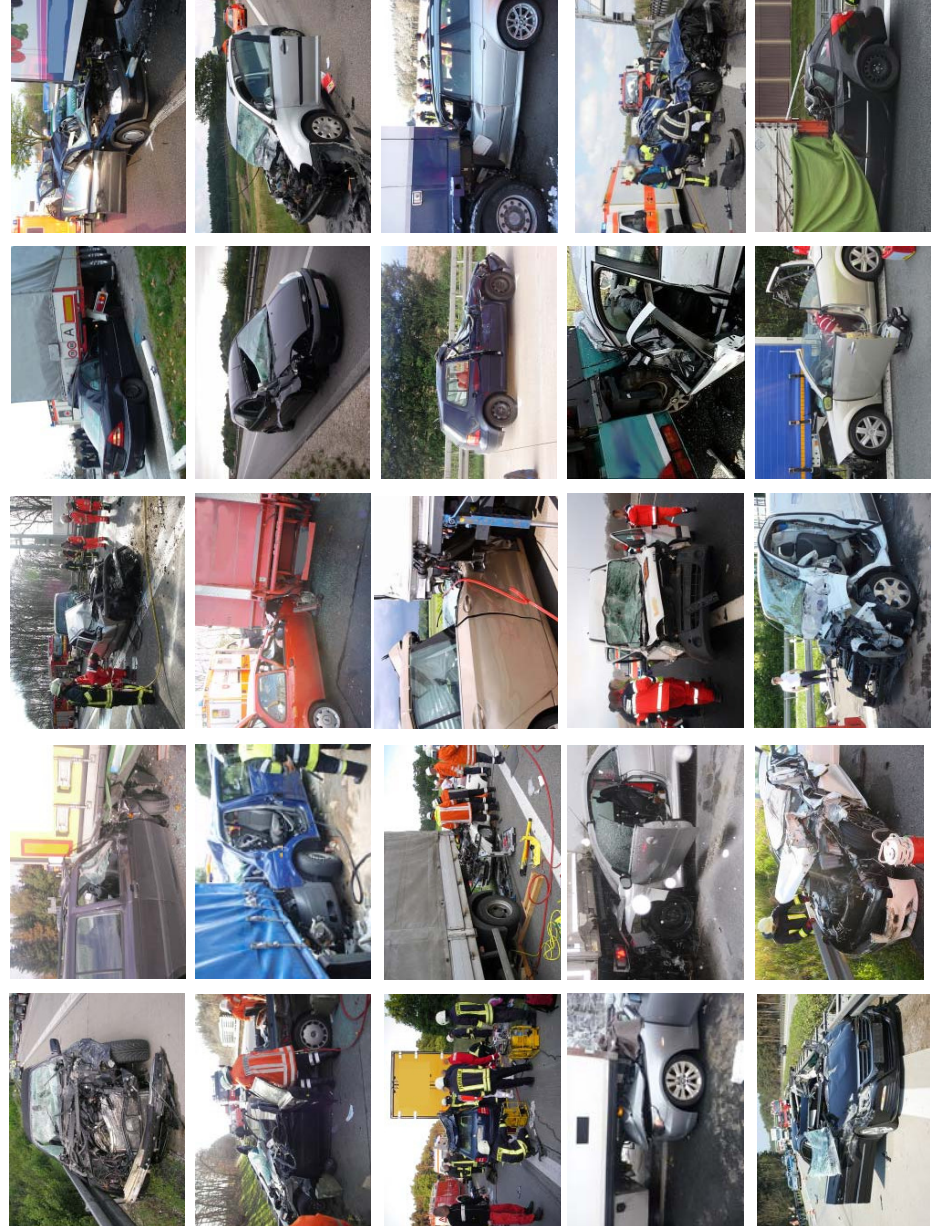
ADAC air rescue and

ADAC Technik Zentrum

ADAC air rescue

- approx. 40,000 missions per year
- approx. 35,000 patients per year
- approx. 4,000 road accidents per year

=> Data of approx. 1,400 road accidents is fed into the ADAC accident research database every year



ADAC accident research

- In a rear-end impact, the underrun protection system often detaches from the HGV, failing to withstand the impact forces
- Since the underrun protection device provides no support surface, the crumple zone of the impacting vehicle does not absorb energy
- Decelerating only marginally, the impacting car is wedged under the HGV at high residual speed
- The car's cabin is often fully destroyed, and the seatbelts and airbags fail to prevent occupants from sustaining serious injuries

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ADAC crash test

A small family car crashes into a stationary HGV at 56 kph and with a 75% offset

- To obtain type approval, every car is crash-tested at 56 kph (standard crash)
- Car drivers frequently attempt avoidance manoeuvres shortly before the impact

