

TELEPHONE

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LABORATORY TESTED AND APPROVED

AUTOMATIC  ELECTRIC

1950

COMPLETE SATISFACTION GUARANTEED

SUPPLIES

CATALOG 7000

TELEPHONE SUPPLIES

for

Construction and Maintenance

**CONSTRUCTION MATERIALS
LINEMEN'S EQUIPMENT
INSTALLATION TOOLS
EXCHANGE ACCESSORIES**

AUTOMATIC  ELECTRIC

Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems
Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions: Automatic Electric Sales Corporation
Export Distributors: International Automatic Electric Corporation
1033 West Van Buren Street, Chicago 7, U. S. A.

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ELECTRIC

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Detailed information on any of the above products will be furnished on request.

Foreword

This new Supply Catalog is your key to the shelves and bins of Automatic Electric's large and well-stocked warehouses. On its pages you will find all of the standard telephone supply items that have become your favorites, plus many new ones that have not previously appeared in any supply catalog. These new items (and improvements made in many others) demonstrate the research and development which is constantly going on in the laboratories of our company and of our suppliers. Each item has passed thorough laboratory tests, and has also proved its practical worth in the field. We confidently recommend all of these products as being thoroughly dependable—properly designed and constructed for the job!

You need open only this one book to find everything you desire in the field of telephone supplies. And though it is a big book, you'll find that it's arranged and indexed to make using it a pleasure. Try it for your next requirements.

AUTOMATIC  ELECTRIC

October, 1950

Orders

In the interest of accuracy, we request that you give both a description of the product and the catalog number when ordering. Orders written in this manner with the quantity clearly indicated expedite the delivery of the material to you.

Shipments

Shipments will be made in accordance with instructions received with order. Specify whether we shall ship by freight, express or parcel post and also give preferred routing. In the absence of instructions, we will use our best judgment in routing shipments to give you the very best service.

AUTOMATIC



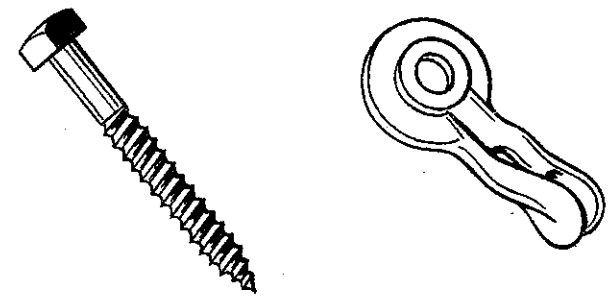
ELECTRIC

Terms

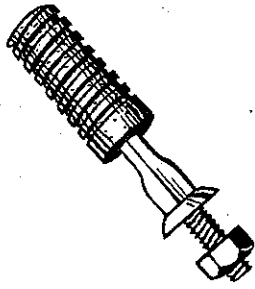
New accounts are solicited on a credit basis. In order to facilitate prompt shipment, send references or other information of a credit character with your order provided you are not rated by the commercial agencies. If it is desired to avoid delay on your first order incidental to communicating with references, etc., instruct us to ship C. O. D. by express or parcel post, or by freight.

Returned Goods

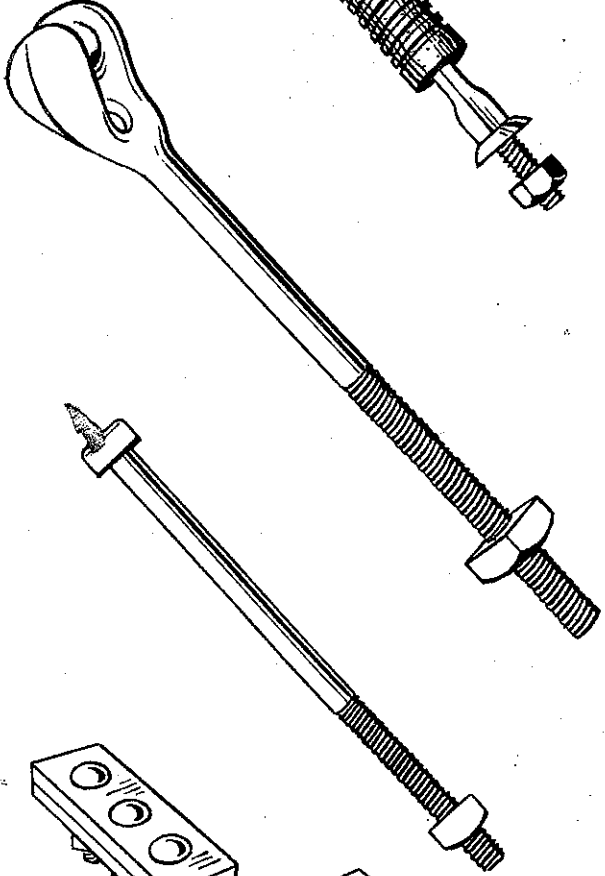
Always notify us before making a return shipment. This will enable us to make proper adjustment without delay.



