BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G53.145
Issue 1, July, 1943
AT&T Co Standard

BLOCK AND HOUSE CABLE
GROUNDING—RUNNING GROUND WIRE

Contents

1. GENERAL

1.01 This section has been prepared to provide information for the use of the field forces in selecting satisfactory grounds, planning and attaching the ground wire run and providing electrical or mechanical protection where required.

1.02 The ground wire should be attached to cable sheath as described in the cable splicing instructions but if splicing facilities are not available it may be attached by means of the L Ground Clamp as outlined in Section G53.150.

1.03 The ground wire should be attached to water pipes, etc., as described in Section G53.150.

2. SELECTION OF GROUND

2.01 The approved grounds for cable sheath and protected terminal grounding are listed below in the order of preference:

(a) Public Water System.

(1) Use a metallic public water system in preference to any other ground.

(2) Connect to cold water pipes only.

(3) While the preferred point of connection is one between the entrance of the water service pipe into the building and the water meter or first joint, any convenient point on the permanent main piping may be used.

Note: Before attaching to pipe within the building it should be determined, by inspection, that the water service entrance pipe is metallic. Cases in which non-metallic pipe is found should be referred to your supervisor.

(4) Unless prohibited by local building codes, continuity of the grounding medium may be insured by the placing of a bond around the meter. The bonding wire should be of the same size as the ground wire.

(b) Public Gas System.

(1) In the absence of any special local restriction, gas pipes may be used for grounding but only when a suitable public water system is not available.

(2) Connect the ground wire on the street side of the meter or, in the absence of a meter, to the gas pipe where it enters the building.

(c) Private Water System.

(1) Do not use a private water system as a ground if a suitable public water or gas system is available.

(2) Use the private water system in preference to a ground rod except in cases of wells and cisterns having little or no metallic pipe buried in the earth. In general, a private system is preferable to a ground rod if 10 feet or more of metallic pipe are buried in the earth. Obtain approval of your supervisor before using pipes connected to wells and cisterns for a ground.

(3) When used, connect to cold water pipe on the same basis as for public water system.

(d) Grounded Metallic Structures.

(1) Grounded metallic structures such as buried tanks, conduits and pipes may be used for grounds only when it is evident that such structures are of a permanent nature and will provide a better ground than a ground rod. Obtain approval of your supervisor before using grounded metallic structures for a ground.

(e) Ground Rod.

(1) Use standard ground rod where grounds described in (a) to (d) are not available.

3. PLANNING GROUND WIRE RUN

3.01 In planning the ground wire run, these points should be kept in mind.

Note: It is expected that the restrictions described in Paragraph 2.01 will result in the selection of grounding mediums other than the cold water pipes only in isolated instances. Therefore, the term "cold water pipe" used in this section includes any of the alternative grounds in Paragraph 2.01 in cases in which such an alternative is necessary and acceptable.

(a) Select points for terminating the ground wire which will result in the shortest run consistent with convenience in making attachments and the requirements of both this section and the detailed plans.

(b) Locate the ground wire where it will be least likely to be broken or detached. Spanning open spaces, as from beam to beam at a distance farther than 3 in. from a wall, is undesirable, particularly where boxes, trunks or other such objects are likely to be stored. Where protection from mechanical injury is required, it should be provided as specified in Part 6.

(c) In the ground wire run avoid metal pipes and foreign conduits, cables and wires, particularly those used in electric light and power supply. Where it is impracticable to obtain the minimum clearances specified below, protect the ground wire as specified in Paragraph 5.01:

	Minimum Separation
Open Power Wiring (not over 750 volts).....	2"*
Electric Service Conduit or Foreign Cables....	1/2"*
Radio Antennae Leads and Ground Wires.....	4"
Open Signal Wires.....	1/2"*
Water, Gas, Sewer, Oil, Steam (bare) Pipes and Heating Ducts	1/2"*
Lightning Wires and Rods and Other Foreign Ground Rods	6'

* 3 in. minimum if Ground Rod is used.

(d) Run the ground wire horizontally or vertically as far as practicable.

