Integrated Vehicle Safety
Automotive Campus 30
5708 JZ Helmond
P.O. Box 756
5700 AT Helmond
The Netherlands

www.tno.nl

T +31 88 866 57 29
F +31 88 866 88 62

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CATS Deliverable 4.2: CATS propulsion system requirements

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Author(s)	Sjef van Montfort, Jeroen Uittenbogaard, Olaf Op den Camp
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Contents

1 Introduction

The overall number of fatalities in road traffic accidents in Europe is decreasing, however unfortunately the number of fatalities among cyclists does not follow this trend with the same rate. In order to address this from 2018, AEB systems dedicated to avoid or mitigate car-to-cyclist collisions will be considered in the safety assessment by Euro NCAP. To develop protocols and appropriate equipment to test such systems, TNO has initiated the CATS “Cyclist-AEB Testing System” consortium, in which around 20 partners, mostly OEM’s and TIER1s, have joined forces. Accidentology was used to determine the three most common car-to-cyclist accident scenarios in the EU. Accident data and data from observation studies were used to determine the parameter ranges in the test matrix that has been proposed for the selected test scenarios. A bicyclist target has been specified to represent a real bicyclist on a bike, taking into account all different types of sensors used in AEB systems. 4activeSystem GmbH (Austria) has developed and manufactured a bicyclist target and propulsion system that meets the set of requirements to represent the defined scenarios. Together with car manufacturers and suppliers, the proposed test matrix has been verified.

This report describes the specifications of the propulsion system, including target platform.

2 Definitions

Throughout this protocol the following terms are used:

Autonomous Emergency Braking (AEB) – braking that is applied automatically by the vehicle in response to the detection of a likely collision to reduce the vehicle speed and potentially avoid the collision.

Car-to-VRU Nearside Bicyclist Unobstructed (CVNBU) – a scenario in which a vehicle travels forwards towards a bicyclist crossing its path cycling from the nearside and the frontal structure of the vehicle strikes the bicyclist when no braking action is applied.

Car-to-VRU Nearside Bicyclist Obstructed (CVNBO) – a scenario in which a vehicle travels forwards towards a bicyclist crossing its path cycling from the nearside behind an obstruction and the frontal structure of the vehicle strikes the bicyclist when no braking action is applied.

Car-to-VRU Farside Bicyclist (CVFB) – a scenario in which a vehicle travels forwards towards a bicyclist crossing its path cycling from the farside and the frontal structure of the vehicle strikes the bicyclist when no braking action is applied.

Car-to-VRU Longitudinal Bicyclist (CVLB) – a scenario in which a vehicle travels forward towards a bicyclist cycling in the same direction in front of the vehicle.

Vehicle under test (VUT) – means the vehicle tested according to this protocol with a pre-crash collision mitigation or avoidance system on board

CATS Bicyclist and bike Target (BT) – means the bicyclist and bike target.

3 Propulsion system requirements

The propulsion system specifications have been defined for the three CATS scenarios, representing the 3 dominant scenarios in the EU; crossing nearside (CVNBO and CVNBU), crossing farside (CVFB) and longitudinal (CVLB) [3].

3.1 General requirements

The general requirements to the propulsion system are similar to the requirements set by vFSS: Test procedure for preventive pedestrian protection systems [2].

3.1.1 All visible parts of the BT mounting, guidance and propulsion system must be coloured in grey or silver shades.

3.1.2 The propulsion system including platform should have no significant influence on radar reflection.

3.1.3 The propulsion system, platform or any supporting ropes, tubes for fixing the dummies position should not interfere with the vehicle under test and in particular with its bicyclist emergency braking system to the point of impact.

3.1.4 The rotating wheels of the Bicyclist and bike Target (BT) should be in permanent contact with the road surface to ensure that the wheel speed matches the forward speed of the BT.

3.1.5 For the longitudinal scenario (CVLB) no parts of the propulsion system should be in the VUT path, behind the BT.

3.2 Dimensions

3.2.1 The parts of the propulsion system, including platform, should be as small as possible to reduce the possible inference with visual detection systems.

3.3 Dynamic properties

Based on the CATS car-to-cyclist scenarios [3], parameter evaluation Reference [4] and Euro NCAP AEB VRU protocol [1] the following dynamic properties for the propulsion system can be defined.

3.3.1 It should be possible to perform tests with vehicle under test (VUT) speeds from 10km/h up to 80km/h and bicyclist and bike target (BT) speeds from 10km/h up to 22km/h.

3.3.2 The speed of the Bicyclist and bike Target (BT) should be remained constant for at least 25m in crossing and longitudinal scenarios with a tolerance of ±0.2km/h, similar to Euro NCAP AEB VRU protocol [1].

3.3.3 An exact and reproducible positioning of the BT has to be guaranteed. The deviation of the position in the direction of BT movement from the test path should be 0 ± 0.05 m. The deviation of the position perpendicular to the direction of BT movement from test path should be 0 ± 0.15 m.

4 Signature

Helmond, September 2nd 2016

TNO

Daan de Cloe – TNO
Research Manager
Integrated Vehicle Safety

Sjef van Montfort – TNO
Consultant
Integrated Vehicle Safety

5 References

[1] Euro NCAP AEB VRU Test Protocol v1.0.1, June 2015 http://euroncap.blob.core.windows.net/media/21509/euro-ncap-aeb-vru-test-protocol-v101.pdf

[2] vFSS; *Preventive Pedestrian Protection: Test procedure for preventive pedestrian protection systems*, vFSS – Test procedure, Version 1.1, 27 October 2014, http://www.vfss.net/fileadmin/Redakteur/Downloads/vFSS_Pedestrian_Specification_Eng_Version_11_2014-10-27.pdf

[3] Uittenbogaard, J., Rodarius, C., Op den Camp, C., *CATS car-to-cyclist accident scenarios*, CATS deliverable D1.2, TNO 2014 R11594, Helmond, September 2016

[4] Uittenbogaard, J., Op den Camp, O., Montfort, S. van, *CATS car-to-cyclist accident parameters and test scenarios*, CATS deliverable D2.2, TNO 2014 R11705, Helmond, September 2016

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