ANCHORS

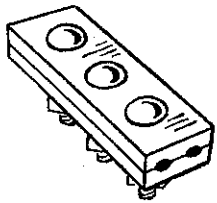


ANCHOR RODS

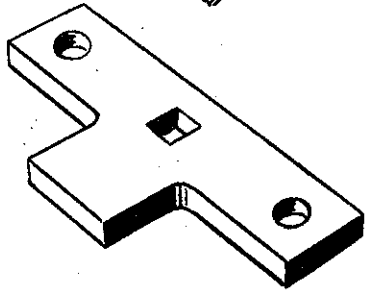


GLY CLAMPS

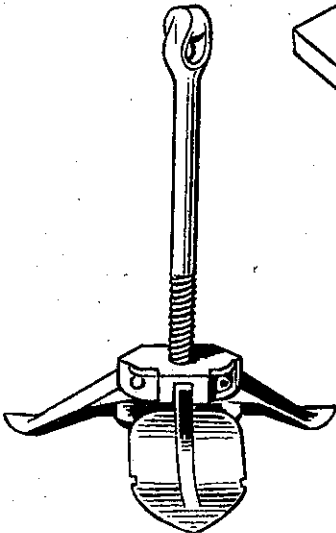
1 Hardware



STRAND CONNECTORS



GUARD ARM BRACES



BOLTS

Index for this section on reverse side



Kearney Expanding Anchors



Easily and quickly installed in any kind of soil, at any angle, by one man. A hole is bored and the anchor placed so that the blades will be horizontal. A tamping bar is pushed along the rod until it strikes the top of the blades. A few blows and the blades open into undisturbed earth.

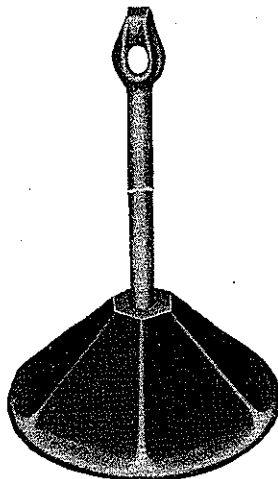
Two-Way Types

Cat. No.	Type	Size Expanded Inches	Rod Size Inches	Wt. per 100, Lbs.
S-2018	5053	5 x 13	1/2 to 5/8	500
S-2019	6069	6 x 14 1/2	1/2 to 5/8	800
S-2089	6076	6 x 15	1/2 to 5/8	800
S-2020	82090	8 x 14	1/2 to 3/4	1040
S-2090	7104	7 x 17 1/2	5/8 to 3/4	1250
S-2091	8120	8 x 19	5/8 to 1	1400
S-2092	8136	8 x 20	5/8 to 1	1800
S-2022	10208	10 x 25	3/4 to 1	3175

Three-Way Types

S-2023	8090	8 x 14 3/4	1/2 to 5/8	1000
S-2025	8110	8 x 16 3/4	1/2 to 3/4	1075
S-2026	8125	8 x 18 1/4	5/8 to 1	1250

Cone Anchors



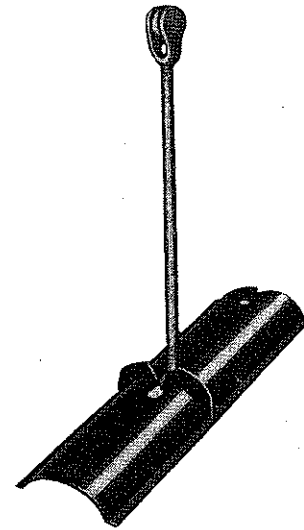
Cone anchors are designed for use in rocky locations, or other locations where moisture does not penetrate the earth deeply.

For installing bore a hole slightly larger than the diameter of the anchor. Drop anchor to bottom of hole (with anchor rod attached) and tamp a quantity of crushed rock around it. Hole is then filled with tamped earth and anchor is ready for use. (For anchor rods see page 8.)

Cat. No.	Base Diam, In.	Rod Size, In.	Wt. per 100, Lbs.
S-2006	6	1/2 or 5/8	320
S-2009	8	5/8 or 3/4	668

NOTE: 10 or 12-inch anchors supplied on order.

Never-Creep Anchors



Pulling at right angles to strain in installing hole, the Chance Never-Creep anchor gives unusual holding power. All strain is directed against undisturbed earth.

To install, locate hole approximately at right angles to line of pull, drive anchor rod through solid earth into hole, pass anchor down hole and hang on rod. Anchor then rests against side of hole in inclined position at right angle to pull.

Anchor Plates

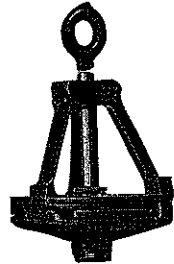
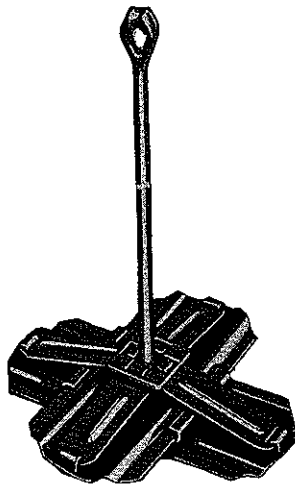
Cat. No.	Plate, In.	Rod Size, In.	Wt. Per 100, Lbs.
S-2073	6 x 17	1/2 or 5/8	905
S-2074	6 x 22	5/8 or 3/4	1180
S-2077	8 x 22	5/8 or 3/4	1602
S-2080	8 x 27	5/8 or 3/4	1935
S-2085	8 x 35	1	2750
S-2088	10 x 40	1	4761

Never-Creep Thimbleye Anchor Rods

Never-Creep type anchors can be used only with Never-Creep rods. Rods with single thimbleye shown below; rods with twineye for double guying can be supplied on special order.

Cat. No.	Diameter, In.	Length, Ft.	Wt. per 100, Lbs.
S-6184	1/2	5	300
S-6186	1/2	6	450
S-6188	1/2	7	500
S-6190	5/8	6	680
S-6192	5/8	7	755
S-6194	5/8	8	830
S-6198	3/4	7	1120
S-6200	3/4	8	1245
S-6204	1	8	2300

Expansion Anchors



Everstick—Above
Chance—Left

Popular, easily installed anchors. A hole is dug and anchor dropped to bottom and expanded by striking with tamping bar. Requires little effort.

