

Family definitions – Proposal for amendment

Annex 4 – Open Issues Task Force

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Observed issues in family definitions

Family definition analysis

Results matrix – Principle

Characteristics/ Detailed definition	Uncertainties/ Issues	One column for each family in GTR 15, R83, EC No 1151/2017	
<ul style="list-style-type: none"> • Combustion process • Fuel system • EGR type • n/v ratios • ... 		<ul style="list-style-type: none"> • Identical • Identical • Identical • n/a • ... 	<ul style="list-style-type: none"> • n/a • n/a • n/a • $\Delta n/v \leq 8\%$ • ...

Family definition analysis

Observed issues

Undefined terms, e.g.

- 'Engine technology'; 'Combustion type'...

Multiple terms for similar characteristics, e.g.

- 'Engine displacement' vs 'Engine volume' vs 'Cylinder capacity'...

Ambiguous definitions, e.g.

- EGR type defined as
 - 'With/without, cooled/uncooled' (ATCT family)
 - 'With/without, cooled/uncooled, LP/HP, internal/external' (PEMS test family)

Reference values not defined or unclear, e.g.

- Catalyst volume +/- 10% (Ki family), Temperature at reference speed (Ki family)...

Various levels of detail and grouping

- 'Type of internal combustion engine' comprises e.g. fuel type, engine displacement
- Other families use these terms as separate characteristics

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Goals of the proposal

Goals:

- The family definitions shall be
 - Robust, i.e. unambiguous, complete and consistent
 - Technology neutral
- The developed methodology and structure shall be suitable for all family definitions

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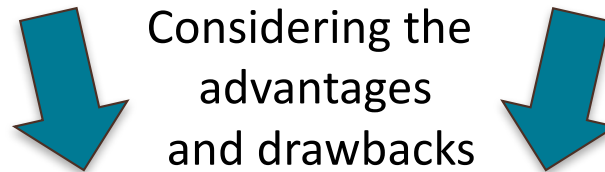
Initially 2 approaches were considered

Approach 1:

Harmonize and clarify the terms used for the definition of the families

Approach 2:

Define the functionality of each family and specify measurable parameters to determine if a vehicle belongs to the family or not



Proposed Approach:

- Define the currently used terms for family definitions:
 - Where fitting, harmonize
 - Otherwise differentiate
- Complement the family definition by adding the functionality of the family

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Advantages of proposed approach

Advantages

- When the family reference vehicles are known it can easily be checked if a vehicle can be member of this family or not
- Vehicles with technologies not yet known can be assigned to the family when fulfilling the family functionality
- Both the functionality of the family as well as the justification for a family membership are transparent

Proposal for amendment: Example: Road load family

Family name	Road load family	
Functionality	<ul style="list-style-type: none"> The road load parameters of any member of the road load family shall be determinable by linear interpolation between two reference vehicles in such a way that the cycle energy derived from the interpolated road load parameters is expected to be equal or higher than the actual cycle energy of the respective vehicle. If tested, the ratio of the cycle energy derived from the interpolated road load parameters and the actual cycle energy of the respective vehicle shall be $\geq [0.xx]$ 	
The family functionality is considered fulfilled if at least the following characteristics meet the matching requirements	Characteristics*	Matching requirement*
	<ul style="list-style-type: none"> Transmission type and model n/v ratios Number of powered axles Electrical machines 	<ul style="list-style-type: none"> Same or lower power losses delta n/v to most commonly installed transmission is $\leq 25\%$ for all transmission ratios Identical Identical...
	<ul style="list-style-type: none"> Vehicles with technologies not covered by the list above can be grouped in the family if the manufacturer can demonstrate that the vehicle fulfills the family functionality 	

Proposal for amendment: Status

Status

- Proposal was presented to Annex 4 Task Force on Sept 6th 2017
- It was decided to bring the following request to IWG

Request to Informal Working Group

- Approve the proposed approach for the GTR in principle
- Confirm that the detailed proposals for each family should be reviewed and refined by experts

Other observed issues

Differences in GTR15 and EC 2017/1151 (EU-WLTP)

- Criteria emissions of interpolation family:
 - GTR15 – ICE: Arithmetic average of vehicle L and H (OR can be omitted)
 - GTR15 – HEV's: Maximum value of vehicle L and H (and M if applicable)
 - EU-WLTP – ICE/HEV: Maximum value of vehicle L and H
- Interpolation and vehicle classes:
 - GTR15: Vehicles may belong to different vehicle classes
 - EU-WLTP: Vehicles must belong to same vehicle class

Thank you very much for your attention!

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