

UN Regulation No. 179

Wheel load used during brake corner
emissions testing

BACKGROUND

<Background>

Brake corner emissions family parent for all vehicles with an identical brake assembly is defined according to highest product $WL_t * c$ where c is the friction braking share coefficient (c -factor) and WL_t the test wheel load.

<Goal>

1. At the choice of the manufacturer, allow to use the highest test wheel load and not the wheel load of the family parent.
2. At the choice of the manufacturer, avoid unnecessary testing in case a new family parent is introduced with lower test wheel load.

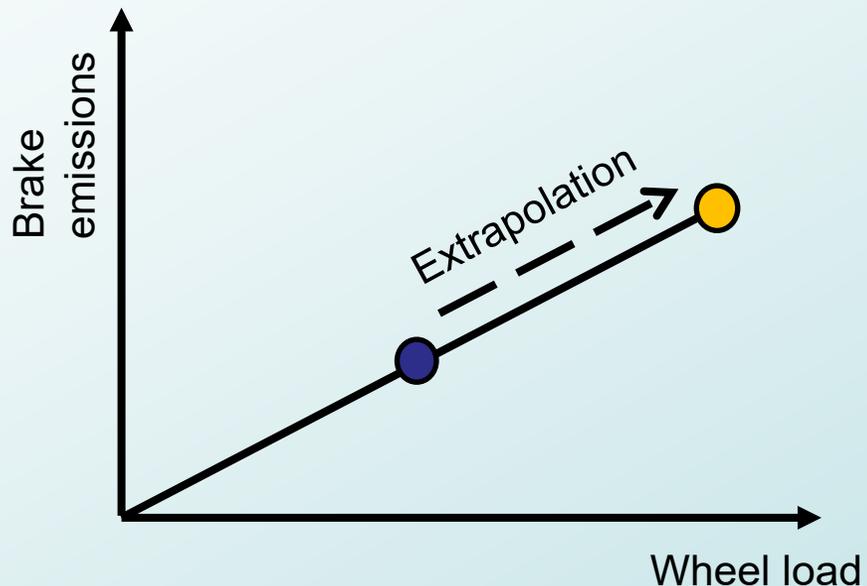
7.2.2. USAGE OF HIGHEST TEST WHEEL LOAD

Case 1: Manufacturer is certain of different powertrain types introduced under the same brake corner emissions family introduced at the same time or approximately at the same time.

Year 20xx or Year 20xx + ...

Powertrain type	Wheel load [kg]	c-factor [-]	[WL]*c-factor	Family parent
● BEV	771	0.17	131.07	-
● NOVC-HEV	700	0.52	364.00	□

Concern: Testing without the highest family wheel load, may cause to extrapolate results.



7.2.2. Brake Corner Emissions Family Parent

For all vehicles with an identical brake assembly as described in paragraph 7.2.1., the vehicle with the highest product of friction braking share coefficient (c-factor fixed as of Table 4 or vehicle specific as of Annex 5) and test wheel load as defined in paragraph 3.1.14. ($WL_i * c$) shall be selected as the parent of the brake corner emissions family.

The product of the friction braking share coefficient and test wheel load shall be used only to identify the brake corner emissions family parent and not as input parameter when testing the brake assembly for its emissions.

The friction braking share coefficient for each vehicle electrification type in the scope of this Regulation is given in Table 4. If the product of the test wheel load and the friction braking share coefficient is the same for two or more vehicles of the same brake corner emissions family, the manufacturer shall select the vehicle with the smallest tyre dynamic rolling radius as the brake corner emissions family parent.

At the request of the manufacturer and in agreement with the type approval authority, the highest test wheel load among vehicles with an identical brake assembly as described in paragraph 7.2.1. may be selected as input parameter when testing the brake assembly for its emissions. In this case, the emission factor $EF_{FA,ref}$ or $EF_{RA,ref}$ and wheel load $WL_{FA,ref}$ or $WL_{RA,ref}$ from this test, shall be considered as the reference parameters to be used in Eq. 7.2 and Eq. 7.3.