Standard styles from two prominent manufacturers (as listed below) in three types — two-way, three-way and four-way.

Designed to be used with standard galvanized anchor rods.

Everstick Style

Cat. No.	Style	Type and Size Inches	Rod Size Inches	Area Expanded Sq. Inches	Lbs. per 100
S-2030	62	Two-way, 6	*	55	680
S-2036	82	Two-way, 8	5/8"	100	1100
S-2042	633	Three-way, 6	5/8"	65	780
S-2045	834	Three-way, 8	5/8"	90	1100
S-2048	836	Three-way, 8	3/4"	110	1400
S-2051	8310	Three-way, 8	3/4"	125	1450
S-2069	104	Four-way, 10	1"	210	3030
S-2068	124	Four-way, 12	1 1/4"	310	5350

* Either 1/2 or 5/8 inch rod size

Chance Style

Cat. No.	Style	Type and Size Inches	Rod Size, Inches	Area Expanded, Sq. Inches	Lbs. per 100
S-2027	62	Two-way, 6	1/2 or 5/8"	53	485
S-2033	826	Two-way, 8	5/8 or 3/4"	98	965
S-2054	64	Four-way, 6	1/2 or 5/8 or 3/4"	70	740
S-2060	846	Four-way, 8	5/8 or 3/4"	115	1407
S-2066	1044	Four-way, 10	1"	200	2493

Never-Creep Anchor Installing Tool



Designed to use as an installing tool, retriever and a tamp. Hook designed to fit easily in hole in anchor. Seasoned hickory handle is fitted with malleable tamp casting.

Cat. No.	Length, Ft.	Wt., Lbs.
S-2362	10	9

Maul



Used for driving rod into hole. Head is fitted with hot-paraffin-dipped, seasoned hickory inserts to prevent damage to anchor rods.

Cat. No.	Wt., Lbs.
S-5310	12

Thimbleye Anchor Rods

Hot Galvanized



As the name implies, Thimbleye Anchor Rods eliminate the need for guy thimbles. The rod ends are made to conform to the curvature of the guy strand—it can be pulled tight without distortion. Drop-forged steel, heavily galvanized, with clean threads. Deeply grooved to seat strands efficiently. Fitted with square nut. For washers see page 10.

Cat. No.	Diameter, In.	Length, Ft.	Wt. per 100, Lbs.
S-6156	1/2	5	375
S-6158	1/2	6	450
S-6160	1/2	7	510
S-6162	5/8	5	605
S-6164	5/8	6	680
S-6166	5/8	7	755
S-6168	5/8	8	830
S-6174	3/4	6	960
S-6176	3/4	7	1120
S-6178	3/4	8	1245
S-6179	3/4	9	1465

Twineye Rods

Cat. No.	Diameter, In.	Length, Ft.	Wt. per 100, Lbs.
S-6177	3/4	8	1280
S-6180	3/4	9	1460
S-6181	1	8	2310
S-6182	1	10	2867

Steelwing Anchors
Hot Galvanized



A labor-saving anchor that provides a large holding area in undisturbed earth. Requires no special tools to install. Drive a crowbar about 18 inches into earth and work with circular motion until top of hole is slightly larger than wing of anchor. Place anchor in hole and use crowbar to screw into ground to desired depth. Furnished with special E-Z eye, high-carbon steel rod and drop forged wings.

Cat. No.	Wing Diam., In.	Rod Diam., In.	Length, Ft.	Wt. per 100, Lbs.
S-2098	4	3/4	5 1/2	800
S-2102	6	3/4	5 1/2	1100
S-2103	7	1	5 1/2	1750
S-2104	8	1	5 1/2	2000
S-2107	10	1 1/4	5 1/2	3200
S-2110	10	1 1/4	8	4300

Thimbleye Nuts
Hot Galvanized



Drop forged. Designed for use on through bolts, eye bolts, double arming bolts, straight and angle thimbleye bolts, cross arm bolts and other attachments where it is desired to convert a standard threaded bolt to a thimbleye. Commonly used for dead-ending a messenger strand or span guy. Made with a generous radius and ample side-wall support for strand.

Cat. No.	Bolt Dia., In.	Weight per 100, Lbs.
S-5548	1/2	118
S-5550	5/8	117
S-5552	3/4	116
S-5553	1	166

Angle Bolt Thimbleyes



These eliminate the use of strain plates, guy hooks, lags and nails in guying and often save from three to five feet of strand. They are easy to install and are often used under the nut of a dead-end thimbleye bolt. Hole is not threaded.

Cat. No.	Bolt Dia., In.	Strand, In.	Eye Radius, In.	Weight per 100, Lbs.
S-2164	5/8	1/2 and under	9/16	70
S-2165	3/4	1/2 and under	11/16	105

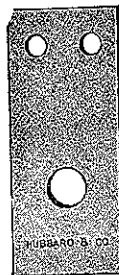
Guy Hooks
Hot Galvanized



Made in three styles for a variety of needs. Constructed with rounded wire grooves to assure strand a safe bending radius. Have 9/16-inch holes for attaching to poles with half-inch lag.

Cat. No.	Size and Length, In.	Type	Weight per 100, Lbs.
S-4834	1 1/4 x 1/4 x 3 1/4	Light (one hole)	40
S-4836	1 1/2 x 3/8 x 3 1/2	Heavy (one hole)	65
S-4838	1 3/4 x 3/8 x 4	Medium (one hole)	89
S-4840	1 1/2 x 3/8 x 6	Heavy (two hole)	91

Guy Plates
Hot Galvanized



Guy plates, or load or lift plates as they are also called, are used under the eye of the guyeye or thimbleye angle bolts to distribute the strain over a greater area. They are fastened to the pole with half-inch lag screws.

