

**Proposal for a Technical Report on the development of a new procedure  
at low temperature, during WLTP phase 2 and a new optional annex,  
WLTP Low Temperature Type 6 test in the global technical regulation  
(GTR No.15 Amd#6) for the Worldwide harmonized Light vehicles Test  
Procedure (WLTP Low Temp)**

Informal document GRPE-81-xx (81<sup>st</sup> GRPE, 9-10 June 2020, agenda item (x))

**Technical Report on the development of a new procedure at low temperature, during WLTP phase 2 and a new optional annex, WLTP Low Temperature Type 6 test in the global technical regulation (GTR No. 15 Amd#6) for the Worldwide harmonized Light vehicles Test Procedure (WLTP Low Temp)**

**Preface**

The WLTP 16<sup>th</sup> session in The Hague Oct 2016 took place right after the conclusion of WLTP phase 1. It was then launched a new task force aiming to develop a new procedure at low temperature, during WLTP phase 2.<sup>[1]</sup> During that meeting, it was also decided that the **Low and Realistic winter temperature Task Force** (hereinafter **LowT TF**) should be chaired by the European Commission and open to all experts, stakeholders and CP representatives that have an interest in WLTP.

Soon after, it was described in the “Mandate and Terms of Reference” that “*The purpose of the low temperature test is to check the level of specific pollutant emissions, CO<sub>2</sub>, and range of vehicles in conditions that may easily be encountered during the winter season*”. 2020 <sup>[2]</sup>

Having asked the Contracting Parties (CPs) about the “*the need to improve the current regulation*” they expressed a number of needs that have been considered in the process of preparation of the informal document amending the working document for GTR#15 Amendment#6 which is presented here. Main concerns mentioned at the time were the effects on air quality, the environment, health, customer information and protection. Some of them are considered critical whereas others should be referred for information. According to the consultation to CPs, the GTR No. 15 should be used, as a basis for the work of this task force. The items which were specifically mentioned for discussion **the low / realistic winter temperature, the cycle, the vehicle category to be included and parameters to be measured.**

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<sup>1</sup> Reference Document WLTP-14-14e; ToR of the task force Low and Realistic Winter temperature; Meeting 9th January 2017 – Geneva. Consolidated version on the 25<sup>th</sup> of January 2017

<sup>2</sup> All documents mentioned in this summary can be found at CIRCA BC under: [EUROPA](#) > [European Commission](#) > [CIRCA BC](#) > [GROW](#) > [wltip](#) > [P](#) > [Low and realistic winter temperature TF](#), as well as in the UNECE Wiki page: <https://wiki.unece.org/pages/viewpage.action?pageId=85295115>

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## Background

Europe introduced in 1998 a type-approval test that allows to measure emissions at low temperatures from vehicles with positive-ignition engines. The Directive 98/69/EC of the European Parliament and of the Council<sup>[3]</sup> was a measure against air pollution by emissions from motor vehicles. This test was carried out on vehicles with petrol engines (M1 and N1 Class I) on a chassis dynamometer at  $-7 \pm 3$  °C only over the Urban Driving Cycle (first part of the New European Driving Cycle, NEDC). The diluted exhaust gases should be analysed for CO and HC. Road-load can be either determined at  $-7$  °C or adjusting the driving resistance for a 10% decrease of the coast-down time at 20°C. Regulation (EC) 715/2007<sup>[4]</sup> and its amendment EC 692/2008<sup>[5]</sup> brought some modifications, including the eligibility of vehicles with positive ignition engines (namely petrol hybrids, bi-fuel and flex-fuel), for the test, which is known as the Type 6 test from that moment. Most of the content found in this last regulation (EC 692/2008) regarding Type 6 test is identical to what is present in the UNECE Regulation 83 07 series, where this test is referred as Type VI.<sup>[6]</sup>

Regulation EC 692/2008<sup>[5]</sup> includes the obligation of the manufacturers to present the type-approval authority with information showing that the NOx after-treatment device on diesel vehicles reaches a sufficiently high temperature for efficient operation within 400 seconds after a cold start at  $-7$  °C and strategy of EGR systems used in diesel vehicles at low temperature. Similar procedures to the Type 6 test are applied in the USA (CFR 1066 Subpart H) where the test is also performed at  $-7$  °C ( $\pm 1.7$  °C) and the determination of the road-load is done in the same way determined at  $-7$  °C or adjusting the driving resistance for a 10% decrease of the coast-down time), there are important differences as well. In the USA the entire FTP testing procedure is used, while only the UDC is used in EU. The CFR 1066 procedure foresees the use of the vehicle's heater and defroster during the test, while the Type 6 test specifies that these auxiliaries should not be used.<sup>[7]</sup> Moreover, in the USA otto-cycle and diesel vehicles must be tested at low temperature.

