Ministry of Transportation and Communications

Taiwan New Car Assessment Program (TNCAP)

Second Version

1.5 Film and Photo Protocol

V2.1
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1.5.1 General Film and Photo Requirements

1.5.1.1 Digital Data Format, Encoding and Sampling Requirements

All films shall be produced in HD format, apart from on-board camera footage. The films shall be sampled at a rate of a minimum of 500 frames per second. All files (including the inspection films and crash test data) shall be promptly sent to TNCAP executive agency after the tests.

1.5.1.1.1 Full-Scale Crash Test Films (ODB, FW, MDB and Pole Tests)

Three sets of films shall be supplied:

(1) Inspection Films

(A) Format: MP4 or AVI.

(B) Codec: H.264, Data/Bit rate: 2 Mbps.

(C) Resolution: Native camera resolutions.

(D) Frame rate: 30 fps.

(E) Must include burnt in timers.

(2) Media Films (For Publication)

(A) Format: Prores422, or Avid DNxHD-145 QuickTime, or MP4, or AVI as an alternative.

(B) Codecs : Apple Prores422 / Avid DNxHD-145 Quicktime* / H.264(Data/Bit rate: 2 Mbps).

(C) Resolution: Native camera resolutions.

(D) Frame rate (time base): 30 fps.

(E) Display mode: Progressive.

(F) YUV Format: 4:2:2.

(G) Color Depth: 10 bit.

(H) Films shall be supplied without “burnt in” timers, technical service logos or text.

* If a first conversion pass is necessary prior to convert to prores422/DNxHD: Please use a minimum 10-bit codec / format, or 16-bit image sequences to maintain quality.

(3) Real-Time Films (Supplementary Camera, For Publication)

Same specifications as for media films above. The time window for recording shall be set to record 10 seconds before the start of the car/trolley moving and 10 seconds of recording after the impact.

1.5.1.1.2 Pedestrian Impact and Whiplash Test Films

Two sets of films shall be supplied (1) inspection films and (2) media films, as specified in section 1.5.1.1.1. For the whiplash media film please only supply 1 view: publication wide view high severity pulse.

1.5.1.1.3 Track Test Films – AEB VRU、AEB City、AEB Inter-Urban、LSS、

SAS、OSM、BSD & BSV

To avoid errors the AEB & LSS film file name convention as detailed in Euro NCAP Technical Bulletin TB21 shall only be used.

Only the necessary recordings shall be made available: please remove bad takes and unusable video files. Only video/audio files shall be shared, no other files or directory structure from the shooting card (.SIF, .XML files, etc.). The time window for recording shall be set to [-5sec to +5sec]. Two sets of films shall be supplied:

(1) Inspection Films (to include all AEB、LSS、SAS、OSM、BSD & BSV test films – See detailed list in each relevant test section)
   (A) Format: MP4 or AVI.
   (B) Codec: H.264.
   (C) Data/Bit rate: 2 Mbps.
   (D) Resolution: Native camera resolutions.
   (E) Frame rate: 30 fps.

(2) Media Films (For Publication – See detailed list in each relevant test section)
   (A) Format: Prores422, or Avid DNxHD-145 QuickTime, or MP4, or AVI as an alternative.
   (B) Codecs : Apple Prores422 / Avid DNxHD-145 Quicktime* / H.264(Data/Bit rate: 2 Mbps).
   (C) Resolution: HD 1920x1080
   (D) Frame rate (time base): 30 fps.
   (E) Display mode: Interlaced or progressive (depending on cameras).
   (F) Color Depth: 10 bit.
   (G) Sound: Yes. (no background conversations shall be audible)
   (H) Films shall be supplied without “burnt in” timers, technical service logos or text.

   * If a first conversion pass is necessary prior to convert to prores422/DNxHD: Please use a minimum 10-bit codec / format, or 16-bit image sequences to maintain quality.

   Alternatively, the following is also acceptable:

   Reduced duration versions of the original camera files via QuickTime 7 Pro / FFMpeg / Any other tools capable of extracting the original video signal with no encoding process.

1.5.1.2 Vehicle Markings

1.5.1.2.1 TNCAP markings

TNCAP markings will be attached to the exterior of the vehicle in a contrasting color (black or white) to the test vehicle such that it is clearly visible in the high

speed films. Only standardized TNCAP markings are allowed as supplied by the TNCAP executive agency (dimensions 600 x 300 mm).

Pedestrian and Whiplash markings shall be located on a rigid background and not in the foreground. And so as not to interfere with the camera、test equipment and test vehicle. TNCAP logo and test numbers on a simple sheet of paper placed on barriers, trolleys or walls are not acceptable for publication.

Examples showing correct (left) and incorrect (right) test number location, logo display material, background location

TNCAP logo shall be attached to the exterior of the vehicle in accordance with Figure 1. And the unique TNCAP test reference number shall be placed below the TNCAP logo.

Figure 1: Standardized labels on L/R side, the bonnet and roof area of the test vehicle

1.5.1.2.2 Test house logos

(1) Test house logos may be added to the vehicle on the lower half of the rear doors/rear ¼ panel only for full scale tests and active safety tests. No markings to be placed on the vehicle for pedestrian sub system tests.

(2) Test house logos shall not to be placed on the roof area, on the bonnet or anywhere else on the tested vehicle.

(3) The size of test house logos shall not exceed that of the TNCAP official logo and shall not be more prominent in the camera views than the TNCAP official logo.

1.5.1.2.3 Test numbers

1.5.1.2.3.1 The TNCAP executive agency shall inform the technical service of the unique TNCAP test number prior to the test and this shall be used as the main test reference number. This number shall also appear on all test data and documents. The test number shall be

placed in close proximity to each TNCAP logo, preferably underneath – if placed underneath leave a space between the logo and the test number.

1.5.1.2.3.2 Reference numbers are provided by TNCAP to each technical service. Please use a vinyl plotter/cutting plotter to produce the test reference number in vinyl of the font type (Etelka Text Pro) and font size (180). Please cut out the numbers so that the full number appears on a single line. The sequence of characters of reference number shall always follow the same convention, as shown in this example:

"T23-NIS-123-OD1",

where "T23" is the year of test, "NIS" refers to the car brand, "123" is TNCAP unique key number and "OD1" is the code for the type of (re-)test. Figure 2 below illustrates examples of good and bad reference number size and spacing.

Additional internal test house numbers shall be kept as small as possible (never be larger in size than the official reference number) and always be placed below the test house logo (see section 1.5.1.2.2).

correct

incorrect

Figure 2: Examples showing correct (left) and incorrect (right) font size and reference number spacing and material

<Image source：Euro NCAP Film & Photo Protocol>

1.5.1.3 Camera Locations

1.5.1.3.1 In this document, high speed camera layout diagrams are provided for each full scale, sled or track test as a guide to show what part of the vehicle and the surroundings shall be in view for each particular camera at T0. Also an example frame from each camera is provided.

1.5.1.3.2 When attaching on-board cameras, the vehicle manufacturer shall be consulted to ensure that no damage is caused to the vehicle that would influence the impact performance. Additionally, the technical service shall be informed if the side curtain airbags are expected to deploy during the impact. Where additional equipment is added, the mass shall be compensated when achieving the final test weight. On-board lighting shall be used for ALL onboard camera views. The mounting for the camera shall ensure that a stable view is obtained throughout the impact without the camera oscillating due to a thin roof panel for example.

1.5.1.3.3 No personnel shall be visible in ANY of the high speed camera views. Sufficient lighting shall be provided so as the vehicle and occupants are clearly visible throughout the impact. Also where a camera is recording sound during a test personnel shall refrain from talking, as these films are used with audio on the TNCAP website.

1.5.1.3.4 Back-up cameras are not required and it is up to the technical service to decide if they are necessary.

1.5.1.4 Still Photographs

1.5.1.4.1 Pre-test photographs will be taken with the dummies in their final positions. A list of the required photos pre-, on- and post-test is provided in each relevant test section.

