

1. TYPE 6 FAMILY BUILDING

A Type 6 family shall comprise finished vehicles with similar emission characteristics. Vehicle emission types may be included in a Type 6 family only as long as the completed vehicles within a Type 6 family are identical with respect to the characteristics in point 1.1.

1.1 **Technical criteria**

1.1.1. Propulsion type (e.g. ICE, NOVC-HEV, OVC-HEV)

1.1.2. Type(s) of fuel(s) (e.g. petrol, diesel, LPG, NG, ...). Bi- or flex-fuelled vehicles may be grouped with other vehicles, with which they have one of the fuels in common.

1.1.3. Combustion process (e.g. two stroke, four stroke)

1.1.4. Number of cylinders

1.1.5. Configuration of the cylinder block (e.g. in-line, V, radial, horizontally opposed)

1.1.6. Engine volume

The vehicle manufacturer shall specify a value V_{eng_max} (= maximum engine volume of all vehicles within the Type 6 family). The engine volumes of vehicles in the Type 6 family shall not deviate more than – 22 % from V_{eng_max} if $V_{eng_max} \geq 1\,500$ ccm and – 32 % from V_{eng_max} if $V_{eng_max} < 1\,500$ ccm.

1.1.7. Method of engine fuelling (e.g. indirect or direct or combined injection)

1.1.8. Type of cooling system (e.g. air, water, oil)

1.1.9. Method of aspiration such as naturally aspirated, pressure charged, type of pressure charger (e.g. externally driven, single or multiple turbo, variable geometries ...)

1.1.10. Types and sequence of exhaust after-treatment components (e.g. three- way catalyst, oxidation catalyst, lean NO_x trap, SCR, lean NO_x catalyst, particulate trap).

1.1.11. Exhaust gas recirculation (with or without, internal/external, cooled/non- cooled, low/high pressure)

1.2. **Extension of a Type 6 family**

An existing Type 6 family may be extended by adding new vehicle emission types to it. The extended Type 6 family and its validation must also fulfil the requirements of points 1 and 2. This may in particular require the Type 6 testing of additional vehicles to validate the extended Type 6 family according to point 2.

1.3. **Alternative Type 6 family**

As an alternative to the provisions of point 1.1 the vehicle manufacturer may define a Type 6 family, which is identical to a single vehicle emission type.

2. Selection of vehicles for Type 6 testing when validating a Type 6 family

By selecting vehicles from a Type 6 family it should be ensured that the following technical characteristics relevant for pollutant emissions are covered by a Type 6 test. One vehicle selected for testing can be representative for different technical characteristics. For the validation of a Type 6 family vehicles shall be selected for Type 6 testing as follows:

- 2.1. For each combination of fuels (e.g. petrol-LPG, petrol-NG, petrol only, **ethanol-petrol, diesel-biodiesel**), on which some vehicle of the Type 6 family can operate, at least one vehicle that can operate on this combination of fuels shall be selected for Type 6 testing.
- 2.2. The manufacturer shall specify a value PMR H (= highest power-to-mass- ratio of all vehicles in the Type 6 family) and a value PMR L (= lowest power-to-mass-ratio of all vehicles in the Type 6 family). Here the ‘power-to-mass-ratio’ corresponds to the ratio of the maximum net power of the internal combustion engine as: Rated engine power: kW at min⁻¹ (manufacturer's declared value) and of the reference mass, where “reference mass” means the mass of the vehicle in running order less the uniform mass of the driver of 75 kg and increased by a uniform mass of 100 kg. At least one vehicle configuration representative for the specified PMR H and one vehicle configuration representative for the specified PMR L of a Type 6 family shall be selected for testing. If the power-to-mass ratio of a vehicle deviates by not more than 5 % from the specified value for PMR H, or PMR L, the vehicle should be considered as representative for this value.
- 2.3. At least one vehicle for each transmission type (e.g., manual, automatic, DCT) installed in vehicles of the Type 6 family shall be selected for testing.
- 2.4. At least one four-wheel drive vehicle (4x4 vehicle) shall be selected for testing if such vehicles are part of the Type 6 family.
- 2.5. For each engine volume occurring on a vehicle in the Type 6 family at least one representative vehicle shall be tested.
- 2.6. At least one vehicle for each number of installed exhaust after-treatment components shall be selected for testing.
- 2.7. Notwithstanding the provisions in points 2.1 to 2.6, at least the following number of vehicle emission types of a given Type 6 family shall be selected for testing:

Number N of vehicle emission types in a Type 6 family	Minimum number NT of vehicle emission types selected for Type 6 testing
1	1
from 2 to 4	2
from 5 to 7	3
from 8 to 10	4

from 11 to 49	$NT = 3 + 0,1 \times N (1)$
more than 49	$NT = 0,15 \times N (1)$
⁽¹⁾ NT shall be rounded to the next higher integer number.	