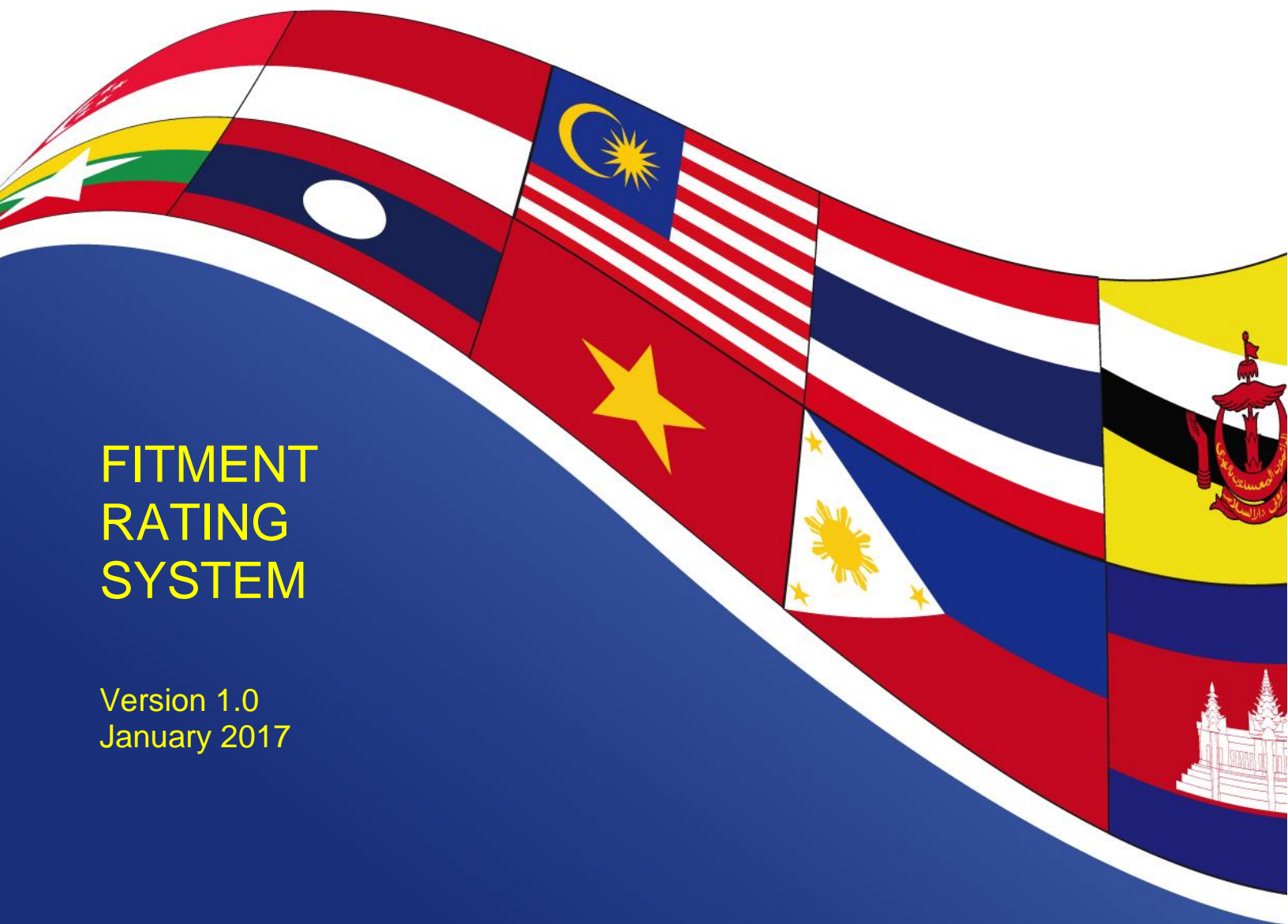


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FITMENT RATING SYSTEM

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FITMENT RATING SYSTEM

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NEW CAR ASSESMENT PROGRAM FOR SOUTHEAST ASIAN COUNTRIES (ASEAN NCAP)

FITMENT RATING SYSTEM

1 INTRODUCTION

It is recognized that ASEAN NCAP has changed the landscape of automotive safety in the region. Apart from the increasing number of vehicles with higher ASEAN NCAP ratings, the demand for those vehicles among the consumers is gaining as well. Nevertheless, the positive impact is still imbalance as the safety features of specific models sold are not necessarily similar among the countries in the region and sometimes can be adversely different.

