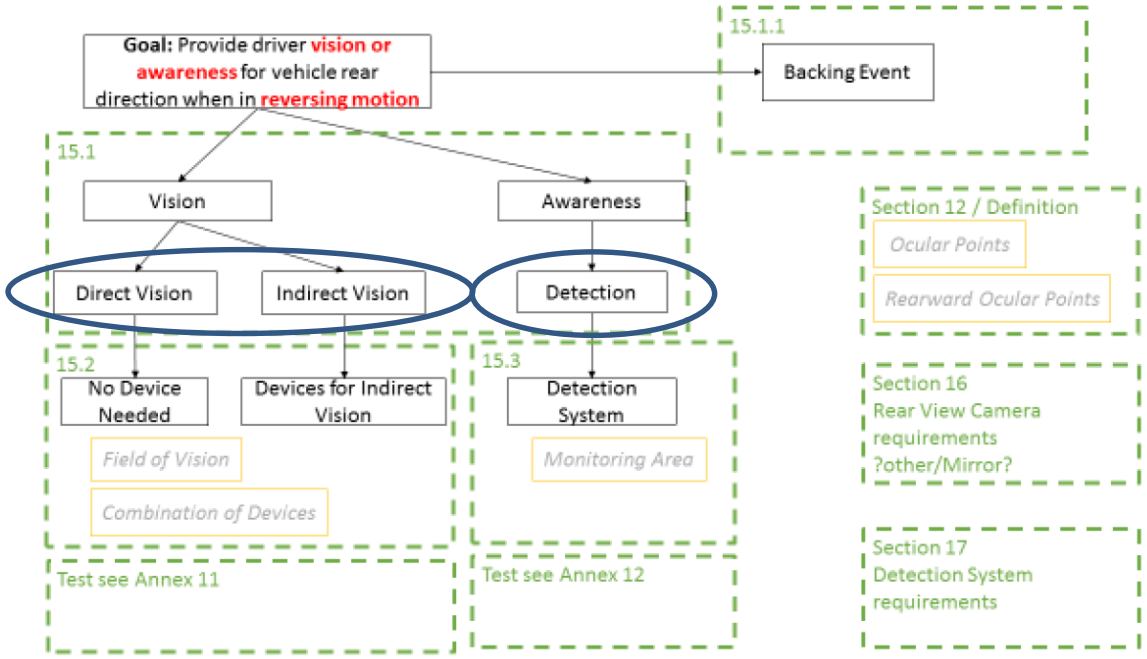
REGULATION FOR REVERSING MOTION

CLEPA inputs for 12th VRU-Proxi IWG
26-28 November 2019

VRU-Proxi-12-02

STATUS ON REVERSING MOTION

- The regulation should fulfill the GSR (General Safety Requirements) by EU for vehicle category M1, M2, M3, N1, N2, N3
- The current draft on reversing motion allows Vision and Detection system:



Latest draft document VRU-11-12

Adobe Acrobat Document

Relevant for detection system:

-**Paragraph 17:** Requirements for detection systems
-**Annex 12:** Test Methods for Detection Systems

- The approach for detection system is based on ISO 17386:2010 (Manoeuvring Aids for Low Speed Operation (MALSO)
- Scope of ISO 17386 are light-duty vehicles, e.g. passenger cars, pick-up trucks, light vans and sport utility vehicles

CONCERN POINTS ON DETECTION SYSTEM

1.) Reference ISO Standard (ISO 17386:2010) is mainly designed for PC => does not address CV applications

Reversing aids and obstacle-detection devices on heavy commercial vehicles are not addressed by this International Standard; requirements for those systems are defined in ISO/TR 12155.

