ASEAN NCAP

NEW CAR ASSESSMENT PROGRAM
FOR SOUTHEAST ASIAN COUNTRIES

TECHNICAL BULLETIN

ASEAN MOTORCYCLE TARGET

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ASEAN Motorcycle Target

1. Background

Building on its success in the car safety domain, ASEAN NCAP recognized the need to focus on motorcyclist safety as well. With ASEAN NCAP AEB Car to Motorcyclist Test Protocol Version 1.0, an ASEAN Motorcycle Target (AMT) was introduced. It was created as part of ASEAN NCAP's broader effort to improve road safety for motorcyclists, who are particularly vulnerable to traffic accidents.

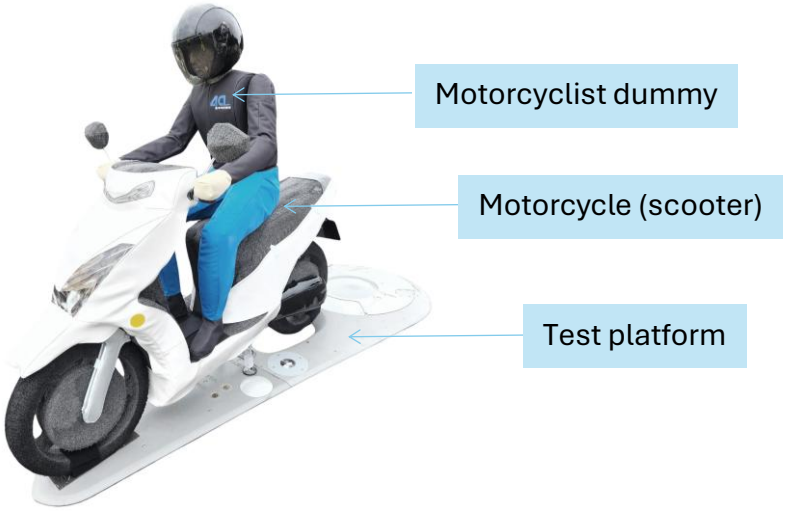
By developing the motorcyclist test dummy, ASEAN NCAP has been able to carry out more realistic and comprehensive motorcyclist safety assessments, which will ultimately aim to reduce road traffic injuries and fatalities, and enhanced protection for motorcyclists on the road.

2. ASEAN Motorcycle Target Components

The AMT is engineered to replicate a scooter with rider motion, capable of reaching 60 km/h in line within the speed requirement of the ASEAN NCAP AEB Car-to-Motorcyclist Test Protocol Version 1.0, as listed below:

- Car to Motorcycle Rear-end Moving – 30 km/h to 60 km/h
- Car to Motorcycle Front turn across path – 30 km/h to 60 km/h
- Car-to-Motorcyclist Crossing – 20 km/h
- Car-to-Motorcyclist Oncoming – 60 km/h

The resulting motion are designed to work with RADAR, video, laser, and near-IR-based systems automotive sensor technologies, as defined by ACEA Articulated Pedestrian Target Specifications. It is compatible across multiple vehicle platforms, offering flexibility and scalability to meet diverse testing requirements.



3. AMT Key Features

The AMT represents a realistic surrogate for motorcycle testing in active safety assessments. Its key features are designed to ensure high fidelity and applicability in actual testing environments, including:

a. Dimensional accuracy

i. The AMT is constructed to represent the typical size and shape of motorcycles commonly found across the ASEAN region, ensuring regional relevance and consistency in testing protocols.

ii. The target comprises 39 defined dimensions**,** encompassing both motorcycle and rider components and anthropometric references are incorporated for the rider model, covering critical body parts such as the head, chest, torso, legs, and feet.

No.	Measurement	Minimum	Maximum	Mean
1	Wheelbase	1230	1280	1255
2	Front Wheel Diameter	510	530	517
3	Front Wheel Inner Diameter	380	390	387
4	Rear Wheel Diameter	520	540	533
5	Rear Wheel inner Diameter	390	400	393
6	Ground Clearance	130	130	128
7	Wheel Ground Clearance	0	25	0
8	Total Height	1600	1660	1630
9	Seat Height	740	780	760
10	Front Height	1050	1090	1070
11	Rear Height	820	850	835
12	Number Plate Lower Edge	450	470	460
13	Rear Reflector Height	570	590	580
14	Front Reflector Height	660	690	672
15	Side Reflector Height	580	600	590
16	Pedal Height	310	320	315
17	Knee Width	550	570	560
18	Pedal Width	390	410	399
19	Shoulder Width	410	430	420
20	Total Width	660	690	675
21	Head Width (incl. Helmet)	250	260	250
22	Front Wheel Width	100	100	100
23	Rear Wheel Width	110	110	110
24	Number Plate Width	240	250	245
25	Number Plate Height	150	160	155
26	Chest Dimension	210	210	210
27	Upper Body Length	470	490	480
28	Upper Leg Length	390	410	400
29	Lower Leg Length	390	410	400
30	Foot Length	210	220	215

