Submitted by the experts of OICA

Informal Document: ACSF-15-09

Maximum allowable Override Force

Industry input to ACSF IG
15th meeting
2017, October 22-24, Bonn

v2

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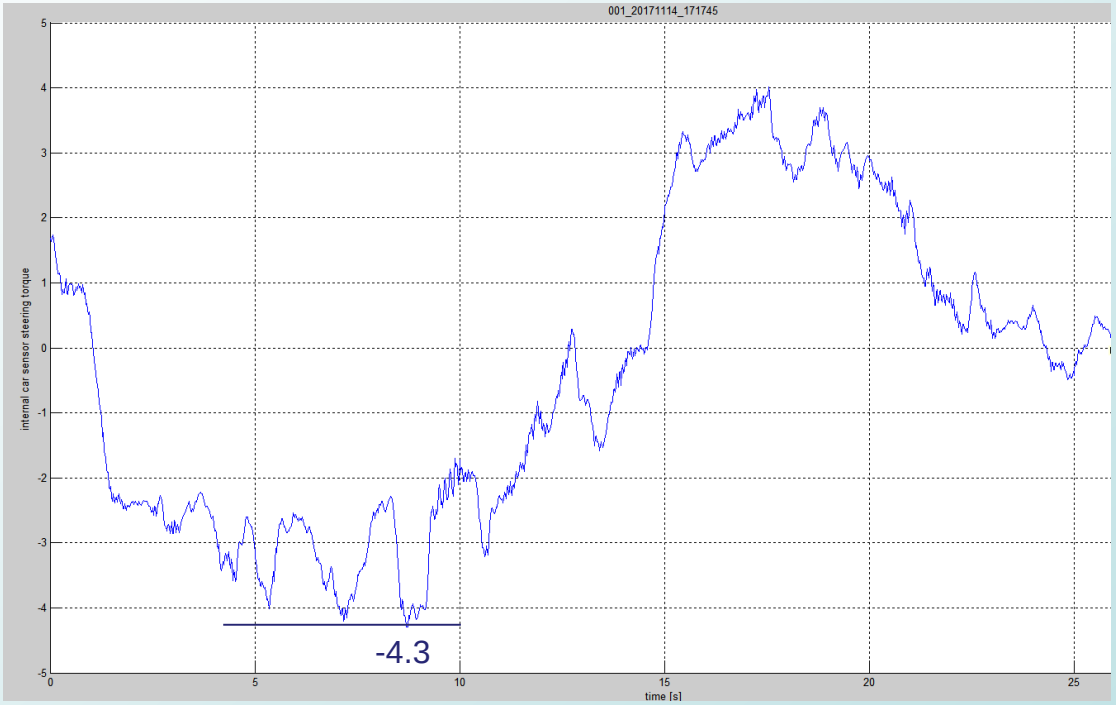
The following requirement is proposed to be carried over from series 02 to ACSF C1 and ESF amendments:

A steering input by the driver shall override the steering action of the system. The steering control effort necessary to override the directional control provided by the system shall not exceed [30 or 50] N.

Question for IWG:

What is the appropriate value for the maximum allowable override force?