2.) Reference ISO Standard (ISO 17386:2010) has the focus on USS solution

MALSO systems use object-detection devices (sensors) for ranging in order to provide the driver with information based on the distance to obstacles. The sensing technology is not addressed; however, technology affects the performance-test procedures set up in this International Standard (see Clause 7). The current test objects are defined based on systems using ultrasonic sensors, which reflect the most commonly used technology at the time of publishing this International Standard. For other sensing technologies possibly coming up in the future, these test objects shall be checked and changed if required.

3.) Test object with no link to VRU (Vulnerable Road Users)

Table 4 — Test objects for ultrasonic-based systems

Monitoring range		Material	Diameter	Length
All horizontal areas Test object H		Wood, metal or hard plastic	75 mm	$1^{0}_{+0,2}$ m
Vertical areas	Rear-1, rear-2, front	Wood, metal or hard plastic	75 mm	Length equal to width of test vehicle bumper plus 20 % to 40 %
Test object V	Corners	Wood, metal or hard plastic	75 mm	$1^{0}_{+0,2}$ m

7.1.3 Radar-based systems

Reflectivity measurements on relevant objects have been conducted. The results of this testing proved that the following tubular test objects are suitable as representations of real objects that were detectable by systems using radar-based sensors.

Table 5 — Test objects for radar-based systems

Monitoring range		Material	Diameter	Length
All horizontal areas Test object H		Metal	25 mm	$1^{0}_{+0,2}$ m
Vertical areas	Rear-1, rear-2, front	Metal	25 mm	Length equal to width of test vehicle bumper plus 20 % to 40 %
Test object V	Corners	Metal	25 mm	$1^{0}_{+0,2}$ m

Poles

(3) Over the past decades, developments in vehicle safety have contributed significantly to the overall reduction in the number of road fatalities and severe injuries. However, ***25 300 people died on Union roads in 2017, a figure that has remained constant*** in the ***last four years. Moreover, 135 000 people are seriously injured in collisions every year . The*** Union ***should do its utmost to reduce or to eliminate accidents and injuries in road transport. In addition to safety measures to protect vehicle occupants, the implementation of specific measures to prevent fatalities and injuries of vulnerable road users***, such as ***cyclists and pedestrians, is needed to protect road users outside of the vehicle.*** Without new initiatives on general road

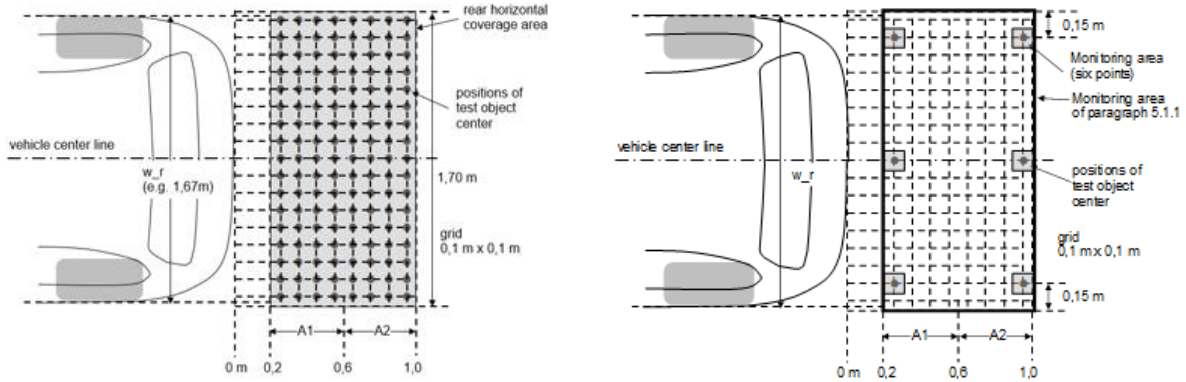
GSR with focus VRU!

