



Development of technical requirements for occupational safety topics of agricultural and forestry vehicles

Comments regarding the improvement of tractors safety.

During our work, we noticed that additional requirements need to be addressed to tractors safety. Please find below additional priorities on key improvements for the safety of tractors:

- Continuously variable transmission. Requirements to joystick and pedal operation are missing. Among years we have been observing the accident occurrence with tractors. Particularly obvious here is that tractors with continuously variable transmission in conjunction with air-braked trailers have always been caught in dangerous situations or even cause serious accidents. In this, technical innovations such as the continuously variable transmission, which allows joystick control or the control of the continuously variable gas pedal plays a decisive role. The joystick control allows the tractor to slow down over manual control. In this case, the compressed air-braked trailers receive no brake signal. This circumstance leads to the overriding of the trailer to the tractor (leads to a “jackknife” situation). The tractor can be pushed to one side and overturn. Often collapses the cabin, which can result to serious or fatal injury. The same can happen when you release the pedal, which continuously adjusts the travel drive. Depending on the design specifications of the manufacturer, the vehicle can brake so much that the drive wheels block by the sudden release of the pedal. Especially when using air-braked trailers, this inevitably leads to push-back. Loss of control during trailer pulling and operating in the joystick and pedal mode, while the trailer pushes the tractor presents a high risk.
- Requirements for functional safety of the control system of tractors, e.g. according to EN ISO 13849 are missing.
- ROPS: Currently, the test is carried out on the basis of reference mass without ballast. A testing on the basis of the maximum permissible mass does not occur. In the current OECD code 4 is intended to take account of this problem. The relationship between maximum permissible mass and the reference mass shall be not larger than 1.75. In our opinion this is not enough. The factor should be max 1.4. Roll over with heavy mounted equipment presents a high risk.
- Free towing of tractors, identification of free towing points with indication of the max towing force, description of safe towing process in the manual. Pulling action may results uncontrolled force and high risk to the operator
- 2009/63/EG Ballast weights of tractors, marking of hitches with the maximum force is missing. Which safety topic presents the highest risks? Pulling action results uncontrolled force and high risk to the operator
- 80/720/EWG The width of the steps (250 mm) is different from the state of art: The common width for agricultural machinery is at least 300 mm. Which safety topic presents the highest risks? Access to agricultural machinery is one of the major accident emphasis.

- Requirements for additional accesses are missing. Which safety topic presents the highest risks? Access to agricultural machinery is one of the major accident emphasis. Additional access is needed to clean windows on the right side or to adjust mirrors.
- Obligation of risk assessment at tractors. The risk assessment should deal with all the hazards identified in the machinery directive and follow the methodology given in EN 12001.
- Operation of connected machinery
 - Avoid dangerous movement of machine parts when the operator is not on the tractor seat (OPC)
e.g. forage trailer – open unloading device, baler – open bale-chamber, mower, power-driven soil-working machine, rotary rake
 - Connect machinery specific situations and operation conditions with OPC, in order to influence certain functions
e.g. drive depending on movement
 - Stationary operation of Equipment without operator on tractor seat
e.g. pumps, generators etc.
 - Only temporary permission of power drive during arrangement and adjusting as well as during maintenance-, cleaning- and fault-clearance-work (hold-to-run-control)
- Functions to be realized
 - Stopping power source
 - Temporary switching on the power-source by hold-to-run-control
 - Switching on the power source at stationary operated machinery
- Power sources to be covered
 - Mechanical power - PTO
 - Hydraulic power
 - Electrical power