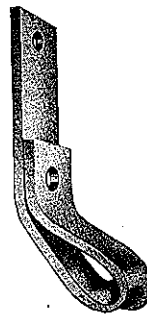
Curved

Cat. No.	Bolt Dia., In.	Plate Size, In.	Weight per 100, Lbs.
S-5712	5/8	2 1/2 x 7 x 7/8	95
S-5714	3/4	2 1/2 x 7 x 1/4	124
S-5716	1	2 1/2 x 7 x 7/8	148

Flat

S-5718	1 (and under)	2 1/2 x 7 x 7/8	148
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Guy Straps
Hot Galvanized



Guy Straps, or Storm Guys, as they are also known, are constructed with rounded wire grooves to give the strand safe bending radius. There are two types. Storm type has two holes for attaching, cross arm type has single hole. Will take strands to half-inch diameter.

Cat. No.	Hole Diameter Upper	Lower	Size, In.	Weight per 100, Lbs.
S-2262	9/16	13/16	1/4 x 1 1/2 x 7	117
S-2263		11/16	1/4 x 1 1/2 x 4 1/8	86

Guy Thimbles



High grade steel, thoroughly galvanized. Thimbles are grooved to fit the guy strand and bent to the mechanically correct radius to avoid sharp kinks. Thimble ends are separated to enable slipping over size of guy rod indicated in listing below.

Cat. No.	Strand Size, In.	Rod Size, In.	Weight per 100, Lbs.
S-7488	3/8	1/2 and 5/8	9 1/2
S-7490	1/2	5/8 and 3/4	22
S-7492	5/8	1	45

Guy Clamps
Hot Galvanized



Guy Clamps are held to rigid tolerances to assure proper seating of the guy strand and maximum holding power. All clamps have straight, smooth, parallel grooves, offer greater clamping area than any other design, and are not injurious to the guy strand. All holes are centered so that the two halves line up perfectly. Bolt shoulder and bolt holes are elliptical shaped to prevent turning when nut is tightened. Three-bolt clamps are assembled with center bolt reversed to provide ample wrench clearance.

Light Type

Cat. No.	No. Bolts	Length* Inches	Width Inches	Strand Size Inches	Weight Pounds 100 Pcs.
S-3516	1	1 3/4	1 1/4	1/8 to 1/4	48
S-3518	2	3 3/4	1 1/4	1/8 to 1/4	106
S-3520	3	5 3/4	1 1/4	1/8 to 1/4	160

Medium Type

S-3522*	1	1 7/16	1 9/16	1/4 to 3/8	63
S-3524	2	3 3/8	1 9/16	3/16 to 1/4	132
S-3526	3	4	1 9/16	5/16 to 3/8	185
S-3530	3	6	1 9/16	5/16 to 3/8	246

Heavy Type

S-3532	2	4	1 21/32	5/16 to 1/2	174
S-3534	3	6	1 21/32	5/16 to 1/2	284

* S-3522 has square bolt head and bolt hole to minimize tipping as bolt is tightened.

Wire Rope Clips

Hot Galvanized



Available in a complete range of sizes in malleable iron. Saddle properly grooved to fit specified strand. All surfaces smoothly finished to eliminate rough edges.

Cat. No.	Strand Size In.	Weight per 100, Lbs.
S-3662	1/4	16
S-3663	5/16	18
S-3664	3/8	24
S-3666	1/2	44
S-3668	5/8	61

Round and Square Washers

Hot Galvanized



Washers are cleanly cut and galvanized in such a manner as to insure a smooth, even coating with no lumps or drops to interfere with bolt or nut.

Round Washers

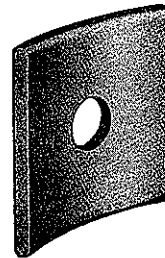
Cat. No.	Outside Dia., In.	Hole Dia., In.	Thickness, In.	Weight per 100, Lbs.
S-7700	1	7/16	5/64	1.6
S-7702	1 1/4	1/2	5/64	2.6
S-7704	1 3/8	9/16	7/64	4.2
S-7706	1 3/4	11/16	1/8	8.4

Square Washers

Cat. No.	Size, In.	Hole Dia., In.	Bolt-Rod Dia., In.	Weight per 100, Lbs.
S-7708	2 x2 x1/8	11/16	1/2 or 5/8	14.6
S-7709	2 1/4 x2 1/4 x3/16	11/16	1/2 or 5/8	24.2
S-7710	2 1/4 x2 1/4 x3/16	13/16	5/8 or 3/4	22.8
S-7712	3 x3 x3/16	13/16	5/8 or 3/4	47.8
S-7716	4 x4 x3/16	13/16	5/8 or 3/4	87.5
S-7718	4 x4 x1/4	15/16	3/4	115
S-7719	4 x4 x1/2	1 3/16	1	251

Curved Washers

Hot Galvanized



Used in guy construction to help distribute strain over a large pole area. For dead-ending a messenger, curved washers are used on the nut end of a thimbleye bolt. Cleanly cut, smoothly galvanized, there are no irregularities to prevent proper seating of bolt heads or nuts.

