WLTP DTP Lab Processes subgroup	
Title	Combined solution for vehicle test mass definition and inertia mass step-less approach
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Introduction

At the 7th DTP meeting (Sept 12-14, 2011) it was agreed in principle to accept the proposal from NL, T&E and ICCT on an improved definition of vehicle test mass as well as the proposal from ICCT to substitute the current step-based inertia class system by a step-less approach. Aquainted For details on the individual proposals see WLTP-DTP-LabProcICE-091 and the NL proposal. During the DTP meeting a combined solution for both proposals was discussed and agreed upon. It will be evaluated in validation phase 2 and further discussed at the next GRPE meeting in January 2012. In addition, during the LabProcICE meeting on 22-23 November 2011 a proposal was introduced by T&E to also include vehicle selection criteria for road load determination. This revised document explains the combined approach for vehicle test mass, inertia setting and road load vehicle selection.

Explanation of the approach

The following text aims at explaining the compromise solution found during DTP-07 so that it can be included in the test matrix for validation phase 2. Figures 1 and 2 illustrate the approach. Core of the approach described is to take into account optional equipment and other load for determining vehicle test weight and road load, as well as analytically adjusting CO_2 emissions for different test weights. This is to be carried out along the following steps:

1. From a group of vehicles with identical technically permissible maximum laden mass, engine capacity, maximum net power (where the maximum engine power would define a new type with regard to emissions), type of gearbox, number of gears and maximum number of seating positions the unladen mass (UM) of the empty vehicle including standard equipment is determined.
2. The maximum mass of optional equipment available for the group of vehicles is determined and added to UM. The result is the mass including all optional equipment for the heaviest vehicle (OM_H).
3. To the UM + OM_H a constant weight of 100 kg is added to account for the driver, some luggage and optional equipment installed by the owner which result in a heaviest reference mass (RM_H). In addition to this, a variable weight is added to account for passengers and additional luggage. For M1 vehicles this variable weight is defined as 15% of the difference between technically permissible maximum laden mass (LM_H) and the heaviest vehicle reference mass (RM_H). For N1 vehicles the factor is 35%. The result of UM + OM_H + 100 kg + variable weight is the test mass of the heaviest vehicle (TM_H).
4. TM_H is used for both CO_2 and non-CO_2-emission measurements as well as determining road load coefficients. The vehicle selected for road load determination should have a mass equal to TM_H and all of the options that negatively influence the air resistance installed (worst case condition). If the mass of optional equipment offered for the group of vehicles is less than 100 kg, then the manufacturer may decide to only use TM_H to determine CO_2 emissions and steps 5-6 are obsolete.
5. To UM a constant weight of 100 kg is added as well as the variable weight for the heaviest vehicle as defined in step 3. The result is the test mass of the lightest vehicle (TM_L) that does not have any optional equipment. It is up to the manufacturer to decide if another set

Comment [I1]: As an alternative, we may also let the manufacturer decide if he wants to test at TM_L. In that case we only have to say that it is not obligatory to do the separate CO2 measurement

of road load coefficients at TM_L, in addition to TM_H. The vehicle selected for road load determination should have a mass equal to TM_L and no options that negatively influence the air resistance installed (best case condition).

6. Based on TM_L and TM_H a linear regression line for CO_2 over vehicle test weight is determined. This relationship is specific for a group of vehicles. It can be extrapolated by up to [50 kg]. If the manufacturer foresees that future options may add more weight, he may choose to select a test mass higher than TM_H, in order to allow these options being covered by the type approval. Making use of the determined regression line, CO_2 emissions for all other vehicles within the respective group of vehicles can be calculated.

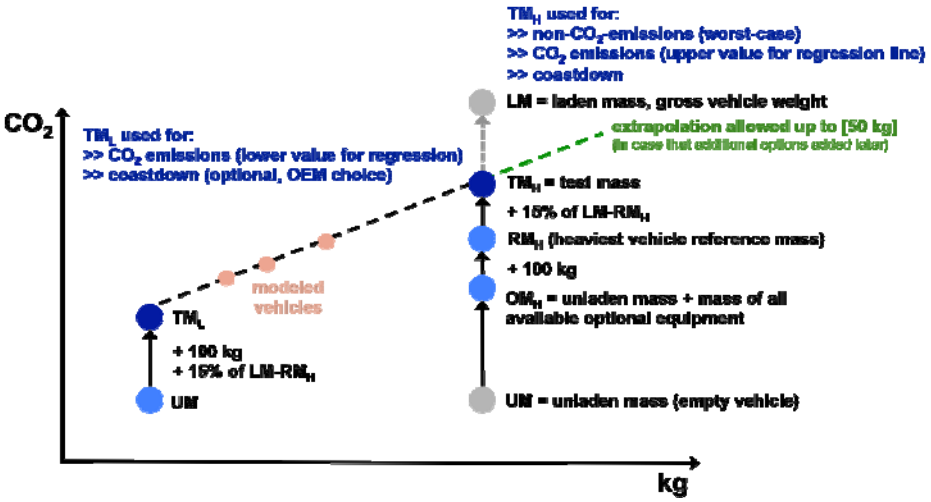

Figure 1: *Illustration of combined vehicle test weight and step-less inertia approach*

Definitions

- *Unladen mass (UM):* The mass of the vehicle in running order without driver, passengers or load, but with the fuel tank 90 per cent full and the usual set of tools and spare wheel on board, where applicable.
- *Standard equipment:* The basic configuration of a vehicle including all features that are fitted without giving rise to any further specifications on configuration or equipment level but equipped with all the features that are required under the regulatory acts.
- *Optional equipment:* All the factory-fitted features under the manufacturer's responsibility, not included in the standard equipment that can be ordered by the customer.
- *Mass of optional equipment:* Mass of the equipment which may be fitted to the vehicle in addition to the standard equipment, in accordance with the manufacturer's specifications.
- *Mass including all optional equipment (OM):* Unladen mass plus mass of all optional equipment
- *Technically permissible maximum laden mass (LM):* Maximum mass allocated to a vehicle on the basis of its construction features and its design performances.
- *Test mass (TM):* Mass of the vehicle used for road load determination, and the inertia that needs to be set at the chassis dynamometer for emission measurements.

Figure 2: Schematic illustration of required steps for the suggested approach