Thus, in order to reduce the substandard treatment, ASEAN NCAP has developed the first Fitment Rating System (FRS) in the world. The following protocol deals with the assessment of FRS for Head Protection Technology (HPT), Effective Braking and Avoidance (EBA), Seatbelt Reminder (SBR) system, Blind Spot Technology (BST) and Advanced Safety Assist Technology (SAT).

DISCLAIMER: ASEAN NCAP has taken all reasonable care to ensure the information published in this protocol is accurate and reflects the technical decisions taken by the organization. In the unlikely event that this protocol contains a typographical error or any other inaccuracy, ASEAN NCAP reserves the right to make corrections and determine the assessment and subsequent result of the affected requirement(s).

2 METHOD OF ASSESSMENT

2.1 Information Required from Manufacturers

2.1.1 Before the abovementioned technologies can be evaluated by ASEAN NCAP, it is necessary for the manufacturers to provide ASEAN NCAP with detailed information prior to the assessment. Please refer ASEAN NCAP Guideline for Test Model Form Version 2.0.

2.1.2 ASEAN NCAP will perform verification process through its counterparts in the respective countries to ensure the information provided to ASEAN NCAP is accurate.

2.2 Performance and Functionality Assessments

2.2.1 In order to determine whether or not the technologies are eligible to be included in the rating calculation, the performance and functionality assessments have to be conducted.

2.2.2 Refer ASEAN NCAP Assessment Protocol – Adult Occupant Protection Version 1.0 for the assessment of HPT and ASEAN NCAP Assessment Protocol – Safety Assist Version 1.0 for the assessments of SBR system, EBA specifically Electronic Stability Control (ESC) and Anti-lock Braking System (ABS), BST and Advanced SATs.

2.2.3 Vehicles of which systems meet the requirements will be eligible for further FRS calculation and determination of final points for respective technologies. If No, more information will be inquired from manufacturers and ASEAN NCAP will decide for a re-test or not.

2.3 Determination of Car Technology Fitment Score (CTFS)

2.3.1 Generally, the score for each technology, which is called *CTFS* (Car Technology Fitment Score), is calculated primarily based on the tested model equipped with the technology sold in the respective country and type of fitment. The formula for *CTFS* is as follows;

$$CTFS = \frac{\sum_{i=1}^{i=n} \alpha_i CS_i}{\sum_{i=1}^{i=n} CS_i} \times TFS$$

where *CTFS* is the Car Technology Fitment Score, α is the Fitment Rating Score, *CS* is the Country Score and *TFS* is the Technology Fitment Score.

2.3.2 The value for *CS* is based on the sectors the countries represent. The philosophy behind the *CS* is the 3-5-2 concept that was introduced by ASEAN NCAP in 2013. Generally, the 10 countries in the region are divided into three tiers (3 [Laos, Cambodia and Myanmar] – 5 [Malaysia, Thailand, Indonesia, the Philippines and Vietnam]) – 2 [Brunei and Singapore]) based on their similarities in terms of road safety situation and automotive industry.

2.3.3 The concept is further refined and categorized into four sectors; Sector 0, Sector 1, Sector 2 and Sector 3. Basically, each country in the same sector represents similar *CS*. Table 1 lists the four sectors with their associated countries and respective *CS*s. For example, in Sector 0, both Brunei and Singapore carry similar *CS* of 2 points each.

Table 1: The *CS* for each Sector

SECTOR 0	SECTOR 1	SECTOR 2	SECTOR 3
Brunei	Malaysia	The Philippines	Laos
Singapore	Thailand	Vietnam	Cambodia
	Indonesia		Myanmar
<i>CS of 2 points per country</i>	<i>CS of 3 points per country</i>	<i>CS of 2 points per country</i>	<i>CS of 1 point per country</i>

2.3.4 As for α and *TFS*, the values differ among the technologies, which will be further explained in the following sections.

2.4 **Overall Process Flow**

The overall process flow and respective references are illustrated in Figure 1.

