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Statens vegvesen
Norwegian Public Roads Administration

TB 021 New Naming Convention – Crash Avoidance

10 August 2023 // Adriano_palao@euroncap.com

Background – Data structure & Naming Convention

Scope:
Crash Avoidance Tests
(Track and VTA)

- **Current status**: as per TB 021 v4.0.2
  - Scenario-based (e.g., CMRs50_AEB_30VUT-01)
  - Specific and not future-proof
- **Future**: Up to 2026 requirements
  - Standard Tests
    - ✓Layout-based: Scenario Parametrization in 1 single name
  - Robustness Tests
    - ✓Indicate robustness layers (and its attributes) in MME-file through additional headers: Target type (including lane markings), pre-impact path, infrastructure/clutter, environmental conditions

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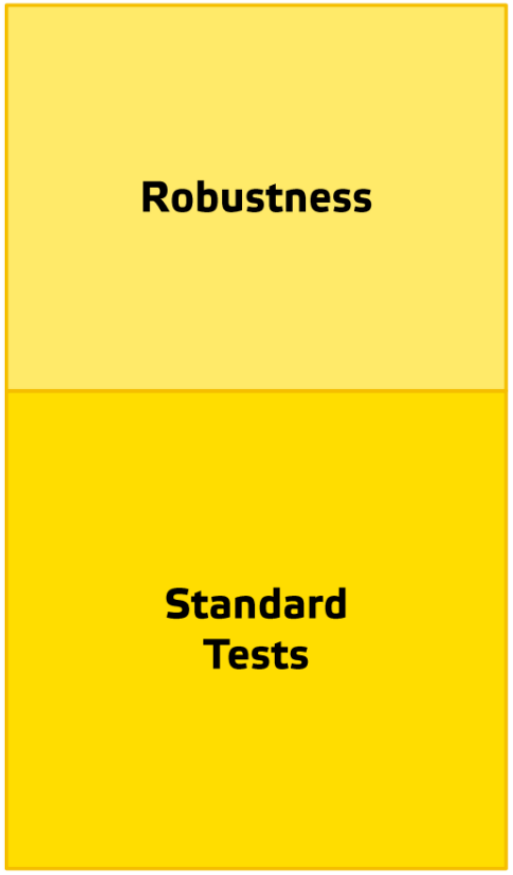
Background – Robustness



- Performance outside of Euro NCAP envelope
- Additional (real-life) layers
  - Pre-impact path and/or driver input
  - Additional targets and/or clutter
  - Infrastructure
  - Environmental conditions
- On-road driving?

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Background – 2026 Rating Scheme

Crash Avoidance

Frontal Collisions
- Car & PTW
- Pedestrian & Cyclist

Lane change Collisions
- Single Vehicle
- Car & PTW

Robustness

Standard Tests

- Standard (Existing) Tests +
- Robustness: Standard (Existing) Tests populated with robustness layers

Acceleration prevention
- Car & PTW
- Pedestrian & Cyclist

Standard Tests

- New* set of Standard Tests
- (Robustness out of scope)

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* VUT starts from standing still/ low speed condition

Main Test Naming Convention

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VUT Type	VUT Motion	VUT LongSpeed [Km/h]	VUT LatSpeed [m/s]	Lane Marking	Target Type	Target Heading [°]	Target Speed [Km/h]	Target Accel. [m/s^2]	Overlap / Impact Point [%]	Scenario Attributes
C (Car)	FW (Forward)	000	01	SSL (Single Solid Line)	Ca (Car Average)	090 (Forward)	00	D2 (-2 m/s^2)	150 (-50%)	NKK-R (Night)
V (Van)	RE (Reverse)	004	03	SDL (Single Dashed Line)	Pa (Pedestrian Adult)	270 (Head-on)	05	D4 (-4 m/s^2)	175 (-75%)	OKK-R (Obscuration)
H (Truck)	LR (Lane Change Right)	008	05	REN (Road Edge NO Line)	Pc (Pedestrian Child)	000 (Farside)	08	D6 (-6 m/s^2)	100 (100%)	ONK-R (Obscuration+Night)
	LL (Lane Change Left)	010		REC (Road Edge Centre Line)	Ba (Bicycle Adult)	180 (Nearside)	15	A2 (+2 m/s^2)	075 (75%)	IKK-R (VUT Indicator)
	TL (Turn Left)	072		SSL (Single Solid Lane)	Ma (Motorcycle Average)	030 (Headroom Robustness)	20		050 (50%)	LKK-R (Target Lane Change)
	TR (Turn Right)	100		FML (Fully Marked Lane)	PS (PSS)		60			H40-R (40m. Headway)
	DO (Dooring)			NLM (No Lane Markings)						H12-R (12m. Headway)
										KKK-R (Robustness)*
A	**BB**	**CCC**	**DD**	**EEE**	**Ff**	**GGG**	**HH**	**II**	**JJJ**	**KKK-R**

