India comments on EPPR-07-04e

MEASUREMENT PROCEDURE FOR [TWO- OR THREE-WHEELED LIGHT MOTOR VEHICLES] EQUIPPED WITH A COMBUSTION ENGINE WITH REGARD TO THE CRANKCASE AND EVAPORATIVE EMISSIONS

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H.A. Nakhawa

India comments and marked in ~~double strikethrough~~ and ***this font***

No	Reference Para	India comments	Ref doc	Justification
1	Title	MEASUREMENT PROCEDURE FOR [TWO- OR THREE-WHEELED ~~LIGHT~~ MOTOR VEHICLES] EQUIPPED WITH A COMBUSTION ENGINE WITH REGARD TO THE CRANKCASE AND EVAPORATIVE EMISSIONS	New suggestion from India	1) The expression ñlight vehicleò is used in CARB and sometimes in REPPR. In SR1, there is no term called ñlight vehicleò. Hence, term ñlightò to be deleted. 2) As per SR1, Two and three wheeled vehicles are defined as ñcategory 3 vehiclesò, and further they are classified as 3-1 and 3-3 for two wheelers and 3-2, 3-5 , for three wheelers, accordingly clause is modified and this shall be followed hereafter.
	A.	**STATEMENT OF TECHNICAL RATIONALE AND JUSTIFICATION**		
2	**A.1.**	**Introduction** The industry producing two-, three and four-wheeled ~~light~~ vehicles is a global one, with companies selling their products in many different countries. The Contracting Parties to the 1998 Agreement have determined that work should be undertaken to address the environmental performance requirements from ~~light~~ two- and three-wheeled vehicles as a way to help improve air quality internationally. The aim of this Global Technical Regulation (GTR) is to provide measures to strengthen the world-harmonisation of ~~light~~ vehicle approval and certification legislation, in order to improve the cost effectiveness of environmental performance testing, remove trade barriers, reduce the overall complexity of global legislation, remove potential areas of conflict or opposing requirements and improve the air quality. This GTR establishes harmonised test procedures to determine the crankcase emissions and evaporative emissions of ~~light~~ two- and three wheeled ***3-1, 3-3 and 3-2, 3-4, 3-5 vehicles*** as part of the environmental performance tests for [approval] / [certification] of such vehicles. The test procedures were developed so that they would be: Åable to provide an internationally harmonised set of tests to ensure efficient, cost-effective and practicable testing; Åcorresponding to state-of-the-art testing, sampling and measurement technology in the area of performance testing of ~~light~~ vehicles; and Åapplicable in practice to existing and foreseeable future powertrain technologies.		

No	Reference Para	India comments	Ref doc	Justification
2	A.1. contd..	The technical and economic feasibility of the measures contained within this GTR have been considered and are discussed further in Section A.5. This GTR covers the following test types: Åest type III, emissions of crankcase gasses; The section on emissions from crankcase gasses includes two alternative tests which were set out to demonstrate, where required, that no emissions are released from the crankcase gas ventilation system and hence to ensure that no crankcase emissions can escape to the atmosphere from the crankcase ventilation system. Åest type IV, evaporative emissions. The section on evaporative emissions includes a cascade of three tests to determine the evaporative emissions, from either a fuel tank permeability test for non-metallic fuel storage tanks, a fuel storage and delivery system permeation test, or a SHED based test to determine the evaporative emissions from the entire vehicle in a sealed house test. This GTR is based on the work of the Informal Working Group (IWG) on Environmental and Propulsion unit Performance Requirements of ~~light-~~vehicles, from now on referred to as L-EPPR, which held its first meeting during the 65th GRPE in January 2013 and on the initial proposal by the European Commission (EC). Specific issues and options raised and resolved in their development are discussed in Section 0. "Introduction issues and proposed options for harmonisation" of this document, which will be transferred into the report that accompanies this new draft GTR.	New suggestion from India	Same as above

No	Reference Para	India comments	Ref doc	Justification
3	A.3.1.	Technical references in the development of the GTR For the development of the GTR, the following legislation and technical standards contained relevant applications of requirements for motorcycles and other ~~light~~ ***category 3*** vehicles or transferable provisions for passenger cars: Åcrankcase emissions: UN Regulation No 83 (applicable to cars and vans) custom tailored for combustion engines fitted to ~~light~~ ***category 3*** vehicles; Åevaporative emissions, permeability tests; Annex 1 to chapter 6 of Directive 97/24/EC; Åevaporative emissions, permeation tests; US Federal test procedures (86.410-2006 Emission standards for 2006 and later model year motorcycles); Åevaporative emissions: SHED test; California Air Resources board test procedure (based on the 1978 test procedure for light-duty vehicles); California evaporative emission standards and test procedures; for 2001 and subsequent model motor vehicles, as amended on 22 March 2012)	New suggestion from India	Same as above