Flow Chart	Reference
<pre> graph TD Start([Start]) --> Step1[Information Required from Manufacturers [Section 2.1]] Step1 --> Step2[Performance and Functionality Assessments [Section 2.2]] Step2 --> Decision{Pass?} Decision -- No --> Start Decision -- Yes --> Step3[Determination of CTFS [Section 2.3]] Step3 --> End([End]) </pre>	<p><i>ASEAN NCAP Guideline for Test Model Form Version 2.0</i></p> <p><i>ASEAN NCAP Assessment Protocol – Adult Occupant Protection Version 1.0</i></p> <p><i>ASEAN NCAP Assessment Protocol – Safety Assist Version 1.0</i></p>

Figure 1: Overall Flow Chart of FRS

3 FITMENT RATING SCORE FOR HEAD PROTECTION TECHNOLOGY

- 3.1 Realizing the need to improve the safety of occupants from side impacts, ASEAN NCAP has introduced Head Protection Technology (HPT) as part of Adult Occupant Protection (AOP) score. The *TFS* for HPT is 4 points.
- 3.2 HPT can be other than an airbag, as long as it protects the head. However, for technologies other than the conventional curtain or head airbags, manufacturer is requested to provide evidence that the system is effective, at least in principle, before an assessment can be carried out.
- 3.3 There are three fitment types applied for HPT. Table 2 lists the α values for each fitment type. An example of the HPT calculation is shown in APPENDIX I.

Table 2: Fitment Rating Score for HPT

Fitment Type	Details	Fitment Rating Score, α
Option A	Vehicle model is equipped with HPT as standard equipment	1
Option B	Vehicle model is equipped with HPT as optional equipment	0.5
Option C	Vehicle model is not equipped with HPT	0

4 FITMENT RATING SCORE FOR EFFECTIVE BRAKING AND AVOIDANCE

- 4.1 In 2012 to 2016, ASEAN NCAP only considered Electronic Stability Control (ESC) as a pre-requisite for 5-star AOP rating. Starting from 2017, instead of only ESC, the new requirement will also include Anti-lock Braking System (ABS). Based on ASEAN NCAP's observation, the fitment rates of ABS in certain ASEAN countries is still lacking in which it is still offered as optional rather than standard equipment.
- 4.2 Both ABS and ESC represent the Effective Braking and Avoidance (EBA) which is part of the overall Safety Assist score. The *TFS* for EBA is 8 points.
- 4.3 There are six fitment types applied for EBA. Table 3 lists the α values for each fitment type. An example of the EBA calculation is shown in APPENDIX II.

Table 3: Fitment Rating Score for EBA

Fitment Type	Details	Fitment Rating Score, α
Option A	Vehicle model is equipped with ESC as standard equipment	1
Option B	Vehicle model is equipped with ESC as optional equipment but ABS as standard equipment	0.5
Option C	Vehicle model is not equipped with ESC but equipped with ABS as standard equipment	0.375
Option D	Vehicle model is equipped with both ESC and ABS as optional equipment	0.25
Option E	Vehicle model is not equipped with ESC but equipped with ABS as optional equipment	0.125
Option F	Vehicle model is not equipped with either ESC or ABS	0

5 FITMENT RATING SCORE FOR SEATBELT REMINDER SYSTEM

- 5.1 Seatbelt Reminder (SBR) system is part of the overall Safety Assist score. In 2012 to 2016, ASEAN NCAP only considered SBR system for driver and front passenger as a prerequisite for 5-star AOP rating.
- 5.2 Starting from 2017, as an encouragement for vehicle manufacturers, incentive is given to those vehicles fitted with rear SBRs in addition to frontal SBRs. This is part of ASEAN NCAP's mission to increase the wearing rates among rear passengers beyond legislation approach. The *TFS* for SBR system is 6 points.
- 5.3 There are five fitment types applied for SBR system. Table 4 lists the α values for each fitment type. An example of the SBR calculation is shown in APPENDIX III.

