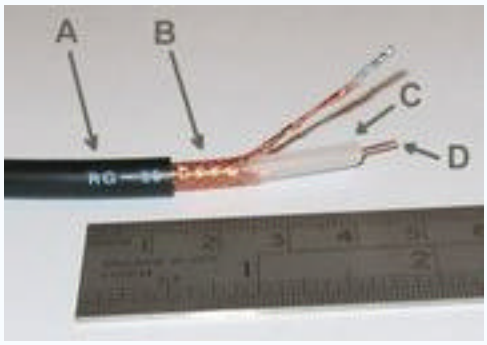
# Coaxial cable

**Coaxial cable** is an electrical cable consisting of a round conducting wire, surrounded by an insulating spacer, surrounded by a cylindrical conducting sheath, and usually surrounded by a final insulating layer.




Radio-grade flexible coaxial cable.
A: outer plastic sheath
B: copper screen
C: inner dielectric insulator
D: copper core

The cable is designed to carry a high-frequency or broadband signal, as a high-frequency transmission line. Sometimes DC power (called bias) is added to the signal to supply the equipment at the other end, as in direct broadcast satellite receivers. Because the electromagnetic field carrying the signal exists (ideally) only in the space between the inner and outer conductors, it cannot interfere with or suffer interference from external electromagnetic fields.

Coaxial cables may be rigid or flexible. Rigid types have a solid sheath, while flexible types have a braided sheath, both usually of thin copper wire. The inner insulator, also called the dielectric, has a significant effect on the cable's properties, such as its characteristic impedance and its attenuation. The dielectric may be solid or perforated with air spaces. Connections to the ends of coaxial cables are usually made with RF connectors.

Most coaxial cables have a characteristic impedance of either 50, 52, 75, or 93 ohms. The RF industry uses standard type-names for coaxial cables.

**Technical Features**

| Code | RG 11 | RG 6 | RG 59 |
|---|---|---|---|
| Color | ● ○ | ● ○ | ○ |
| Nominal impedance Ohm | 75 | 75 | 75 |
| Polyethylene dielectric | Expanded | Exp. | Exp. |
| Outer PVC sheating O mm | 6.6 | 6.7 | 6.2 |
| Capacity pF/m | 84 | 55 | 55 |

A series of standard types of coaxial cable were specified for military uses, in the form "RG-#" or "RG-#/U" (*RG* from Radio Guide, */U* indicates multiple uses). They go back to World War II and were listed in *MIL-HDBK-216* published in 1962. These desigations are now obsolete. The current military standard is MIL-SPEC MIL-C-17. MIL-C-17 numbers, such as M17/75-RG214.are given for military cables and manufacturer's catalog numbers for civilian applications. However, the RG-series designations were so common for generations that they are still used, although critical users should be aware that since the handbook is withdrawn there is no standard to guarantee the electrical and physical characteristics of a cable described as "RG=# type". The RG designators are mostly used to identify compatible connectors that fit the inner conductor, dielectric, and jacket dimensions of the old RG-series cables. For example:

| type | approx. imped. [O] | core | dielectric | | | overall diameter | | braid | velocity factor | comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | type | [in] | [mm] | [in] | [mm] | | | |
| RG- | 75 | 21 AWG (American | PE | 0.185 | 4.7 | 0.332 | 8.4 | double | | low loss at high frequency for cable |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 6/U | | wire guage) | | | | | | | | television, satellite television and cable modems |
| RG-6/UQ | 75 | | PE | | | | | quad | | This is "quad shield RG-6". It has four layers of shielding, regular RG-6 only has one or two |
| RG-8/U | 50 | | PE | | | 0.405 | 10.3 | | | used for thick Ethernet (10base5) and amateur radio |
| RG-9/U | 51 | | PE | | | 0.420 | 10.7 | | | |
| RG-11/U | 75 | 7×26 AWG | PE | 0.285 | 7.2 | 0.412 | 10.5 | | 0.66 | Used for long drops and underground |
| RG-58/U | 50 | | PE | 0.116 | 2.9 | 0.195 | 5.0 | single | 0.66 | used for radiocommunication and amateur radio and thin Ethernet (10base2) |
| RG-59/U | 75 | 0.0230 in Cu-covered steel | PE | 0.146 | 3.7 | 0.242 | 6.1 | single | 0.66 | used to carry baseband video in closed-circuit television, previously used for cable television |
| RG-62/U | 92 | | PE | | | 0.242 | 6.1 | single | 0.84 | used for ARCNET |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| RG-174 | 50 | | | 0.100 | 2.5 | | | single | | |
| RG-178/U | 50 | | | | | 0.079 | 2.0 | single | | |
| RG-179/U | 75 | | | | | 0.094 | 2.4 | single | | |
| RG-213/U | 50 | 7×0.0296 in Cu | PE | 0.285 | 7.2 | 0.405 | 10.3 | single | 0.66 | for radiocommunication and amateur radio, EMC test antenna cables |
| RG-316/U | 50 | 7×0.0067 in | PTFE | 0.060 | 1.5 | 0.102 | 2.6 | single | | |
| H155 | 50 | | | | | | | | 0.79 | lower loss at high frequency for radiocommunication and amateur radio |
| H500 | 50 | | | | | | | | 0.82 | low loss at high frequency for radiocommunication and amateur radio |