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<sup>3</sup> Directive 98/69/EC of the European Parliament and of the Council of 13 October 1998, "Relating to measures to be taken against air pollution by emissions from motor 59 vehicles and amending Council Directive 70/220/EEC". Off. J. Eur. Un., L0069, pp1-65.

<sup>4</sup> Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and 61 commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information. Off. J. Eur. Communities L171/1; 2007.

<sup>5</sup> Commission regulation (EC) No 692/2008 of 18 July 2008 implementing and amending regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information. Off. J. Eur. Communities L199/1; 2008.

<sup>6</sup> <https://www.unece.org/fileadmin/DAM/trans/doc/2018/wp29grpe/GRPE-76-24e.pdf>

<sup>7</sup> US. EPA; <http://www.ecfr.gov/cgi-bin/text-id.x?SID=ba447754d6f766672ab21e5aa4146283&mc=true&node=pt40.33.1066&rgn=div5#sp40.37.1066.h>

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## Introduction

After the establishment in the Global Registry as GTR No. 15 in March 2014, ECE/TRANS/WP.29/AC.3/39 on the authorization to further develop the work on Phase 1b was adopted to solve the remaining issues of WLTP Phase 1a. WLTP Phase 1b activities were completed and amendments to GTR No. 15 were submitted in October 2015 to be considered at the GRPE January 2016 session.

An extension of the mandate for the WLTP IWG, sponsored by the European Union and Japan was granted to tackle the development of the remaining issues. Phase 2 activities started immediately after the endorsement of this authorization by WP.29 and AC.3 at their November 2015 sessions.

The scope of work in Phase 2 covered, among other issues, the effect of Low ambient temperature on emissions and range.

With this premises and since January 2017, the LowT TF has been working regularly **on a new Type 6 test to replace the Type VI test in UNR No. 83**. The work has been supported by a group of approximately 25 persons, including representatives from CP and stakeholders, which have been actively and regularly participating in the meetings and web-conferences. Along these years, the TF has hold forty three encounters, either face-to-face meetings (usually twice per year) or via telco/ web conference. During the last year, the TF hold nineteen encounters, including a face-to-face meeting during the 28<sup>th</sup> WLTP meeting in Bern in September and the intermediate WLTP in February 2020. The work was also complemented by intense collaboration with SG EV, where from fall 2019 until mid-2020 alone, about twenty-two encounters, including web conference, face-to-face and drafting meetings were hold and specifications for the low temperature test procedure for electrified vehicles, amongst others, were developed.

Early discussions in the preparation of the Terms of Reference (ToR) resolved that, as far as conventional vehicles are concerned, **the test procedure was meant to assess the impact of low temperature on the efficiency of after-treatment devices or other emission control technologies**.

In order to properly reflect the conditions that are encountered in real world winter conditions, the road load should be representative of the increased resistance to progress at low temperatures due to the higher air density and other factors (viscosity of transmission lubricant,...). A proper procedure to define the road load and consequently the dyno settings was developed.

Another element to be addressed was **whether the emissions should be predominantly measured during the cold start and immediately after or during the whole WLTC cycle**.

Moreover, **low temperatures largely affect the range of electrified vehicles as a consequence of a reduced efficiency of the battery**, and also due to the additional energy

consumption from auxiliaries (i.e. heating system). This aspect does not fall within the typical scope of the low temperature tests, especially due to the absence of exhaust emissions in the case of battery electric vehicles. However, this is an important element of the so-called ‘range anxiety’ which exists among potential EV consumers.

