

TECHNICAL BULLETIN

CertainTeed Corporation • Insulation Group • 750 East Swedesford Road • Valley Forge, PA 19482

TECHNICAL BULLETIN #62 (Revised)

DATE: October 11, 2007

SUBJECT: Knob and Tube Wiring

Knob and tube wiring is a wiring method usually found only in older homes. It consists of knobs (intermediate supports), tubes (protect and support wire where required) and single insulated conductors.

Knob and tube wiring (sometimes abbreviated K&T) was the earliest standardized method of electrical wiring in buildings, in common use from about 1880 to the 1930s. It consisted of single insulated copper conductors run across interior walls or within ceiling cavities, passing through joist and stud drill-holes via protective porcelain insulating tubes, and supported along their length on nailed-down porcelain knob insulators. Where conductors entered a wiring device such as a lamp or switch, they were protected by flexible cloth insulating sleeving. The first insulation was asphalt saturated cotton cloth, then rubber became common. Wire splices in such installations were twisted for good mechanical strength, then soldered and wrapped with friction tape (asphalt saturated cloth) or made inside metal junction boxes.



Fig. 1 – Old Knob, Tube and Cleat



Fig. 2 - Knob and tube wiring in ceiling

Open wiring systems like knob-and-tube, because they are in open air, can dissipate heat very well, however, in some cases improper or failed splices and joints can “glow” red-hot (as Edison pointed out) and go unnoticed for quite some time. During the energy crisis of the 1970’s, it became popular to blow loose-fill cellulose insulation into the attics and walls of older houses. This became a problem for older homes with knob-and-tube wire splices with glowing connections or overheated conductors that could easily ignite this insulation and cause a fire.



Fig. 3 - Knob and tube wiring in walls



Fig. 4 – K&T wiring through joists

TECHNICAL BULLETIN

CertainTeed Corporation • Insulation Group • 750 East Swedesford Road • Valley Forge, PA 19482

Covering it with insulation is unsafe and prohibited

Currently the United States NEC forbids use of loose, blown-in, or expanding foam insulation over K&T wiring. This is because K&T is designed to let heat dissipate to the surrounding air. As a result, energy efficiency upgrades that involve insulating previously uninsulated walls usually also require replacement of the wiring in affected homes.

Homeowners insurance underwriters may refuse to cover it

As existing K&T wiring gets ever older, insurance companies are starting to decline the growing risk it presents. Several companies will not write new homeowners policies at all unless all K&T wiring is replaced. An alternate requirement is that a homeowners policy will not be written unless the percentage of a home's wiring that remains K&T is below a certain threshold. This underwriting trend began in the 1990s and, especially since 2005, is growing rapidly. As of 2007, homebuyers are finding that the companies willing to write a new policy to cover K&T wiring are now the exception rather than the rule. This gives K&T owners with existing insurance policies a strong incentive to hire an electrician and upgrade the wiring, because if they want to sell their homes, the buyer's dilemma (K&T → no insurance → no mortgage approval → no sale) becomes their dilemma as well.

Knob-and-tube wiring has not been permitted by the NEC for new installations since the mid-1970's, however, is still described in the 2005 NEC in Art. 394 for existing installations and by special permission.

The NEC (National Electrical Code of the National Fire Protection Association) in Article 324-4 states "Concealed knob-and-tube wiring shall not be used in commercial garages, theaters and similar locations, motion picture studios, hazardous (classified) locations, or in the hollow spaces of walls, ceilings, and attics where such spaces are insulated by loose, rolled, or foamed-in-place insulating material that envelopes the conductors." The word "concealed" indicates this wiring can be used in hollow wall cavities as opposed to an "open wiring" method which must be exposed and which is only permitted in industrial or agricultural buildings."

The NEC explains that "Weatherization of hollow spaces (containing wiring) by blown-in, foamed-in rolled insulation prevents the dissipation of heat into the free air space. This will result in higher conductor temperatures, which could cause insulation breakdown (insulation that coats the conductor) and possible ignition of the insulation."

References

1. William Kibbel III. [Ask the Home Inspector: Knob and Tube Wiring](#). *Old House Web*. Retrieved on 2007-03-24.
2. <http://www.nfpa.org>
3. http://en.wikipedia.org/wiki/Knob_and_tube_wiring
4. National Electrical Code (NEC), or NFPA 70