According test object is considered in
a.) BSIS (Blind Spot Information System)

Most probably will be considered in
b.) MOIS (Moving Off Information System)

CONCERN POINTS ON DETECTION SYSTEM

4.) Detection range (ISO 17386:2010) => focus on existing PC applications using USS



Source: Internet

Test fits for M1, but does not really fit for larger categories (e.g. to N2 and N3 applications)

5.) No consideration of crossing scenario

VRU-Proxi-11-15 Draft minutes

- It was remarked that accident statistics indicates that moving pedestrian (crossing at the rear) ought to be addressed as Reversing Motion scenario. Chair took notice and proposed after consideration to move this to a second phase in order to avoid jeopardizing the deadline for submission of the draft regulation (April 2020). UK, J, F and the Industry agreed.

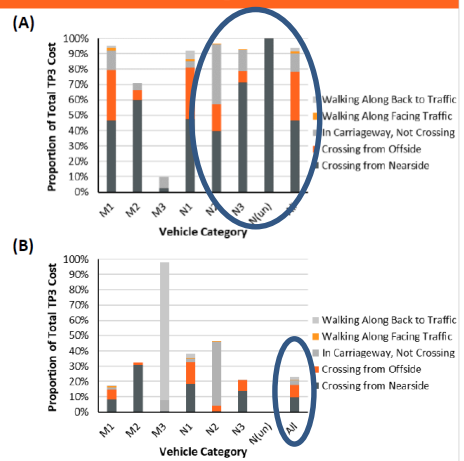
Reference: VRU-Proxi-11-08

Key Collision Characteristics: REV

TRL

Key Vehicle and VRU Manoeuvres Characterising Pedestrian Collisions

- Comparison of pedestrian manoeuvres for:
  - A. Reversing – driver failed to look properly
  - B. Reversing – vehicle blind spot
  - C. Reversing – both contributory factors
  - D. Reversing – either contributory factor
- Key pedestrian manoeuvres:
  - Crossing from nearside/offside
  - In carriageway – relatively small proportion
- Vehicle categories:
  - M3 vehicle collisions primarily associated with vehicle blind spots – CMS needed?
  - Other vehicles dominated by driver failing to look properly – information systems needed?



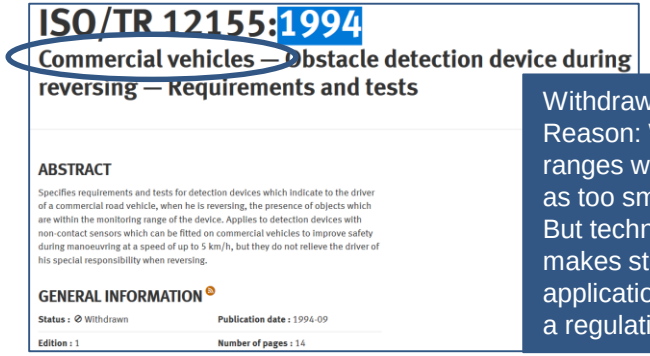
the future of transport.

POSSIBLE SOLUTIONS ON THE CONCERN POINTS

1.) Reference ISO Standard (ISO 17386:2010) is mainly designed for PC => does not address CV applications

Reversing aids and obstacle-detection devices on heavy commercial vehicles are not addressed by this International Standard; requirements for those systems are defined in ISO/TR 12155.

→ To consider ISO/TR 12155 (e.g. detection range)


ISO/TR 12155:1994

Commercial vehicles — Obstacle detection device during reversing — Requirements and tests

ABSTRACT

Specifies requirements and tests for detection devices which indicate to the driver of a commercial road vehicle, when he is reversing, the presence of objects which are within the monitoring range of the device. Applies to detection devices with non-contact sensors which can be fitted on commercial vehicles to improve safety during manoeuvring at a speed of up to 5 km/h, but they do not relieve the driver of his special responsibility when reversing.

