

Factsheet: Two Ways to Wire an Electric Tool

OSHA Construction Industry standards say:

1926.302 (a)

Electric power-operated tools.

1926.302 (a) (1)

Electric power operated tools shall either be of the approved double-insulated type or grounded in accordance with Subpart K of this part.

What does that mean?

There are two different ways of wiring an electrical tool: **double insulation** or the use of **equipment grounding**. First of all, the individual wires in the tool and cord are insulated and the cord itself is also insulated. These are the *first level* of insulation.

With the **double insulation** method, the manufacturer provides a *second level* of insulation inside the tool, to reduce the risk of a damaged "hot" wire within the tool (generally at 120 volts AC) from coming in contact with any exposed metal on the tool.

Double insulation protects you by providing another insulation barrier, preventing a wiring defect that could allow an energized conductor to touch any metal on the tool that you can touch. A double insulated tool will be marked on its handle or on a data label with the words "**Double Insulated**" or with a symbol: a square box within a square box.

With the **equipment grounding** method, a third wire is added to the tool's wiring and connected to a round pin on the tool's plug. The other end of this grounding wire is connected to the metal frame of the tool. The 3-conductor plug on the tool must be plugged into a grounded outlet. The equipment ground connection on the outlet must be connected to a grounding connection at the electrical panel. The steel electrical panel is then connected to the earth. This is generally done via clamping a *system ground* wire to a **metal** cold water pipe or to ground rods driven into the earth.

Equipment grounding only works when there is a permanent and continuous electrical connection between the metal shell of a tool and the earth. If a wiring defect in the tool allows an energized wire to touch the tool's metal shell, grounding provides a *low resistance path to earth* for the resulting current. This will generally allow enough current to flow so that a fuse will blow or a circuit breaker is tripped, thus turning off the electricity in that circuit. **If this grounding path is broken at any point, the tool is not grounded and the operator is at risk of shock or electrocution.**

All electrical tools and equipment must be maintained in safe condition and checked regularly for defects. They must be taken out of service if a defect is found.