1.5.1.4.2 If necessary, tall blank screens shall be placed behind the vehicle to get a “clean” photo to avoid other test equipment or personnel appearing in the photos.

No personnel shall be visible in ANY of the pre and post-test still photographs.

1.5.1.4.3 Stills shall have the following specifications:

(1) Format: JPEG.

(2) Resolution: The media version is set to maximum resolution that the camera allows. While the inspection version is compressed to 1920 x 1080.

(3) File size: No compression or as little compression as possible (Superfine)

(4) The original still shall not be edited

1.5.1.4.4 Photos shall be arranged in PRE and POST folders, technical service shall not separate photos into component folders such as driver, passenger, CRS, vehicle etc. Photos are numbered according to the number in the photo list. If the list mentions “media” or “after removing the dummy”, it must be marked after the number.

1.5.1.4.5 The inspection quality photos shall be supplied with the crash test data. The media quality photos shall be provided to the Secretariat along with

the media quality films.

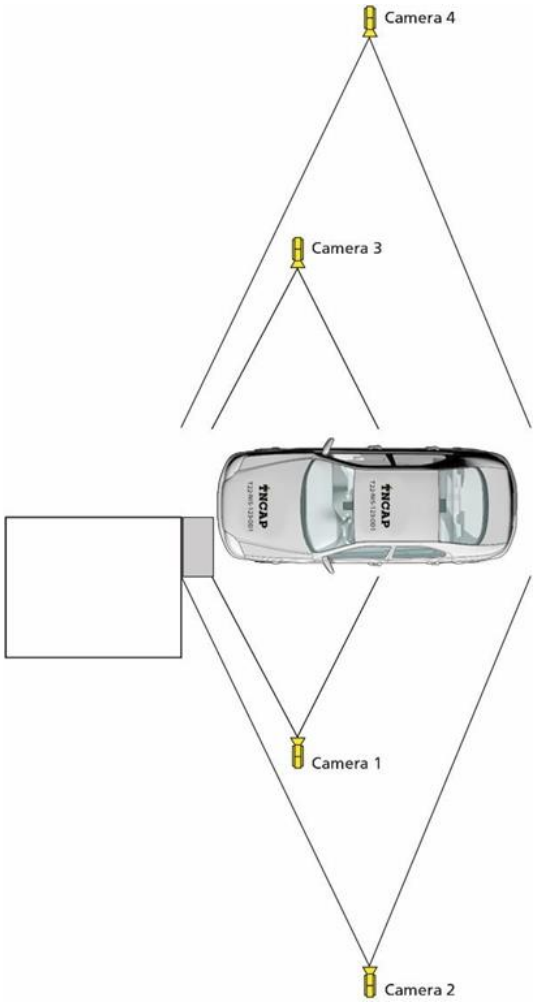
1.5.2 Frontal Offset Deformable Barrier Impact

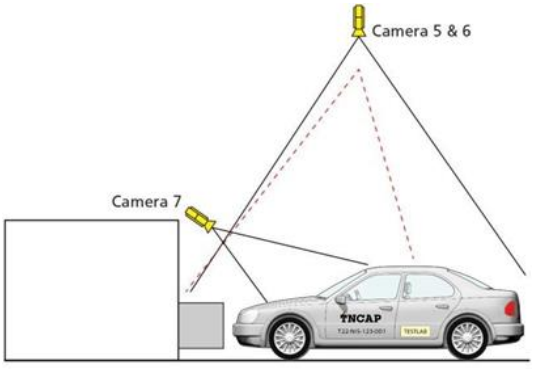
1.5.2.1 Vehicle Marking Locations

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.2.2 Camera Locations and Views

A minimum of 7 cameras shall be installed around the test vehicle, positioned as indicated in Figure 3 below. Three (3) additional on-board cameras for child and driver dummy views are to be used. A separate camera (not listed) must record the crash in real time.





Camera views:

1. Driver (tight)
2. Driver (full) publication
3. Passenger (tight)
4. Passenger (wide)
5. Plan (full)
6. Plan (tight)
7. Front (full)
8. Q6 (on-board, not shown)
9. Q10 (on-board, not shown)
10. View of both child dummies (on-board not shown)
11. Real time video(not shown)

Figure 3: Locations for Cameras 1 to 7 (Frontal Offset Deformable Barrier)

Table 1: List of camera views (Frontal Offset Deformable Barrier)

	Camera:	1
	Filename:	1_Driver_tight
	Description:	The rear of barrier to the b-pillar @ T0
	Camera:	2
	Filename:	2_Driver_full_publication
	Description:	Rear edge of the barrier and the whole vehicle @ T0
	Camera:	3
	Filename:	3_Passenger_tight
	Description:	Just rear of the B-Pillar to the rear edge of the barrier mount @ T0
	Camera:	4
	Filename:	4_Passenger_wide
	Description:	Rear edge of the barrier and the whole vehicle @ T0

	Camera:	5
	Filename:	5_Plan_full
	Description:	Rear of the vehicle to the rear edge of barrier. Allow room on passenger side for rotation of vehicle @ T0
	Camera:	6
	Filename:	6_Plan_tight
	Description:	From b-pillar to the rear edge of barrier @ T0
	Camera:	7
	Filename:	7_Front_full
	Description:	Front edge of the roof to rear edge of the barrier @ T0
	Camera:	8 (on-board)
	Filename:	8_Q6_onboard
	Description:	Centred on 550mm head excursion line to include steering wheel. On-board lighting shall be used @ T0.

	Camera:	9 (on-board)
	Filename:	9_Q10_onboard
	Description:	Camera shall be centred on 450mm head excursion line. On-board lighting shall be used @ T0.
	Camera:	10 (on-board)
	Filename:	10_both_Q_dummies
	Description:	Front view of both Q dummies @ T0.
	Camera:	11 (supplementary)
	Filename:	Realtime_publication
	Description:	Camera shall be mounted just above barrier, looking towards the vehicle @ T0. Check for unwanted objects or persons in view. Record sound.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.2.3 Still Photographs

Table 2: List of photos (Frontal Offset Deformable Barrier)

No.	Pre	Post	Media	View
1	•	•		Front view of barrier and trolley.
2	•	•		Side view of barrier and trolley.
3	•	•		Side view of barrier and trolley at 45 degrees to front.
4		•	•	Wide view of car and barrier/trolley from LHS, showing crash lighting (for publication).
5	•	•	•	Car LHS, with camera centred on junction of B-post waist, showing full car (for publication).

No.	Pre	Post	Media	View
6	•	•	•	Car LHS, with camera centred on B-post waist, showing rear passenger compartment (for publication).
7	•	•	•	Car LHS, with camera aimed at waist height, showing driver's compartment (for publication).
8	•	•	•	Car LHS at 45 degrees to front (for publication).
9	•	•	•	Front view of car (for publication).
10	•	•	•	Car RHS at 45 degrees to front (for publication).
11	•	•	•	Car RHS, with camera aimed at waist height, showing front passenger's compartment (for publication).
12	•	•	•	Car RHS, with camera centred on B-post waist, showing rear passenger compartment (for publication).
13	•	•	•	Car RHS, with camera centred on B-post waist, showing full car (for publication).
14	•	•		Driver and seat to show driver compartment and position of seat relative to the sill.
15	•	•		To show area immediately in front of driver.
16	•	•		To show driver's footwell area and location of dummy's feet and pedals.
17	•	•		Passenger and seat to show compartment and position of seat relative to sill.
18	•	•		To show area immediately in front of passenger.
19	•	•		To show passenger footwell area and dummy's feet.
20	•	•		To show both child dummies and restraints through LHS rear door.
21	•	•		To show both child dummies and restraints through RHS rear door
22		•		Overall view of where the car has come to rest after impact (including barrier and trolley).
23		•		To show position of all door latches and/or open doors.
24		•		To show driver knee contacts with fascia (airbag shall be lifted if obscuring view)
25		•		To show passenger knee contacts with fascia (airbag shall be lifted if obscuring view).
26	•			LHS rear seat belt anchorage with child restraint and dummy in place.
27	•			RHS rear seat belt anchorage with child restraint and dummy in place.