A List of all known
Coaxial cables

```
Cable       Imped  Max Oper    O.D.
Type        (Ohms)  Volts     Inches                 Remarks
-------------------------------------------------------------------------
-----
RG-5B/U      50    3,000      .328      For replacement only, use RG-
212/U
RG-6A/U      75    2,700      .332      None
```

| | | | | |
|---|---|---|---|---|
| RG-8A/U | 52 | 5,000 | .405 | For replacement only, use RG-213/U |
| RG-9B/U | 50 | 5,000 | .420 | For replacement only, use RG-214/U |
| RG-10A/U | 52 | 5,000 | .475 | For replacement only, use RG-215/U |
| RG-11A/U | 75 | 5,000 | .405 | None |
| RG-12A/U | 75 | 5,000 | .475 | None |
| RG-13A/U | 74 | 5,000 | .420 | For replacement only, use RG-216/U |
| RG-14A/U | 52 | 7,000 | .545 | For replacement only, use RG-217/U |
| RG-15/U | 76 | 5,000 | .545 | None |
| RG-16/U | 52 | 6,000 | .630 | None |
| RG-18A/U | 52 | 11,000 | .945 | For replacement only, use RG-219/U |
| RG-19A/U | 52 | 14,000 | 1.120 | For replacement only, use RG-220/U |
| RG-20A/U | 52 | 14,000 | 1.195 | For replacement only, use RG-221/U |
| RG-21A/U | 53 | 2,700 | .332 | For replacement only, use RG-222/U |
| RG-22B/U | 95 | 1,000 | .420 | Balanced cable twisted conductors |
| RG-23A/U | 125 | 3,000 | .945 | Dual coaxial cable |
| RG-24A/U | 125 | 3,000 | 1.034 | Dual coaxial cable |
| RG-25A/U | 48 | 8,000 | .505 | Pulse cable |
| RG-26A/U | 48 | 8,000 | .650 | Pulse cable |
| RG-27A/U | 48 | 15,000 | .650 | High voltage pulse cable |
| RG-28B/U | 48 | 15,000 | .750 | High voltage pulse cable |
| RG-33/U | 51 | 6,000 | .470 | None |
| RG-34B/U | 75 | 6,500 | .630 | None |
| RG-35B/U | 75 | 10,000 | .945 | None |
| RG-36/U | 69 | 13,000 | 1.180 | None |
| RG-41/U | 67.5 | 3,000 | .425 | None |
| RG-54A/U | 58 | 3,000 | .250 | None |
| RG-55B/U | 53 | 1,900 | .206 | None |
| RG-56/U | -- | -- | .535 | Special twisted pulse cable |
| RG-57A/U | 95 | 3,000 | .625 | Twin conductor |
| RG-58C/U | 50 | 1,900 | .195 | General purpose |
| RG-59B/U | 75 | 2,300 | .242 | General purpose |
| RG-60/U | 50 | -- | .425 | None |
| RG-62A/U | 93 | -- | .249 | None |
| RG-62B/U | 93 | 750 | .242 | None |
| RG-63B/U | 125 | 1,000 | .405 | Low capacitance |
| RG-64/U | 48 | -- | .495 | Pulse |
| RG-65A/U | 950 | 1,000 | .405 | High impedance delay line, video cable |
| RG-71B/U | 93 | 750 | .250 | None |
| RG-72/U | 150 | -- | .630 | None |
| RG-73/U | 25 | -- | .275 | None |
| RG-74A/U | 52 | 7,000 | .615 | For replacement only, use RG-224/U |
| RG-77A/U | 48 | 8,000 | .450 | Pulse cable |
| RG-78A/U | 48 | 8,000 | .420 | Same as RG-74A/U except single braid |
| RG-79B/U | 125 | 1,000 | .475 | RG-63B/U with armor |