No	Reference Para	India comments	Ref doc	Justification
4	A.3.2	Methodology for deriving harmonised test procedures for the GTR The European Commission launched an L-EPPR study in January 2012 with the objective to develop proposals to update GTR No 2 for technical progress and to develop proposals for GTRs and UN Regulations with respect to harmonised EPPR legislation not yet covered at the international level for ~~light~~ ***category 3*** vehicles, e.g. crankcase and evaporative emission test requirements, on-board diagnostic requirements, propulsion unit performance requirements etc. The output of this comprehensive study was submitted for the assessment and approval of the L-EPPR group. The methodology used in this study to develop the test procedures contained within the GTR involved an iterative process of review. The process was initially based on an assessment of existing literature and new evidence, which was gathered from a wide range of pertinent stakeholders, to provide more insight with regards to the future requirements of the GTR. The first phase comprised a stocktake of appropriate literature, international legislation and proposals. The aim was to ensure that all current and proposed test types and the specific requirements of different regions were captured. The second phase of the evidence gathering consisted of a stakeholder consultation. An important part of this was a questionnaire, which asked stakeholders to provide information and at times their views on current practices in different regions and the way forward. The third and final phase of the study, the derivation of the test procedures contained within the GTR, consisted of a technical evaluation of the information collected in phases one and two. Specifically, each test type was assessed and the following aspects considered: Å common international practices (existing harmonised practices); Å significant differences with respect to testing methods and procedures; Å the global technical feasibility; Å the likely cost and economic impact; Å the likely acceptability for all Contracting Parties; Å the effectiveness of each proposal at improving vehicle emission performance; Å the suitability of the testing procedures with regard to current and future powertrains and technologies. The order of the aspects presented above does not represent any ranking, the priority was dependent on, each of the specific areas analysed during the development of the GTR. This is shown where applicable in the accompanying options section 0. Where multiple options were left after the assessment of the factors listed above, further iterative evaluation was undertaken by the L-EPPR IWG. The outcome of this work was among others the development of a new proposal based on the consolidation of existing global legislation and up-to-date technical provisions. Subsequently the L-EPPR group assessed the study output and decided as follows: To be inserted by the L-EPPR group before submitting the final proposal of this GTR to GRPE.	New suggestion from India	Same as above

No	Reference Para	India comments	Ref doc	Justification
5	A.4.	**Discussion of the issues addressed by the GTR** This GTR brings together the test procedures to determine the crankcase emissions and evaporative emissions of ~~light~~ ***category 3*** vehicles. The process to develop this GTR followed the methodology discussed in Section A.3.2, where important issues addressed during the development were: ÅAdapt provisions to two- and three-wheeled ~~light~~ vehicles where necessary; ÅProvide a series of options to allow testing to be carried out involving varying degree of complexity and equipment (i.e. from a simple mass based permeability test to a full SHED test).	New suggestion from India	Same as above
6	A.4.1.	Applicability The IWG followed the agreed terms of reference and has prepared a GTR for ~~light~~ two- and three-wheeled vehicles under the 1998 Agreement as well as ~~light~~ two-, three- and four-wheeled vehicles under the 1958 Agreement. In accordance with the agreed terms of reference UN GTRs and UN Regulations in the area of EPPR will be developed as much as possible in a coherent way.	New suggestion from India	Same as above
7	A.4.5.	Performance requirements With respect to crankcase gas emissions these shall be entirely combusted by the engine and therefore zero emissions shall be evacuated directly from the crankcase system to the atmosphere. The performance requirements for the three evaporative emissions have been derived from a mix of USA and EU requirements, which are proposed to be adopted for the evaporative emission performance of ~~light~~ ***category 3*** vehicles world-wide.	New suggestion from India	Same as above
8	A.5.1.	Increasingly, mopeds, motorcycles and other ~~light~~ ***category 3*** vehicles are being designed for the world market. To the extent that manufacturers are preparing substantially different models in order to meet different emission regulations and methods of measuring CO2 emission and fuel or energy consumption, testing costs and other production values are increased. It would be more economically efficient to have manufacturers using a similar test procedure worldwide wherever possible to prove satisfactory environmental performance before being placed on the market. A prerequisite for that is a harmonised definition of the test procedures for measuring crankcase emissions and evaporative emissions. It is anticipated that the test procedures in this GTR will provide a common test programme for manufacturers to use in countries worldwide and thus reduce the amount of resources utilised to test ~~light~~ ***category 3*** vehicles. These savings will accrue not only to the manufacturers, but more importantly, to the consumers and the authorities as well. However, developing a test programme just to address the economic question does not address the mandate given when work on this GTR was first started, which is to reduce hydrocarbon emissions from crankcase gas and evaporative emissions. The test programme also improves the state of testing ~~light~~ ***category 3*** vehicles and covers recent and near-future powertrain technologies.	New suggestion from India	Same as above

No	Reference Para	India comments	Ref doc	Justification
	B.1.	**TEXT OF THE REGULATION, GENERAL PART**		
9	1.1.1	~~A sealed crankcase and/or if applicable a crankcase ventilation system emitting zero emissions to the atmosphere shall be regarded as prerequisite to carry out test type IV regarding evaporative emissions.~~	New suggestion from India	Type III and Type IV tests covers different requirements. It is not necessary to conduct Type III test before Type IV. It is observed that this clause do not appear in Document No. EPPR-08-08e.
10	2.	**Scope** ~~Light two- and [three-wheel] vehicles equipped with a propulsion unit complying with table B.1.-1. – a positive ignition engine, cfr table B.1.-1~~ ***Two wheeled category 3-1, 3-3 and 3-2, 3-4, 3-5 vehicles equipped with a PI engine complying with in accordance with table B.1.-1*** ***Type ï IV test is not applicable for vehicles equipped with a mono fuel gaseous fuel system.***	EPPR-07-24e	There is no definition for a ñlight two wheeled vehicle or three wheeled vehicle. (India proposal in last meeting). Classification 3-1 and 3-3 for two wheeled vehicles, 3-2 for two wheeled vehicles with side car and 3-2, 3-5 for 3 wheelers based on SR1 may be followed hereafter. The exemption of Type IV test for mono-fuel gaseous system vehicles is proposed for better clarity in line with EPPR-08-09e

No	Reference Para	India comments	Ref doc	Justification
11	3.8.	‗hybrid vehicle' means a powered vehicle equipped with at least two different energy converters and two different energy storage systems (on-vehicle) for the purpose of vehicle propulsion;***of which one is an IC engine;***	New suggestion from India	This GTR will apply only if there is an IC Engine. Definition to be taken from VPSD
12	3.9.	‗non-exposed' type of fuel storage tank and delivery system means that the fuel storage and fuel delivery system, ***except the fuel tank cap,*** are not directly exposed to radiation of sunlight;	India's suggestion based on EPPR-07-20	India supports in principle Japan's comments given in EPPR-07-20. India has collected data on vapour & fuel temperature when vehicles are exposed to sunlight, this data is given in **Annex A.** From this it can be observed that fuel and vapour temperatures are of the same order whether fuel tank cap is only exposed or not to sunlight. India modified the clause suitably.