GENERAL INFORMATION

Status : Withdrawn | Publication date : 1994-09

Edition : 1 | Number of pages : 14

Withdrawn in 2013
Reason: Warning ranges were considered as too small.
But technical content makes still sense for CV applications considering a regulation

2.) Reference ISO Standard (ISO 17386:2010) has the focus on USS solution

→ To change from technology approach to use case approach,
by adaption of monitoring area, test object and test scenario

CONCERN POINTS ON DETECTION SYSTEM

3.) Test object with no link to VRU (Vulnerable Road Users)

Alternative:

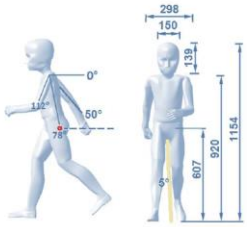
To consider ISO 19206

Road vehicles — Test devices for target vehicles, vulnerable road users and other objects, for assessment of active safety functions —

Part 2:
Requirements for pedestrian targets

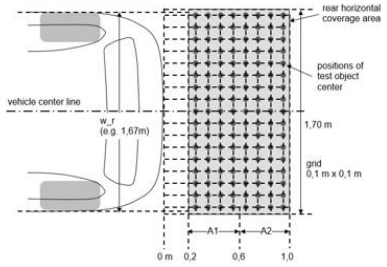
To use Dummy (proposal child dummy) like Euro NCAP Pedestrian

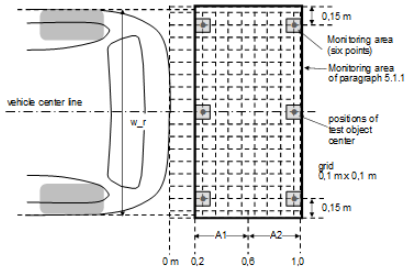
Segment	Unit	Dim.	Tol.
Body height (+shoes)	mm	1154	± 20
HIP Point height	mm	607	± 20
Shoulder width	mm	298	± 20
Shoulder height	mm	920	± 20
Head width	mm	150	± 10
Head height	mm	250	± 10
Torso depth	mm	139	± 10
Ground Clearance	mm	20	± 5
Torso angle	deg	78	± 2
R Upper arm angle	deg	50	± 2
R Upper arm angle	deg	112	± 2
Tube in driving dir.	deg	5	± 2



CONCERN POINTS ON DETECTION SYSTEM

4.) Detection range (ISO 17386:2010) => focus on existing PC applications using USS





To use CV relevant detection ranges (e.g. 0,3m…….2m) / **Input** from GS-VL 40 or ISO/TR 12155

DGUV Test
Prüf- und Zertifizierungsstelle
Fachbereich Verkehr und Landschaft

Grundsätze für die Prüfung und Zertifizierung von Rückfahrassistenzsystemen für Nutzfahrzeuge

Stand: 26.04.2019 Ausgabe: 1.0

GS-VL 40

Fachbereich Verkehr und Landschaft
Prüf- und Zertifizierungsstelle im DGUV Test
Ottenser Hauptstraße 54
22765 Hamburg

In Zusammenarbeit mit:
Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung (IFA)
Prüf- und Zertifizierungsstelle im DGUV Test
Alte Heerstr. 111
53757 Sankt Augustin

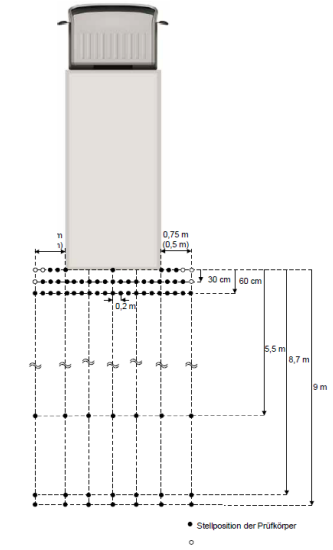


Abbildung 4: Überwachungsbereich (erforderliche Detektionsbereich) RAS-V2: 5,5 m und RAS-V1: 9 m (Draufsicht)

TECHNICAL REPORT

ISO TR 12155

First edition
1994-10-01

Commercial vehicles — Obstacle detection device during reversing — Requirements and tests

