Motivation and current status of technology:

Dispensers designed for refuelling light duty vehicles are usually equipped with precooling for fast fills, but they might also have (or should have) the capacity to fill larger tank volumes for e.g., heavy-duty vehicles. In this case the refuelling performance might be limited, resulting in a lower SOC (if the onsite storage is not sufficient) and/or longer fueling times (because the fueling speed is limited to 60 g/s). Furthermore, the precooling system design is not necessarily suitable for large fills.
Nevertheless, the capabilities of LDV dispensers might provide enough possibilities to enable backup fills of heavy-duty vehicles in the future with the already available HRS network.
Currently, there are no standardized H35 protocols for fuel tanks larger than 250L, except for

- H35 CEP protocol, which is specifically designed for tank system sizes of 20 to 42,5 kg and 120 g/s peak flowrate and
- SAE J2601-5 TIR, which is also specifically for above 120 g/s.

Content of SAE J2601-1 :2020 protocol and possible implementation of category D for H35

The 2020 version of the refuelling protocol for light duty vehicles includes a path for refuelling heavy duty vehicles for H70 known as category D but not for H35 as shown in table 4.

Pressure Class	Total Amount of Hydrogen in CHSS at 100% SOC (kg)	Water Volume of CHSS (L)	CHSS Capacity Category Identifier
H35	1.19 to 2.39	49.7 to 99.4	A
H35	2.39 to 4.18	99.4 to 174.0	B
H35	4.18 to 5.97	174.0 to 248.6	C
H70	2.00 to 4.00	49.7 to 99.4	A
H70	4.00 to 7.00	99.4 to 174.0	B
H70	7.00 to 10.00	174.0 to 248.6	C
H70	>10.00	>248.6	D

Table 4

This results in having no table defined for H35 category D fuelling.

Nevertheless the logic to define the pressure ramp rate is the same as for H70, using ambient temperature and a reduction factor compared to the reference tank volume of 248.6 L. Applying the same MC formula protocol logic, a pressure ramp rate for refuelling category D can be defined for H35.

Moreover, the target pressure for refuellings whether with or without communication and the fill pressure limit (with communication) as in SAE J2601 section J.2.7.2 can be defined with the same calculation methodology. This calculation is not specific to H70.

WARNING:

- This proposal is limited and does not account for future and upcoming vehicles with single CHSS volume larger than 248.6L. This is proposed for SAE J2601-5 and the next SAE J2601 revision will address this issue. (For fuelling up to 350 bar, the overheating risk with MC Formula hypothesis is smaller as for H70)
- Non-Communication:
    - it needs to be considered that the volume measurement might not be precise enough, as the injected mass at the beginning may be too small to determine the volume accurately. This can lead to excessive flowrates in case the volume is under-estimated
    - the state of charge upon reaching the non-comm target pressure will be low, as the pressure drop between the dispenser and the CHSS is considerable while delivering close to the peak flow rate during a H35 fuelling

The CEP proposes this approach as a bridging solution until SAE J2601 and SAE J2601-5 have treated the Category D for H35 refuellings and peak flowrates below 60 g/s.