Cat. No.	Size, In.	Bolt Diam., In.	Wt. per 100, Lbs.
S-7722	2 1/2 x2 1/2 x3/16	5/8	34
S-7724	3 x3 x1/4	3/4	66

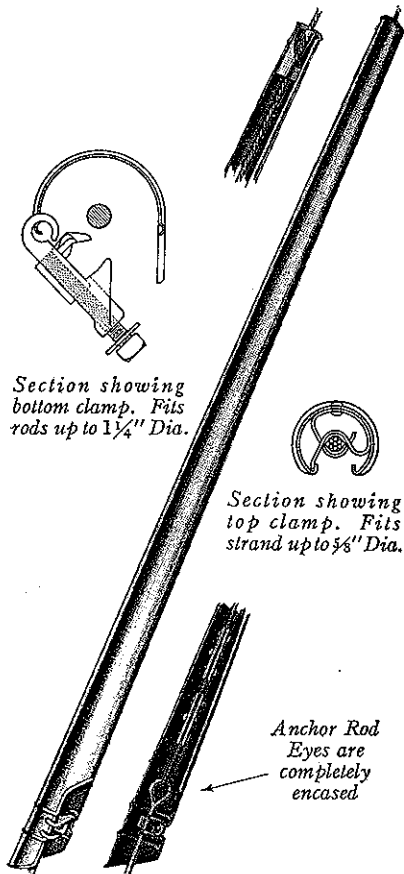
Stubbing Washers

Hot Galvanized

Identical in appearance with curved washers listed above. Used on each end of the through bolt to draw the pole and stub together and also used as a clip to draw together the wires wrapped around the pole and stub.

Cat. No.	Size, In.	Hole Dia., In.	Bolt Diam., In.	Wt. per 100, Lbs.
S-7726	3 1/4 x3 1/8 x 1/4	13/16	5/8 or 3/4	85
S-7728	3 1/2 x3 3/8 x 3/8	13/16	5/8 or 3/4	120

Guy Wire Protectors
Hot Galvanized



Full round guy-wire protectors are made from 18-gauge steel, combining strength, visibility and ease of installation. Attachment at top engages the guy wire (up to 3/8-inch) after which lower end is brought into alignment and swinging clamp is locked over rod, holding it rigidly centered on strand. Formed to provide ample clearance for all standard anchor eyes and clamps.

The half-round type of guy-wire protector also gives highly satisfactory service. Clamping is accomplished by U-Bolts which are designed to fit either clamp, rod or strand. Will not turn on wire. (Not illustrated).

Shipment is made with all parts assembled or attached. Nothing loose to be mislaid or forgotten. Be sure to specify style wanted on order.

Cat. No.	Style	Length, Ft.	Wt. per 100, Lbs.
S-5978	Half-Round	7	1100
S-5980	Half-Round	8	1200
S-5982	Full-Round	7	1100
S-5984	Full-Round	8	1200

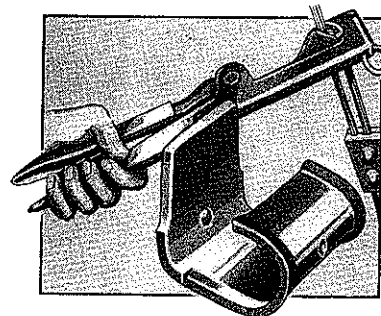
Overton Flexibal Guy Guard



Designed by an engineer, tested in the field. The Flexibal combines unusual flexibility, visibility, protection and long-life. Seasoned hardwood, finished in durable aluminum paint with one hot-dipped galvanized nail already inserted. Easily and quickly applied with a few blows of a hammer. Safe for animals, cars, accidental impacts. Weather resistant, highly attractive. Each set complete with positive cable clamp.

Cat. No.	Type No.	Length Ft.	Weight Lbs.
S-4521	85	5	4
S-4523	86	6	4 1/2
S-4525	87	7	5

Kearney Guy Wire Clips

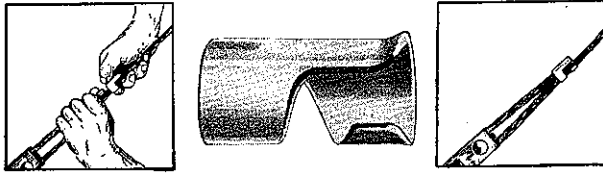


Designed to provide a safer, less laborious method of serving up strand ends. They are half-formed to fit the strand and may be installed with either ordinary pliers or a special tool. Cannot damage strand and are quicker to install than most ordinary guy wire clips. Furnished in aluminum, in five sizes, to fit standard guy strands. Can be supplied in copper or galvanized iron on order.

Cat. No.	Strand Size, In.	Wt. per 100, Lbs.
S-3674	1/4	2
S-3676	5/8	2
S-3678	3/8	2 1/2
S-3680	7/8	2 1/2
S-3682	1/2	2 3/4
S-7521	Guy Wire Clip Tool	300

Servisleevs

Hot Galvanized

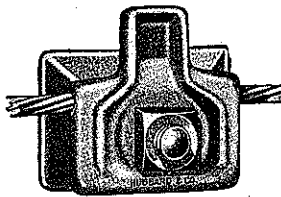


Used to serve up strand ends. No cutting, clipping or crimping necessary. Easily and quickly installed without special tools. Retains original shape and maintains a firm grip at all times.

Cat. No.	Strand Size, Ins.	Length, In.	Weight per 100, Lbs.
S-6783	1/4	1 3/8	3
S-6784	5/8	1 1/2	5 1/2
S-6786	3/8	1 3/4	7 1/2

Non-Breakable Messenger Hangers

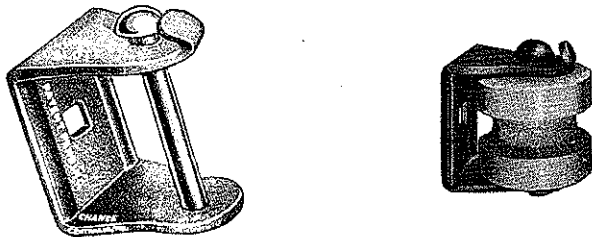
Hot Galvanized



Uses a standard 5/8-inch through bolt for installing—requires no extra nuts. The vertical finger keeps the messenger in place while it is being pulled tight and it is then dropped into groove and nut is set up. Made of malleable iron, with back curved to fit the pole. Has a long clamping surface and supports the cable well away from the pole.