No.	Pre	Post	Media	View
28		•		Q6 dummy and restraint through RHS rear door.
29		•		Q10 dummy and restraint through LHS rear door.

After Dummy Removal:

No.	Pre	Post	View
30		•	Passenger compartment from rear window.
31		•	RHS interior from LHS of car.
32		•	LHS interior from RHS of car.
33		•	RHS front door area.
34		•	LHS front door area.
35		•	Fascia.
36		•	Passenger footwell.
37		•	Driver footwell.
38		•	Steering wheel taken perpendicular to driver's side.
39		•	Driver right knee impact point.
40		•	Driver left knee impact point.
41		•	Passenger knee impact area.

1.5.2.4 Screen Captures / On Test Stills:

In addition to the pre- and post-test stills, a set of pictures captured during the crash (driver's view full) need to be provided, as follows: (1) the car deep into the barrier, (2) the airbag in deployment, (3) airbag fully deployed and (4) head of the dummy reaching the full extent of forward motion.

The list of photos is intended to be used as a guide and if the technical service photographer finds some other interesting or unusual test occurrences these shall also be photographed.

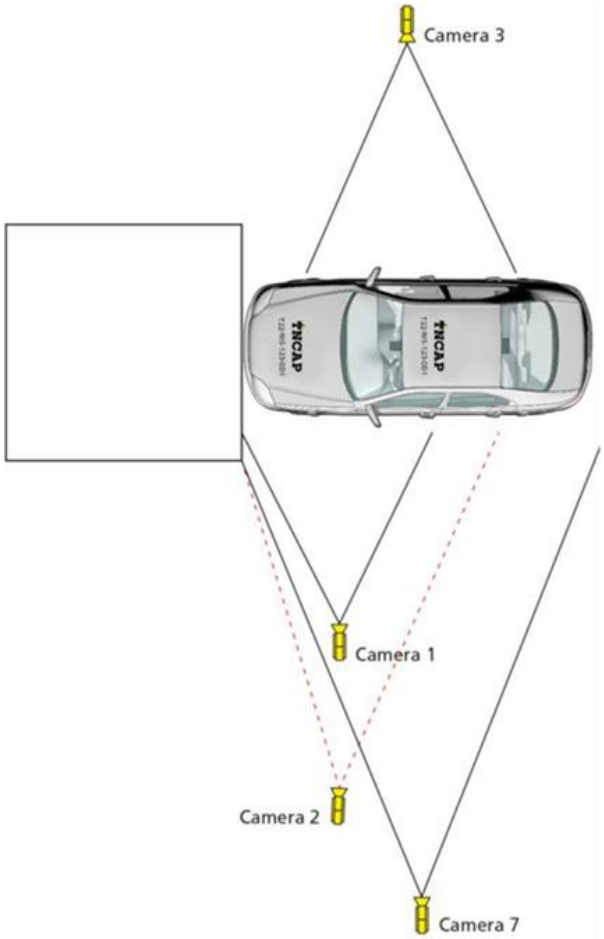
1.5.3 Frontal Full Width Rigid Barrier Impact

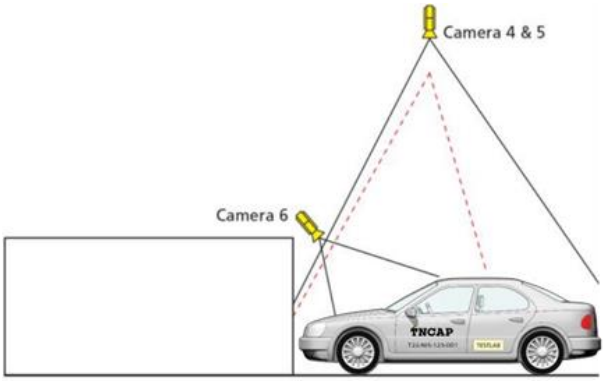
1.5.3.1 Vehicle Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.3.2 Camera Locations and Views

A total of 7 cameras views are required as indicated in Figure 4 below. In addition, two (2) onboard camera views are specified, for driver and rear passenger respectively and one realtime camera located on the block.





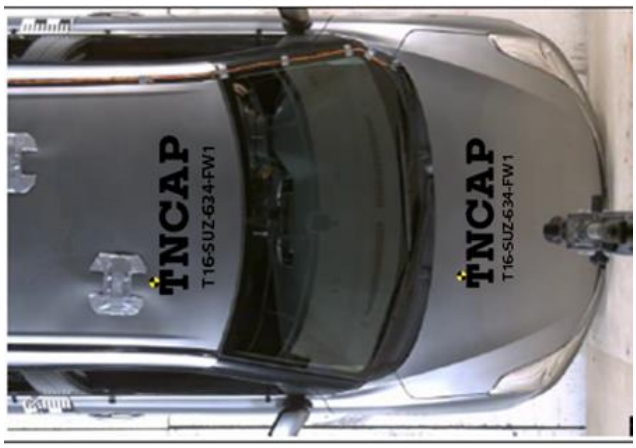
Camera views:

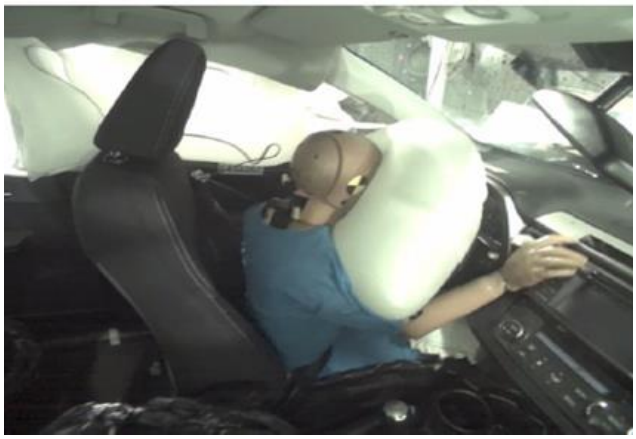
1. Driver (tight)
2. Driver (wide)
3. Rear passenger (wide)
4. Plan (full)
5. Plan (tight)
6. Front (driver)
7. Driver (wide) publication
8. Driver dummy (on-board, not shown)
9. Rear dummy (on-board, not shown)
10. Real time video (not shown)

Figure 4: Locations for Cameras 1 to 7 (Frontal Full Width Rigid Barrier)

Table 3: List of camera views (Frontal Full Width Rigid Barrier)

	Camera:	1
	Filename:	1_Driver_tight
	Description:	The rear of driver dummy head to block @ T0
	Camera:	2
	Filename:	2_Driver_wide
	Description:	Front and rear occupants in view @ T0
	Camera:	3
	Filename:	3_Rear_passenger_wide
	Description:	Just rear of the passenger head to centre of front wheel @ T0
	Camera:	4
	Filename:	4_Plan_full
	Description:	Rear of the vehicle to the block. The entire vehicle shall be in view @ T0

	Camera:	5
	Filename:	5_Plan_tight
	Description:	B-pillar to the block @ T0
	Camera:	6
	Filename:	6_Front_driver
	Description:	Front edge of the roof to base of windscreen/edge of bonnet @ T0
	Camera:	7
	Filename:	7_Driver_wide_publication
	Description:	Rear of vehicle to block. The entire vehicle shall be in view @ T0
	Camera:	8 (on-board)
	Filename:	8_Driver_onboard
	Description:	Required view @ T0: Camera centred on driver head CoG. Driver seat, belt buckle and majority of driver dummy shall be in view. Required view @ max forward movement: Driver

		seat, belt buckle and majority of driver dummy shall be in view. Care shall be taken to secure or route dummy cables so they do not obscure view of dummy during impact.
 	Camera: Filename: Description:	9 (on-board) 9_Rear_dummy_onboard Required view @ T0: Camera shall be centred on excursion line with dummy head, both femurs and belt buckle in view. Required view @ max head excursion: dummy head & arms
	Camera: Filename: Description:	10 Realtime_publication Camera mounted on block. Check for unwanted objects or persons in view, record sound.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.3.3 Still Photographs