The HGV underrun protection system complies with the current legal requirements

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ADAC crash test



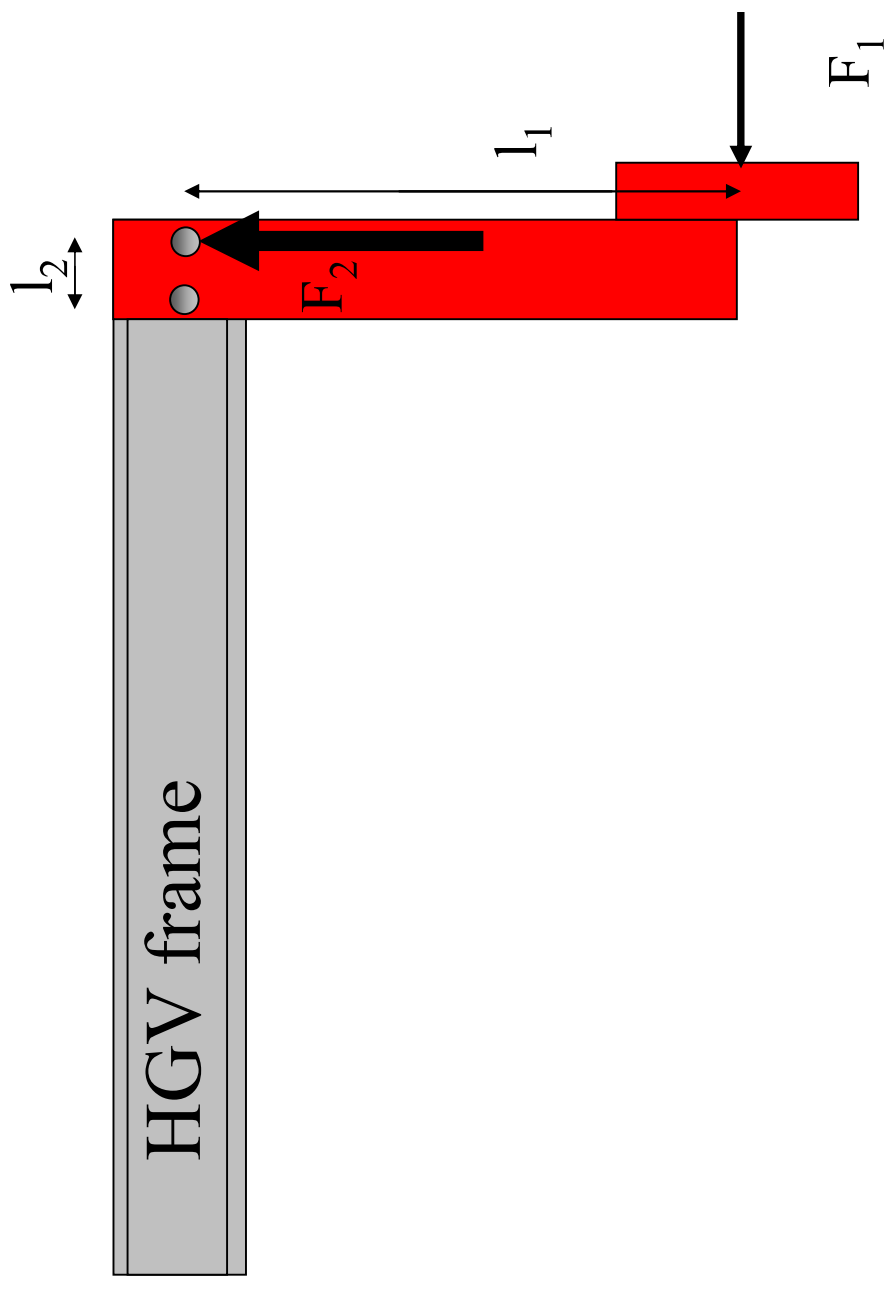
- The test confirms the findings of the ADAC accident researchers**
- The underrun protection system breaks off immediately after the impact
 - The car underruns the HGV at high residual speed
 - The car's cabin is almost fully destroyed
 - The retention systems fail to protect the occupants