No	Reference Para	India comments	Ref doc	Justification
13	3.14.	ópollution control deviceô means those components of a vehicle that control or reduce ~~tailpipe and/or~~ evaporative emissions;	New suggestion from India	The term ñtailpipeò has no relevance to the subjects covered by this GTR. The clause is acceptable in the context of GTR 2. All the definitions can be covered in separate GTR as suggested by India.
14	3.17	***ôMono-fuel gaseous vehicleômeans a vehicle that is designed primarily for permanent running on LPG or NG / bio methane or hydrogen, but may also have a petrol system for emergency purposes or starting only, where the petrol tank does not contains more than 2 litres in the case of a 3-1, 3-3 and 3-4 category vehicles and 3 litres in the case of a 3-2 and 3-5 category vehicles.***	EPPR-07-24e	India suggests ómono-fuel gaseous vehicleô definition for better clarity. (definition corrected for terminology of classification SR1. In the case of 2 wheeler with side car India feels that emergency capacity may be retained to 2 litres.) The same text is suggested to be considered for EPPR-08-09e.

No	Reference Para	India comments	Ref doc	Justification
15	**B.2.**	**TEXT OF THE REGULATION, TEST TYPE III, EMISSIONS OF CRANKCASE GASSES**	EPPR-08-08e	India comments have been given on EPPR-08-09e document separately

No	Reference Para	India comments	Ref doc	Justification
	B.3.	**Test type IV requirements: evaporative emissions**		
16	1.1.	To allow for the large variation of vehicle types and sizes and also to allow for the differing requirements from various regions, the evaporative emission test procedures shall be available as different classes. This ranges from the simplest ***permeability*** test ***for a non-metallic fuel storage tank,*** requiring minimum equipment and effort, to a ***more*** complex ***fuel storage and delivery system evaporative emission*** test ***procedure , and finally to the most comprehensive whole vehicle evaporative emission test procedure*** requiring ***a*** chassis dyna***mo***meter and a SHED.	Based on EPPR-07-24e India with editorial correction	As part of defining the hierarchy clearly we have separated different types of tests in different clauses as, clause 1.2 for permeability, clause 1.3 for permeation test and new clause 1.4 for SHED test.
17	1.3.	The evaporative emission test procedures laid down in Annexes B.3.2. and ~~B.3.3.~~ set out ***the test*** method~~s~~ for the determination of the loss of hydrocarbons by ~~evaporation~~ ***permeation*** from the fuel ***storage and supply*** systems of ***the*** vehicles equipped with a propulsion ***unit*** type that uses volatile, liquid fuel.		
18	***1.4***	***The procedure laid down in Annex B.3.3. sets out the evaporative hydrocarbon emission determination requirements of the whole vehicle and it is therefore the most comprehensive test methodology***	Updates based on EPPR-07-24e	

No	Reference Para	India comments	Ref doc	Justification
19	2.2.	~~The fuelling system tightness shall comply with the requirements referred to in ISO xx.xx:yyyy~~ ***Fuel tanks shall pass the leak-tightness tests carried out with an internal pressure equal to twice the relative service pressure (design pressure) or an overpressure of 30 kPa, whichever is higher, as described in points 2.2.1. Any orifices may be blocked for the purpose of this test. The fuel tank shall not crack or leak during the test, but may remain permanently deformed.***	EPPR-07-22e	As currently, the ISO mentioned here is under finalization which will be based on SAE J 2973 and further it may have difficulty in referring in GTR. Hence, India would like to propose this clause 2.2 for leak tightness test and similarly, hydraulic pressure test which are based on Doc. EPPR-07-22 a proposal from IMMA. Once administrative requirements regarding reference to SAE are sorted out necessary amendment may be proposed to this GTR.
20	***2.2.1***	***Hydraulic test*** ***The tank shall be subjected to a hydraulic internal pressure test which shall be carried out on an isolated unit complete with all its accessories. The tank shall be completely filled with a non-flammable liquid having a density and a viscosity close to those of the fuel normally used, or with water. After all communication with the outside has been cut off, the pressure shall be gradually increased, through the pipe connection through which fuel is fed to the engine, to the internal pressure specified in point 2.2 and this pressure shall be maintained for at least 60 seconds without any leakage.***		

<table>
<tr><th>No</th><th>Reference Para</th><th>India comments</th><th>Ref doc</th><th>Justification</th></tr>
<tr><td>21</td><td>2.3.</td><td>The following three classes of type IV testing ~~shall be defined~~ are listed in hierarchical order as follows::</td><td rowspan="6">Updates based on EPPR-07-24e</td><td rowspan="6">Text modified as part of defining the hierarchy clearly

This is also proposed in EPPR-08-09e.</td></tr>
<tr><td>22</td><td>~~3~~2.3.1.</td><td>Class A; the test procedure in Annex B.3.1 sets out the permeability test procedure of a non-metallic fuel storage tank; as a component;</td></tr>
<tr><td>23</td><td>2.3.2.</td><td>Class B; the test procedure in Annex B.3.2 sets out the permeation test procedures of the fuel storage of and supply systems.</td></tr>
<tr><td>24</td><td>2.3.3.</td><td>Class C; The SHED test is described in Annex B.3.3. and sets out the evaporative emission test procedure for a whole vehicle:</td></tr>
<tr><td>25</td><td>2.4.</td><td>[Test hierarchy and obligations of contracting parties]