| | | | | |
|---|---|---|---|---|
| RG-81/U | 50 | 3,000 | .375 | Semi-Rigid high temperature cable |
| RG-82/U | 50 | 5,000 | .750 | Same as RG-81/U |
| RG-83/U | 35 | 2,000 | .405 | None |
| RG-84A/U | 75 | 10,000 | 1.000 | RG-35B/U with lead sheath, not armor |
| RG-85A/U | 75 | 10,000 | 1.565 | RG-84A/U with special armor |
| RG-86/U | 200 | -- | .650 | Twin lead |
| RG-87A/U | 50 | 5,000 | .425 | For replacement only. New, use RG-225/U |
| RG-88/U | 50 | 8,000 | .515 | Pulse |
| RG-88A/U | 50 | 8,000 | .515 | None |
| RG-88B/U | 50 | 10,000 | .565 | None |
| RG-89/U | 125 | 1,000 | .632 | Low capacitance |
| RG-90/U | 50 | 3,000 | .425 | Carrier Frequency Communication |
| RG-93/U | 50 | 10,000 | .710 | Replaced with RG-117/U |
| RG-94/U | 50 | 7,000 | .445 | For replacement only. New, use RG-226/U |
| RG-100/U | 35 | 2,000 | .242 | None |
| RG-108A/U | 78 | 1,000 | .235 | Shielded twisted pair |
| RG-111A/U | 95 | 1,000 | .490 | none |
| RG-114A/U | 185 | 1,000 | .405 | Special low capacitance |
| RG-115/U | 50 | 4,000 | .375 | None |
| RG-115A/U | 50 | 4,000 | .415 | None |
| RG-116/U | 50 | 5,000 | .475 | For replacement only. New, use RG-227/U |
| RG-117A/U | 50 | 7,000 | .730 | Same as RG-117/U. New, use RG-211A/U |
| RG-118A/U | 50 | 7,000 | .780 | Same as RG-118/U. New, use RG-228A/U |
| RG-119/U | 50 | 6,000 | .465 | High temperature cable |
| RG-120/U | 50 | 6,000 | .525 | Same as RG-119/U, with armor |
| RG-122/U | 50 | 1,900 | .160 | Same as RG-58/U except smaller in size |
| RG-124/U | 73 | 2,300 | .240 | Replaced by RG-140/U |
| RG-125/U | 150 | 2,000 | .600 | Special low capacitance |
| RG-126/U | 50 | 3,000 | .280 | High attenuation same as RG-301/U |
| RG-130/U | 95 | 8,000 | .625 | Same as RG-57A/U except inner conductor |
| RG-131/U | 95 | 8,000 | .710 | Same as RG-130/U except for armor |
| RG-133A/U | 95 | 4,000 | .405 | NATO type NWR7 |
| RG-140/U | 75 | 2,000 | .233 | High temperature, similar to RG-59A/U |
| RG-141A/U | 50 | 1,900 | .190 | High temperature, similar to RG-58C/U |
| RG-142A/U | 50 | 1,900 | .206 | High temperature, similar to RG-55A/U |
| RG-142B/U | 50 | -- | .195 | Same as above |
| RG-143A/U | 50 | 3,000 | .325 | High temperature, similar to RG-58/U |
| RG-144/U | 75 | 5,000 | .410 | High temperature, similar to RG-11/U |
| RG-147/U | 52 | 14,000 | 1.937 | RG-19/U with armor |
| RG-148/U | 72 | 4,000 | .800 | RG-8/U with spiral armor |
| RG-149/U | 52 | 5,000 | .405 | Low noise |

