6th ACSF meeting
Tokyo, 19-21 April 2016

Industry proposal
Low Speed Systems < 60 kph Category B2

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5.6.1.1.4.1 The specified maximum lateral acceleration aysmax shall not have a value of more than 3 m/s2. Additionally, in case $v_{S,max}$ is greater than 60 km/h, $a_{yS,max}$ shall not be less than 1 m/s².

Justification:

The range of recommended design speeds in km/h on international roads is as follows:

Motorways	x	80	100	120	140
Express roads	60	80	100	120	x
Ordinary roads	60	80	100	x	x

Design speed (km/h)		60	80	100	120	140
Minimum radii in plane (corresponding to maximum superelevation 7%)		120	240	**450**	650	1 000
Maximum gradient (percentage not to be exceeded)*		8	7	6	5	4
Maximum longitudinal gradient in new tunnels**		**5**	**5**	**5**	**5**	**5**
Minimum radii at the highest point of the vertical alignment (in m)	One-way	1 500	3 000	6 000	10 000	18 000
	Two-way	1 600	4 500	10 000	-	-
Minimum radii at the lowest point of the vertical alignment		1 500	2 000	3 000	4 200	6 000

Source: ECE-TRANS-SC1-384e - EUROPEAN AGREMENT ON MAIN INTERNATIONAL TRAFFIC ARTERIES (AGR)

Vsmax:

30 km/h: radius 240m = lateral acceleration is 0,289 m/s²

30 km/h: radius 650m = lateral acceleration is 0,107m/s²

60 km/h: radius 240m = lateral acceleration is 1,158m/s²

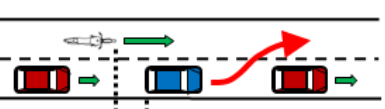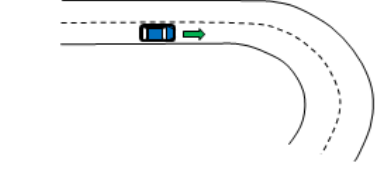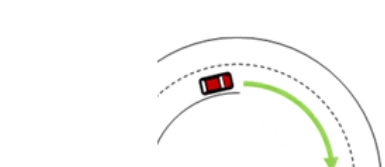60 km/h: radius 650m = lateral acceleration is 0,428m/s²

➢ Simplified calculation excluding e.g. Gradient

Conclusions:
- **A low speed in a typical curve that can be found of a motorway will generate very low decelerations.**
- **Such low values of lateral acceleration (e.g. 0.2 m/s²) are very difficult to measure.**
- **From a practical standpoint, and given the lower criticality of the function at low speed (e.g. for a traffic jam assist), industry sees no necessity to define a minimum value for the lateral acceleration for maximum speed lower than 60km/h.**

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Neccesity of Tests for low speed systems Vsmax < 60 km/h

Tests for category E	
FU1 Lane keeping	➤ necessary, but with lower /other value of lateral acceleration
FU2 Abort of lane change	➤ Not necessary, no lane change on B2 e.g. traffic jam assist
FU3 Lane change	
TR1 Lateral acceleration exceeded	➤ Not necessary, the system boundary of max. lateral acceleration of this systems is 1 m/s² on Highways
TR2 Missing marking	➤ necessary, but with lower /other value of lateral acceleration

Lateral accelerations from slide 2:

Vsmax:

30 km/h: radius 240m = lateral acceleration is 0,289 m/s²

30 km/h: radius 650m = lateral acceleration is 0,107m/s²

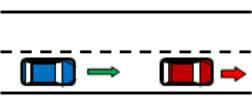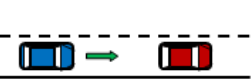**60 km/h: radius 240m = lateral acceleration is 1,158m/s²**

60 km/h: radius 650m = lateral acceleration is 0,428m/s²

> Simplified calculation excluding e.g. gradient

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Neccesity of Tests for low speed systems Vsmax < 60 kph

TR3 Driver not available		➢ necessary, but with lower /other value of lateral acceleration
TR4 Failure		
TR5 Taking over steering task by driver		
EM1 Moving target (decel. 6 m/s²)		➢ Not necessary for systems Vsmax < [50 kph], reflecting the Issue „measurability acceleration of 6 m/s²"
EM2 Stationary target		➢ necessary

Lateral accelerations from slide 2:

Vsmax:

30 km/h: radius 240m = lateral acceleration is 0,289 m/s²

30 km/h: radius 650m = lateral acceleration is 0,107m/s²

60 km/h: radius 240m = lateral acceleration is 1,158m/s²

60 km/h: radius 650m = lateral acceleration is 0,428m/s²

> Simplified calculation excluding e.g. gradient

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5.6.1.4.2.3

In case of a sudden unexpected event without imminent danger of a collision a transition demand shall be given immediately and the system shall follow the initial path ~~and shall not cross any lane marking~~ for at least [4 s] after the transition demand, in the following cases

• if the speed of the vehicle with activated ACSF exceeds vsmax ~~+ 5 km/h, or a transition demand shall be given immediately and the.~~

• if the vehicle with activated ACSF [with Vsmax higher than 60 km/h] ~~and~~ reaches a lateral acceleration of more than aysmax , or ~~3 m/s² a transition demand shall be given.~~

• if a system boundary is reached due to a missing lane marking, or

• if a single sensor failure occurs.

Justification:

For a lateral acceleration of 3 m/s², the radius must be lower than 92m. The maximum lateral acceleration is lower than 1,2 m/s² for low speed systems (Vsmax is 60 km/h or lower).