ADAC crash test



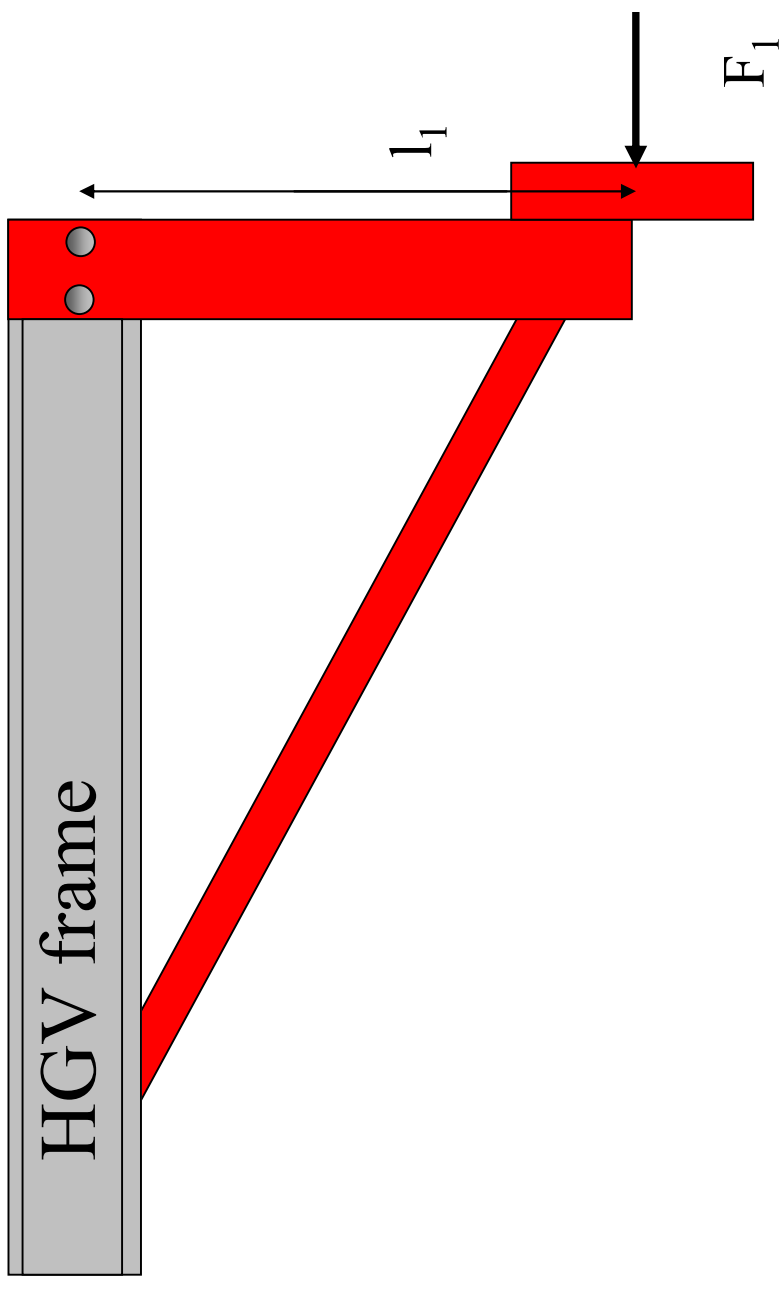
- The impact forces (F_1) put an enormous strain on the screws that keep the underrun protection device attached to the HGV
- =>The screws break off immediately after the impact, making the underrun protection device ineffective



ADAC crash test



- The impact forces (F_1) put an enormous strain on the screws that keep the underrun protection device attached to the HGV
- =>The screws break off immediately after the impact, making the underrun protection device ineffective
- =>An additional supporting structure reduces the load on the screws



