Extension Cords

Summary

As a quick reference, here is the gauge of wire or extension cord needed to handle a certain amperage of power tool

Amp Rating of Tool	Up to 25 Feet	Up to 50 Feet	Up to 100 Feet
Up to 3	18 gauge	18 gauge	16 gauge
3-4	18 gauge	18 gauge	16 gauge
4-5	18 gauge	18 gauge	14 gauge
5-6	18 gauge	16 gauge	14 gauge
6-8	18 gauge	16 gauge	12 gauge
8-10	18 gauge	14 gauge	12 gauge
10-12	16 gauge	14 gauge	12 gauge
12-14	14 gauge	12 gauge	10 gauge
14-16	14 gauge	12 gauge	10 gauge

Background Information

The National Electrical Code contains some rules for using extension cords. Some of the rules state that extension cords are not permitted to be used:

1. As a substitute for the fixed wiring of a structure;
2. Where run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings, or floors;
3. Where run through doorways, windows, or similar openings;
4. Where concealed behind building walls, structural ceilings, suspended ceilings, dropped ceilings, or floors.

Daily visual inspection

Extension cords and power tools must be checked for damage daily by the persons who will be using them. Any damage found must be repaired before the cord or tool is used. Damaged extension cords and power cords of tools must not be spliced. The cords can either be replaced or shortened to remove the damaged portion.

Continuity and polarity testing every three months

A qualified worker must test every extension cord and power tool for circuit continuity and correct polarity before they are used for the first time, following repairs, and during the months of January, April, July, and October. A qualified worker is a person who has been authorized by a supervisor to perform the task and who has received appropriate training.

Colour-coding extension cords and power tools

Extension cords and power tools that have been tested should be identified with a band of coloured tape near the male plug. Often coloured electrical tape is used for this purpose. A different colour is required for each quarter of the year. The following colours are used in an Assured Grounding Program in B.C.:

Red	January, February, March
White	April, May, June
Blue	July, August, September
Green	October, November, December

Not all extension cords are equal. To help you select the appropriate extension cord for specific conditions of use, they come with helpful ratings such as the following:

S = Service Grade
(also means extra hard service when not followed by J, V, or P)
J = Hard Service
V = Vacuum cleaner cord (also light duty cable)
P = Parallel cord (also known as zip cord) – Always light duty
E = Thermoplastic Elastomer (UL/NEC designation ONLY)
O = Oil Resistant*
T = Thermoplastic
W = Outdoor-includes sunlight resistant jacket and wet location rated conductors (formerly "W-A")
H = Heater cable
VW-1 = Flame retardant
FT2 = Flame retardant

* When only one "O" appears in a classification (i.e. SJEOW), only the outer jacket material is oil resistant. If two "O's" are in the classification (i.e. SEOOW), the insulation covering the conductors and the outer jacket insulation are all oil resistant

When using a power tool outside, use an extension cord marked for outdoor use with “W-A” or “W”. These cords are made for outdoor use.

The Different Gauges of Wires

Remember:
Thicker copper wire is lower gauge
Thicker copper wire is lower resistance

Don't be fooled by the apparent thickness of the extension cord itself. Different cords can have different thickness of coatings. This is often done to provide greater protection from physical damage. **Always check the gauge rating of the cord.**

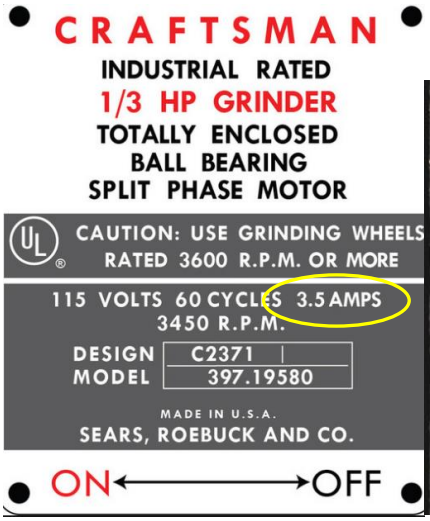
Cord Construction

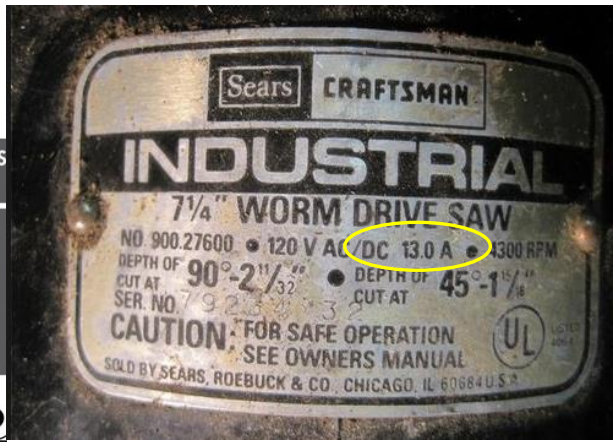
Looks can be deceiving! You can't tell how much current a cord can handle by how thick the cord is! The reason is that cords are made with different amounts of resistance to physical damage.

Two cords of noticeably different thickness may have exactly the same copper wire (and therefore current capacity) inside them. Notice in the photo of examples at right that one of the #16 AWG cords is thicker than the #14 AWG cord below it. See "Cord Marking" below for more details.

Selecting the Correct Gauge of Wire or Extension Cord

The wire gauge and the length of the extension cord must be able to handle the amps of the tool. Find the Amps (A) on the tools nameplate. You will need this to determine the necessary wire gauge for the extension cord.





The nameplate on the left shows that the device draws 3.5 amps. The nameplate on the right shows that the worm drive saw draws 13 amps.

There are limits on the amount of current that cords are permitted to carry. This is for safety, to **prevent overheating** the cord. The allowable current capacity limits for common cords are given in the chart below:

Amp Rating of Tool	Up to 25 Feet	Up to 50 Feet	Up to 100 Feet
Up to 3	18 gauge	18 gauge	16 gauge
3-4	18 gauge	18 gauge	16 gauge
4-5	18 gauge	18 gauge	14 gauge
5-6	18 gauge	16 gauge	14 gauge
6-8	18 gauge	16 gauge	12 gauge
8-10	18 gauge	14 gauge	12 gauge
10-12	16 gauge	14 gauge	12 gauge
12-14	14 gauge	12 gauge	10 gauge
14-16	14 gauge	12 gauge	10 gauge

Using the above table, the 3.5 amp grinder could use an 18 gauge extension cord but the 13.5 amp worm drive saw would require a 14 gauge extension cord – assuming a 25 foot extension cord.

Notice that lower gauges are recommended for longer extension cords. Longer runs of wire can have a significant effect on the voltage delivered to the power tool. A 100 foot cord will have twice the resistance as a 50 foot cord. It is good practice to take into account the length of the extension cord by using the following table. This will result in a voltage drop of less than 5% due to resistance in the extension cord.