

Detailed description of the Subject of the Order

DUMMIES FOR ADVANCED DRIVING ASSISTANCE SYSTEMS

1. Introduction

- 1.1. The main subject of this purchase order is a delivery of three dummies for advanced driving assistance systems:
  - 1) Adult pedestrian dummy;
  - 2) Child pedestrian dummy;
  - 3) Bicyclist dummy.
- 1.2. Dummies must be suitable for European New Car Assessment Programme (Euro NCAP) „TEST PROTOCOL – AEB VRU systems” version 2.0.2. regulations, which is an appendix 1 to this document.
- 1.3. Dummies should adjust the regulations of the EuroNCAP Protocol applying autonomous emergency breaking – AEB BRU and also the specifications in European Automobile Manufacturers Association „Articulated Pedestrian Target Specifications” Version 1.0, which is an appendix 2 to this document.
- 1.4. Bicyclist dummy should also meet a requirements of the specifications described in a document CATS D3.4 – Specifications Bicyclist and Bike Target v1.1 – 2016-12-23 which is an appendix 3 to this document.

2. Technical specification

2.1. Pedestrian dummies (adult and child)

- 2.1.1. Dummies should be equipped with moving legs and a mechanism for automatic triggering the movement.
- 2.1.2. Dummies should have the following properties:
  - The IR reflectivity from 850 to 910 nm wavelength of clothes and the skin must be within the following range of 40% to 60%;
  - At the selection of the clothes it has to be ensured, that the IR reflectivity measured with the 45° probe must not differ for more than 20% from the reflectivity measured with the 90° probe;
  - The radar reflectivity characteristics of the pedestrian targets should be equivalent to a human pedestrian of the same size;
  - Waterproof;
  - Work temperature in range -5°C to 40°C;
  - Robust - crashes up to 60km/h could not damage the dummy;

- No hard impact points prevents damage to test vehicles;
- Battery powered – one day test should be possible on one battery;
- Automatic or manual triggering operation with remote control;
- Euro NCAP standard tests or optional programmed tests;
- Modular system - hip, center tube, legs, electronic unit and battery are easy to change;
- Arms could be articulated.

### 2.1.3. Adult pedestrian dummy

2.1.3.1. Additional technical specification of the adult pedestrian dummy is shown in table 1.

Table 1 Additional specification of the adult pedestrian dummy

<b>Parameter</b>	<b>Dimension</b>	<b>Tolerance</b>
Body height	1800 mm	± 20 mm
Hip point height	923 mm	± 20 mm
Shoulder width	500 mm	± 20 mm
Shoulder height	1500 mm	± 20 mm
Head width	170 mm	± 10 mm
Head height	260 mm	± 10 mm
Torso depth	235 mm	± 10 mm
Ground clearance	20 mm	± 5 mm
Torso angle	85°	± 2°
Right upper arm angle	60°	± 2°
Left upper arm angle	110°	± 2°
Tube in driving direction	5°	± 2°
Weight	< 7 kg	

#### 2.1.4. Child pedestrian dummy

2.1.4.1. Additional technical specification of the child pedestrian dummy is shown in table 2.

2.1.4.2. Table 2 Additional specification of the child pedestrian dummy

<b>Parameter</b>	<b>Dimension</b>	<b>Tolerance</b>
Body height	1154 mm	± 20 mm
Hip point height	607 mm	± 20 mm
Shoulder width	298 mm	± 20 mm
Shoulder height	920 mm	± 20 mm
Head width	150 mm	± 10 mm
Head height	250 mm	± 10 mm
Torso depth	139 mm	± 10 mm
Ground clearance	20 mm	± 5 mm
Torso angle	78°	± 2°
Right upper arm angle	50°	± 2°
Left upper arm angle	112°	± 2°
Tube in driving direction	5°	± 2°
Weight	< 4 kg	

#### 2.2. Bicyclist dummy

2.2.1. Bicyclist dummy consists of a bicyclist and a bicycle with moving wheels dummy. The wheels are propelled from the road surface.

2.2.2. The bicyclist dummy should have following properties:

- Wheels must be propelled from the road surface;
- The dummy must be suitable for longitudinal and crossing scenarios;
- Longitudinal crashes must be able up to 45km/h differential speed;
- Crossing test must be able up to 60km/h;
- Torso and legs should be removable, bike could be able to fold up for transport and storage;
- Torso should have an adjustable position with two handle bar sets;
- Should be very easy to exchange spare parts;
- Robustness - clips on the back wheel opens during a crash;
- Tensioning ropes offering better stability should be low optical reflective;
- Reflectors should be mounted on the bicycle - white: front and wheels, red: back, orange: pedal;
- Pedals could have an ability to rotate.

2.2.3. All of the dummies should have unified hook allowing them to be mounted to

the platform in a correct position to perform tests according to EuroNcap Protocol.

2.2.3.1. Additional technical specification of the bicyclist dummy is shown in table 3.

Table 3 Technical specification of the bicyclist dummy

<b>Parameter</b>	<b>Dimension</b>
Handlebar height	1150 mm
Wheels diameter	700 mm
Wheels distance	1230 mm
Bicycle weight	< 6 kg
Dummy weight	< 4 kg
Total height	1840 mm
Total length	1940 mm

### 3. Appendix

- App. 1 European New Car Assessment Programme (Euro NCAP) „TEST PROTOCOL – AEB VRU systems” version 2.0.2.
- App. 2 European Automobile Manufacturers Association „Articulated Pedestrian Target Specifications” Version 1.0.
- App. 3 CATS D3.4 – Specifications Bicyclist and Bike Target v1.1 – 2016