Table 4: Fitment Rating Score for SBR system

Fitment Type	Details	Fitment Rating Score, α
Option A	Vehicle model is equipped with SBR for driver, front passenger and rear passengers as standard equipment	1
Option B	Vehicle model is equipped with SBR for driver and front passenger as standard equipment but rear passengers as optional equipment	0.75
Option C	Vehicle model is equipped with SBR for driver and front passenger only as standard equipment	0.5
Option D	Vehicle model is equipped with SBR for driver only as standard equipment	0.25
Option E	Vehicle model is not equipped with SBR	0

6 FITMENT RATING SCORE FOR BLIND SPOT TECHNOLOGY

- 6.1 Blind Spot Technology (BST) is part of the overall Safety Assist score. With the mission to reduce the number of lane-changing or merging crashes especially involving motorcyclists, ASEAN NCAP introduces additional incentive for vehicle model equipped with BST.
- 6.2 This is part of ASEAN NCAP's strategic approaches in curbing the number of accidents and injuries involving motorcycles in the region. The *TFS* for BST is 2 points.
- 6.3 There are five fitment types applied for BST. Table 5 lists the α values for each fitment type. An example of the BST calculation is shown in APPENDIX IV.

Table 5: Fitment Rating Score for BST

Fitment Type	Details	Fitment Rating Score, α
Option A	Vehicle model is equipped with BST for both nearside and offside as standard equipment	1
Option B	Vehicle model is equipped with BST for both nearside and offside as optional equipment	0.5
Option C	Vehicle model is equipped with BST for one side only as standard equipment	0.5
Option D	Vehicle model is equipped with BST for one side only as optional equipment	0.25
Option E	Vehicle model is not equipped with BST	0

7 FITMENT RATING SCORE FOR ADVANCED SAFETY ASSIST TECHNOLOGIES

- 7.1 ASEAN NCAP realizes the importance of increasing the number of Advanced Safety Assist Technologies (SATs) in the region. With that in mind, manufacturer may choose to obtain the maximum score of 2 points from two options with one of the options through FRS.
- 7.2 There are two fitment types applied for each Advanced SATs. The *TFS* for each Advanced SAT is 1 point. Table 6 lists the α values for each fitment type. An example of one of the Advanced SATs (AEB Inter-Urban) is shown in APPENDIX V.
- 7.3 There is no limit on the number of Advanced SAT to be proposed, nevertheless the maximum score allocated for Advanced SAT is 2 points. If the total point is more than 2 points, the maximum point for this section is still 2 points.

Table 6: Fitment Rating Score for Advanced SATs

Fitment Type	Details	Fitment Rating Score, α
Option A	Vehicle model is equipped with Advanced SAT as standard or optional equipment	1
Option B	Vehicle model is not equipped with Advanced SAT	0

APPENDIX I

Fitment Rating System for Head Protection Technology				
COUNTRY	FITMENT TYPE	$\alpha \times CS$	CS	CTFS
<i>Brunei</i>		0	0	2.67
<i>Singapore</i>		0	0	
<i>Malaysia</i>	Yes	Option A 3	3	
<i>Thailand</i>	Yes	Option B 1.5	3	
<i>Indonesia</i>	Yes	Option B 1.5	3	
<i>The Philippines</i>		0	0	
<i>Vietnam</i>		0	0	
<i>Laos</i>		0	0	
<i>Cambodia</i>		0	0	
<i>Myanmar</i>		0	0	
			TFS	
Fitment Type	Details			Fitment Rating Score, α
<i>Option A</i>	<i>Vehicle model is equipped with HPT as standard equipment</i>			<i>1</i>
<i>Option B</i>	<i>Vehicle model is equipped with HPT as optional equipment</i>			<i>0.5</i>
<i>Option C</i>	<i>Vehicle model is not equipped with HPT</i>			<i>0</i>

APPENDIX II

Fitment Rating System for Effective Braking and Avoidance					
COUNTRY		FITMENT TYPE	$\alpha \times CS$	CS	CTFS
<i>Brunei</i>	Yes	Option A	2	2	5.00
<i>Singapore</i>	Yes	Option A	2	2	
<i>Malaysia</i>			0	0	
<i>Thailand</i>	Yes	Option C	1.125	3	
<i>Indonesia</i>			0	0	
<i>The Philippines</i>			0	0	
<i>Vietnam</i>	Yes	Option D	0.5	2	
<i>Laos</i>			0	0	
<i>Cambodia</i>			0	0	
<i>Myanmar</i>			0	0	
				TFS	8.00
Fitment Type		Details			Fitment Rating Score, α
<i>Option A</i>		<i>Vehicle model is equipped with ESC as standard equipment</i>			<i>1</i>
<i>Option B</i>		<i>Vehicle model is equipped with ESC as optional equipment but ABS as standard equipment</i>			<i>0.5</i>
<i>Option C</i>		<i>Vehicle model is not equipped with ESC but equipped with ABS as standard equipment</i>			<i>0.375</i>
<i>Option D</i>		<i>Vehicle model is equipped with both ESC and ABS as optional equipment</i>			<i>0.25</i>
<i>Option E</i>		<i>Vehicle model is not equipped with ESC but equipped with ABS as optional equipment</i>			<i>0.125</i>
<i>Option F</i>		<i>Vehicle model is not equipped with either ESC or ABS</i>			<i>0</i>