## **The mandate of the Low and realistic winter temperature TF**

According to the ToR.<sup>[8]</sup> The low and realistic winter temperature Task Force was preordained to:

- be open to all experts, stakeholders and CP representatives that have an interest in WLTP;
- be chaired by the European Commission;
- develop a harmonised low and realistic winter temperature test procedure (Type 6 test) for the assessment of the emissions (including CO<sub>2</sub>), vehicle fuel consumption and electric range, at low and/or realistic winter temperature
- propose a harmonised procedure to assess the impact of low temperatures on the range of electric vehicles for proper information of the consumers;
- act as a platform for the exchange of information and contributions of stakeholders, to be discussed and agreed during the development process;
- report to the WLTP-IWG on the progress;
- Deliver technical advice and make recommendations to the WLTP-IWG on the document strategy, i.e. a new GTR or an annex of the GTR No. 15. Provide a draft text and contribute to the drafting process.
- focus only on the technical issues regarding the procedure to be developed, while decisions are made at the WLTP-IWG level
- develop a proposal for the handling of families for low temperature requirements
- Promote interaction and exchange of information with other IWG Groups, sub-group and task forces, in particular with WLTP Sub-Group-EV and PMP- IWG.

The Task Force worked intensively to define the temperature for the procedure in order to be representative of low and/or realistic winter temperatures.

- Define the driving cycle to be used for the procedure at low and/or realistic winter temperature and more specifically whether the whole WLTC cycle should be used or a reduced part of it.
- Define the procedure for the adjustment of the road load and consequently of the dyno settings.

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<sup>8</sup> Reference Document WLTP-14-14e -; ToR of the task force Low and Realistic Winter temperature; Meeting 9th January 2017 – Geneva. Consolidated version on the 25<sup>th</sup> of January 2017

The work needed specific studies or requests from the experts in the task force, specifically regarding a/ the procedure for assessing the pollutant emissions in conventional and electrified vehicles (LowTemp-Emissions); b/ the procedure for assessing the impact of the low temperature test on the range of electrified vehicles (LowTemp-Range):

### **LowTemp-Emissions**

The scope was to develop a procedure to check specific emissions including CO<sub>2</sub>. The specific objectives were the following:

- Define the procedure to measure the distance specific emissions of the following compounds: total HC, CH<sub>4</sub> and NMHC, CO, NO<sub>x</sub>, CO<sub>2</sub> as well as PM and Particle Number, paying attention to the measurement procedures for those compounds not currently regulated at low temperatures.
- Define specific provisions for the low temperature procedure for diesel and hybrid vehicles where necessary.

### **LowTemp-Range**

The scope was set to develop a procedure to determine the impact on the range of electrified vehicles at low temperature. The specific objectives were the following:

- Assess whether the shortened procedure for PEV and OVC-HEV range measurement was appropriate at low temperatures or otherwise agree on a new procedure for range determination
- Develop a procedure to assess the impact of auxiliary systems (e.g. thermal comfort systems,...) on the energy consumption and the range of electrified vehicles

To reach the scope of the task force which can be adapted to the specific purpose of each deliverable.

- Start with an analysis of the existing normative and literature on the method;
- Prepare a comparative analysis amongst the different regional procedures;
- Propose a way forward for the development of a harmonized procedure, including considerations on whether there is need for experimental activities and to what extent;
- Develop the harmonized method;
- Validate the method

Under proposal of the LowT TF, to the WLTP, it was agreed to produce an optional annex to GTR No. 15. <sup>[9]</sup> Concerning the title of the GTR optional annex, it was agreed to name it

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<sup>9</sup>See comments in sheet 2019-05-16 & 2019-09-09:  
<https://wiki.unece.org/pages/viewpage.action?pageId=85295115>

“WLTP Low Temp”;<sup>[10]</sup> The members of the Low T TF also agreed that the name of the test should be "Type 6"<sup>[11]</sup>

The scope of the text and the application should be the same as the GTR No. 15; it should be applicable to all vehicle although it was agreed to exempt FCHV for the first version of the optional annex.<sup>[12]</sup>

#### **Key changes to the UNR No. 83 Type VI test include:**

- Drafting an **optional annex** to GTR No. 15 for low and realistic winter temperature
- Applicable **to all type of vehicles and fuels** (exempt FCHV for the first version of the optional annex)
- Purpose is to check compliance of pollutant emissions (THC, CH<sub>4</sub>, NMHC, CO, NO<sub>x</sub>, PM, PN) and provide information for CO<sub>2</sub>, FC, EC and range.