| | | | | |
|---|---|---|---|---|
| RG-150/U | 75 | 5,000 | .475 | Same as RG-149/U except armored |
| RG-156/U | 50 | 10,000 | .540 | Taped innerlayers 1 type K&1 type A-1R |
| RG-157/U | 50 | 15,000 | .725 | Betw 2n braid of outer conductor & braided |
| RG-158/U | 25 | 15,000 | .725 | Tinned copper shield pulse cable |
| RG-159/U | 50 | 2,300 | .195 | Replaced by RG-142/U |
| RG-160A/U | 125 | 3,000 | 1.055 | Same as RG-160/U except copper braid |
| RG-164/U | 75 | 10,000 | .870 | Same as RG-35B/U except armored |
| RG-165/U | 50 | 5,000 | .410 | None |
| RG-166/U | 50 | 5,000 | .460 | Same as RG-165/U except armored |
| RG-174/U | 50 | 1,500 | .100 | None |
| RG-177/U | 50 | 11,000 | .895 | None |
| RG-178B/U | 50 | 1,000 | .075 | None |
| RG-179B/U | 75 | 1,200 | .105 | None |
| RG-180B/U | 95 | 1,500 | .145 | none |
| RG-181/U | 125 | 3,500 | .640 | None |
| RG-182/U | 125 | 2,300 | 1.055 | Special dual twinax |
| RG-183/U | 50 | -- | .750 | None |
| RG-185/U | 2000 | -- | .282 | Delay cable |
| RG-186/U | 1000 | -- | .405 | Delay cable |
| RG-187A/U | 75 | 1,200 | .110 | Same as RG-187/U except inner conductor |
| RG-188A/U | 50 | 1,200 | .110 | Same as RG-188/U except inner conductor |
| RG-189/U | 50 | 3,500 | .875 | 7/8 in stroflux cable |
| RG-190/U | 50 | 15,000 | .700 | Taped inner layers: 2 wraps of type K |
| RG-191/U | 25 | 15,000 | 1.469 | & 2 wraps of type L between outer braid |
| RG-192/U | 12.5 | 15,000 | 2.200 | Pulse cable |
| RG-193/U | 12.5 | 30,000 | 2.100 | Pulse cable |
| RG-194/U | 12.5 | 30,000 | 1.945 | Pulse cable |
| RG-195A/U | 95 | 1,500 | .155 | Same as RG-195/U except inner conductor |
| RG-196A/U | 50 | 1,000 | .080 | Same as RG-196/U except inner conductor |
| RG-197/U | 50 | -- | .875 | None |
| RG-199/U | 70 | -- | 1.015 | None |
| RG-200/U | 70 | -- | 1.765 | None |
| RG-209/U | 50 | 3,200 | .750 | None |
| RG-210/U | 93 | 750 | .242 | Replaces RG-62C/U |
| RG-211A/U | 50 | 7,000 | .730 | Same as RG-211/U except braid wire size |
| RG-212/U | 50 | 3,000 | .332 | Formerly RG-58/U |
| RG-213/U | 50 | 5,000 | .405 | Formerly RG-8A/U |
| RG-214/U | 50 | 5,000 | .425 | Formerly RG-9B/U |
| RG-215/U | 50 | 5,000 | .475 | Formerly RG-10A/U |
| RG-216/U | 75 | 5,000 | .425 | Formerly RG-13A/U |
| RG-217/U | 50 | 7,000 | .545 | Formerly RG-144A/U |
| RG-218/U | 50 | 11,000 | .870 | Formerly RG-17A/U |
| RG-219/U | 50 | 11,000 | .945 | Formerly RG-18A/U |
| RG-220/U | 50 | 14,000 | 1.120 | Formerly RG-19A/U |
| RG-221/U | 50 | 14,000 | 1.195 | Formerly RG-20A/U |
| RG-222/U | 50 | 2,700 | .332 | Formerly RG-21A/U |