APPENDIX III

Fitment Rating System for Seatbelt Reminders					
COUNTRY	FITMENT TYPE	$\alpha \times CS$	CS	CTFS	
<i>Brunei</i>	Yes	0	0	4.88	
<i>Singapore</i>		0	0		
<i>Malaysia</i>		0	0		
<i>Thailand</i>		Option A	3		3
<i>Indonesia</i>		0	0		
<i>The Philippines</i>		0	0		
<i>Vietnam</i>		0	0		
<i>Laos</i>	Yes	Option D	0.25		1
<i>Cambodia</i>		0	0		
<i>Myanmar</i>		0	0		
			TFS	6.00	
Fitment Type	Details			Fitment Rating Score, α	
<i>Option A</i>	<i>Vehicle model is equipped with SBR for driver, front passenger and rear passengers as standard equipment</i>			1	
<i>Option B</i>	<i>Vehicle model is equipped with SBR for driver and front passenger as standard equipment but rear passengers as optional equipment</i>			0.75	
<i>Option C</i>	<i>Vehicle model is equipped with SBR for driver and front passenger only as standard equipment</i>			0.5	
<i>Option D</i>	<i>Vehicle model is equipped with SBR for driver only as standard equipment</i>			0.25	
<i>Option E</i>	<i>Vehicle model is not equipped with SBR</i>			0	

APPENDIX IV

Fitment Rating System for Blind Spot Technology					
COUNTRY		FITMENT TYPE	$\alpha \times CS$	CS	CTFS
<i>Brunei</i>	Yes	Option A	2	2	0.81
<i>Singapore</i>	Yes	Option B	1	2	
<i>Malaysia</i>	Yes	Option C	1.5	3	
<i>Thailand</i>	Yes	Option D	0.75	3	
<i>Indonesia</i>	Yes	Option E	0	3	
<i>The Philippines</i>			0	0	
<i>Vietnam</i>			0	0	
<i>Laos</i>			0	0	
<i>Cambodia</i>			0	0	
<i>Myanmar</i>			0	0	
				TFS	
Fitment Type		Details			Fitment Rating Score, α
<i>Option A</i>		<i>Vehicle model is equipped with BST for both nearside and offside as standard equipment</i>			<i>1</i>
<i>Option B</i>		<i>Vehicle model is equipped with BST for both nearside and offside as optional equipment</i>			<i>0.5</i>
<i>Option C</i>		<i>Vehicle model is equipped with BST for one side only as standard equipment</i>			<i>0.5</i>
<i>Option D</i>		<i>Vehicle model is equipped with BST for one side only as optional equipment</i>			<i>0.25</i>
<i>Option E</i>		<i>Vehicle model is not equipped with BST</i>			<i>0</i>

APPENDIX V

Fitment Rating System for AEB Inter Urban				
COUNTRY	FITMENT TYPE	$\alpha \times CS$	CS	CTFS
<i>Brunei</i>		0	0	0.58
<i>Singapore</i>	Yes	Option A 2	2	
<i>Malaysia</i>	Yes	Option A 3	3	
<i>Thailand</i>	Yes	Option B 0	3	
<i>Indonesia</i>		0	0	
<i>The Philippines</i>	Yes	Option A 2	2	
<i>Vietnam</i>	Yes	Option B 0	2	
<i>Laos</i>		0	0	
<i>Cambodia</i>		0	0	
<i>Myanmar</i>		0	0	
			TFS	1.00
Fitment Type	Details			Fitment Rating Score, α
<i>Option A</i>	<i>Vehicle model is equipped with AEB Inter-Urban as standard or optional equipment</i>			<i>1</i>
<i>Option B</i>	<i>Vehicle model is not equipped with AEB Inter-Urban</i>			<i>0</i>

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