ADAC crash test – improved underrun protection



The framework conditions in the second test are identical

- A small family car crashes into a stationary HGV at 56 kph

The HGV is equipped with an improved underrun protection device

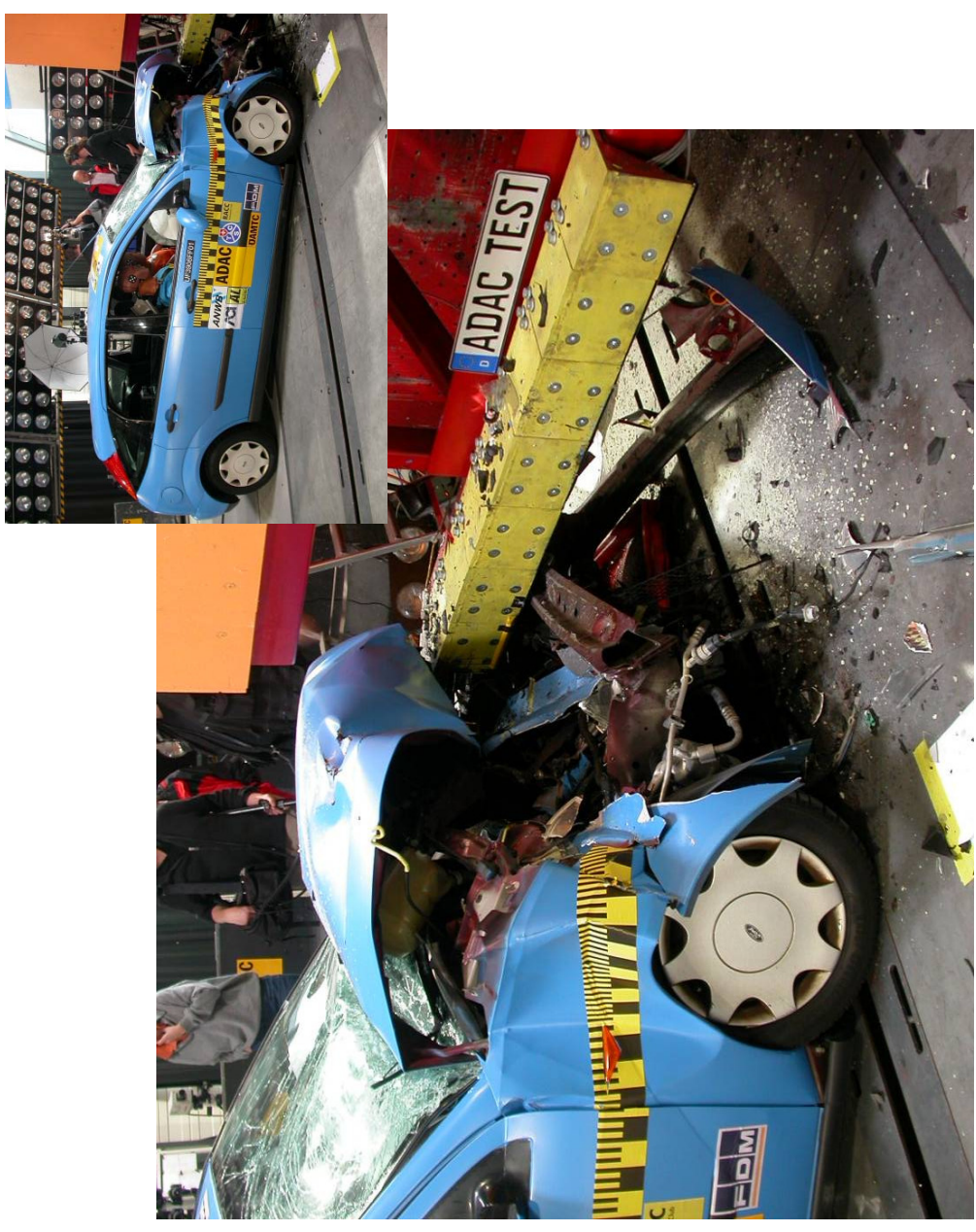
- An additional supporting structure increases underrun protection stability
- Ground clearance is reduced by 100 mm, and the underrun protection device is mounted flush with the HGV's tail end. This enables the car's crumple zone to absorb energy more effectively



ADAC crash test – improved underrun protection



- The underrun protection device withstands the loads
- The crumple zone of the impacting car fully absorbs the impact energy
- The car cabin remains intact
- The seatbelts and airbags retain the occupants whose injury risk is comparatively low
- The forces impacting the underrun protection device far exceed the legal requirements



VC-Compat European study

Cost-benefit analysis of rear underrun protection systems:

- Improved underrun protection systems would prevent 57 % of fatal and 67 % of severe injuries
- Excerpt from a report on the cost of improving underrun protection systems:
“many envisaged constructive improvements could be realized for less than € 100 on top of the cost for current designs”

=> Improved underrun protection systems are extremely effective and comparatively affordable

ADAC position

Much more stable underrun protection systems

- The systems must be much more stable to ensure that passengers do not sustain life-threatening injuries
- Higher static test loads are therefore urgently required for the type approval of underrun protection systems

Lower mounting height

- Putting underrun protection systems at a lower height helps mitigate the consequences of an accident since the impacting passenger car is able to absorb energy much better when hit at its supporting structure
- This will prevent the car from considerably underrunning the HGV and protect occupants from serious harm
- ADAC recommends to lower the permissible mounting height of underrun protection systems from 550 to 450 mm

Underrun protection near the rear panel

- According to the EU Directive, underrun protection deflection must not exceed 400 mm for type approval
- If there is less or hardly any deformation, the distance between the protection device and the rear panel may even be 400mm. However, this reduces valuable crumple distance for the colliding vehicle and presents a particular drawback for its crumple zone if the vehicle is short

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**Thank you
for your attention**