Considerations on family concept and the possibility of including simulation methods were the centre of intense and prolific discussions and were to be included in the optional annex. Nevertheless, a simulation method is currently not included.

During the definition of the scope of the Type 6 test, Contracting Parties indicated that the focus of this test was on criteria emissions for vehicles using internal combustion engines and energy consumption and range from electrified vehicles. Hence, for vehicles equipped with internal combustion engines the family was defined using the same criteria implemented in the PEMS family of the European and Global RDE. A series of adjustments were included to assure that the vehicle selected for the Type 6 test was previously tested over the Type 1 procedure. For pure electric vehicles new provisions that cover the main elements related to the impact of the temperature on energy consumption and range were defined.

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<sup>10</sup> <https://wiki.unece.org/pages/viewpage.action?pageId=85295115> (See comment in 2019-09-09)






<sup>11</sup> <https://wiki.unece.org/pages/viewpage.action?pageId=85295115> (See comments in 2019-04-17)

<sup>12</sup> <https://wiki.unece.org/pages/viewpage.action?pageId=85295115> (See comments in 2019-09-09)


## Analysis of the existing normative

To reach the scope of the task force, **there was an initial analysis of the existing normative** and literature on the method and it was prepared a comparative analysis among the different regional procedures (See figure below).

**Low  
Temperature  
Current  
legislation  
Worldwide**

	T C °	Cycle	Road-Load	Vehicles	Pollutants
	-7.0 ±3	UDC	Determined at -7 C or 10% reduction of coast-down time	<b>PI</b> including hybrids + information regarding NOx after-treatment for C.I.	HC, CO
	-7.0 ±3	UDC	"	"	THC, CO
	-7.0 ±1.7	FTP	Performing coast-down tests and calculating road-load coefficients	Otto-cycle and diesel including multi-fueled, alternative fueled, hybrid electric, and zero emission vehicles	NMHC, CO, CO <sub>2</sub> *
	-6.7	CVS-75		Gasoline + information regarding NOx after-treatment for C.I.	CO
	-7.0 ±3	Low+ Medium of WLTC	Determined at -7 C or 10% reduction of coast-down time	S.I.; C.I.; hybrids	THC, CO, NOx

\* CO<sub>2</sub> is analysed and results used for the determination of the vehicle fuel economy. Cold temperature standards apply for CO and NMHC emissions.



The work in the LowT TF needed also some specific studies from the experts in the group, specifically regarding the procedure for assessing the pollutant emissions in conventional and electrified vehicles as well as the procedure for assessing the impact of the low temperature test on the range of electrified vehicles. Experts in the LowT TF have also worked in the assessment of the impact of auxiliary systems (e.g. thermal comfort systems) on the energy consumption and the range of electrified vehicles. Besides, the TF has been working in the development of a proposal for the handling of families for low temperature requirements. Therefore, the TF has been acting as a platform for the exchange of information and contributions of stakeholders to be discussed and agreed during the development process.

Moreover, from the Chair of the TF, there has been an intense work of promotion of interaction and exchange of information with other IWG Groups, sub-groups and task forces, in particular with WLTP Sub-Group EV. The Chair has also been reporting regularly to the WLTP-IWG on the progress and decisions. On this respect, the TF has focused only on the technical issues regarding the procedure to be developed and delivered technical advice and made recommendations to the WLTP-IWG on the document strategy (an optional annex of the GTR No. 15) while decisions were made at the WLTP-IWG level. Finally, the Task Force was deeply committed to provide a draft text and contributed to the drafting process.



## **The Outcome: an “optional annex” for a new Type 6 test.**

The outcome of the work of the LowT TF is a document, which provides test procedures to test conventional and electrified vehicles at cold ambient temperatures to be added as a **new optional Low Temperature (Type 6) test to GTR No. 15.**<sup>13</sup>

During the work and drafting of that document, the LowT TF has confirmed the set point temperature for the procedure (-7°C) and the requirements that the new procedure of the Type 6 test would have in a new optional annex. The procedure follows GTR No. 15 and the Type 1 test, therefore, the new test is performed following the **WLTC**, replacing the NEDC (shorter and less realistic).