(e) Allow sufficient ground wire at each end of the run to permit termination as specified.

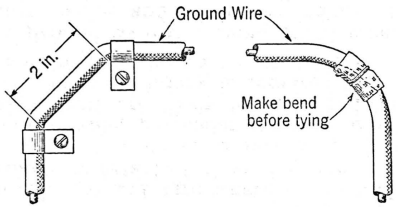
(f) Ground wire shall not be fished under floors or run vertically within partitions or walls.

(g) The ground wire from a protected terminal may be placed in building conduit which is grounded in accordance with the National Electric Code and any local regulations that may apply. Conduit not so grounded should not be used unless arrangements can be made for the owner or tenant to provide proper grounding. This restriction shall not be considered to apply to wires run to provide signalling grounds or to short lengths of sleeving used to provide mechanical protection where the ground wire passes through a floor from one level to another.

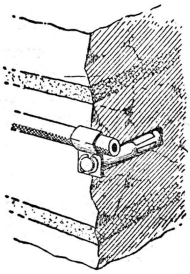
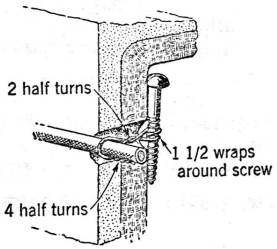
4. ATTACHING GROUND WIRE

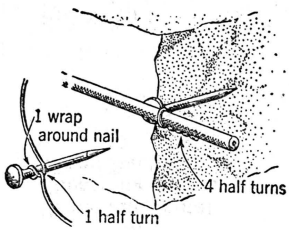
4.01 Space the ground wire fasteners approximately 24 in. apart, except where the ground wire is within 5 ft. of the floor or where it is otherwise subject to displacement, when the fasteners should be spaced approximately 16 in. apart. Where the ground wire is run on frame construction, place a fastener at every beam or stud.

4.02 Where the ground wire turns a corner clamps and wire ties should be arranged as illustrated below:



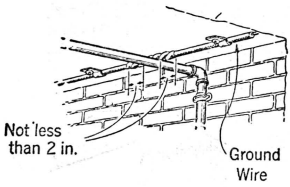
4.03 The methods of attaching No. 6 Ground Wire and No. 14 Ground Wire to the surfaces most commonly encountered are specified below. Refer to Section G10.375 for information with regard to the installation of anchoring devices in masonry, hollow tile and similar surfaces.

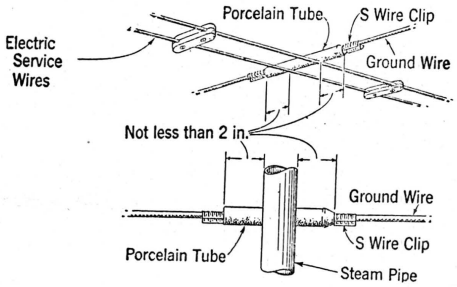
Surfaces	Methods of Attachment
Masonry: 	No. 6 Cable Clamp for No. 6 Ground Wire and Ground Wire Clamp for No. 14 Ground Wire. Attach clamp by means of 3/16 in. x 7/8 in. Hammer Drive Anchor or 1 in. No. 8 R.H. Blued Wood Screw with 6-8 x 3/4 in. Wood Screw Anchor.
Hollow Tile and Plaster on Metal Lath: 	Attach by means of 10 in. length of 049 Steel Lashing Wire and a 2 in. screw. When attaching No. 14 Ground Wire by means of a wire tie, the ground wire should be protected by applying 3 layers of 3/4 in. Friction Tape.
Wood and Metal Sheathing on Wood Backing:	No. 6 Cable Clamp for No. 6 Ground Wire and Ground Wire Clamp, Ground Wire Staple or Ground Wire Nail for No. 14 Ground Wire. Attach clamp by means of 1 in. No. 8 R.H. Blued Wood Screw or 1 in. No. 12 Roofing Nail.
Plaster on Wood Lath or Plaster Board:	No. 6 Cable Clamp for No. 6 Ground Wire and Ground Wire Clamp for No. 14 Ground Wire. Attach clamp by means of 1-1/2 in. No. 8 R.H. Blued Wood Screw.