| | | | | |
|---|---|---|---|---|
| RG-223/U | 50 | 1,900 | .216 | Formerly RG-55A/U |
| RG-224/U | 50 | 7,000 | .615 | Formerly RG-74A/U |
| RG-225/U | 50 | 5,000 | .430 | Formerly RG-87A/U |
| RG-226/U | 50 | 7,000 | .500 | Formerly RG-94A/U |
| RG-227/U | 50 | 5,000 | .490 | Formerly RG-116/U |
| RG-228A/U | 50 | 7,000 | .795 | Same as RG-228/U except wire size |
| RG-230/U | 25 | -- | .740 | Triaxial pulse cable |
| RG-231/U | 50 | -- | .500 | None |
| RG-232/U | 50 | -- | 1.050 | None |
| RG-233/U | 50 | -- | 1.765 | None |
| RG-234/U | 50 | -- | 3.295 | None |
| RG-235/U | 50 | 5,000 | .470 | None |
| RG-236/U | 50 | -- | .500 | None |
| RG-237/U | 50 | -- | .600 | None |
| RG-240/U | 50 | -- | 1.625 | None |
| RG-242/U | 50 | -- | 3.125 | None |
| RG-244/U | 75 | -- | .500 | None |
| RG-245/U | 75 | -- | .600 | None |
| RG-246/U | 75 | -- | .875 | None |
| RG-247/U | 75 | -- | 1.015 | None |
| RG-248/U | 75 | -- | 1.625 | None |
| RG-249/U | 75 | -- | 1.765 | None |
| RG-259/U | 75 | -- | 3.125 | None |
| RG-251/U | 75 | -- | 3.295 | None |
| RG-252/U | 50 | -- | .530 | None |
| RG-253/U | 50 | -- | .635 | None |
| RG-254/U | 50 | -- | 1.100 | None |
| RG-255/U | 50 | -- | .953 | None |
| RG-256/U | 50 | -- | .953 | None |
| RG-257/U | 50 | -- | 1.786 | None |
| RG-258/U | 50 | -- | 1.936 | None |
| RG-259/U | 50 | -- | .390 | None |
| RG-263/U | 50 | -- | .500 | None |
| RG-264A/U | 36.8 | -- | .750 | Same as RG-264/U except low temperature |
| RG-266/U | 1530 | 4,000 | .400 | Delay cable |
| RG-268/U | 50 | -- | .500 | None |
| RG-269/U | 50 | -- | 1.005 | None |
| RG-270/U | 50 | -- | 1.830 | None |
| RG-279/U | 75 | -- | .125 | None |
| RG-280/U | 50 | 3,000 | .467 | For low loss and low voltage application |
| RG-281/U | 50 | 4,000 | .750 | For low loss and low voltage application |
| RG-282/U | 54.6 | 4,500 | .200 | For 150 degree [C] operation |
| RG-283/U | 46 | 8,000 | .475 | For 150 degree [C] operation |
| RG-284/U | 75 | -- | 1.005 | None |
| RG-285/U | 100 | -- | 1.005 | None |
| RG-286/U | 75 | -- | 1.830 | None |
| RG-287/U | 100 | -- | 1.830 | None |
| RG-292/U | 75 | -- | 1.830 | none |
| RG-293/U | 50 | -- | .545 | None |
| RG-294/U | 95 | -- | .630 | Twin Axial |
| RG-295/U | -- | -- | .895 | None |
| RG-296/U | 50 | 10,000 | 1.190 | None |
| RG-297/U | 50 | -- | 1.005 | None |

| | | | | |
|---|---|---|---|---|
| RG-298/U | -- | -- | .650 | unshielded buoyant cable |
| RG-301/U | 50 | 3,000 | .245 | Similar to RG-126/U |
| RG-302/U | 75 | 2,300 | .206 | Similar to RG-140/U |
| RG-303/U | 50 | 1,900 | .170 | Similar to RG-141/U |
| RG-304/U | 50 | 3,000 | .280 | Similar to RG-143A/U |
| RG-305/U | 75 | -- | 1.990 | None |
| RG-306A/U | 75 | -- | 1.015 | None |
| RG-307/U | 75 | 400 | .270 | Interlayer is polyvinyl chloride |
| RG-316/U | 50 | 1,200 | -- | High temperature similar to RG-188A/U |
| RG-318/U | 50 | -- | 1.100 | None |
| RG-319A/U | 50 | -- | 2.000 | None |
| RG-321/U | 50 | -- | 2.850 | None |
| RG-322/U | 50 | -- | 3.040 | None |
| RG-323/U | 50 | -- | 1.060 | None |
| RG-324/U | 50 | -- | .980 | None |
| RG-325/U | 50 | -- | .465 | None |
| RG-326/U | 50 | -- | .779 | None |
| RG-327/U | 50 | -- | 1.180 | None |
| RG-331/U | 50 | -- | .625 | None |
| RG-332/U | 50 | -- | .815 | None |
| RG-333/U | 50 | -- | 1.052 | None |
| RG-334/U | 75 | -- | .500 | None |
| RG-335/U | 75 | -- | .625 | None |
| RG-336/U | 75 | -- | .875 | None |
| RG-360/U | 50 | -- | .825 | None |
| RG-366/U | 50 | -- | .620 | None |
| RG-367/U | 50 | -- | 5.200 | Very large cable |
| RG-369/U | 50 | -- | .470 | None |
| RG-370/U | 50 | -- | .390 | None |
| RG-371/U | 50 | -- | .140 | None |
| RG-376/U | 50 | -- | 1.060 | None |
| RG-377/U | 50 | -- | .530 | None |
| RG-378/U | 50 | -- | 2.000 | None |
| RG-382/U | 50 | -- | 1.620 | None |
| RG-385/U | 50 | -- | .660 | None |

## *Installing Cable - Some Guidelines*

When running cable, it is best to follow a few simple rules:

- Always use more cable than you need. Leave plenty of slack.
- Test every part of a network as you install it. Even if it is brand new, it may have problems that will be difficult to isolate later.
- Stay at least 3 feet away from fluorescent light boxes and other sources of electrical interference.

- If it is necessary to run cable across the floor, cover the cable with cable protectors.
- Label both ends of each cable.
- Use cable ties (not tape) to keep cables in the same location together.