



Heavy Goods Vehicle Under Run Protection

Fédération Internationale de l'Automobile

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Requirements for effective Passenger Vehicle Occupant Protection



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

Requirements for effective HGV Under Run Protection



- A rear under run 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

Requirements for effective HGV Under Run Protection



E/ECE/324 } Rev.1/Add.57/Rev.2
E/ECE/TRANS/505 }

10 September 2008

AGREEMENT

**CONCERNING THE ADOPTION OF UNIFORM TECHNICAL PRESCRIPTIONS
FOR WHEELED VEHICLES, EQUIPMENT AND PARTS WHICH CAN BE FITTED
AND/OR BE USED ON WHEELED VEHICLES AND THE CONDITIONS FOR
RECIPROCAL RECOGNITION OF APPROVALS GRANTED ON THE BASIS OF
THESE PRESCRIPTIONS */**

(Revision 2, including the amendments which entered into force on 16 October 1995)



- The approval of under run protection systems is based on ECE Regulation 58
- Under-run protection systems must comply with certain geometrical requirements (e.g. max. 550mm ground clearance)
- In a static test where the under run protection system is mounted to a test stand and impacted in five different areas, deflection must not exceed 400mm. If deflection is lower, the under run protection system may be mounted closer to the HGV's rear end.

HGV Under Run Accident Research



- In a rear-end impact, the under run protection system often detaches from the HGV, failing to withstand the impact forces
- Since the under run 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



HGV Under Run Accident Research



HGV Under Run Accident Research



- ADAC accident research database
- In none of the cases the RUPD was strong enough to prevent the car from under riding
- Many of these accidents happen in the area of motorway stations, petrol stations and exits



HGV Under Run Protection Test

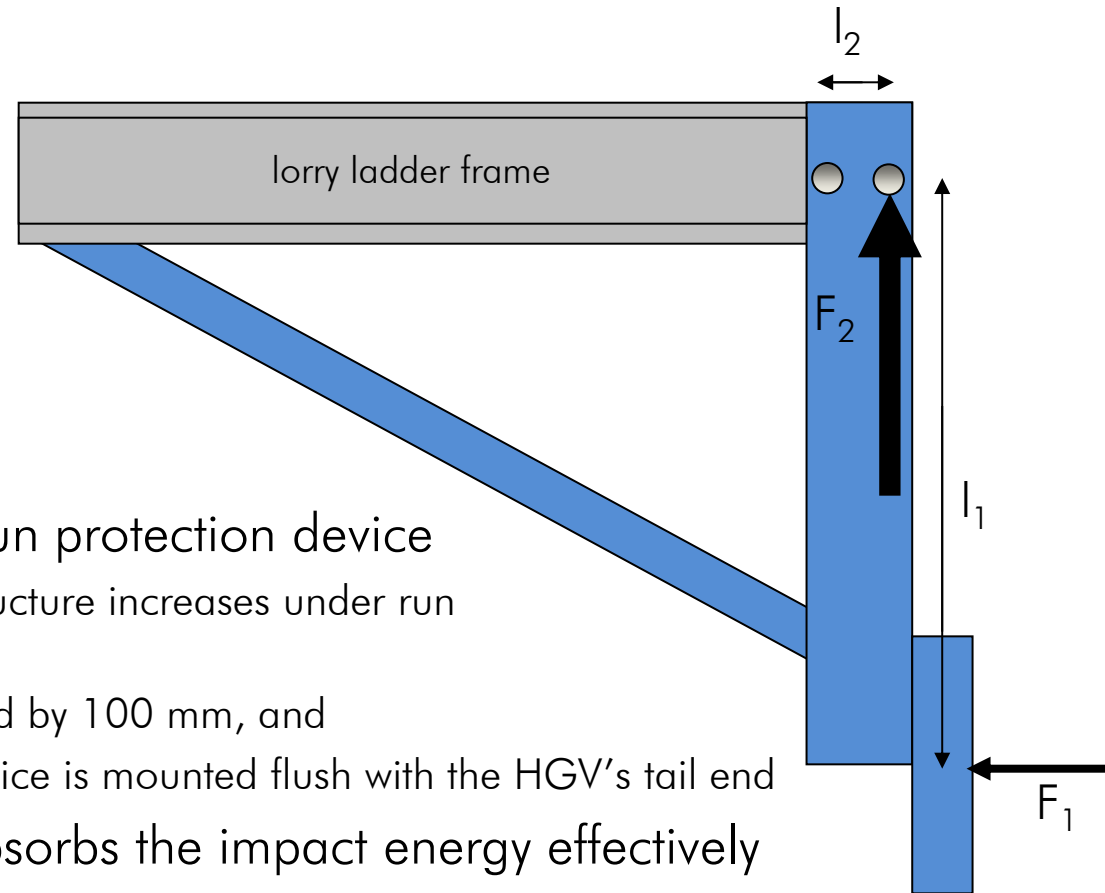


- HGV under run protection device has to comply with UNECE R58
- Test¹ confirms accident research findings
 - Under run protection device breaks off immediately after impact
 - Passenger car under-runs the HGV at high residual speed
 - Passenger car cabin is almost fully destroyed
 - Sum of 480 kN maximum force on the RUPD during the impact



¹ Performed according to UNECE R94 type approval conditions: 56 km/h, 550 mm RUPD ground clearance, 75 % overlap

HGV Under Run Improved Protection Test



- With an improved under run protection device
 - An additional supporting structure increases under run protection device stability,
 - Ground clearance is reduced by 100 mm, and
 - the under run protection device is mounted flush with the HGV's tail end
- The car's crumple zone absorbs the impact energy effectively
- The forces impacting the under run protection device far exceed the legal requirements

HGV Under Run Protection Test



Cost-benefit analysis of improved Under Run Protection



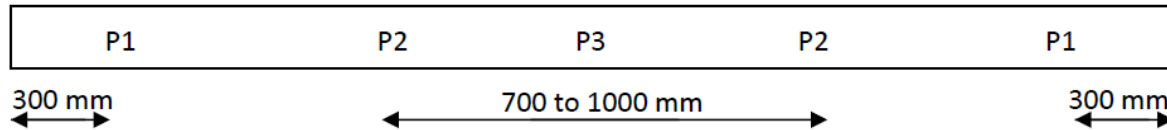
- Improved under run protection systems would prevent 57% of fatal and 67% of severe injuries
- Excerpt from a report on the cost of improving under run protection systems¹:
“many envisaged constructive improvements could be realized for less than €100 on top of the cost for current designs”

¹ VC-Compat, Improvement of Vehicle Crash Compatibility through the development of Crash Test Procedures, 2007

HGV Under Run Protection FIA Position



- More stable under run protection device
 - Higher static test loads required for the type approval of under run protection devices
 - Specification to test loads of 150kN (P1 & P3) and 200kN (P2) respectively applied in three test points simultaneously – instead of consecutively



- Lower mounting height
 - An impacting passenger car absorbs energy better when hit at its supporting structure
 - Reduction of RUPD maximum mounting height to 450mm, both for HGV with hydraulic suspensions and steel-sprung vehicles
- Under run protection near the rear panel
 - The distance between the protection device and the rear panel reduces valuable crumple distance for the colliding vehicle, in particular if the vehicle is short
 - RUPD maximum offset forward of the rear of 100mm – both for HGV with and without a lift platform



Thank You for your Attention

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