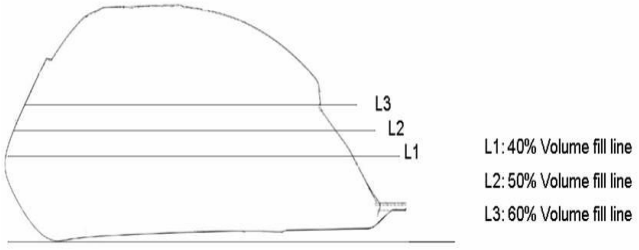
Each class shall consist of one or more tests, which are listed in Table B.3.-1, together with the SHED type required for the tests, if any.</td></tr>
<tr><td>26</td><td>2.4.1</td><td>
<table>
<tr><th rowspan="2">Test</th><th colspan="3">Evaporative emissions class</th><th rowspan="2">SHED type</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>~~Fuel storage p~~Permeability test of a non-metallic fuel storage tank as component</td><td>√</td><td></td><td></td><td>-</td></tr>
<tr><td>~~Fuel storage and supply system~~
~~p~~Permeation test of the fuel storage and supply system</td><td></td><td>√</td><td></td><td>-</td></tr>
<tr><td>SHED test of the whole vehicle, short diurnal test (fuel temp. change)</td><td></td><td></td><td>√</td><td>Sfv(1)</td></tr>
<tr><td>SHED test of the whole vehicle, hot soak loss test</td><td></td><td></td><td>√</td><td>Sfv(1)</td></tr>
</table>
Comments:
(1) Sfv Fixed volume SHED
SHED Sealed Housing for Evaporative Determination
The fixed volume SHED is the minimum requirement. The tests may be carried out in a variable volume SHED.
</td></tr>
</table>

<table>
<tr><th>No</th><th>Reference Para</th><th>India comments</th><th>Ref doc</th><th>Justification</th></tr>
<tr><td>27</td><td>~~2.4.2.~~</td><td>~~A vehicle that has been tested in a class C evaporative emission test is exempted from the classes A and B evaporative emission test requirements. A fuel storage and supply system tested according to the class B evaporative emission test is exempted from the class A evaporative emission test type.~~</td><td rowspan="5">Updates based on EPPR-07-24e</td><td rowspan="5">Text modified as part of defining the hierarchy clearly

This is also proposed in EPPR-08-09e.</td></tr>
<tr><td>28</td><td>~~2.4.3.~~</td><td>~~A contracting party may apply the class A, B or C evaporative emission test procedure in its territory, but is not obliged to accept:~~</td></tr>
<tr><td>29</td><td>~~2.4.3.1.~~</td><td>~~Classes A and B evaporative emission test results if the contracting party applies class C evaporative emission test requirements in its territory;~~</td></tr>
<tr><td>30</td><td>~~2.4.3.2.~~</td><td>~~Class A evaporative emission test results if the contracting party applies class B or C evaporative emission test requirements in its territory.~~</td></tr>
<tr><td>31</td><td>~~2.4.4.~~</td><td>~~Class C evaporative emission test results shall be accepted by all contracting parties independent of the test class applicable in its territory.~~</td></tr>
<tr><td>32</td><td>2.4.2.</td><td colspan="2">Two-wheeled motorcycles shall be tested according to the class C evaporative emission test procedure.</td><td rowspan="5">Updates based on EPPR-07-24e with suggested classification in the text aligned with SR1</td><td rowspan="5">Text modified as part of defining the hierarchy clearly

This is also proposed in EPPR-08-09e.</td></tr>
<tr><td>33</td><td>2.4.3.</td><td colspan="2">For any other type of a two- -wheeled 3-1 and 3-3 vehicle the Contracting Party may decide to apply one test procedure only from the three listed evaporative emission test procedure classes for the [approval] / [certification] of a vehicle laid down in point 2.3.</td></tr>
<tr><td>34</td><td>2.4.4</td><td colspan="2">The Contracting Parties shall accept test reports for the [approval] / [certification] of a vehicle according to the following table setting out the test hierarchy:
<table>
<tr><th>Type IV test class mandated by the Contracting Party for the whole vehicle in its territory:</th><th>Compliance to type IV test class to be accepted by the Contracting Party for the whole vehicle:</th></tr>
<tr><td>A</td><td>A / B / C</td></tr>
<tr><td>B</td><td>B / C</td></tr>
<tr><td>C</td><td>C</td></tr>
</table></td></tr>
</table>

No	Reference Para	India comments	Ref doc	Justification
35	**4.**	**Durability** The manufacture shall demonstrate the durability of the evaporative ***emission*** control system ***using the following procedures;*** ~~Completing the durability testing of the vehicle. prior to carrying out the evaporative emissions test shall ensure that the vehicle will meet the evaporative emission standards over the useful life of the vehicle. For that purpose the following shall be followed~~: For Class B: The procedure prescribed in Annex B3.2 For Class C: ***The procedure prescribed in Annex B.3.3*** ~~The rapid ageing procedure of evaporative emission control components set out in Annex B.3.6 shall be followed.~~	EPPR-07-08, EPPR-07-22, EPPR-06-05e	Some clarity by text modification in line with Doc. EPPR-07-22e
	Annex B.3.3.	**Sealed Housing for Evaporation Determination (SHED) test procedure**		
36	2.3.	Test fuel The appropriate test fuel, as defined in Annex B6.2. to Revision 1 of GTR No 2, shall be used. ***If the engine uses a fuel oil mixture, the oil added to reference fuel shall comply to the grade and quantity recommended by the manufacturer.***	New suggestion from India	This is to cover the 2 stroke engines where the fuel and 2T oil are mixed together