Véhicules utilitaires — Dispositifs de détection d'obstacles pendant la marche arrière — Exigences et essais

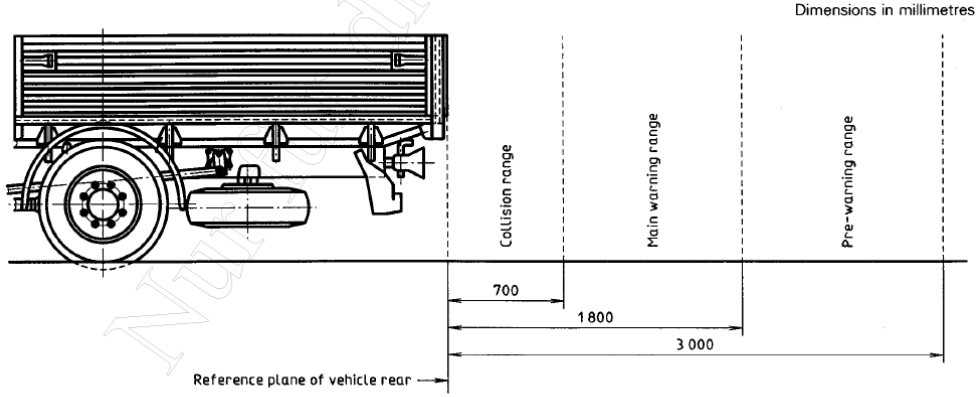
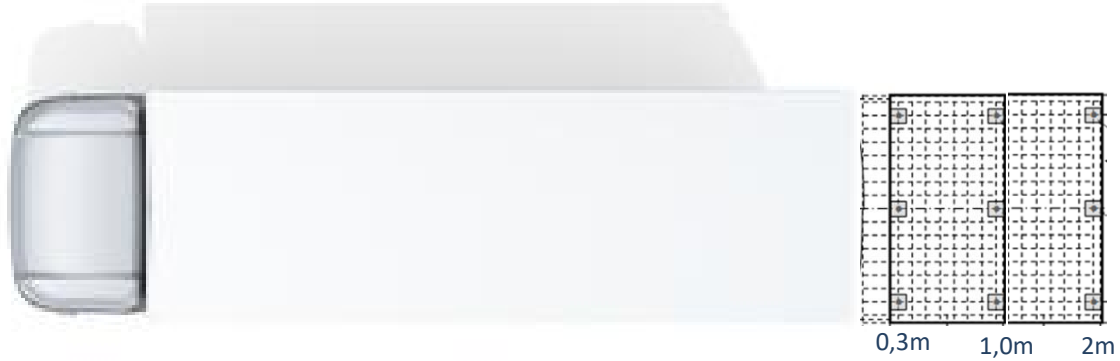


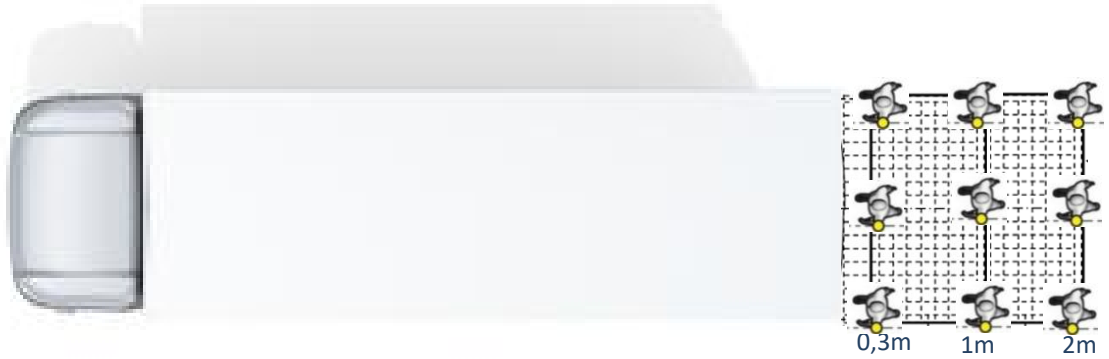
Figure 1 — Monitoring range of reversing detection device