* 'R' indicates a Robustness case (i.e., out of the Standard envelope) . Some of the Robustness attributes to be included in the MME-file through additional headers

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MME-Headers for Robustness cases

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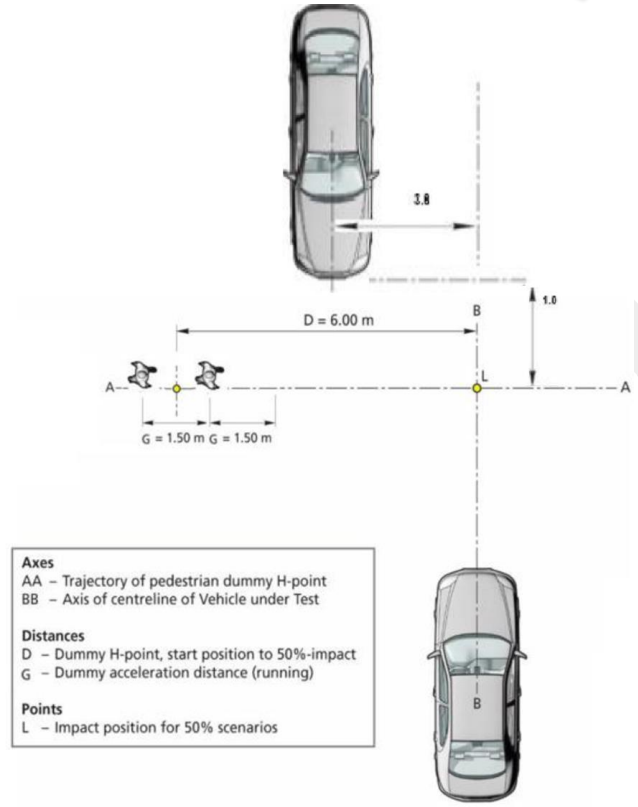
MME-File Header	VUT	Target 1	Target 2	Obscuration	Clutter 1	Remarks
Type Object	-	Pa	Pa	-	Ca	
(Alternative) **Position Object** [cm,cm]	-	[000,+075]	[000,-075]	-	[-380,+100]	For Target 1 and/or Target 2 and/or Obscuration, "Position" refers to an offset on X and/or Y direction vs the original scenario position at the start of the test. For Clutter, Position refers to the distance from the Impact Point until the Reference Point of the Object. (For ELK Oncoming/Overtaking tests, lateral position of target is from straight-line path until centre of the centre line)
Heading Object [°]	-	000	000	-	270	Element straight line path vs VUT straight line path. Note: Heading of the Target 1 is already implicit in the test name.
Reference Point Object [%-Length,%-Width]	-	[050,100]	[050,100]	-	[100,050]	[050,100]: Reference point on 50% of the object's length and 100% of the object width (starting from the bottom left in the facing direction)
Speed Object [Km/h]	-	008	008	-	000	-
Special Attribute	-	RV	-	-	-	RV: Reflective Vest
Pre-impact path	NSR					NSR: No Steering Robot



Theoretical example of a baseline CPFA injected with several robustness layers (multi-pedestrian, pedestrian appearance, clutter (stationary vehicle on adjacent lane)).