Table 4: List of photos (Frontal Full Width Rigid Barrier)

No.	Pre	Post	Media	View
1	•	•		Front view of block.
2	•	•		Side view of block.
3	•	•		Side view of block at 45 degrees to front.
4	•	•	•	Side view of block with vehicle (for publication).
5		•	•	Wide view of car and block LHS, showing crash lighting (for publication).
6	•	•	•	Car LHS, with camera centred on junction of B-post waist, showing full car (for publication).
7		•		Car LHS, with camera centred on B-post waist, showing rear passenger compartment.
8	•	•	•	Car LHS, with camera aimed at waist height, showing driver's compartment (for publication).
9	•	•	•	Car LHS at 45 degrees to front (for publication).
10	•	•	•	Front view of car (for publication).
11	•	•	•	Car RHS at 45 degrees to front (for publication).
12	•	•	•	Car RHS, with camera aimed at waist height, showing front passenger's compartment (for publication).
13	•	•	•	Car RHS, with camera centred on B-post waist, showing rear passenger compartment (for publication).
14	•	•	•	Car RHS, with camera centred on B-post waist, showing full car (for publication).
15	•	•		Driver and seat to show driver compartment and position of seat relative to the sill.
16	•	•		To show area immediately in front of driver.
17	•	•		To show driver's foot well area and location of dummy's feet and pedals.
18	•	•		Rear passenger and seat to show compartment.
19	•	•		To show passenger foot well area and dummy's feet.
20	•	•		To show rear passenger through LHS rear door.
21	•	•		To show rear passenger through RHS rear door.
22		•		Overall view of where the car has come to rest after impact (including block).
23		•		To show position of all door latches and/or open doors.
24		•		To show driver knee contacts with fascia (airbag shall be lifted if obscuring view).

After Dummy Removal:

No.	Pre	Post	View
25		•	Passenger compartment from rear window.
26		•	RHS interior from LHS of car.
27		•	LHS interior from RHS of car.
28		•	RHS front door area.
29		•	LHS front door area.
30		•	Fascia.
31		•	Steering wheel taken perpendicular to driver's side.
32		•	Driver right knee impact point.
33		•	Driver left knee impact point.
34		•	Rear Passenger knee impact area on rear of front seat.

1.5.3.4 Screen Captures / On Test Stills:

In addition to the pre- and post-test stills, a set of pictures captured during the crash (driver's view full) need to be provided, as follows: (1) the car well into the barrier, (2) the airbag in deployment, (3) airbag fully deployed and (4) head of the dummy reaching the full extent of forward motion.

The list of photos is intended to be used as a guide and if the technical service photographer finds some other interesting or unusual test occurrences these shall also be photographed.

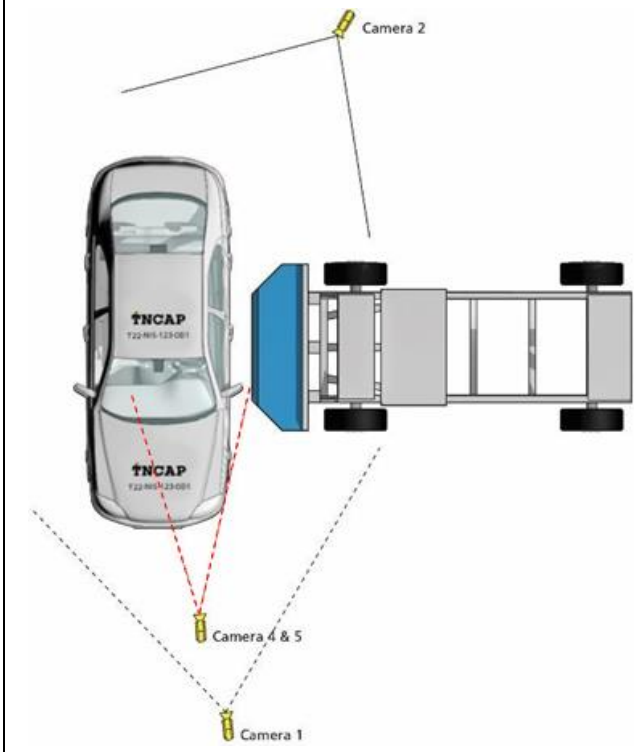
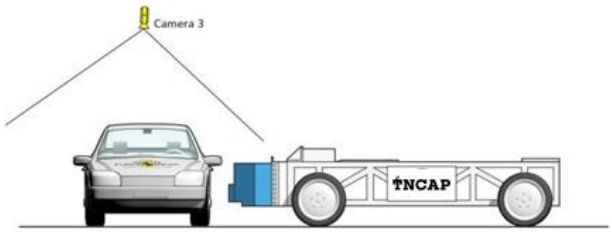
1.5.4 Side Moving Deformable Barrier Impact

1.5.4.1 Vehicle and Barrier Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1. The unique TNCAP test reference number shall be placed below each TNCAP logo. TNCAP markings shall also be stuck to the front of the trolley on both sides. Test house logos may be added to the trolley provided that they do not detract attention from the TNCAP markings.

1.5.4.2 Camera Locations and Views

A minimum of 5 cameras shall be installed around the test vehicle, positioned as indicated in Figure 5 below. Two (2) additional on-board cameras to assess child dummy head containment are to be used and also one real time camera.

<table>
<tr>
<td> 
</td>
<td> 

Camera views:
1. Front (wide) publication
2. Rear angled (wide)
3. Plan (full)
4.Front driver (body)
5. Front driver (head)
6. Q6 (on-board, not shown)
7. Q10 (on-board, not shown)
8. Real time video (not shown)</td>
</tr>
</table>

Figure 5: Locations for Cameras 1 to 5 (Side Moving Deformable Barrier)

Table 5: List of camera views (Side Moving Deformable Barrier)

<table>
<tr><td rowspan="3">  </td><td>Camera:</td><td>1</td></tr>
<tr><td>Filename:</td><td>1_Front_wide_publication</td></tr>
<tr><td>Description:</td><td>Trolley logo to 1 car width beyond non-struck side of vehicle @ T0</td></tr>
<tr><td rowspan="3">  </td><td>Camera:</td><td>2</td></tr>
<tr><td>Filename:</td><td>2_Rear_angled_wide</td></tr>
<tr><td>Description:</td><td>Angled view to catch any door opening on struck side</td></tr>
</table>

	Camera:	3
	Filename:	3_Plan_full
	Description:	Front of trolley to one car width beyond non-struck side of vehicle. The entire vehicle shall be in view @ T0.
	Camera:	4
	Filename:	4_driver_body
	Description:	Edge of driver's door to at least the outboard edge of front passenger seat. The driver's thorax and abdomen shall be visible @ T0

	Camera:	5
	Filename:	5_driver_head
	Description:	Edge of driver's door to at least the outboard edge of front passenger seat. The driver's head shall be visible @ T0
	Camera:	6 (on-board) Q6
	Filename:	6_Q6_onboard
	Description:	Required view @ T0: Passenger head restraint may be removed if possible. The wings of CRS shall be visible, possibly by marking with white tape.
	Camera:	7 (on-board) Q10
	Filename:	7_Q10_onboard

	Description:	Required view @ T0: Camera can only be placed slightly rotated as the driver head rest will usually prevent lining the camera up with Q10 dummy centreline.
	Camera:	8
	Filename:	8_Rear_angle_realtime
	Description:	Angled view to catch any door opening on struck side.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.4.3 Still Photographs

Table 6: List of photos (Side Moving Deformable Barrier)

No.	Pre	Post	Media	View
1	•	•		Front view of barrier.
2	•	•		Side view of barrier.
3	•	•		Side view of barrier at 45 degrees to front.
4	•	•	•	Side view of barrier with vehicle, from front of vehicle (for publication).
5		•	•	Side view of barrier with vehicle, from rear of vehicle (for publication).
6		•	•	Wide view of entire trolley and entire vehicle showing struck side, from front of vehicle (for publication).
7		•	•	Wide view of entire trolley and entire vehicle showing struck side, from rear of vehicle (for publication).
8	•	•	•	Car LHS, with camera centred on B-post waist, showing full car (for publication).
9	•	•		Car LHS, with camera centred on B-post waist, showing the rear passenger compartment.
10	•	•		Car LHS, with camera aimed at waist height, showing driver's compartment.