Cat. No.	Size Strand, In.	Wt. per 100, Lbs.
S-4722	1/4 to 5/16	150
S-4710	3/8 to 1/2	160

Chance Terminal Brackets



For various types of dead-ending and terminal use. The insulator locks into the bracket after mounting. No keys or nuts are necessary. Brackets and pins are galvanized. Ideal for an inexpensive and efficient dead-ending method. Brackets and insulators must be ordered separately, as listed below.

Cat. No.	Description	Wt. per 100, Lbs.
S-3130	Brackets with Pins	35
S-4922	Single-Groove Insulators	38

Cross Arm Back Braces

Hot Galvanized



These braces are used for back-bracing cross arms at corners and on terminal poles. In many cases they eliminate the necessity for double arming.

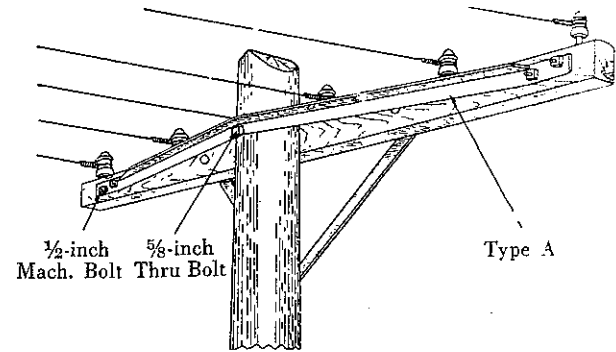
Open Hearth steel, furnished in two styles: Type A (light) shown above, fastens to cross arm by half-inch carriage bolts at each end and to pole by 5/8-inch machine bolt. Type B (heavy) fastens to arm by two half-inch machine bolts at each end and 5/8-inch machine bolt at pole.

Type A

Cat. No.	Steel Size, In.	Length, In.	Weight per 100, Lbs.
S-3027	1 1/2 x 1 1/2 x 3/16	72	1090

Type B

S-3028	1 3/4 x 1 3/4 x 3/16	109	2040
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Flat Cross Arm Braces



Open-hearth steel, thoroughly galvanized. Punched at both ends—one end with 7/16-inch hole for carriage bolt; the other end with 9/16-inch hole for lag screw.

Cat. No.	Length, Inches	Width, Inches	Thickness, Inches	Weight per 100, Pounds
S-3036	20	1-3/8	3/8	156
S-3038	22	1-3/8	3/8	172
S-3040	24	1-3/8	3/8	187
S-3042	26	1-3/8	3/8	202
S-3044	28	1-3/8	3/8	218
S-3046	30	1-3/8	3/8	233
S-3050	22	1 1/4	1/4	201
S-3051	24	1 1/4	1/4	220
S-3056	30	1 1/4	1/4	275

(Other sizes are available on order)

Straight Thimbleye Bolts



Thimbleye bolts save from three to five feet of strand and leave the pole clear for ground wire or moulding. They eliminate strain plates, guy hooks, lags and nails. Eyes are drop forged and have ample radius to prevent strand being kinked too sharply and concentrating strain at any one point. Roll threaded.

Cat. No.	Diameter, In.	Length, In.	Weight per 100, Lbs.
S-2753	5/8	8	132
S-2755	5/8	10	154
S-2757	5/8	12	176
S-2759	5/8	14	198
S-2760	5/8	16	220
S-2761	5/8	18	242
S-2766	3/4	8	204
S-2768	3/4	10	229
S-2770	3/4	12	255
S-2772	3/4	14	280
S-2774	1	8	400
S-2775	1	10	448
S-2778	1	12	497

Thimbleye Angle Bolts



For use in place of guy hooks and strain plates. Eliminates the necessity of wrapping wire around pole. Saves time, material and labor. Eyes free from burrs to prevent strand injury. Angle convenient for most guying. Furnished with "buffer points" for quick, easy threading or hammering out without damaging threads.

Available in diameters of 5/8, 3/4 and one inches to accommodate 6,000, 10,000 and 16,000 pound strands respectively. When a strain of 8,000 or more pounds is imposed they should be used with the guy plates listed on page 9. Thoroughly galvanized, furnished with nuts.

Cat. No.	Diam., In.	Length, In.	Weight per 100, Lbs.
S-2776	5/8	6	110
S-2777	5/8	8	120
S-2779	5/8	10	140
S-2781	5/8	12	160
S-2783	5/8	14	180
S-2784	5/8	16	200
S-2785	5/8	18	220
S-2789	3/4	8	180
S-2791	3/4	10	210
S-2793	3/4	12	240
S-2795	3/4	14	280
S-2796	1	8	400
S-2797	1	10	448
S-2799	1	12	497

Machine or Through Bolts



Sometimes known as cross-arm or pole bolts. Made with "buffer points" for quick easy threading. Also permits bolt to be hammered without damaging threads. Furnished with rolled threads and square nut. Thoroughly galvanized. Washers on page 10.