CONCERN POINTS ON DETECTION SYSTEM

Combination of Test object 3.) and detection range 4.) for categories M2, M3, N2, N3



Poles



Dummy

Alternative:

- Poles or Dummy can be used
- Increased detection range

CONCERN POINTS ON DETECTION SYSTEM

5.) No consideration of crossing scenarios

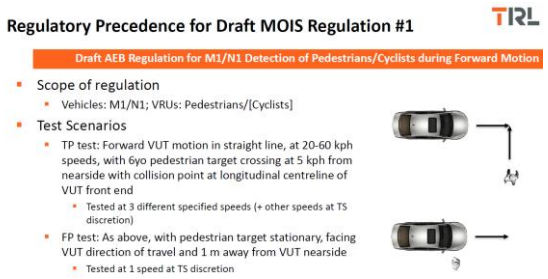
To use crossing scenarios comparable to MOIS or AEB VRU systems (PC)

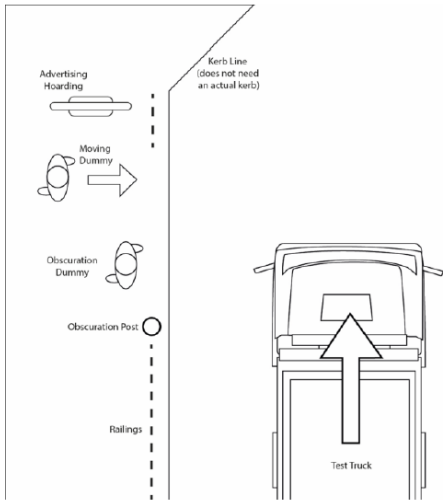
MOIS

not known or not available.

- Outcome of discussions (all depending on the scenarios, speeds/locations):
  - Include pedestrians (adults and children) crossing/moving from nearside and offside with no obstructions;

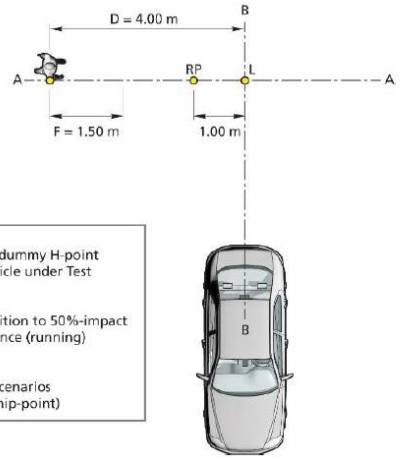
Details under discussion in VRU-Proxi





AEB VRU systems (PC)

7.2.9 Car-to-Pedestrian Reverse Adult



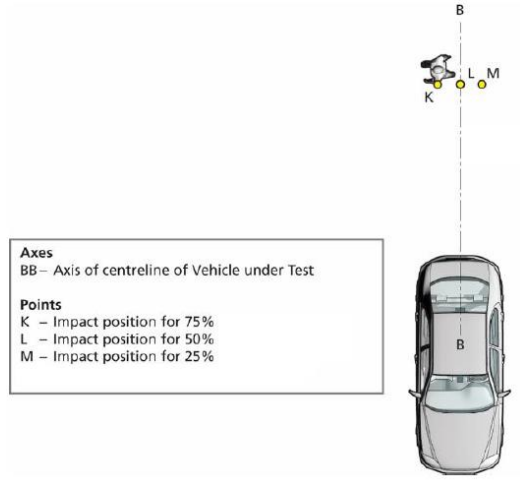


Figure 7-6: CPRA scenario, Pedestrian from Nearside (right) and Stationary (left)