

ANNEX C: VEHICULAR SAFETY TECHNOLOGY SPECIFICATIONS TEMPLATE

GPEs can use the guided specifications below, where appropriate, that is suitable for the vehicle type and work environment.

A) Proximity Sensing and Warning Sensor

- 1) Alert the heavy equipment operator when a person or object is detected in the Areas of Risks (AOR)¹ and blind area, and trigger an alarm with blinker to warn the person at risk. If the alarm is not audible for the operator, there should be a separate alarm in the operator cabin and a digital display if appropriate.
- 2) False alarms shall be minimised by getting the suitable model or customisation by solution vendor to ensure that the false alarm rate is as low as reasonably practicable.
- 3) Perform reliably in adverse climatic and weather conditions.
- 4) Allow for configuration of detection distance is required.
- 5) Provide training and demonstrate that operators and supervisors have received training in the care, maintenance, safety rules, use and limitations of the system.
- 6) Perform regular maintenance and reinstate to working condition when the system malfunctions.
- 7) Obtain necessary approval from vehicle manufacturers if the system requires tapping into the electronics and control systems of the heavy vehicles/equipment.
- 8) Ensure visual and audio alerts are unique such that operators and supervisors can differentiate whether the alerts are from this Proximity Sensing and Warning Sensor, or from other system such as Driver Fatigue Management System.
- 9) Ensure that the system, including the alerts cannot be bypassed or turned off by operator during equipment operation. Any bypass required for operational needs, e.g. if vehicle is parked beside a wall, shall be controlled by the supervisor or other authorised personnel.

B) Camera Monitor System

- 1) Provide heavy equipment operator with visual monitors in the cabin to have a clear image of a person or object in the AOR.
- 2) The image of a person or object in the LCD monitor must be clear and easily identifiable.
- 3) Perform reliably in adverse climatic and weather conditions.
- 4) Allow for capturing of video data for retrieval, playback and analysis.
- 5) Provide training and demonstrate that operators and supervisors have received training in the

¹ Areas of risk (AOR) is defined as areas of obstructed view that would fall within the equipment's direction of movement, where a person or object cannot be seen by the equipment operator in the normal operating position, either by direct line-of-sight or even with the use of mirrors.

care, maintenance, safety rules, use and limitations of the system, including reminders that the camera is a supplement device that still requires the operator to use it in conjunction with the vehicle mirrors or systems for maximum coverage.

- 6) Perform regular maintenance and reinstate to working condition when the system malfunctions.
- 7) Obtain necessary approval from vehicle manufacturers if the system requires tapping into the electronics and control systems of the heavy vehicles/equipment.
- 8) Ensure that the system cannot be turned off by operator during equipment operation.

C) Driver Fatigue Management System

- 1) Detect signs of driver fatigue and distractions when heavy equipment is in operation, including but not limited to drowsiness, dozing off, using of mobile device, looking away, eating, and smoking.
- 2) Alert heavy equipment operator and supervisor in real-time when driver fatigue or distraction is detected.
- 3) Provide analytical dashboard and reports for reporting and trend analysis.
- 4) Provide training and demonstrate that operators and supervisors have received training in the care, maintenance, safety rules, use and limitations of the system.
- 5) Perform regular maintenance and reinstate to working condition when the system malfunctions.
- 6) Obtain necessary approval from vehicle manufacturers if the system requires tapping into the electronics and control systems of the heavy vehicles/equipment.
- 7) Ensure visual and audio alerts are unique such that operators and supervisors can differentiate whether the alerts are from this Driver Fatigue Management System, or from other system such as the Proximity Sensing and Warning Sensor.
- 8) Ensure that the system, including the alerts cannot be bypassed or turned off by operator during equipment operation.