No	Reference Para	India comments	Ref doc	Justification
37	3.4.1.	The fuel storage tank heating system shall consist of two separate heat sources with two temperature controllers~~. Typically, the heat sources will be electric heating strips, but other sources may be used at the request of the manufacturer.~~ ***A typical heat source is a pair of heating strips. Other sources may be used as required by the circumstances. At the request of manufacturer, the test agency may allow manufacturerôs to provide the heating apparatus for compliance testing.*** Temperature controllers may be manual, such as variable transformers, or ***they may be*** automated. Since vapour and fuel temperature are to be controlled separately, an automatic controller is recommended ***both*** for the fuel ***and vapour***. The heating system shall not cause hot-spots on the wetted surface of the tank which would cause local overheating of the fuel. Heating strips, for the fuel ***if used,*** shall be located as low as practicable on the fuel storage tank and shall cover at least 10 % of the wetted surface. The centre line of the ***fuel*** heating strips ***if used,*** shall be below 30 % of the fuel depth as measured from the bottom of the fuel storage tank, and approximately parallel to the fuel level in the tank. The centre line of the vapour heating strips, if used, shall be located at the approximate height of the centre of the vapour volume. The temperature controllers shall be capable of controlling the fuel and vapour temperatures to the heating function described in 4.3.1.6.. ***Note:*** ***In order to ensure uniform and appropriate heating and measurement of temperature for fuel and vapour the following precautions or the manufacturer recommendations shall be followed, such as :*** ***(a) Separate heating pads for fuel and vapour shall cover as much area as possible.*** ***(b) The pasting of heating pads on either side of fuel tank shall be symmetric for fuel and vapour heating.*** ***(c) The position of fuel and vapour temperature sensors shall be as close to the area covered by heating pads respectively.*** ***(d) No fuel heating pad shall be located above a 40% volume fill line from bottom. Likewise no vapour heating pad for the tank evaporative test should be below the 60% volume fill line from bottom. Refer figure below (Example: as installed on vehicle).***  	New suggestion from India	Clause is modified for the precise mounting of heating pads for both fuel vapour and liquid fuel. The correct location of heating pads are very important for repeatability of test results.

No	Reference Para	India comments	Ref doc	Justification
38	4.1.1.	(c) the fuel storage tank of the vehicle shall be equipped with temperature sensors so that the temperature of the fuel and fuel vapour in the fuel storage tank can be measured when it is filled to 50 % ± 2 % of its ***capacity*** ~~rated capacity~~ ***declared by the manufacturer;***	New suggestion from India	The rated capacity is not defined, and it is better to use the term ñcapacity declared by the manufacturerò
39	4.3.1.3.	The fuel storage tank(s) shall be emptied as described in point 4.1.1 and refilled with test fuel at a temperature of between 283.2 K and 287.2 K (10 °C and 14 °C) to 50 ± 2 % of its ~~normal volumetric capacity.~~ ***manufacturerôs declared capacity.***		

<table>
<tr><th>No</th><th>Reference Para</th><th>India comments</th><th>Ref doc</th><th>Justification</th></tr>
<tr><td></td><td><u>Annex B.3.4.</u></td><td><u>Ageing test procedure for evaporative emission control devices</u></td><td></td><td></td></tr>
<tr><td>41</td><td>2.1.</td><td>Canister ageing test procedure

In the case of a multiple canister system, each canister shall undergo the procedure separately. The number of test cycles of canister loading and discharging shall correspond to ~~[300 cycles],~~ the number set-out in the table x. Dwell time and subsequent purging of fuel vapour shall be run to age the test canister at an ambient temperature of 297.2 ± 2 K (24 ± 2 °C) as follows:

Table x: Amount of test cycles of charging and purging the test canister
<table>
<tr><th>Vehicle specification</th><th>Number of cycles</th></tr>
<tr><td>Vmax≦50km/h</td><td>90</td></tr>
<tr><td>50km/h<Vmax<130 km/h</td><td>170</td></tr>
<tr><td>Vmax≧130 km/h</td><td>300</td></tr>
</table></td><td>EPPR-07-22e</td><td>India agrees.

This is also incorporated in EPPR-08-09e</td></tr>
</table>

No	Reference Para	India comments	Ref doc	Justification
42	2.1.1.3	The test canister shall be loaded each time to 2000 mg ***or more for*** ~~± 100~~ breakthrough detected by:	EPPR-07-10e, EPPR-07-22e EPPR-06-12-Rev1	India agrees. This is also incorporated in EPPR-08-09e
43	2.1.1.3.2.	Gravimetrical test method using the difference in mass of the test canister charged to 2000 ***mg or more*** ~~± 100~~ breakthrough and the purged canister. ***In this case the test equipment shall be capable of measuring the mass with a minimum accuracy in the range between 0 and +100 mg***	EPPR-07-10e, EPPR-07-22e	India agrees. This is also incorporated in EPPR-08-09e
44	3.1.	The durability test shall actuate control valves, cables, and linkages, where applicable, for a minimum of [5000] cycles.	EPPR-07-12e EPPR-06-05e	Difference in text mentioned in Doc. EPPR-07-04 & EPPR-07-12 need to be discussed further for harmonized test procedure in agreement with CPsôto conclude on this clause.
45	General	Conversion to ñ°Cò as temperature unit to added along with ñKò in complete document wherever applicable	New suggestion from India	India has no specific opinion of the conversion factor for K to ^{O}C. The following options are acceptable to India. ÅTemperatures may be specified only in ^{O}C. ÅIf K is specified, at all places the corresponding ^{O}C values shall also be specified, using the same conversion factor 273, or 273.2 or 273.15) IT will be useful to refer to WLTP GTR also to maintain the uniformity.