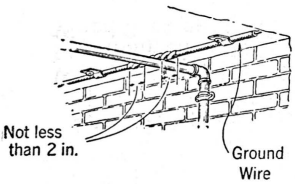
Surfaces	Methods of Attachment
Cinder Concrete and Plaster Block: 	Attach by means of a 4 in. length of 049 Steel Lashing Wire and 6d Slating Nail. When attaching No. 14 Ground Wire by means of a wire tie, the ground wire should be protected by applying 3 layers of 3/4 in Friction Tape.

5. CROSSING OTHER WIRES AND METALLIC OBJECTS

5.01 Where the ground wire crosses other wires and metallic objects with clearances less than those specified in Paragraph 3.01, protect it as follows:

Obstructions	Methods of Protection
Electric Service Conduit, Gas Pipes and Foreign Signal Wires: 	Apply one layer of 3/4 in. Friction Tape over one layer of 3/4 in. Rubber Tape, each layer to be half lapped and to extend not less than 2 in. on each side of the obstruction.
Electric Service Wires Not Encased in Conduit and Steam Pipes Not Covered with Asbestos:	Install 3/8 in. Porcelain Tube of such length as to extend not less than 2 in. on each side of the obstruction. Secure the tube in position by means of two S Wire Clips.



Obstructions	Methods of Protection
Electric Service Wires Encased in Wooden Molding:	**No protection is necessary. The only requirement is that the ground wire fasteners shall not be placed in the molding.**
Water Pipes: 	**Apply one layer of 3/4 in. Friction Tape over one layer of 3/4 in. Rubber Tape, each layer to be half lapped and to extend not less than 2 in. on each side of the obstruction. Run the wire above water pipes where practicable, as they are likely to sweat under certain conditions.**

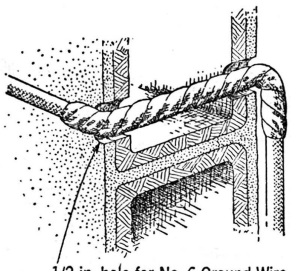
6. PROTECTION OF GROUND WIRE

6.01 Where the ground wire is likely to be subject to mechanical injury, cover it with Ground Wire Molding. The methods of attaching the molding to the surfaces most commonly encountered are given below. Fasteners should be spaced 24 in. apart.

Surfaces	Methods of Attachment
Masonry:	No. 17 Cable Clamp attached by means of 1/4 in. x 1 in. Hammer Drive Anchor.
Hollow Tile:	No. 17 Cable Clamp attached by means of 3/16 in. x 3 in. Toggle Bolt. If a longer bolt is required, use 3/16 in. x 4 in. Toggle Bolt.
Wood and Metal Sheathing on Wood Backing:	No. 17 Cable Clamp attached by means of 1-1/2 in. No. 14 R.H. Galv. Wood Screw or 3/16 in. x 1-1/2 in. Strap Nail.
Plaster on Wood Lath or Plaster Board:	No. 17 Cable Clamp attached by means of 2 in. No. 14 R.H. Galv. Wood Screw.
Cinder Concrete and Plaster Block:	No. 17 Cable Clamp attached by means of 1-1/2 in. No. 14 R.H. Galv. Wood Screw with 10-14 x 1-1/2 in. Wood Screw Anchor.

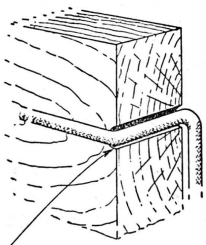
3.02 The protection required where ground wire passes through walls is specified below:

Types of Wall	Methods of Protection
Masonry, Hollow Tile, Plaster on Metal Lath, Metal Sheathing and Other Abrasive Materials:	Apply two layers of 3/4 in. Friction Tape, the layers to be half lapped and reversed.



1/2 in. hole for No. 6 Ground Wire
3/8 in. hole for No. 14 Ground Wire

Wood: **No protection is necessary.**



3/8 in. hole for No. 6 Ground Wire
1/4 in. hole for No. 14 Ground Wire