Cat. No.	Size, In.	Thread Length, In.	Weight per 100, Lbs.
S-2858	3/8x3	3	13.1
S-2860	3/8x3 1/2	3	14.6
S-2862	3/8x4	3	16.0
S-2864	3/8x4 1/2	3	17.5
S-2865	3/8x5	3	20.1
S-2868	3/8x5 1/2	3	20.4
S-2870	3/8x6	3	21.8
S-2878	1/2x4 1/2	3	33.8
S-2880	1/2x4 3/4	3	35.0
S-2882	1/2x5	3	36.3
S-2886	1/2x8	4	51.6
S-2890	1/2x10	4	61.8
S-2892	1/2x12	4	72.0
S-2894	1/2x14	6	82.2
S-2898	5/8x6	3	70
S-2900	5/8x8	4	82
S-2902	5/8x10	4	98
S-2904	5/8x12	4	114
S-2906	5/8x14	6	130
S-2908	5/8x16	6	146
S-2910	5/8x18	6	150
S-2912	5/8x20	6	164

Turnbuckles

Hot Galvanized



All parts drop-forged from new open-hearth steel, assuring strength and reliability. Bodies are fitted with hexagonal ends so they may be adjusted with a wrench at the end as well as a lever at the center. Available in two types—Hook-and-Eye and Eye-and-Eye.

Hook-and-Eye

Cat. No.	Size, In.	Wt. per 100, Lbs.
S-7641	1/2 x 6	163
S-7642	1/2 x 9	206
S-7643	1/2 x 12	250
S-7644	5/8 x 9	415
S-7645	5/8 x 12	477
S-7646	3/4 x 12	682

Eye-and-Eye

Cat. No.	Size, In.	Wt. per 100, Lbs.
S-7647	1/2 x 6	163
S-7648	1/2 x 9	206
S-7649	1/2 x 12	250
S-7650	5/8 x 9	415
S-7651	5/8 x 12	477
S-7652	3/4 x 12	682

Wood Screws

When ordering wood screws specify finish—either galvanized or blued—and type of head—round or flat. Length of screw is measured from the under side of the round head to the point, and from the top of the flat head to the point.

Number								
6	7	8	9	10	12	14	16	18
Length, Inches								
3/8	1/2	1/2	3/4	3/4	3/4	1	1 1/4	1 1/2
1/2	5/8	5/8	7/8	7/8	7/8	1 1/4	1 1/2	2
5/8	3/4	3/4	1	1	1	1 1/2	1 3/4	2 1/2
3/4	7/8	7/8	1 1/4	1 1/4	1 1/4	1 3/4	2	3
7/8	1	1	1 1/2	1 1/2	1 1/2	2	2 1/2	3 1/2
1	1 1/4	1 1/4	1 3/4	1 3/4	1 3/4	2 1/4	3	4
1 1/4	1 1/2	1 1/2	2	2	2	2 1/2	3 1/2	
1 1/2		1 3/4	2 1/2	2 1/4	2 1/4	3	4	
		2		2 1/2	2 1/2	3 1/2		
		2 1/2		3	3	4		
				3 1/2	3 1/2			

The following chart shows typical applications of some of the above screws in telephone work.

Type	Length	Ga. No.	Use
R.H. Galv.	2 1/2"	10	For attaching Type C Knob.
F.H. Galv.	2 1/2"	18	For attaching Type S Knob.
F.H. Galv.	3"	18	For attaching Type T Knob.
F.H. Galv.	2 1/2"	18	For attaching No. 4 Single Groove Knob.
F.H. Galv.	3 1/2"	18	For attaching No. 4 Double Groove Knob.
F.H. Galv.	2 1/2"	18	For attaching other than first "A" knobs.
F.H. Galv.	3"	18	For attaching first "A" knob.
F.H. Galv.	3 1/2"	18	For attaching to Stucco Walls.
R.H.B.	3/4"	6	For leather strapping.
R.H.B.	3/4"	8	For Cable Clamps.
R.H.B.	1"	6	For mounting Connecting Blocks.
R.H.B.	1"	8	For mounting Subsets on Oak.
R.H.B.	1 1/4"	6 & 8	For mounting Subsets on Oak.
R.H.B.	1 1/2"	6	For mounting Fanning Strips.
R.H.B.	1 1/2"	8	For mounting Subsets.
R.H.B.	1 1/2"	10	With lead screw anchor for 50 and 100 Pr. Clamp.
R.H.B.	2"	6 & 8	Mounting Subsets on plastered walls.
R.H.B.	2 1/2"	8	Mounting Subsets on plastered walls.
R.H. Galv.	3/4"	8	Mounting 3/8" Wire Clamps.
R.H. Galv.	1"	8	Mounting 1/2" Wire Clamps.
R.H. Galv.	1 1/2"	14	For attaching House Brackets.
R.H. Galv.	2"	14	For attaching House Brackets to stucco walls.

Double Arming Bolts

Hot Galvanized



Used with four square washers in the approved method of tying two cross arms together. For correct length allow two inches for washers and nuts, add twice the thickness of the cross arm, plus diameter of pole (less depth of gain). Full length thread for ease of replacement and added flexibility. Furnished with nuts but not with washers.

Cat. No.	Size, In.	Weight per 100, Lbs.
S-2826	1/2 x 12	111
S-2828	1/2 x 14	120
S-2830	1/2 x 16	129
S-2832	1/2 x 18	138
S-2836	5/8 x 12	165
S-2838	5/8 x 14	194
S-2840	5/8 x 16	200
S-2842	5/8 x 18	218
S-2844	5/8 x 20	235

(Longer bolts available on request)

Carriage or Brace Bolts

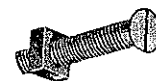
Hot Galvanized



Standard heads, square nuts, finished points and rolled threads. Furnished without washers. For washers, see listing page 10.