Annex A

India proposal
Definition of “non exposed” fuel tank

Definition for ‘non-exposed’ type of fuel storage tank

B.1. TEXT OF THE REGULATION, GENERAL PART (Ref EPPR 07-04 e)

3.9. ‘non-exposed’ type of fuel storage tank and delivery system means that the fuel storage and fuel delivery system are not directly exposed to radiation of sunlight;

Add the following sentence to the definition of ‘non-exposed’ type fuel tank. (Ref EEPR 07 -20e)

3.9. ‘non-exposed’ type of fuel storage tank and delivery system means that the fuel storage and fuel delivery system are not directly exposed to radiation of sunlight or if manufacturer can properly validate it to be treated as non-exposed type.

India opinion

There are many models whose fuel tanks and configurations are different, in some cases, fuel tank caps alone are exposed to sunlight . In such designs, the additional statement provides opportunity to the manufacturer to validate it to be treated as Non exposed type. This is a welcome change in the definition.

However, it becomes necessary for each manufacturer to demonstrate to different authorities.

This goes against the spirt of harmonization.

India is proposing simpler definition.

Study of various types of fuel tanks
with regard to temperature rise of vapor and fuel when
exposed to sunlight concurrently

Configuration analysis

Considering the proposal by Japan, possible configurations that can emerge are:

Config.	Fuel tank material	Fuel tank cap material	Exposed to sunûs radiation	Decision based on the definition
1	Metallic	Metallic	No	Non Exposed fuel tank
2	Non metallic	Non metallic	No	Non Exposed fuel tank
3	Non metallic	Metallic	Fuel tank cap	Fuel tank is not exposed but fuel tank cap exposed leads to demonstration & possible ambiguity on classification
4	Metallic	Metallic	Yes	Exposed fuel tank

Vehicles with various tank configurations

- Test vehicles have different configurations of fuel tank as explained in the previous slide .
- The fuel tanks are instrumented with temperature sensors
- Concurrently temperatures are recorded during the exposure to sunôs radiation in the same environment..

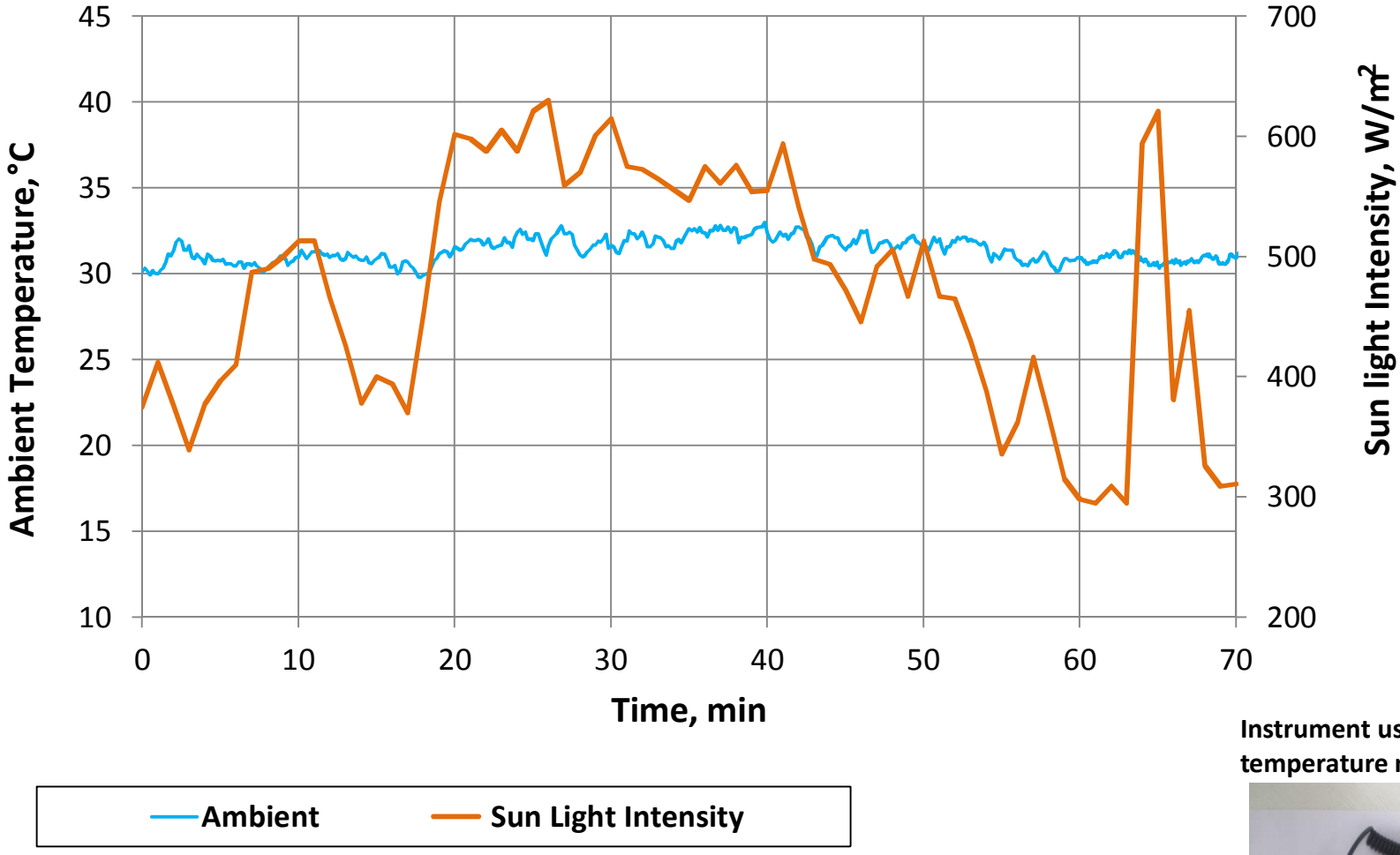
Fuel tank details of the various configurations used in the experiment