Note: for illustration purposes only – not an oficial scenario

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Robustness – Scenery Objects

+ Catalogue with pedestrian appearance to be created

Targets (Type & appearance)

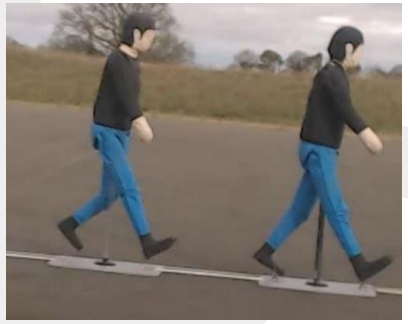
- Car
- Pedestrian

  - ✓Adult, child
  - ✓Additional attributes e.g., reflective vest, baby stroller…
- Bicyclist

  - ✓Adult, child, PSS
- Motorcyclist

  - ✓Average, scooter

+ Provisions for multiple targets



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Robustness – Scenery Objects

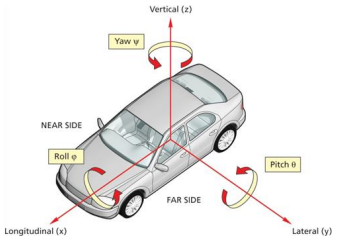
Clutter

- Scenery objects disturbing the perception of the main hazard
  - ✓Other (stationary) vehicles
  - ✓Catalogue of Roadside Objects / Infrastructure:
    - e.g., “C009” →

(Alternative) Obstructions / obscurations

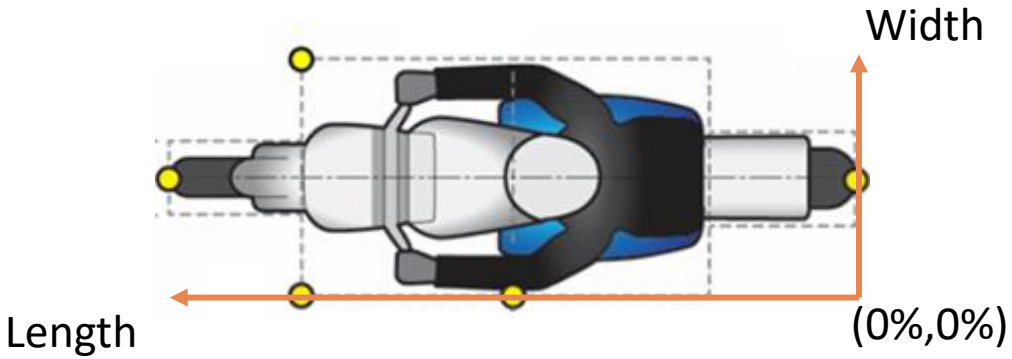
- Car, van, truck, wall…

Robustness – Scenery Objects (Properties)



Reference Point

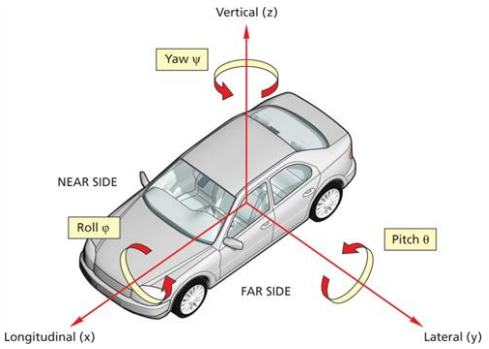
- (Alternative) Object Reference Point
  - ✓(%-length, %-width)

