SPECIFICATIONS FOR PROTECTION OF BUILDINGS AGAINST LIGHTNING.

Protection against lightning is advisable on isolated buildings, and on all buildings having tall chimneys, steeples, high peaked or gable roofs, or flag poles.

One "rod" with proper air and earth terminal is recommended per unit of roof area, as follows:

Pitched roofs of metal, 1 each 2,000 square feet of ground area.

Pitched roofs other than metal, 1 each 5,000 square feet of ground area.

Flat roofs of metal, 1 each 5,000 square feet of ground area.

Air terminals should never be more than 50 feet apart and each should be provided with its individual ground.

A low, broad building of greater area than 75x100 feet can best be protected by an additional rod through the center of the building.

The air terminal to be placed at the highest point of the roof or structure. Where there are two or more gables, or other projections above the roof, of nearly equal height, each to have an air terminal and all to be connected together.

Where trees stand so close to a building that branches overhang, or approach very close to the roof, a conductor with proper earth terminal to extend along the trunk of each tree to near the highest branch-top, fastened by a band around the branch or trunk, and equipped with a cluster of points.

THE STANDARD ROD.

Conductors to be put in sheet or tape form of either copper, weight not less than 6 ounces per foot, or iron weighing not less than 2¼ pounds per foot, the latter to be painted or galvanized to prevent corrosion.

One inch iron rod can be used to connect iron ground with copper conductor, the conductor terminating above the surface of the ground.

AIR TERMINALS.

To be rods of iron or copper, not less than ¾ inch in diameter, with point cone-shaped and height of cone equal to the radius of the base.

One foot below the point there should be a casing holding four copper points.

Large chimneys should have a band of iron or copper, not smaller than the conductor, around the top 6 inches below the corbeling, and provided with copper points a foot long and ½ an inch in diameter.

Terminals should extend not less than 3 feet above roofs or chimneys.

Terminals can be satisfactorily made of ¾ inch copper or iron pipe.

CONDUCTORS — BETWEEN AIR TERMINALS AND GROUND.

All joints to be made mechanically and electrically secure and then soldered.

To be run down side of building where best ground is obtainable, preferably on the side most exposed to rain.

Not to be run nearer than five feet to interior piping unless absolutely unavoidable.

To be run as straight as possible, avoiding all turns of radius of less than one foot, and to incline downwards throughout its entire course.

Should never be insulated, but fastened securely to the surface.

Must never be run through iron pipes.

CONNECTIONS.

With iron piping or castings, to be made by screwing a brass plug into same and fastening conductor secruely to it, then soldering.

Or, with copper ground, by riveting and soldering, the connection then being coated with asphaltum paint.

GROUNDING ON EARTH TERMINALS.

A copper plate not less than 2 feet by 3 feet by 1-16 inch buried in permanently damp earth, not less than 4 feet below the surface, with 3 inches of crushed coke or charcoal underneath, and the same material above to within 6 inches of the surface of the ground.

Or, an iron casting so shaped as to have a number of pockets or cups facing upward. Should have not less than 6 square feet of surface. Should be buried with not less than 6 inches of scrap metal and coke under and 6 inches over same.

A proper ground is absolutely essential, and permanently damp earth is absolutely required.

1. WHERE ADVISABLE.

Protection against lightning is advisable on country buildings, on isolated buildings, and on all buildings wherever located having elevated features such as tall chimneys, steeples, high peaked or gable roofs, and flag poles.

2. GENERAL SUGGESTIONS FOR INSTALLATION.

a One "rod" with proper air and earth terminal is recommended per unit of roof area, as follows:

Pitched roofs of metal, 1 each 2,000 square feet of area.

Pitched roofs other than metal, 1 each 1,500 square feet of area.

Flat roofs other than metal, 1 eacn 2,500 square feet of area.

Flat roofs of metal, 1 each 5,000 square feet of area.

NOTE—1: The above figures must be materially modified where irregularly shaped structures are to be protected. Air terminals should never be more tnan 50 feet apart and each to be provided with its individual ground. Ordinary type flat or peak metal roofs approximately 50 by 50 feet, or same type other than metal approximately 35 by 35 feet, will require one rod and earth terminal, but sharp corners, wet with rain, such as gables, dormers and wings, diminish resistance and may require protection in greater proportion to area.