31	Back Radius	650	670	660
32	Steering fork angle	24	28	26
33	Upper body angle	10	20	15
34	Upper leg angle	10	20	15
35	Lower leg angle	0	10	5
36	Foot angle	0	10	5
37	Number plate angle	32	36	34
38	Upper leg front angle	40	50	45
39	Arm angle	24	28	26

b. Visibility

i. The visual characteristics of the AMT have been meticulously defined to ensure optimal detection and classification by automotive sensor systems.

ii. These properties encompass the appearance and finish of key components, with specific RGB colour ranges and surface finishes—to closely replicate real-world motorcycle and rider clothing materials and enhance visibility across camera, radar, and LiDAR detection platforms.

No	Segment	Colour	Red	Green	Blue	Appearance
1	Main Body	min	229	230	224	Glossy
		mean	239	240	234	
		max	249	250	244	
2	Black Top, Shoes	min	35	36	37	Matt
		mean	45	46	47	
		max	55	56	57	
3	Trousers	min	0	90	133	Matt
		mean	0	110	153	
		max	20	130	173	
4	Skin, Face, Hands	min	112	95	72	Matt
		mean	182	165	142	
		max	252	235	212	
5	Steering Fork	min	231	229	231	Glossy
		mean	241	239	241	
		max	251	249	251	
6	Helmet	min	5	5	5	Glossy
		mean	15	15	15	
		max	25	25	25	
7	Tires, Rubber Parts	min	35	34	36	Matt
		mean	45	44	46	
		max	55	54	56	
8	Number Plate					Retroreflecting
9	Side Mirrors Glass	min	55	55	55	Matt
		mean	65	65	65	
		max	75	75	75	

c. Reflectivity

i. Integrated with surface materials that simulate real-world radar signatures, enhancing compatibility with sensor-based detection systems.

ii. Infrared (IR) reflectivity within the 850–950 nm wavelength range is specifically characterized and defined for key components of the AMT, including main body, top section, shoes, trousers, skin, face, hands, steering fork, helmet, tires, rubber parts, number plate, and side mirror glass.

No	Segment	Reflectivity
1	Main Body	≥ 70
2	Black Top, Shoes	40 - 60
3	Trousers	40 - 60
4	Skin, Face, Hands	40 - 60
5	Steering Fork	10 - 40
6	Helmet	≤ 50
7	Tires, Rubber Parts	≤ 15
8	Number Plate	≥ 85
9	Side Mirrors Glass	≤ 30

d. Radar Cross Section

i. The Radar Cross Section (RCS) represents the detectability of an object by radar, quantifying the amount of radar signal reflected back to the sensor. In the AMT, the RCS is carefully engineered to replicate the reflective characteristics of an actual motorcycle and rider.

ii. This RCS measurement includes fixed range, variable viewing angle measurements (0º, 30º, 60 º, 70 º, 80 º, 90 º, 100 º, 110 º, 120 º, 150 º, 180 º) and variable range measurements (0 – 100 m) at specific fixed viewing angle of 0º, 30º, 60 º, 1120 º, 150 º, 180 º.

e. Micro Doppler Signature Integration

i. The AMT incorporates dynamic features such as rotating wheels and simulated engine vibrations, which generate micro-Doppler signatures representative of real motorcycles.

ii. These micro-Doppler characteristics are critical in enabling vehicle systems to effectively distinguish the AMT from other road users or static objects.

iii. The inclusion of consistent micro-Doppler patterns also improves target tracking stability, allowing radar systems to maintain continuous and accurate detection of the moving target throughout test scenarios.

f. Robustness and Test adaptability

i. The AMT is constructed using durable yet lightweight materials**,** to withstand repeated tests. It is engineered to demonstrate dynamic stability at all required test speeds specified under current active safety evaluation protocols.

ii. It is designed to be feasible for deployment in actual testing scenarios with considerations for mounting, alignment, and mobility in dynamic test environments.

iii. The AMT demonstrates a real-world motorcyclist motion during scenarios involving advanced driver assistance systems (ADAS) and collision avoidance assessments.

Dimensional accuracy | Visibility | Reflectivity | Robustness | Test adaptability | Radar cross section | Micro Doppler signature

4. AMT Manufacturer

Company(s) that has successfully established manufacturing capabilities for the AMT in alignment with the specified key performance features is listed as follows:

- 4activeSystems GmbH, Austria

This list is subject to revision, if further information becomes available.