Config.	Configuration of the fuel tank & fuel filling Cap.	Fuel tank Capacity	Vapor Volume when fuel is filled 50 %
1	Metallic fuel tank + Metallic fuel tank cap both non-exposed	**4**	2.1
2	Non metallic fuel tank + Non metallic Cap , both non-exposed. .	**5**	2.6
3	Non Metallic fuel tank, not exposed & metallic fuel tank cap and exposed	**5**	2.6
4	Metallic fuel tank ; metallic fuel tank cap both exposed.	**10**	11.5

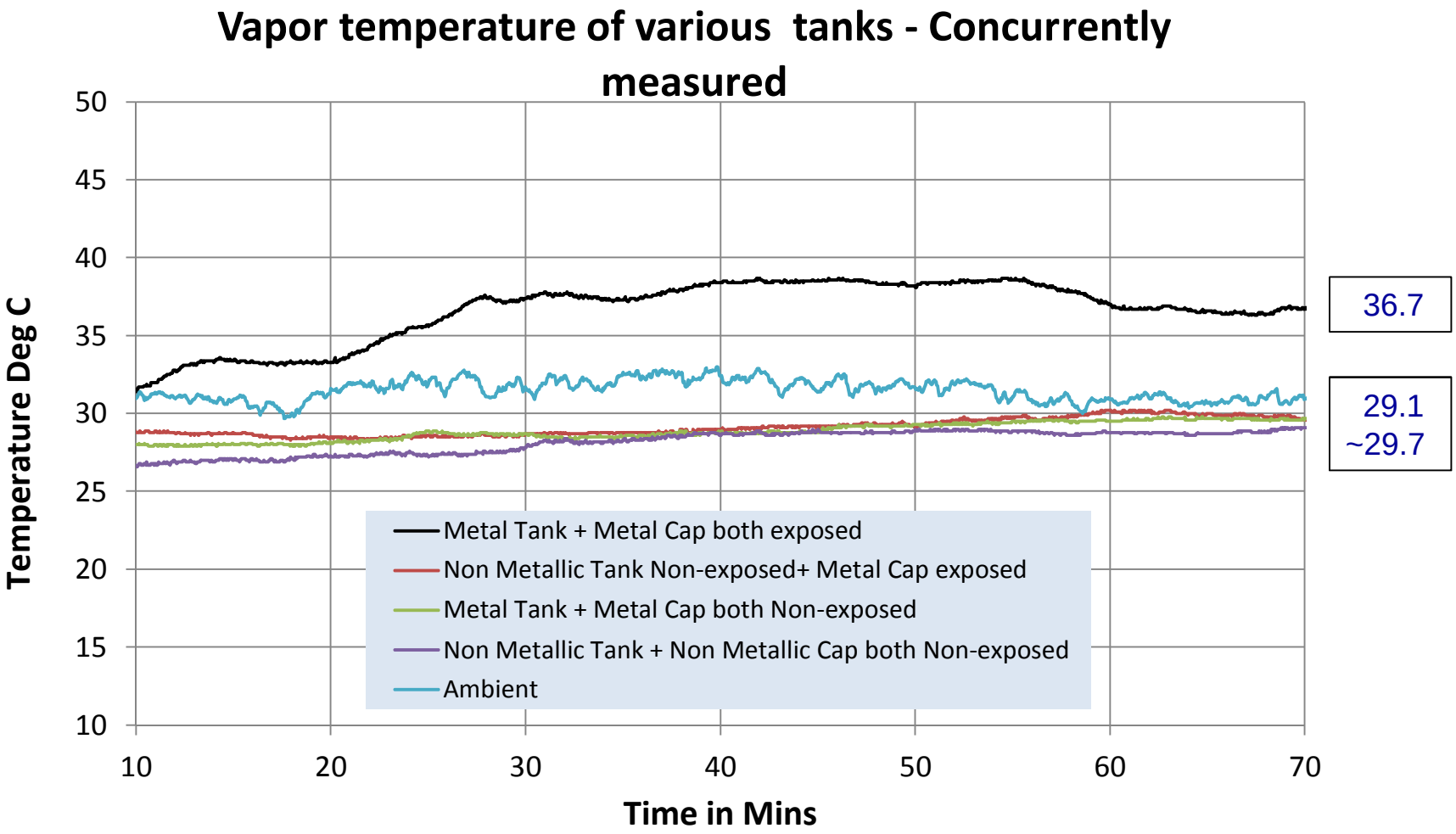
Test procedure

- The various configurations of the fuel tanks were exposed to radiation of sunlight concurrently to make comparison of vapor temperature under same test conditions.
- The fuel tanks are instrumented to measure temperatures of fuel & vapor.
- The fuel is filled to 50 % of fuel level, as is being done during SHED test.
- Fuel was chilled to 10 Deg. C, before start of the test, to simulate the conditions as in SHED tests.
- Temperatures of both fuel & vapor were recorded with the data logger on all the vehicles simultaneously when exposed to sun light.