No.	Pre	Post	Media	View
11	•	•	•	Car LHS at 45 degrees to rear (for publication).
12	•	•	•	Car LHS at 45 degrees to front (for publication).
13	•	•	•	Front view of car (for publication).
14	•	•	•	Car RHS, with camera centred on B-post waist, showing full car (for publication).
15	•	•		Car RHS, with camera centred on B-post waist, showing the rear passenger compartment.
16		•		To show position of all door latches and/or open doors.
17	•	•		Driver & seat through open driver's door to show driver compartment and position of seat relative to the sill.
18	•	•		To show area immediately in front of driver.
19	•	•		To show child dummies and restraints through LHS rear door.
20	•	•		To show child dummies and restraints through RHS rear door.
21		•		Car and barrier at rest at 45 degrees to front of car.
22		•		Car and barrier at rest at 45 degrees to rear of car.

After Dummy Removal:

No.	Pre	Post	View
23		•	View through RHS front passenger door of driver's door interior panel & paint marks from dummy ribs.

1.5.4.4 Screen Captures / On Test Stills:

In addition to the pre- and post-test stills, a set of pictures captured during the crash (front wide view) need to be provided, as follows: (1) barrier well into the car, (2) the airbag in deployment, (3) airbag fully deployed and (4) dummy's head in airbag. The list of photos is intended to be used as a guide and if the technical service photographer finds some other interesting or unusual test occurrences these shall also be photographed.

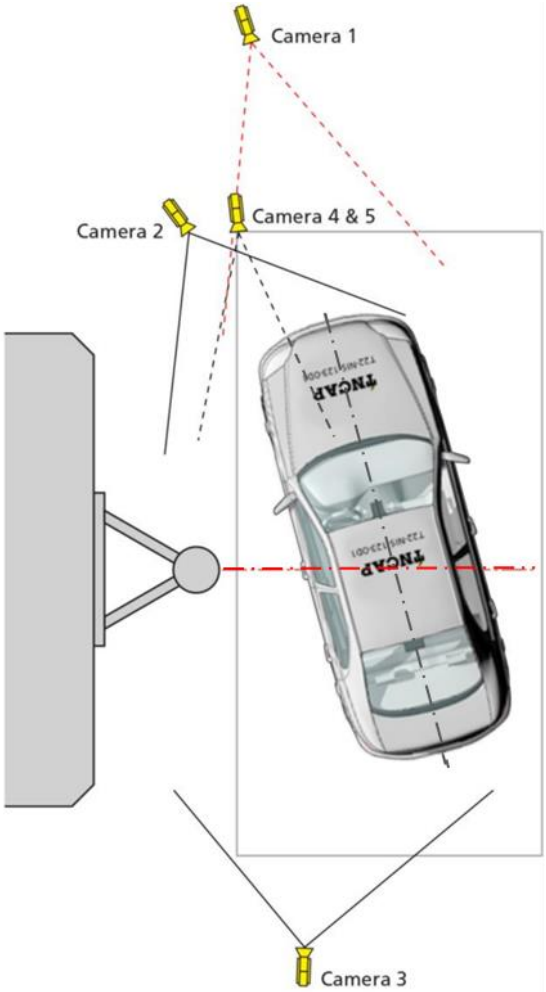
1.5.5 Side Oblique Pole Impact

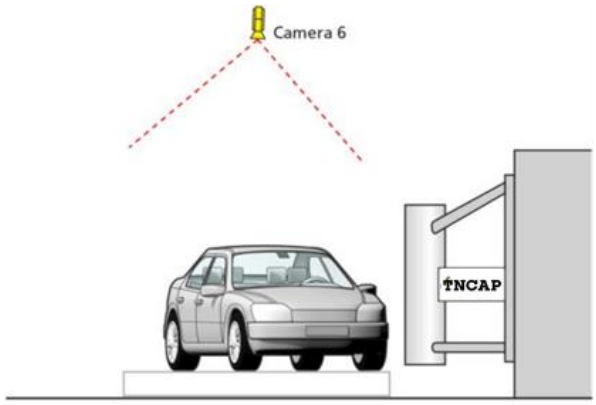
1.5.5.1 Vehicle and Pole Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1. The unique TNCAP test reference number shall be placed below each TNCAP logo. No markings, targets excluded, are allowed on the pole itself. This includes test house logos.

1.5.5.2 Camera Locations and Views

A minimum of 6 cameras shall be installed around the test vehicle, positioned as indicated in Figure 6 below. No on-board cameras are required.





Camera views:

1. Front (wide) publication
2. Front, 45° (wide)
3. Rear (full)
4. Driver head (tight)
5. Driver rib/abdomen (tight)
6. Plan (full)
7. Real time front (not shown)

Figure 6: Locations for Cameras 1 to 6 (Side Oblique Pole)

Table 7: List of camera views (Side Oblique Pole)

	Camera:	1
	Filename:	1_Front_wide_publication
	Description:	Camera aligned with vehicle centreline @ T0. Rear of pole to 1m beyond non-struck side of vehicle
	Camera:	2
	Filename:	2_Front_45_wide
	Description:	Camera positioned at 45° to vehicle centreline @ T0. Rear of pole to 1m beyond non-struck side of vehicle
	Camera:	3
	Filename:	3_Rear_full
	Description:	Rearward of pole to 1m beyond non-struck side of vehicle. The entire vehicle shall be in view @ T0 and the camera shall be positioned to be perpendicular to direction of moving floor.
	Camera:	4
	Filename:	4_Driver_head_tight
	Description:	Pole to the passenger side of the vehicle @ T0. Camera shall be positioned to be perpendicular to direction of moving floor.

	Camera:	5
	Filename:	5_Driver_body
	Description:	Passenger side of vehicle to the pole. The driver's thorax and abdomen shall be visible @ T0
	Camera:	6
	Filename:	6_Plan_full
	Description:	Entire vehicle shall be in view @ T0
	Camera:	7
	Filename:	7_Front_realtime
	Description:	Real time view using same view as high speed camera view 2.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.5.3 Still Photographs

Table 8: List of photos (Side Oblique Pole)

No.	Pre	Post	Media	View
Car on carrier against pole:				
1	•	•	•	Top view of full car, carrier and pole (for publication).
2	•	•	•	Front view of full car, carrier and pole (for publication).
3	•	•		Rear view of full car, carrier and pole.
4	•	•	•	Side view of car, carrier and pole at 45 ° to front, impact side (for publication).
5	•	•	•	Side view of car, carrier and pole at 45 ° to rear, impact side (for publication).

No.	Pre	Post	Media	View
6		•	•	Wide view of pole and entire vehicle, from front of vehicle (for publication).
7		•	•	Wide view of pole and entire vehicle, from rear of vehicle (for publication).
Car and carrier away from pole:				
8	•	•	•	Side view car/carrier impact side, showing full car (for publication).
9	•	•		Side view car/carrier non-impact side, showing full car.
10		•		To show position of all door latches and/or open doors.
11	•			Side view through open driver's door on driver & seat to show driver compartment and position of seat relative to the sill.
12	•			Detail view on driver's legs and feet through open door.
13	•	•		Side view through open front passenger door to show driver.
14	•	•		Side view of car/carrier impact side centred on impact line showing front door and B-post.
15	•			Front/side view of pole.
16		•		Front view of dummy through front windscreen.
17	•	•		Inside car view on abdomen/pelvis area.

