

OEM Roundtable recommendation #4

This document is a recommendation of the *OEM roundtable for electrified construction equipment* to Non-Road Mobile Machinery (NRM) OEMs selling in the European market. It constitutes a recommendation to voluntarily standardize the described aspects for the benefit of end-users' ability to operate electric machines easily and safely. All recommendations and further details on the roundtable process are publicly available at <https://www.emissielooosnetwerkinfra.nl/english/oem-roundtable>.

Name: Big red buttons / Emergency stop buttons

Executive Summary: **An Emergency stop (E-stop) button specifically for charging should be located on the charger, not on the machine.**

Emergencies around charging can happen, but are not the only type of event where a machine needs to be stopped immediately for functional safety. As there already are emergency buttons on most machines that bring the machine into a 'safe state' from a functional perspective, there should not be any other button on the machine that suggests the same functionality. The existing buttons are in most cases located inside the cabin.

Instead, there should be an emergency stop button available on the charger side, whether or not that is integrated with a Battery Electric Storage System (BESS). This E-stop button should not be duplicated on the machine side. For any kind of regular operation of the charging session – like unlocking the cable after charging has finished – red buttons should not be used to avoid the impression of an E-stop functionality.

Any Emergency stop button should be designed and located in such a way that operators are discouraged to misuse them as a way to end a regular charging session. That must be avoided in order to prevent damage to electrical systems by misuse of an emergency feature.

Problem: There have been observations where a 'big red button' was located close to the charging socket on the machine either labelled 'emergency stop' or – being part of the regular operation of the charging session – a mere 'stop charging' button.

Stopping a charging session through an emergency routine, namely cutting off all energy flows immediately, can damage electrical systems like onboard batteries. That increases risks of subsequent internal failures that might eventually pose risks to the equipment. It is a challenge to design systems safely without making misuse likely to happen. Misuse might be encouraged by e.g. putting emergency stop buttons close at hand to a charging socket or not labelling buttons appropriately.

Solution: A user should always be able to interrupt a charging session in case of an emergency. As a charging session will always involve an external charger (DC) or managed power outlet (AC) together with a machine, emergency stop functionality should be foreseen on the infrastructure side.

Existing emergency buttons

E-stop buttons on machines address functional safety and not electrical safety. They should therefore not be located too closely to a charging socket and be clearly described in machine manuals and emergency information.

Call to Action: The roundtable participants recommend the following actions

1. Construction Equipment OEM

Construction equipment should follow the recommendations laid out here as much as possible and make clear distinctions between functional emergency buttons and electrical safety features. They should not use big red buttons that suggest emergency stop features in regular procedures of charging.

2. Charging equipment manufacturers

A fully functional emergency stop button that cuts power immediately should be located at a charger at all times. Designing them on mobile chargers should be done with great care to discourage misuse that could lead to damages to electric components. This is also true for BESS manufacturers that integrate charging solutions into their products.

3. Standardisation Leadership

Standard setting bodies should bring this recommendation into respective machine guidelines as well as regulation for mobile and temporary chargers.

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Author:	<u>OEM roundtable for electrified construction equipment</u>
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Roundtable participants that support this recommendation in alphabetical order:
Liebherr Earth Moving Equipment, VDL ETS, Volvo CE