NOTE—2: A low, broad building of greater area than 75 by 100 feet can best be protected by an additional rod through the center of the building.

b The air terminal to be placed at the highest point of tne roof or structure. Where there are two or more gables or other projections above the roof, of equal or nearly equal height, each to have an air terminal, and all to be connected or bonded together over the high part of the roof to make the system a unit.

c Hot or moist air currents from chimneys, dampness in hay or fodder and in ice houses, diminish resistance to lightning discharges, hence the importance of rods on chimneys and at openings or ventilators in roofs of stables and ice houses.

d Where plain iron work, such as railings, exists on roof, a cluster of points to be provided every 15 feet. Ornamental iron work may require no points.

e All exterior metal work to be connected with the lightning rod system below the line of the metal work itself, or be separately grounded. This includes metal roofs, gutters, ventilators, railings and chimney hoods.

f Where trees stand so close to a building that branches overhang, or approach very close to the roof, a conductor with proper earth terminal to extend along the trunk of each tree to near the highest branch-top, fastened by a band around the branch or trunk, and equipped with a cluster of points. If extreme protection is desired, wires to be strung from tree to tree across the roof of the building, and all connected together, the ends being separately grounded. In either case, the building should also be equipped.

the building should also be equipped.

3. MATERIALS.

a But one kind of material to be used in the same system.

b Conductors to be in sheet or tape form, of either copper weighing not less than 6 ounces per foot, or iron weighing not less than 2¼ pounds per foot, the latter to be painted or galvanized to prevent corrosion.

c Rain-spouts and drain-pipes may be utilized if of equal conductivity as provided under "A," and properly grounded.

4. AIR TERMINALS.

a To be rods of copper, not less than ¾ inch diameter, or iron not less than ⅞ inch diameter, with upper point cone shaped and height of cone equal to the radius of the base.

b One foot below the point there should be a casting holding four copper points, each 6 inches long and ¼ inch in diameter.

c Large chimneys should have a band of iron or copper, not smaller than the conductor, around the top 6 inches below the corbeling, and provided with sharp copper points a foot long and ¼ inch diameter —one for every two feet along the circumference.

d Terminals should extend not less than 3 feet above flat or peaked roofs or chimneys, and be firmly secured in upright position.

5. CONDUCTORS—BETWEEN AIR TERMINALS AND GROUND.

a All joints to be made mechanically and electrically secure and soldered.

b To be run down side of building where best ground is obtainable, preferably on the side most exposed to rain.

c Not to be run nearer than five feet to interior piping unless absolutely unavoidable.

d To be run as straight as possible, avoiding all turns of radius of less than one foot.

e Should never be insulated, but fastened securely to the surface to be protected by clamps of same kind of metal and of sufficient strength and mechanical application to prevent conductors from working loose, at the same time allowing for expansion of the metal.

f Must never be run through iron pipes.

g All interior masses of metal, such as girders, beams, and water piping, but in no case gas piping, to be securely connected to a conductor system, at as high a point as possible and the connecting bond to incline downward.

6. CONNECTIONS.

a With iron piping or castings, to be made by screwing a brass plug into same and fastening conductor securely to it, then soldering.

b With copper ground, by riveting and soldering, the connection then being coated with asphaltum paint.

7. GROUNDING ON EARTH TERMINALS.

a The best ground consists of a copper plate not less than 2 feet by 2 feet by 1-16 inch buried in permanently damp earth, below the frost line and not less than 4 feet below the surface, with 3 inches of crushed coke or charcoal underneath, and the same material above to within 6 inches of the surface of the ground.

b The next best ground consists of an iron pipe not less than 10 feet long, 2 inches inside diameter, and ¼ inch thick, perforated with ½-inch holes at intervals of 3 or 4 inches, or with slots ¼ by 10 inches at intervals of 10 inches. A hole must be dug 10 feet deep and not less than 6 inches in diameter, the pipe placed in the center, and the hole filled in with crushed coke or charcoal about pea size.

c A third method of grounding which may be used if neither of the above is possible, is to dig a trench not less than 3 feet long and 1 foot wide leading away from the building and deep enough to reach permanently damp earth, but not less than 4 feet deep, and cover the bottom with a layer of scrap metal or well burned coke about walnut size, in which a star shaped casting securely attached to conductor shall be embedded.

NOTE—2: A proper ground is absolutely essential, and permanently damp earth is absolutely required. If same cannot be found at base of conductors, they should be extended underground (buried below the frost line in a wooden jacket) to a point where proper ground can be found.