At the request of the manufacturer the wheel load of the dedicated brake corner emission family parent may be increased to cover wheel load increases or wheel load uncertainties of future vehicles of the same type or friction braking share coefficient variances. The brake corner shall then be tested on the brake component test stand with this increased wheel load. The test wheel load multiplied by the friction braking share coefficient of any member of the brake corner emissions family shall not be more than 10 % of the original parent product value. This increased value will become the new determining parent product value.

7.2.3. AVOID UNNECESSARY TESTING

Case 2: Manufacturer is not certain of different powertrain types introduced under the same brake corner emissions family introduced at the same time or approximately at the same time.

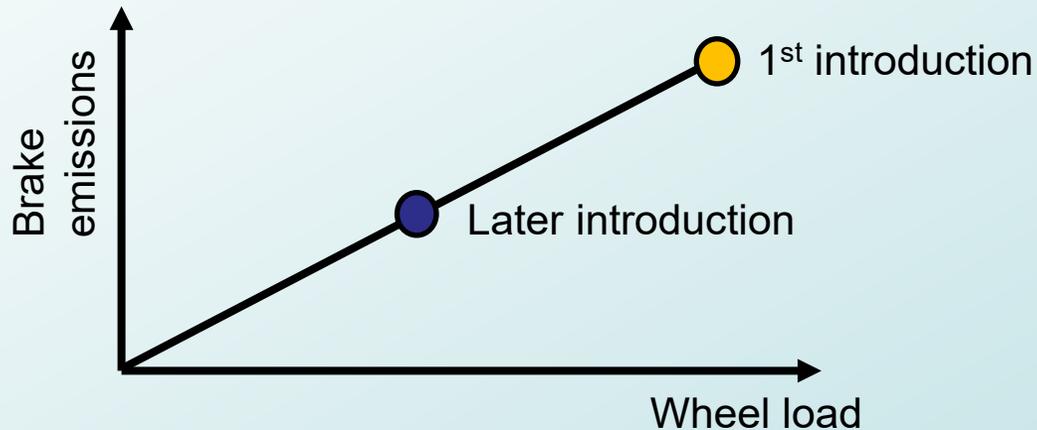
Year 20xx

Powertrain type	Wheel load [kg]	c-factor [-]	[WL]*c-factor	Family parent
● BEV	771	0.17	131.07	☐

Year 20xx + ...

Powertrain type	Wheel load [kg]	c-factor [-]	[WL]*c-factor	Family parent
● BEV	771	0.17	131.07	-
● NOVC-HEV	700	0.52	364.00	☐

Concern: Due to the introduction of a new family parent, retesting would be necessary despite lower wheel load. Family parent is function of product's introduction timing.



7.2.3. Brake Corner Emissions Family Testing

The brake assembly of original and original replacement brake systems shall be tested on the test stand using the test wheel load, as described in paragraph 8.1. of Annex 4, corresponding to the brake corner emissions family parent.

Original and original replacement brake parts (discs, pads, drums, shoes) shall be tested on the test stand coupled with the corresponding original brake part (e.g. an original brake pad shall be used to test an original replacement brake disc). The test wheel load, as described in paragraph 8.1. of Annex 4, that corresponds to the brake corner emissions family parent shall be applied. **In case in an existing brake corner emissions family a new parent shall be defined due to higher product of $WLt*c$, if the test wheel load of the new family parent is lower than the test wheel load of the existing family parent, brake corner emissions testing with the test wheel load of the new family parent may be omitted.**

The final brake PM and PN emission factors for the brake corner emissions family parent are calculated after multiplying the reference PM and PN emissions of the tested brake with the friction braking share coefficient of the brake corner emissions family parent vehicle as described in paragraphs 12.1.5. and 12.2.4. of Annex 4, respectively.



- The author and the speaker of this document/presentation confirm that they have authorization to use all content including photos and visual elements.
- The material is either copyright-free or the author/speaker hold the necessary copyright or permission.
- The UNECE will remove any material from its events and supporting websites if there is unlawful use of copyrighted material.
- The author/speaker takes responsibility for any infringement on copyright and holds the UNECE harmless to this effect