



*Cable excellence engineered through quality*

# **Informational** Coaxial Cable Basics



# Coaxial Cable Basics

Coaxial cable was invented by English engineer and mathematician Oliver Heaviside, who patented the design in 1880.

Coaxial cables, or coax consists of a centre conductor (usually a solid copper, stranded copper or copper coated steel wire) surrounded by an outer conductor typically one to four layers of woven metallic braid and metallic tape separated by an insulating layer (dielectric). The cable is protected by a protective outer sheath. The term coaxial comes from the inner conductor and the outer shield sharing a geometric axis.

(common axis/*axial*)

## Design Advantages

The centre conductor, dielectric, shield and sheath are constant throughout the production process, controlled to give a precise, constant spacing between the inner and outer conductor, as a result the variation of impedance "impedance tolerance" is very small. Even normal installation conditions such as being bent, flexed or stepped on have little effect on the performance of a good quality coax. The coax design ensures that electric and magnetic fields are confined to the dielectric with very little loss or interference to signals inside the cable.





## Construction

Coaxial cable design choices affect physical size, frequency performance, and attenuation, power handling capabilities, flexibility, strength, and cost.

The inner conductor might be solid or stranded; stranded is more flexible. Tinned or silver plated copper is necessary on high temperature cables to prevent rapid oxidation of the copper during processing and use. Silver-plated conductor also gives better high-frequency performance. Copper clad steel wire is often used as an inner conductor for cable used in the cable television/CATV/ broadband/satellite coax. These cables are designed for high frequencies, where only the skin of the wire is actually carrying the signal. The steel improves the strength of the conductor enormously and improves the cost.

The dielectric may be polyethylene (PE), foam/cellular polyethylene (FPE), five cell air spaced or tube and thread (the thread supports the inner conductor) or materials such as Polytetrafluoroethylene (PTFE) may be used for high temperature applications.. The properties of dielectric control some electrical properties of the cable.

## Applications

Coaxial cable is used to transmit radio frequency (RF) signals connecting radio transmitters and receivers with their antennas, TV distribution through direct connection in the ground via aerial or satellite , broadcast and professional audio visual solutions.

For links between base stations and antenna in 3G/4G mobile communication networks, coaxial feeder cable with a solid copper wire, copper clad aluminium wire or a copper tube with a solid copper outer conductor is available. The outer conductor is rippled like a bellows to permit flexibility , either annularly corrugated or helically corrugated which is highly flexible .The inner conductor is held in position by a plastic spiral to approximate an air dielectric or is foam filled.

# Sheathing Materials

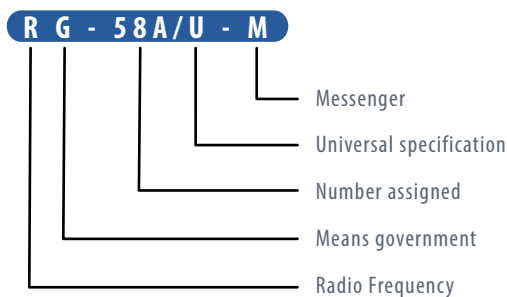
The protection sheath can be made from many materials. A common choice is PVC, but many specifiers will insist that installations in public buildings use Low Smoke Zero Halogen material such as FireFighter®. Outdoor versions are also available, where there is a need for mechanical protection DataGuard® steel wire armoured cables are available or PE sheathed version for use in cable ducts. Flooded coaxial cables use a water blocking gel which acts as a self-repair to protect the cable from water infiltration through minor cuts in the jacket.

## Standards

A series of standard types of coaxial cable were specified for military uses, in the form "RG-#" or "RG-#/U".

The origin of the RG designations is in old, long-obsolete U.S. (Government) military specification; RG stands for "Radio Guide," and the RG numbers are now completely arbitrary.

The meaning of the individual components of the designation are:



Many other designations for coax types have appeared over the years for driven by the demands of each application In the UK alone we have lots of standard types such as BBC "PSF" types , Uniradio "URM" types , BT versions such as "2003 ,3002 etc and "CT" types for TV and satellite applications