After Dummy Removal:

No.	Pre	Post	View
18		•	Detail view(s) on paint marks on the driver's door and seat

1.5.5.4 Screen Captures / On Test Stills:

In addition to the pre- and post-test stills, a set of pictures captured during the crash (front wide or front 45° wide) need to be provided, as follows: (1) showing car well into pole, (2) the airbag in deployment, (3) airbag fully deployed and (4) dummy's head in airbag.

The list of photos is intended to be used as a guide and if the technical service photographer finds some other interesting or unusual test occurrences these shall also be photographed.

1.5.6 Whiplash Tests

1.5.6.1 Sled, Seat and Dummy Markings

In order to monitor the seat and the dummy film targets shall be applied to seat, sled and dummy. Targets shall be securely affixed to areas of the seat which will not be deformed by the dummy during the test. The required target definitions are illustrated in Figure 7a is given along with their reference points in Table 9. A plain

light colored, even surface and non-reflective screen or wall shall be placed behind the sled with the TNCAP logo and the official test reference number below clearly in view.

In order to track the trajectories of the dummy and seat with reference to the sled the dimensions in Table 10, Figure 7b shall be recorded. All measurements shall be measured from the camera film plane to the reference targets and recorded in mm.

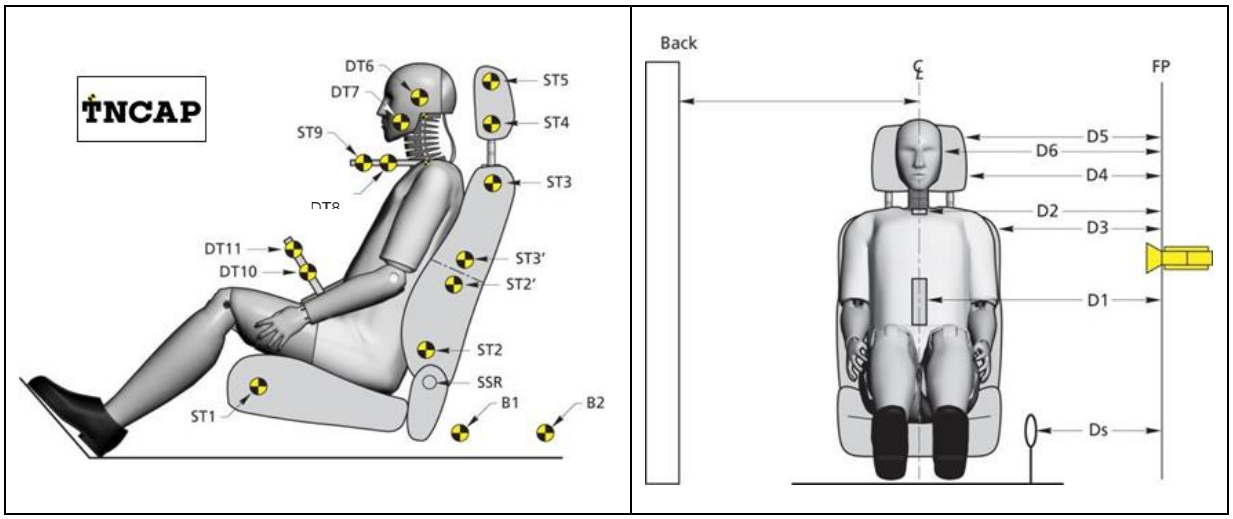


Figure 7: (a) Video motion targets and TNCAP label placement, left; (b) Video tracking measurements, right

Table 9: Video motion target placement description (Whiplash)

Designation	**Description**
B1	Sled base #1
B2	Sled base #2
DT6	Head CoG
DT7	Cheek
DT8	T1 bracket proximal
DT9	T1 bracket distal
DT10	Pelvis bracket proximal
DT11	Pelvis bracket distal
ST1	Seat base forward
ST2	Seat back lower
ST2’	Seat back mid #1 *
ST3	Seat back upper
ST3’	Seat back mid #2 *
ST4	Lower head restraint
ST5	Upper head restraint

SRR	Seat recliner centre

* These target locations are required only for 2 part hinged seatbacks.

Table 10: Video tracking measurement description (Whiplash)

Designation	**Measure**	**Reference**
DS	Sled reference to focal plane	Sled – FP
D1	Pelvis to focal plane	DT11 – FP
D2	T1 bracket to focal plane	DT9 – FP
D3	Seatback upper to focal plane	ST3 – FP
D4	Head restraint lower to focal plane	ST4 – FP
D5	Head restraint upper to focal plane	ST5 – FP
D6	Head CoG to focal plane	DT6 - FP

1.5.6.2 Camera Locations and Views

Two cameras are required (with acceleration sled system):

(1) Camera 1: The camera shall record a view of the entire test and the seat on the sled. The view shall be such that 300ms of the test are in complete view from T0.

(2) Camera 2: The camera shall frame the head and neck of the dummy, and track the entire movement of the dummy during the test. The view shall be such that 300ms of the test are in complete view from T0.

Care shall be taken to ensure that camera placement is perpendicular to the direction of sled travel. Camera measurements shall be taken to the film plane of the camera, from both the fixed targets and the head Centre of Gravity target. For off board camera views, compensation must be included in the film analysis to take account of parallax effects due to sled motion relative to the cameras.

Table 11: List of camera views (Whiplash)

	Camera:	1
	Filename:	1_Whiplash_wide_publication
	Description:	Wide view showing all of seat and dummy including seat mounting & toeboard area.
	Camera:	2
	Filename:	2_Whiplash_tight

	Description:	Verify whether TNCAP logo and test reference number are in view.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.6.3 Still Photographs

The following photographs will be taken pre and post-test unless otherwise indicated. Pre-test photographs will be taken with the dummy in the final position.

Table 12: List of photos (Whiplash)

No.	Pre	Post	View
1	•	•	Seat structure reference point
2	•	•	Seat track markings (both sides)
3	•	•	Close view of Head restraint test position (identifiable point and any visible notches)
4	•	•	Dummy and seat at 45 degrees to rear
5	•	•	Side view of dummy and seat
6	•	•	Dummy and seat at 45 degrees to front
7	•	•	Front view of dummy and seat
8	•	•	Front view of dummy showing top of head down to knees
9	•	•	Dummy head down to thorax and seat at 45 degrees to rear
10	•	•	Dummy head down to thorax and seat at 20 degrees to rear
11	•	•	Side view of dummy head down to thorax
12	•	•	Dummy head down to thorax and seat at 45 degrees to front
13	•	•	Dummy head down to thorax and seat at 20 degrees to front
14	•	•	Side view of dummy showing thorax down to feet, camera centred on seat base
15	•	•	Tight side view of dummy showing thorax down to feet, camera centred on seat base
16	•	•	Side view of dummy and seat (portrait) showing seat back to knees
17	•	•	Tight side view of dummy and seat (portrait) showing seat back to pelvis
18		•	Any damage to seat (multiple aspects required)
19		•	Any damage to dummy (multiple aspects required)

No.	Pre	Post	View
20		•	Seat variant and trim condition (multiple aspects required)
21		•	Seat adjustment controls (multiple aspects required)

1.5.6.4 Screen Captures / On Test Stills:

In addition to the pre- and post-test stills, a picture captured during travel needs to be provided, as follows: (1) high severity pulse - maximum seat deflection.

1.5.7 Pedestrian Subsystem Tests

1.5.7.1 Vehicle and Other Markings

To hide any background test equipment or personnel, a plain light colored, non-reflective screen shall be placed near (behind) the vehicle test area with the TNCAP logo and official test reference number clearly visible in view. Test house logos and/or test number may be shown provided that they do not detract attention from the TNCAP markings (see section 1.5.1.2.2). There shall be no markings on the vehicle, including test house logos.