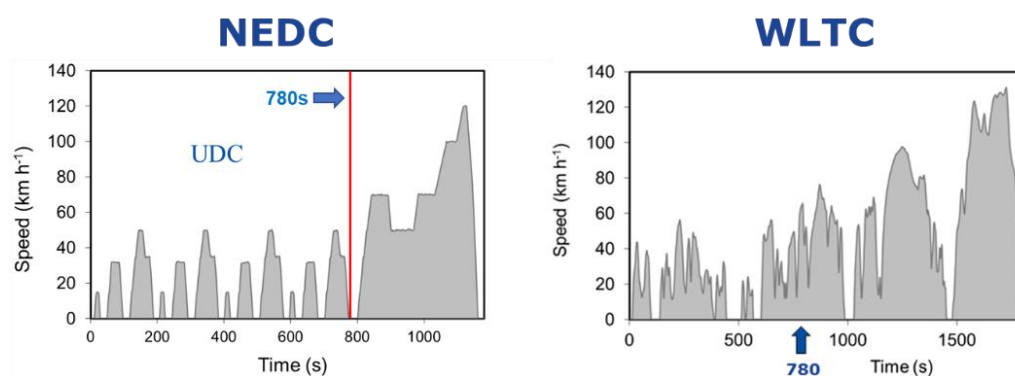


Figure 1 – Left panel: old test cycle for type approval in (NEDC) – Right panel: new text cycle (WLTC) for type approval

The **optional annex** was presented as “a working document” for its consideration, and previously to the delivery of the Working Document, due in March 2020, 20<sup>th</sup>

**200110 - Low Temp Annex based on ECE-TRANS-WP29-2019-62e.docx**<sup>14</sup>

**The approach has been to leave the Type 1 test paragraphs of Annexes 1 - 8 unaltered and to indicate in the optional annex where the Type 6 test would alter those requirements.** However, there were some Type 6 related elements, which were expected to be incorporated into the current GTR No. 15 sections. These included a definition of a Low Temperature Family in Section 5 of the GTR and specifications for Type 6 reference fuels in Annex 3.

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<sup>13</sup> The document is based on the text of GTRN<sup>o</sup>15 Amendment #5 as submitted for vote at the June 2019 session of WP.29.

<sup>14</sup> On January the 6<sup>th</sup>, 2020, Standard GTRN<sup>o</sup>15 text was deleted to just leave the Type 6 test relevant sections. **Document loaded in: <https://wiki.unece.org/display/trans/Optional+annex+Low+T+-+Drafting>**

The WLTP Low Temperature Type 6 test optional annex 13 describes the procedure for undertaking the Type 6 test defined in paragraph 6.2.4. of the GTR No. 15 Amendment 6. At the option of the Contracting Party this annex may be omitted. Fuel cell hybrid vehicles are currently exempted from the Type 6 test.

Type 6 test requirements state that the Type 6 should be undertaken according to the definitions, requirements and tests set out in paragraphs 3 to 7 of the UN GTR No. 15. Application and amendments to the requirements of Annexes 1 to 8 inclusive of the GTR No. 15 are now specified in paragraphs 2.1. to 2.7. of the optional annex 13.

Other premises in GTR No. 15 were identified to apply to the optional annex too, namely:

Worldwide light-duty test cycles (WLTC): The requirements of Annex 1 also apply for the purposes of the optional annex.

Gear selection and shift point determination for vehicles equipped with manual transmissions: The shifting procedures described in Annex 2 also apply with the following specific provision for Type 6 testing: It is allowed to set  $n_{\min\_drive}$  and ASM values which are different than those used for Type 1 testing.

Reference Fuels: The reference fuels to be used for the Type 6 test are those specified in Part II of Annex 3, or Part I if a reference fuel is not provided in Part II (e.g., reference diesel). At the option of the manufacturer and approval of the responsible authority a reference fuel as specified in Part I of Annex 3 may be used.

Road load and dynamometer setting: For the vehicle to be tested, the chassis dynamometer load setting determined according to paragraph 8.1.4. or paragraph 8.2.3.3. of Annex 4 is to be applied.