Ambient temperature and Light Intensity vs Time



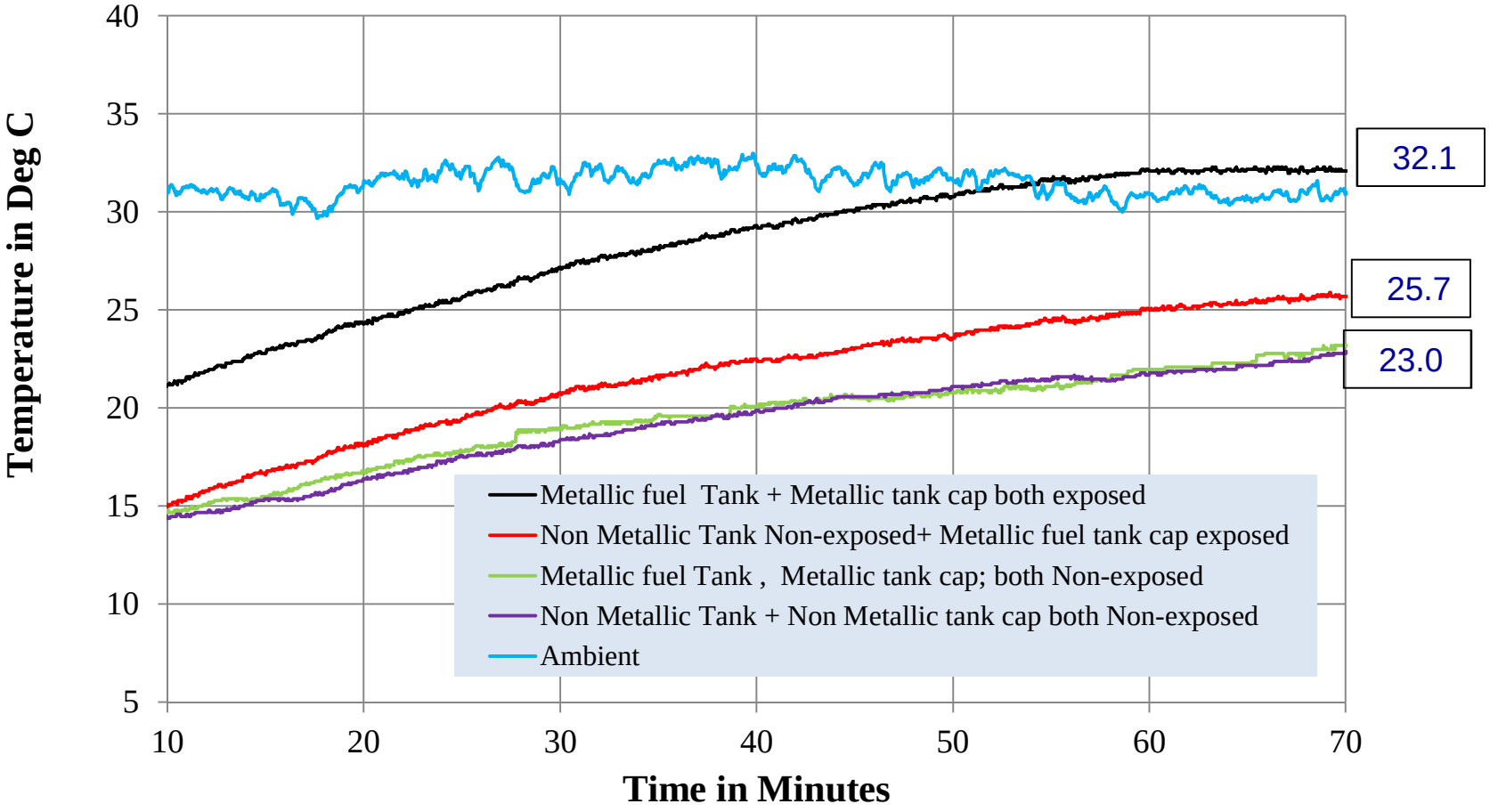
Instrument used for temperature measurements



whether cap is exposed or not, vapor temperature of non exposed fuel tanks --

- Is of the same order.
- Is far below that with fully exposed tank.

Fuel temperature of various tanks - Concurrently measured



With cap exposed fuel temperature of non exposed fuel tanks

- Is appx. 2.7 Deg.C rise
- but is far below that with fully exposed tank.
- Is very close to non exposed tank & cap.

Terminal temperature after 1 hr. of testing
(Exposure to sunlight radiation ï concurrently)

Config.	Configuration of the fuel tank & fuel filling Cap.	Fuel Temp.	Vapor temp
1	Metallic fuel tank + Metallic fuel tank cap both non-exposed	**23.2**	29.7
2	Non metallic fuel tank + Non metallic Cap , both non-exposed. .	**22.8**	29.1
3	Non Metallic fuel tank, not exposed & metallic fuel tank cap and exposed	**25.7**	29.6
4	Metallic fuel tank ; metallic fuel tank cap both exposed.	**32.1**	36.7

Incase of Non exposed fuel tank with exposed metallic cap, the increase in vapor temperature is comparable with both non exposed fuel tank & cap.

Conclusions

- Exposing the fuel tanks to sun's radiation and measuring temperatures of vapor & fuel can assist us for classifying the type of fuel storage tank as exposed or Non exposed.
- Metallic fuel tank cap alone in the fuel delivery system exposed to sun's radiation, did not significantly increase the fuel and vapor temperatures.
- The values of exposed fuel tank cap are comparable with non exposed cap.
- Hence we propose that exposure of fuel tank cap alone to sun's radiation can be considered as "Non exposed" type.

- Proposed definition
  - **'Non exposed' type of fuel storage tank and delivery system means that fuel storage and fuel delivery system, *except the fuel tank cap*, are not directly exposed to radiation of sunlight**.

Thank you