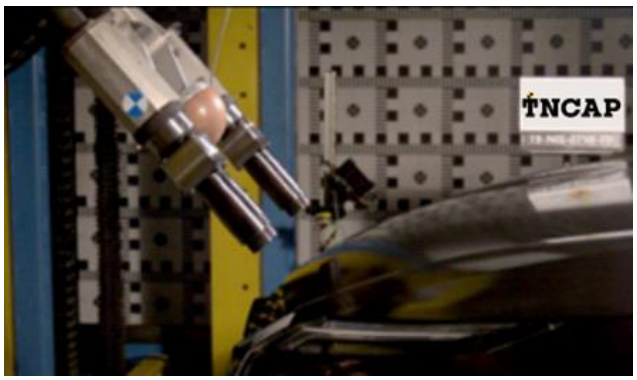
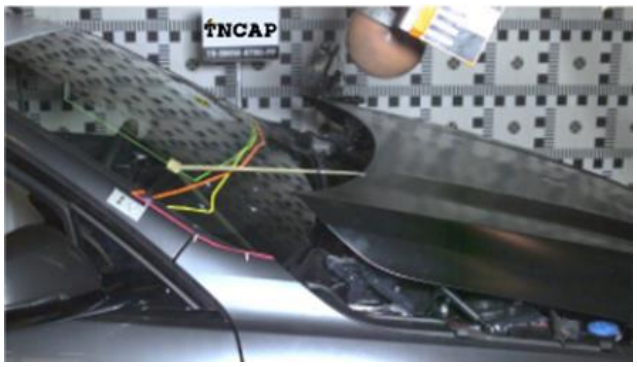
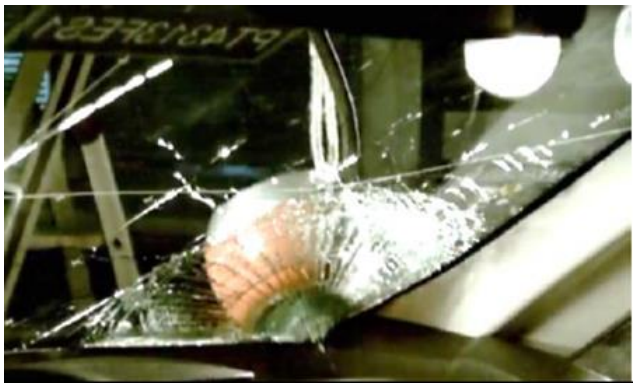
1.5.7.2 Camera Locations and Views

A single camera is required to record the impact events. The camera orientation shall be aligned perpendicular to the vehicle centreline and adjusted in height in accordance with the type of test. TNCAP requires at least one HD quality high speed film recording per pedestrian impactor type for each vehicle model tested (4 in total).

Care shall be taken that the pedestrian test area is sufficiently lit.

Table 13: List of camera views (Pedestrian Subsystem)

	Camera:	1
	Filename:	1_Lower_leg_publication
	Description:	Camera perpendicular to vehicle centreline @ T0. Launcher plate shall be visible. Left or right side views are allowed.
	Camera:	2
	Filename:	2_Upper_leg_publication

	Description:	Camera perpendicular to vehicle centreline @ T0. Impactor shall be completely visible. Left or right side views are allowed
	Camera:	3
	Filename:	3_Ped_child
	Description:	Camera perpendicular to vehicle centreline @ T0. Left or right side views are allowed.
 	Camera:	4
	Filename:	4_Ped_adult
	Description:	Camera perpendicular to vehicle centreline @ T0. Left or right side views are allowed. Tests on windscreen may alternatively be filmed from the vehicle inside.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.7.3 Still Photographs

Pre- and post-test photos shall be taken to show the undamaged/damaged test area pre/post-test (bonnet, A-pillars, glazing, leading edge and bumper). These must

include at least one overview photo of each of the pre-test grid markings on the impact test zones.

For pedestrian testing only inspection quality photos are required by TNCAP.

1.5.8 Autonomous Emergency Braking Tests

1.5.8.1 Vehicle Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1, except for the roof logo which is optional. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.8.2 Camera Locations and Views

1.5.8.2.1 Off-board HD camera (camera 1):

Start filming from far away, when the car approaches the target, both the car & target shall be in view. When the car is about to brake, view shall start to zoom in until the car has stopped. Only the car & target shall be in view. The angle shall be as perpendicular as possible to the car and target.

1.5.8.2.2 On-board camera (cameras 2 and 3):

(1) Camera 2: “Go Pro” or equivalent inside the car filming the view in front. No test equipment (e.g. steering robot) shall be in view.

(2) Camera 3: “Go Pro” or equivalent inside the car filming the dashboard.

For media films only include highest avoidance speed & highest mitigation speed tests plus footage of anything unusual. For the most interesting test runs, additional views shot from different angles shall be provided. The time window for recording shall be set to [-5sec to +5sec]. For the sound recording there shall be no talking audible on the video.

Table 14: List of camera views (Autonomous Emergency Braking Car to Car)

	Camera:	1
	Filename:	1_AEB_Wide
	Description:	Wide view initially. When the car is about to brake, zoom in until the car has stopped. Only car and target in view. Angle shall be as perpendicular as possible to the car and target.

		
	Camera:	2 (on-board)
	Filename:	2_Forward_onboard
	Description:	"Go pro" (or equivalent type camera) inside, looking in forward direction. No test equipment shall be in view.
	Camera:	3 (on-board)
	Filename:	3_dashboard
	Description:	"Go pro" (or equivalent type camera) inside, looking in forward direction towards dashboard, instrumentation cluster, HUD, etc. Visual/Audio warning must be captured.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.8.3 Selection of Views

The camera views to be provided to the TNCAP executive agency as well as the number of runs vary depending on the film quality (media or inspection quality):

(1) Inspection Films

(A) All runs required (AEB and FCW)

(B) Camera views needed:

Off-board **Camera 1**	**On-board** **Camera 2**	**Dashboard** **Camera 3**
Yes	Yes	Yes

(2) Media Films

(A) Runs:

For each vehicle TNCAP will provide a specific list for the predicted vehicle performance according to the table below:

	GOOD	ADEQUATE	MARGINAL	WEAK	POOR
CCRs CCRm CCRb	Random selected test point with GREEN result (avoidance)	Random selected test point with YELLOW result (mitigation) if not available use ORANGE	Random selected test point with ORANGE result (mitigation) if not available use BROWN	Random selected test point with BROWN result (mitigation)	Random selected test point with BROWN result and highest impact speed (mitigation)

(B) Camera views needed:

Off-board Camera 1	**On-board Camera 2**	**Dashboard Camera 3**
Yes	Yes	Yes

1.5.8.4 Still Photographs

Post-test photos shall be taken in case of suspected damage to vehicle front-end or sensor array.

1.5.9 Autonomous Emergency Braking Tests – VRU

1.5.9.1 Vehicle Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1, except for the roof logo which is optional. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.9.2 Camera Locations and Views

1.5.9.2.1 Off-board HD camera (camera 1):

At the start of filming the car and dummy shall be in view with the dummy moving towards the camera. The camera shall be positioned at an angle of approximately 45degrees to the dummy motion. When the car is about to brake, view shall start to zoom in until the car has stopped.

1.5.9.2.2 On-board camera (cameras 2 and 3):

(1) Camera 2: “Go Pro” or equivalent inside the car filming the view in front. No test equipment (e.g. steering robot) shall be in view.

(2) Camera 3: “Go Pro” or equivalent inside the car filming the dashboard.