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## Main topics of the optional annex

N°	Discussion point	Conclusion
1	Test temperature	-7°C
2	Number of phases of the WLTC	EU 4 phases, Japan 3 phases.
3	Reference fuels	Specific provisions for gasoline, LPG and ethanol were added. In order to satisfy the specific requirements of bifuels testing and the switch from petrol to gas and the maximum allowed energy consumed by operation on petrol, it was indicated by OICA, and supported by Japan and EC to include these two elements using data provided after validation of the type 6 procedure, and including this point in the technical report.
4	Family definition	Based on PEMS family and Type 1 test. Focussed on pollutant emissions and electric range.
5	Use of auxiliary devices	Currently introduce the use of thermal comfort systems, Passing-beam (dipped-beam) headlamps and electrical system(s) to defrost. Other systems such as

		<p>radiant panels and heating seats will be addressed at a second stage.</p> <p>The work was divided in three steps:</p> <ol style="list-style-type: none"> <li>1. Assessment of auxiliaries to be included (Heating system for cabin, De-frosting/icing/fogging system, Thermal storage system, Battery Thermal Management system, Additional burners, Lighting, Infotainment equipment)</li> <li>2. Identify conditions to apply to a selected auxiliary in Assessment Matrix (preconditioning, soak, test)</li> <li>3. Procedure description for selected auxiliaries</li> </ol> <p>Initial orientations from Low Temp TF about the Test Procedure to include auxiliaries previewed:</p> <ol style="list-style-type: none"> <li>A. Auxiliary devices Test Procedure had to be as simple as possible to avoid test burden;</li> <li>B. Auxiliary devices should use the same procedure for different powertrains when/if possible;</li> <li>C. USA's procedure for auxiliary devices could be used as bases.</li> </ol>
6	Equipment	Make sure to avoid water condensation.
7	Soak	<ol style="list-style-type: none"> <li>1. A soak period prior to preconditioning was included.</li> </ol> <p>It was agreed to indicate that the soak before preconditioning may be omitted if the manufacturer can justify to the approval of the responsible authority that this soak will have negligible effects on the criteria emissions.</p> <ol style="list-style-type: none"> <li>2. A 12-36h soak period prior to test was agreed.</li> </ol>
	Soak before pre-conditioning	<p>At the request of the manufacturer, and with the approval of the responsible authority, the soak before preconditioning may be omitted if the manufacturer can justify that this soak will have negligible effects on the criteria emissions. As an example, the effects on the criteria emissions may be non-negligible in the case that the vehicle has an aftertreatment system that uses a reagent.</p> <p>Japan supports new EC proposal as long as this option shall not be applied for PEV and CD test of OVC-HEV.</p>
8	Road-load	Follow the approach of the Ambient Temperature Correction Test as used in the Euro 6 legislation.
9	Preconditioning	At -7°C.
10	Procedure for OVC-HEV	CD and CS testing was requested for OVC-HEV.
11	Calculation	Do not apply humidity correction.
12	Criteria for number of tests	Based on criteria emissions for vehicles with ICE, and on declared electric energy consumption and PER for PEVs.
13	HV battery charge	Starting within 1 hour after preconditioning.

14	Possible test sequence options for OVC-HEV testing	1. CD / 2. CS / 3. CD + CS / 4. CS + CD / 5. CS + CS / 6. CD + CD
15	Cycle for PEV	The PEV Type 6 test procedure consists of one dynamic segment (DS), followed by one constant speed segment (CSS), whereas the DS consists of (3) applicable WLTP test cycles (WLTC) in accordance with paragraph 1.4.2.1. of Annex 8 (Type 1).

During the development of a test procedure for PEV, applying the approach from Type 1 adapted for Type 6 conditions consecutive cycle test procedure/shorten test procedure (CCP/STP) was considered the best solution given the time constraints at this stage. The idea of a shortened or alternative STP was considered to be too premature for the implementation into a first working document. Furthermore, a shortened/alternative STP was recognized to have promising aspects to be discussed at a later stage, ideally for both, Type 1 and Type 6, in order to have the same procedure to be performed at both conditions.