Measurement
Manual driving - Curve



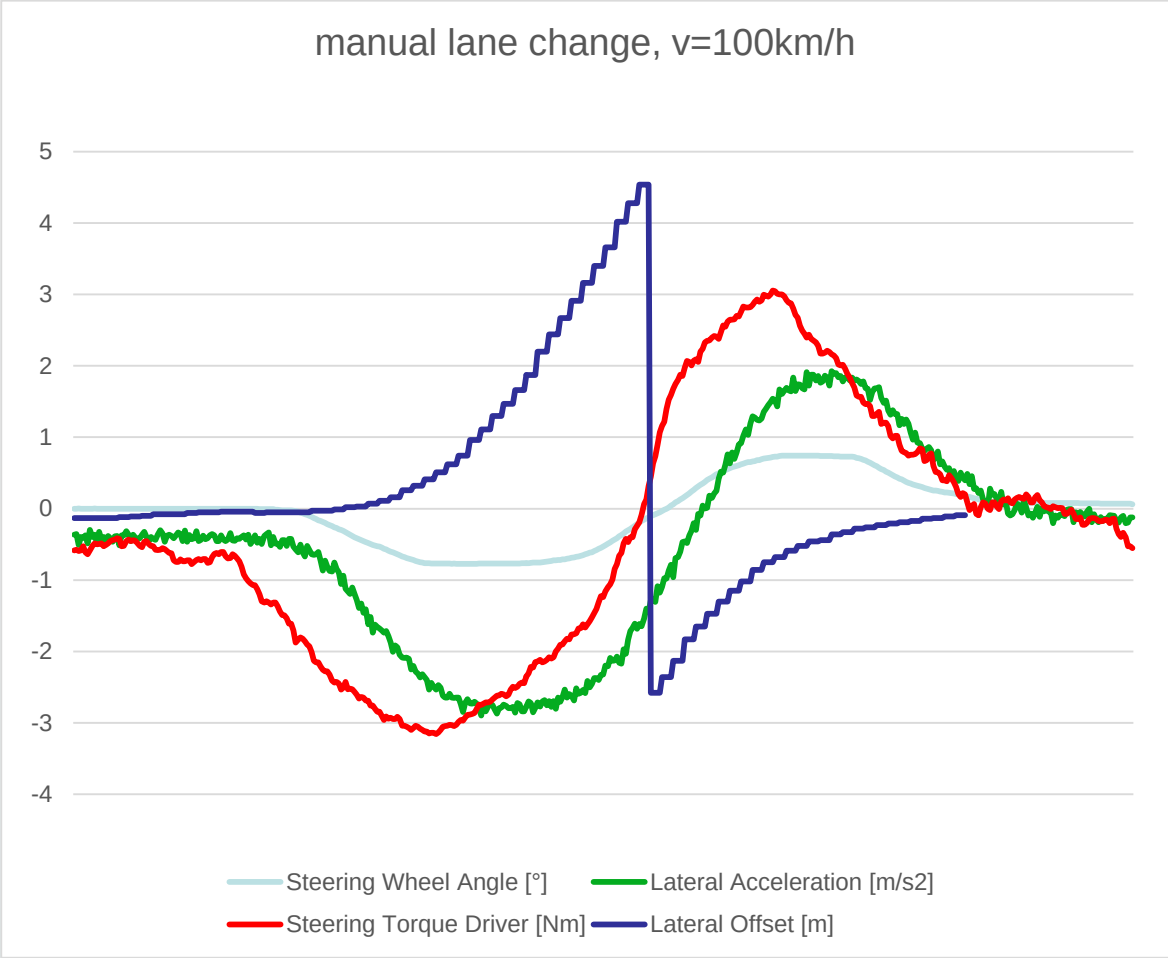
- Rural road
- Curve with radius ~160/110m
- Speed ~85km/h
- Measurement on vehicle A

Maximum value at Steering torque sensor = -4.3Nm

Calculation of the steering forces based on steering wheel radius r = 0.15m

<u>Fmax = 28.6N</u>

Measurement
Manual driving - Lane change



- Rural road
- Straight
- Speed ~ 100km/h
- Measurement on Vehicle B

Maximum value at Steering torque sensor = -3.2Nm

Calculation of the steering forces based on steering wheel radius r = 0.15m

<u>Fmax = 21.3N</u>

Comments to ROK Study (ACSF-13-06)

ROK proposed that the maximum override force to not exceed 30N.

This proposal is based on the steering wheel forces collected whilst driving at 10km/h around a 12m radius circle.

The force values experienced where between 9N and 25N.

Industry do not believe that this study is directly applicable for this debate as the test scenario does not represent the ACSF C use cases:

- At lower speeds the torque assistance through the EPS is at its highest.
- Unreal road condition (test track – flat and smooth surface)
- No dynamic effect (“quasi-static” steering wheel actuation)

Alternative to a fixed maximum allowable override force

Industry was invited by GRRF chair to explore the possibility of defining the maximum override force as a percentage (e.g. 150%) of the actual force to be applied by the driver to turn the steering wheel.

Industry does not see a good potential for this proposal:

- Several factors can influence the force: e.g. vehicle speed and load, a static or dynamic application of the steering force, the type of assistance.
- A varying override force during a manoeuver may be misleading for the driver.
- Complex control algorithm.
- Difficult to check at type approval.

A fixed maximum value is more suitable.

Override Force - Conclusions

A steering input by the driver shall override the steering action of the system. The steering control effort necessary to override the directional control provided by the system shall not exceed [30 or 50] N.

Question for IWG:

What is the appropriate value for the maximum allowable override force?

Answer: 50N is appropriate.

Rationale:

- Data shows in real driving conditions (Speeds applicable to ACSF C) steering forces are close to 30N.
- Manufacturers need to be allowed to use override forces higher than normal driving forces to prevent false detection of overriding.
- The requirement is a maximum override force - manufacturers may chose to go lower.
- The margin between normal driving conditions and maximum overriding force should be greater for emergency manoeuvres (ESF).