Table 15: List of camera views (Autonomous Emergency Braking VRU)

	Camera:	1
	Filename:	1_AEB_VRU_Wide
	Description:	Wide view initially. Car and dummy in view with dummy moving towards camera. Camera angled at approximately 45degrees
	Camera:	2 (on-board)
	Filename:	2_Forward_onboard
	Description:	"Go pro" (or equivalent type camera) inside, looking in forward direction. No test equipment shall be in view.
	Camera:	3 (on-board)
	Filename:	3_dashboard
	Description:	"Go pro" (or equivalent type camera) inside, looking in forward direction towards dashboard, instrumentation cluster, HUD, etc. Visual/Audio warning must be captured.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.9.3 Selection of Views

The camera views to be provided to the TNCAP executive agency as well as the number of runs vary depending on the film quality (media or inspection quality):

(1) Inspection Films

(A) All runs required

(B) Camera views needed:

Off-board **Camera 1**	**On-board** **Camera 2**	**Dashboard** **Camera 3**
Yes	Yes	Yes

(2) Media Films

(A) Runs:

For each vehicle TNCAP will provide a specific list for the predicted vehicle performance according to the table below:

	GOOD	ADEQUATE	MARGINAL	WEAK	POOR
CPFA CPNA25 CPNA25 @ night CPLA50 CPLA50 @ night	Highest avoidance speed	Highest mitigation speed (>75% speed reduction)	Highest mitigation speed (>50% speed reduction)	Highest mitigation speed (>25% speed reduction)	No performance
CBNA CBLA50	Highest avoidance speed	Highest mitigation speed (>75% speed reduction)	Highest mitigation speed (>50% speed reduction)	Highest mitigation speed (>25% speed reduction)	No performance

(B) Camera views needed:

Off-board **Camera 1**	**On-board** **Camera 2**	**Dashboard** **Camera 3**
Yes	Yes	Yes

1.5.9.4 Still Photographs

Post-test photos shall be taken in case of suspected damage to vehicle front-end or sensor array.

1.5.10 Lane Support Systems Test

1.5.10.1 Vehicle Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1, except for the roof logo which is optional. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.10.2 Camera Locations and Views

1.5.10.2.1 Off-board HD camera (camera 1):

The camera shall be on the road, looking at the approaching car. Please position the camera as perpendicular as possible to the road and in such a way that lane departure occurs when car is still heading towards the camera.

1.5.10.2.2 On-board camera (cameras 2, 3 and 4):

(1) Camera 2: “Go Pro” or equivalent inside the car (in order for the warning sound to be heard) filming the view in front. No test equipment (e.g. steering robot) shall be in view.

(2) Camera 3: “Go Pro” or equivalent with the camera on the front door, aimed

forwards at the road, to show clearly the lane departure.

(3) Camera 4: “Go Pro” or equivalent inside the car filming the dashboard.

Table 16: List of camera views (Lane Support Systems)

	Camera:	1
	Filename:	1_LSS_Roadside
	Description:	Camera positioned on road or elevated – as perpendicular as possible to the road - to record approaching car and road markings. Any departure shall be within view.
	Camera:	2 (on-board)
	Filename:	2_Forward_onboard
	Description:	“Go pro” (or equivalent type camera) inside, looking in forward direction. No test equipment shall be in view.
	Camera:	3 (on-board)
	Filename:	3_Door_Outside
	Description:	“Go pro” (or equivalent type camera) Outside mounted to door panel to clearly show lane departure. View shall be aimed forwards.
	Camera:	4
	Filename:	4_dashboard

	Description:	"Go pro" (or equivalent type camera) inside, looking in forward direction towards dashboard, instrumentation cluster, HUD, etc. Visual/Audio warning must be captured.

<Image source：Euro NCAP Film & Photo Protocol>

1.5.10.3 Selection of Views

The camera views to be provided to the TNCAP executive agency as well as the number of runs vary depending on the film quality (media or inspection quality):

(1) Inspection Films

(A) All runs required

(B) Camera views needed:

Off-board Camera 1	**On-board Camera 2**	**Door Outside Camera 3**	**Dashboard Camera 4**
Yes	Yes	Yes	Yes

(2) Media Films

(A) Runs:

One test scenario per type of assessment. The different types of assessment being, depending on the car: LKA, ELK-Road Edge, ELK-Oncoming, ELK-Overtaking.

ELK – Road Edge	0.5 m/s with least amount of lines where the vehicle scores points
ELK - Oncoming	0.6 m/s, only when test is performed with GVT
ELK - Overtaking	0.7 m/s Intentional GVT @ 72 km/h 0.7 m/s Intentional GVT @ 80 km/h
LKA	0.5 m/s Dashed Line @ passenger side

(B) Camera views needed:

Off-board Camera 1	**On-board Camera 2**	**Door Outside Camera 3**	**Dashboard Camera 4**
Yes	No	Yes	Yes

1.5.10.4 Still Photographs

Post-test photos shall be taken in case of suspected damage to vehicle front-end or sensor array.

1.5.11 Blind Spot Detection

1.5.11.1 Vehicle Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1, except for the roof logo which is optional. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.11.2 Camera Locations and Views

1.5.11.2.1 Off-board HD camera (camera 1):

When filming, the car and target shall be in view. The camera shall be placed in the driving direction of the car, and be positioned at an angle of approximately 45degrees to the car motion.

1.5.11.2.2 On-board camera (cameras 2, 3, 4 and 5):

(1) Camera 2: “Go Pro” or equivalent is installed on the jig on the upper side of the windshield, and the angle of the camera is adjusted so that filming the view shall be cover side of the car and blind spot area.

(2) Camera 3: “Go Pro” or equivalent inside the car filming the side mirror.

(3) Camera 4: “Go Pro” or equivalent inside the car filming the dashboard.

(4) Camera 5: “Go Pro” or equivalent is installed on the steering handle of the target filming the dashboard.

Table 17: List of camera views (Blind Spot Detection/ Visualization Systems)

	Camera:	1
	Filename:	1_BSD_Roadside
	Description:	Wide view initially. Only car and target in view. Camera angled at approximately 45degrees
	Camera:	2 (on-board)
	Filename:	2_BSD_Outside
	Description:	Camera is installed on the jig, looking in backward direction. Adjust the camera angle to cover the sides of the car and blind spots.
	Camera:	3 (on-board)
	Filename:	3_Outermirror

	Description:	"Go pro" (or equivalent type camera) inside, looking in sideway and forward direction. No test equipment shall be in view. Visual/Audio warning must be captured.
	Camera:	4 (on-board)
	Filename:	4_SV_dashboard
	Description:	"Go pro" (or equivalent type camera) inside, looking in forward direction towards dashboard, instrumentation cluster, HUD, etc. Visual/Audio warning must be captured.
	Camera:	5 (on-board)
	Filename:	5_TV_ dashboard
	Description:	Camera is installed on the steering handle of the target filming the dashboard.

<Image source：ASEAN NCAP>

1.5.11.3 Selection of Views

The camera views to be provided to the TNCAP executive agency as well as the number of runs vary depending on the film quality (media or inspection quality):

(1) Inspection Films

(A) All runs required

(B) Camera views needed:

Off-board Camera 1	**On-board Camera 2**	**Door Outside Camera 3**	**Dashboard Camera 4**	**Dashboard Camera 5**
Yes	Yes	Yes	Yes	Yes

(2) Media Films

(A) Provide a films that correctly warns test target is on the left side of the car.

(B) Camera views needed:

Off-board Camera 1	**On-board Camera 2**	**Door Outside Camera 3**	**Dashboard Camera 4**	**Dashboard Camera 5**
Yes	Yes	Yes	Yes	No

1.5.11.4 Still Photographs

Post-test photos shall be taken in case of suspected damage to vehicle front-end or sensor array.

1.5.12 Blind Spot Visualization

1.5.12.1 Vehicle Markings

TNCAP markings shall be attached to the exterior of the vehicle as shown in Figure 1, section 1.5.1.2.1, except for the roof logo which is optional. The unique TNCAP test reference number shall be placed below each TNCAP logo.

1.5.12.2 Still Photographs

Photos of the display screens of all runs shall be provided, including the blind spot area and the 20m area for publication (example below). The photo specifications are following section 1.5.1.4.3.

<Image source：ASEAN NCAP>

Post-test photos shall be taken in case of suspected damage to vehicle front-end or sensor array.