# OEM Roundtable recommendation #3

This document is a recommendation of the *OEM roundtable for electrified construction equipment* to Non-Road Mobile Machinery (NRMM) 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.emissieloosnetwerkinfra.nl/english/oem-roundtable.

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Name:

## Location of the charging socket on the machine

Executive Summary:

**Off-Highway machinery should be predictable in terms of socket location to allow for charging infrastructure to suit all types of machines.**

The plug position on the machine is relevant to the charging infrastructure which has limitations in terms of cable length, cable weight and plug height from an occupational health perspective. It is also important with regard to safety considerations like collision protection. Charging infrastructure often needs to cater for trucks as well as NRMM and battery energy storage systems (BESS). Standardisation in socket position is therefore important for safe and efficient operations.

The roundtable recommends that all types of charging sockets should be placed on the same side of the vehicle where entry to the cabin is situated, at a height reachable from the ground and visible from the machine entry point, if the machine design allows for this.

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Problem:

Space on a construction site is often limited and making room available where charging shall take place can be an extra constraint. If a space is not accessible from both sides, additional manoeuvring can become necessary to fit machines with different socket positions into the same spot. Manoeuvring always implies an elevated risk of collision and damage, making it a safety concern. On the other hand, safety concerns that vehicles are not moved with cables still attached or the risk of stumbling over a cable when walking around a machine have to be balanced.

Charging cables with higher capacities become heavier as cable thickness and cooling needs increase. Lifting such a cable too high can constitute a health and safety concern, as can be the necessity to climb onto the machine to connect a charging gun to a socket.

Additionally, chargers can come with a limited cable length and sockets at varying position might become hard to reach with chargers fixed in one spot. That is an argument to increase uniformity and predictability when it comes to the position of the charging plug.

Solution:

Creating predictability of the socket position on a machine or BESS can mitigate those problems. However, during the discussion among the roundtable participants, it became also clear that not all types of NRMM can follow the recommendations formulated here. It is thus a recommendation that should be followed wherever possible, knowing that some types of machines are unsuitable to implement those recommendations.

**Position of the socket(s) on the machine**

The socket for manually connecting all charging systems (like DC, AC and MCS charging) should …

- … be located at the same place on the machine;
- … be located on the same side as the cabin entry;
- … be visible from the point of entry into the machine cabin;
- … be reachable from the ground.

This way, the described safety risks should be mitigated and incorporating charging facilities within a jobsite should become easier and more efficient.

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 to prevent job site design becoming overly inefficient and make operating/charging machines safer.

2. **Standardisation Leadership**
   Where MCS standards also indicate a position for the socket on a machine, DC and AC standards do not yet include that. The roundtable recommends to harmonize the socket position across charging standards in this field.



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