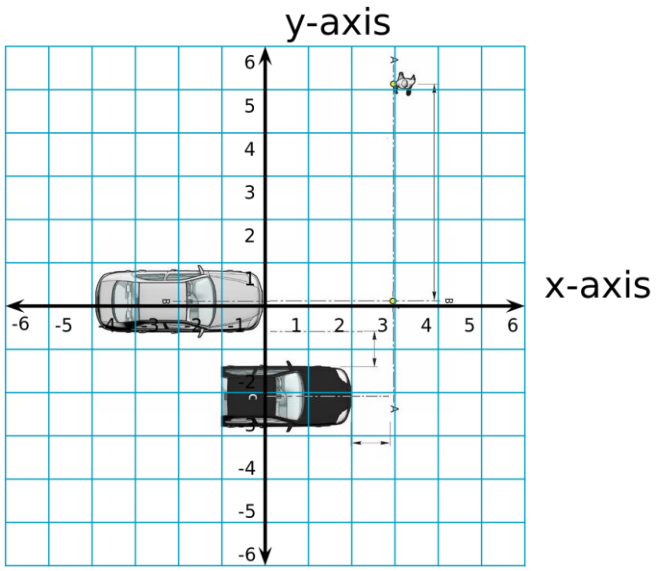


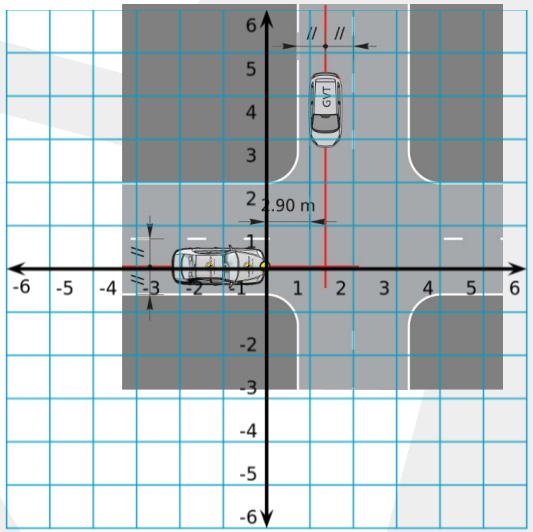
Robustness – Scenery Objects (Properties)

Position

- (Alternative) initial* position of scenario objects:
  - ✓ VUT, Target 1, Target 2, Obscuration: X/Y Offset vs Baseline Scenario Position
  - ✓ Clutter/Infrastructure: X/Y Distance from VUT Reference Point to Object Reference Point
- Using cartesian coordinates:





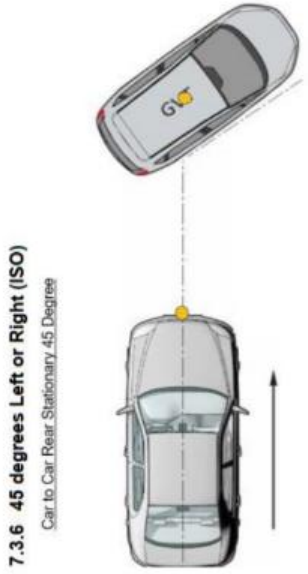


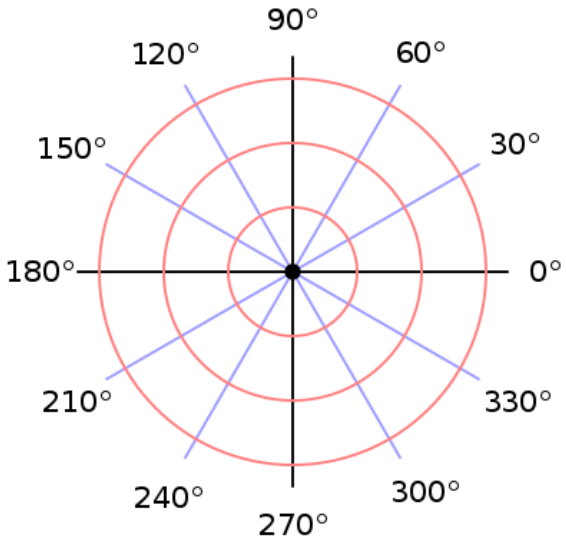
* e.g., @T_0

Robustness – Scenery Objects (Properties)

Heading

- ✓VUT: Initial heading always 90°
- ✓Other objects: Relative angle to the VUT





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Robustness – Other elements

- Pre-impact path / Driver input
  - No Steering Robot [NSR]
  - High beam [HB] / Low beam [LB]

- Adverse environmental conditions
  - Rain, fog, snow
  - Night, Glare

Separate part of the assessment – not to be reflected in the MME-header per se

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Next steps

- Crash Avoidance
  - Feedback on current proposal: Feasibility, missing points
- Future
  - Naming convention for future Occupant Monitoring test cases
  - Naming convention for specific Assisted Driving test cases
  - Naming convention for Speed Assistance Systems test cases
  - Overall data structure for On-road tests

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