Later in the development process and after scrutiny of test data by several stakeholders raising possible concerns with the original approach (see e.g. document WLTP-ITM-03e), guidance from WLTP IWG in the meeting on 20 February 2020 for SG EV was to focus on the development of an “alternative/shortened STP” (i.e. a specific PEV Type 6 test procedure).

Therefore, the PEV Type 6 test procedure was developed accordingly and now consists of one dynamic segment (DS), followed by one constant speed segment (CSS), whereas the DS consists of (3) applicable WLTP test cycles (WLTC) in accordance with paragraph 1.4.2.1. of Annex 8 (Type 1) of GTR No. 15.

## Traceability of the informal document and decision-making process

The informal document for an optional annex on low temperature has been built-up following a dedicated file containing all open-closed issues discussed in the TF. The evolution and construction of the informal document for the new technical annex of the Type 6 test can be followed by considering the excel file where all changes have been registered and appear with the date of the modification/agreement.

**WLTP\_Low\_Temp\_TF\_Status\_list\_v2020-xx-xx.xlsx**<sup>[15] [16]</sup>

<https://wiki.unece.org/display/trans/Optional+annex+Low+T+-+Drafting>

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<sup>15</sup> This serial number was continued and updated by the chair of the TF. In order to track the evolution of the discussions and decisions inside the LowT TF, all excel files detailing the **Low T TF status list** were saved and made available in CIRCAC-BC and in UNECE Wiki page dedicated the LowT TF (<https://wiki.unece.org/pages/viewpage.action?pageId=85295115>)

<sup>16</sup> This document was periodically updated by the drafting coordinator or by any of the Chairs for the LowT TF or the SGEV and always following the discussions in the lowT TF, the SGEV and corresponding drafting sub-groups. In order to track the evolution of the discussions and decisions, the files detailing the **progress in the drafting of the optional annex for lowT** were saved in a dedicated folder in UNECE Wiki page Low TF domain, created *ad-hoc* for this drafting process: <https://wiki.unece.org/display/trans/Optional+annex+Low+T+-+Drafting>

All main changes done in the text during the drafting of the informal document were indicated with margin notes and the latest are dated on the week previous to the delivery of the Informal document to the secretariat of the GRPE in January 2020. Comments were provided at the relevant points of Annexes 1-8 which have been identified as being areas of GTR No. 15 which may need to be amended via the Optional Annex.

The informal document of the Low Temp optional annex was presented as a Working Document by the WLTP IWG to the Secretariat of the GRPE on the 20<sup>th</sup> of March 2020. From that moment, the work in the Task Force continued to solve the remaining issues in open square brackets and the document updated regularly was named:

### **200xyy\_Status Square bracket topics\_Amd\_6 WD**

The new files following the discussions could be found in the same wiki page, <https://wiki.unece.org/display/trans/Optional+annex+Low+T+-+Drafting>

Final sessions (Tele conference) for the drafting of the optional annex took place on the 2<sup>nd</sup> and 3<sup>rd</sup> of June and the new and latest version of the

“200528\_Status Square bracket topics\_Amd\_6 WD\_20200604\_V4” was loaded in the folder

[LowT TF final drafting sessions \(Telco\)](#)

The very final version of the WLTP Low Temperature Type 6 test (optional annex) was uploaded to the UN Wiki for latest version of the GTR No. 15 Amendment 6 text, along with the documents Sub-Annex 1 (Pure electric and hybrid electric vehicles) to Annex 13, the Appendix 1 (REESS state of charge profile) and the Appendix 2 (Vehicle preparation, preconditioning and soaking procedure for Type 6 testing of OVC-HEVs, NOVC-HEVs and PEVs)

<https://wiki.unece.org/display/trans/GTR15+Amnd+6+Drafting>

### **Further improvements in Annex 13 of the GTR No. 15**

In the development process of the WLTP Low Temperature Type 6 test (optional annex 13), several critical decisions had to be taken in order to deliver the final text of the test procedure to be integrated into GTR No. 15 Amendment 6 on time. It also appeared to the experts involved, that there is room for improvement of the current text. Therefore, a possible update of the WLTP Low Temperature Type 6 test procedure for pure ICE and electrified vehicles based on a validation exercise could further improve Annex 13, as well as Annex 13 Sub-Annex 1 of GTR No. 15 Amendment 6.