



FESHCom
Electrical Safety Subcommittee

ESS Determination D2020-02 27 February 2020

**Accommodation of non-NRTL Power Tools for In-Kind Contribution of
Accelerator and Detector Construction**

Scope:

This determination describes accommodations and permitted to allow the use of electric tools by workers not under subcontract to Fermi Research Alliance (FRA) for the construction of accelerator or detector components, equipment and systems at the Fermilab site in Batavia, Illinois and its leased spaces.

Motivation:

The OSHA requirements for Safety in General Industry (29 CFR 1910) are, by reference, made a part of the contract between the Department of Energy (DOE) and Fermi Research Alliance (FRA) to operate and maintain the Fermilab site and leased spaces. FRA is required to follow the regulations contained in 29 CFR 1910, 29 CFR 1910 requires that electrical equipment, including equipment used to distribute power at the site, and the equipment connected to the distribution system (“utilization equipment”) be listed or field inspected by an NRTL unless that type of equipment is not available with a NRTL listing or inspection, in which case it must be inspected and approved by Authority Having Jurisdiction. A detailed explanation of how this requirement is established by 29 CFR 1910 and how it is implemented at Fermilab is documented in ESS Determination 2020-02.

Fermilab has and will receive in-kind contributions from international partners in furtherance of its science objectives. In certain cases, these contributions are not just the physical equipment, but also the work needed to assemble and install the equipment at the Fermilab site or leased spaces. This work is often performed by contractors retained by the international partners which arrive on site with construction tools that are not NRTL listed and often will not operate on the standard North American power distribution voltages and frequency.

Considerations in the agreements with international partners make it imperative that Fermilab make accommodations and provide additional infrastructure so these tools brought by the contractors retained by international partners can be used at the Fermilab site and leased spaces. This determination describes the accommodations that Fermilab will provide to permit the use of these tools and the limits placed on these accommodations.

Tools to be accommodated:

Tools to be used that are not NRTL listed shall be demonstrated to have met foreign design and construction standards that provide an equivalent level of safety as that assured by an NRTL listing. Presently only the CE mark has been evaluated to meet this criterion. Tools must be rated for operation at 60 Hertz, or at multiple or a range of frequencies that include 60 Hertz. Rated supply voltages that do not exceed 250 volts RMS nominal for single-phase supply or 600 RMS volts nominal for three-phase supply are permitted.

For a particular instance of donated construction work, a single voltage and type of receptacle for single-phase and a single voltage and type of receptacle for three-phase will be provided by Fermilab. If more than one ampacity for three-phase receptacles is required, request to provide more than one three-phase receptacle types will be considered on a case-by-case basis.

Receptacle types selected must have a grounding (earthing) contact. Receptacle types requested shall comply with IEC 60884-1, CEE 7, or IEC 60309. Other types will be considered on a case-by-case basis.

Infrastructure:

Permanently-installed power distribution infrastructure is required by the DOE-FRA contract to comply with the National Electrical Code, NFPA 70. Voltages, receptacles, and circuit protection that do not meet the requirements of the NEC and 29 CFR 1910 will not be permanently installed.

Fermilab will permanently install 480 volt, three-phase, 60 ampere receptacles conforming to ANSI/NEMA WD-6 within the area in which the in kind contributed construction work is to be done at places and spacings that will permit the planned work to be done. Fermilab will provide transportable power carts that connect to these receptacles, transform the voltage to that requested by the contributor, and provide overcurrent protection and receptacles to supply the contractor's tools. When possible, the overcurrent protection will include ground fault circuit interruption (GFCI) protection, also known as residual current detection (RCD). Receptacles protected by internal GFCIs will be marked to indicate the protection is present. Where the GFCI protection is not provided by the power cart, the contractor is required to provide GFCI or RCD adapters to protect the worker.

Other related requirements:

The DOE-FRA contract requires that work activities performed by the contractors retained by international partners conform to 29 CFR 1910, or its equivalent regulation for construction work, 29 CFR 1926. Both require that the workers be provided with a workplace free of known hazards. Among these hazards are damaged equipment and equipment not constructed for the environment in which it is used. Tools, extension cords, and battery chargers shall be free of damage that could reduce the level of worker safety. Damage to cords or plugs that expose the insulation of the wires beneath the cord jacket is a frequent deficiency. Wrapping the damaged portions with tape is not an acceptable repair. Fermilab project and safety personnel are authorized to forbid the use of particular damaged items and require them to be removed from the work area.

Utilization equipment designed for residential use is less than adequate for use in a work area where construction is being performed. Fermilab project and safety personnel are authorized to forbid the use of particular residential-duty items and require them to be removed from the work area.

The listings for extension cords and relocatable power taps ("power strips") do not permit them to be connected together ("daisy-chained"). This requirement is applied to extension cords and power strips that are not listed as well. There shall be at most one extension cord or power strip between the power cart receptacle and the tool it is supplying.