

2.6. Driver Availability Recognition

2.6.1. The activated system shall be able to detect if the driver is available to take over control on demand and shall therefore permanently monitor that the driver is awake and present in the driver's seat.

2.6.2. As soon as the driver [is no longer detected to be available], the system shall issue an optical and additionally an acoustic and/or haptic warning. If this warning continues, a transition demand (as specified in section 2.7.) shall be initiated latest after [5] seconds.

The warning may be terminated as soon as the system has detected that the driver is available again.

2.6.3. The manufacturer shall declare appropriate means to detect the driver's availability to take over control on demand to the technical service during type approval.

2.7. Transition Demand and System Operation during Transition phase

2.7.1. The activated system shall recognise situations in which it needs to transition the control back to the driver.

2.7.1.1. In case of an expected event, a transition demand shall be given latest [15] seconds before the event occurs.

2.7.1.2. In case of an unexpected event, a transition demand shall be given upon detection.

2.7.1.3. In case of any failure of the system or of any function needed for the operation, the system shall immediately initiate a transition demand upon detection.

In addition, notwithstanding paragraph 2.7.3, a minimum risk manoeuvre may be immediately initiated depending on the criticality of the failure.

2.7.2. During the transition phase the system shall continue to operate. The system may reduce the speed of the vehicle to ensure its safe operation but shall not bring it to standstill unless required by the situation (e.g. due to vehicles or obstacles obstructing the path of the vehicle).

2.7.3. In case the driver is not responding to a transition demand [by taking over manual control], a minimal risk manoeuvre shall be started automatically, earliest [10 s] after the start of the transition demand.

2.7.4. The transition demand shall consist at least of an optical and in addition an acoustic and/or haptic warning signal. Latest [4] seconds after the initiation of the transition demand, the warning shall be escalated and shall contain a haptic warning.

2.7.5. A transition demand shall only be terminated once the system has detected the driver has taken over manual control, the vehicle has come to standstill or a minimum risk manoeuvre has started.

Comment: the termination of the transition demand when the MRM starts does of course not mean that there is no indication for the driver to take over control during a MRM... This is still required in section 2.8 “information to the driver”.

2.7.6. The system shall be deactivated at the end of any transition phase, unless a minimum risk manoeuvre needs to be performed.

2.8. Information to the driver

2.8.1. The following information shall be indicated to the driver:

- the system status “active” with at least an optical signal,
- any failure of the system with at least an optical signal unless the system is manually deactivated (off mode),
- transition demands as specified in section 2.7.
- an on-going minimal risk manoeuvre with an optical and either an acoustic or haptic warning signal

2.8.2. During the transition phase and the minimal risk manoeuvre, the system shall instruct the driver in an intuitive and unambiguous way to take over manual control of the vehicle. The instruction may include a pictorial information showing hands and the steering control [and may be accompanied by additional explanatory text or warning symbols], as shown in the example below.

With the start of the minimum risk manoeuvre, the given signal shall change its characteristics to emphasize the urgency of an action through the driver. In the case where the pictorial information shown in the example below would be used, at least the hands or the steering control shall be turned to red.



Example 1.

Example 2.

Justification: *the progress in technology brings new insight to HMI technology. This is especially true for automated driving functions, where seamless HMI concepts are needed. The Hands-on warning concept as taken from the B1 functions would therefore be implemented as an “add-on” to more intuitive over-all HMI concepts, thus bearing the risk of information overflow to the driver. An important aspect for the effectiveness for warnings in human factors theory is the location of warnings to the place, where action is needed. Thus, more proper warning concepts could exist of e.g. flashing lights in the steering wheel. The changes aim to find non-design-restrictive requirements for hands-on warnings or takeover request, while keeping as an example the B1 layout.*

2.9. **Minimal Risk Manoeuvre**

During the minimal-risk manoeuvre the vehicle shall be slowed down inside the lane or, in case the lane markings are not visible, remain on an appropriate trajectory taking into account surrounding traffic and road infrastructure, with a deceleration not greater than [4] m/s². Higher deceleration values are permissible for very short durations, e.g. as haptic warning to stimulate the driver's attention, or in case of a severe system failure. Additionally, the hazard warning lights shall be activated not later than [4] seconds after the start of the minimum risk manoeuvre.

In case the driver does not take over manual control during a minimum risk manoeuvre, the system shall bring the vehicle to standstill.

The vehicle shall perform lane changes across regular driving lanes only if the situation is not critical. Such lane changes are deemed critical if an approaching vehicle in the target lane would have to decelerate at a higher level than 3m/s², 0.4 seconds after the ALKS vehicle has crossed the lane marking, to ensure the distance between the two vehicles is never less than that which the ALKS vehicle travels in 1 second. In case the system cannot assess the criticality of a lane change the vehicle shall be brought to standstill in its lane of travel.

Any minimum risk manoeuvre may be terminated as soon as the system detects that the driver took over manual control of the vehicle.

The system shall be deactivated at the end of the minimum risk manoeuvre.

2.10. **Emergency Manoeuvre**

The activated system shall detect if the vehicle is in imminent danger to collide with e.g. another road user ahead or beside the vehicle. In case of insufficient lead time to transition the control back to the driver an emergency manoeuvre shall be initiated automatically.

This manoeuvre shall decelerate the vehicle up to its full braking performance if necessary and/or perform an automatic evasive manoeuvre, whichever is the most appropriate.

During the evasive manoeuvre the ALKS vehicle shall not cross the lane marking [outer edge of the front tyre to outer edge of the lane marking] unless the system is able to detect [has detected] that there is no collision relevant other road user in the relevant neighbouring lane driving to the side, the front or approaching from behind.

Any emergency manoeuvre may be terminated as soon as the collision risk disappeared or the driver took over manual control of the vehicle. In case an emergency manoeuvre led to a complete standstill of the vehicle the system shall be deactivated automatically.