Cat. No.	Size, In.	Length of Thread, In.	Wt., per 100, Lbs.
S-2800	3/8 x 3	1 3/4	12.9
S-2802	3/8 x 3 1/2	1 3/4	14.3
S-2804	3/8 x 4	1 3/4	15.8
S-2806	3/8 x 4 1/2	1 3/4	17.2
S-2808	3/8 x 5	1 3/4	18.7
S-2809	3/8 x 5 1/2	1 3/4	20.1
S-2810	3/8 x 6	1 3/4	21.6
S-2811	3/8 x 8	4	27
S-2812	3/8 x 10	4	33
S-2822	5/8 x 6	3	66

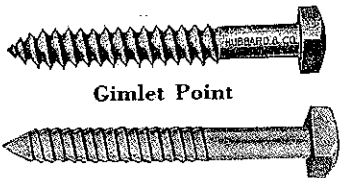
Stove Bolt



Cat. No.	Size, In.	Weight per 100, Lbs.
S-2930	5/16 x 2	6

Lag Screws

Hot Galvanized



Gimlet Point



Fetter Drive

Clean and smooth, all sizes in both styles are made of new open-hearth steel, properly normalized after fabrication. Unless otherwise specified Fetter Drive Lag Screws will be furnished on all orders except for 1/4-inch and 5/8-inch sizes which are available in Gimlet Point only.

Cat. No.	Size, In.	Wt. per 100, Lbs.
S-6482	1/4 x 2	3.5
S-6484	1/4 x 2 1/2	5.0
S-6486	5/8 x 2	5.2
S-6488	5/8 x 2 1/2	6.2
S-6490	5/8 x 3	7.5
S-6492	5/8 x 3 1/2	9.7
S-6493	3/8 x 2 1/4	7.7
S-6494	3/8 x 2 1/2	9.7
S-6496	3/8 x 3	11.0
S-6498	3/8 x 3 1/2	12.8
S-6500	3/8 x 4	14.6
S-6502	3/8 x 4 1/2	16.4
S-6506	1/2 x 2 1/2	18.4
S-6508	1/2 x 3	20.9
S-6510	1/2 x 3 1/2	23.4
S-6512	1/2 x 4	26.0
S-6514	1/2 x 4 1/2	27.8

Pole Steps

Hot Galvanized



S-7200



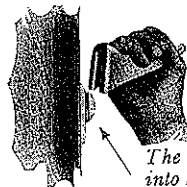
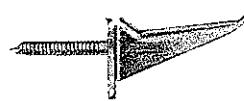
S-7202

Furnished in two styles, as illustrated. Both the standard hook-type step and the long-hook type have Fetter drive threads, which makes them easy to install and prevents tearing wood when steps are driven. No. S-7200 long-hook style is used at points where linemen stand to work. The long hook prevents the foot from slipping off the end of the step.

Cat. No.	Type	Diam., In.	Length, In.	Wt. per 100, Lbs.
S-7196	Std. Hook Head	5/8	9	88
S-7198	Std. Hook Head	5/8	9	70
S-7202	Std. Hook Head	5/8	10	94
S-7200	Long Hook Head	5/8	10	116

Detachable Pole Step

Hot Galvanized



The Step slips easily into the grooves of the Lag Screw Head and is held solidly in place.

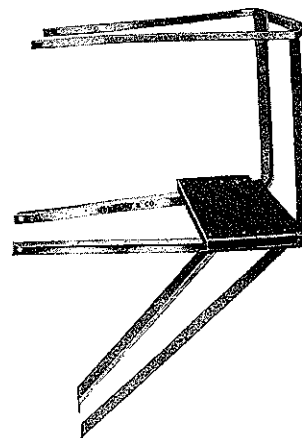
Easy to install—just slip the plate over the lag screw and drive lag in until plate bites into wood. Step slips over groove in each side of lag and is prevented from turning by lug on bottom of plate. A nail driven through the hole in the bottom of the plate offers additional security against turning. Steps are easily slipped on and off and

when removed unlicensed climbing is stopped. Order separately.

Cat. No.	Description	Size, In.	Wt. per 100, Lbs.
S-7199	Lag and Plate	5/8 x 1 1/4	93
S-7201	Step Only	5 1/8	50

Pole Balcony

Hot Galvanized

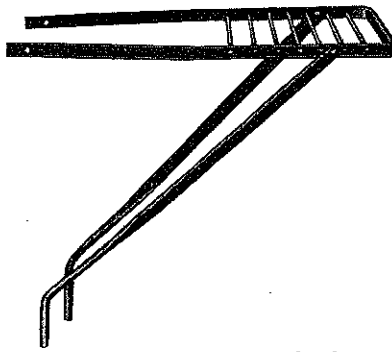


Standard with most companies. Frame, braces and guard rails are of open hearth steel and galvanized by the hot-dip method, while wooden platform is made of thoroughly seasoned oak painted with two coats of standard green pole paint.

Upright braces are 1 1/2 by 1 1/2 by 3/16-inch steel. Platform supports are 1 3/4 by 1 3/4 by 3/16-inch angle steel. Guard rail is 1 1/4-inch flat steel. Complete balcony includes all bolts for fastening parts together but no bolts for attaching to pole.

Cat. No.	Type	Platform, In.	Weight Each, Lbs.
S-2342	9035	40x30	65

Pole Seats

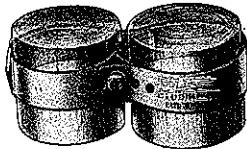


All steel. Strong, rigid and light in weight, these seats were found capable of supporting $\frac{3}{4}$ of a ton safely when tested under actual conditions of use. Steel frames and braces are made of one-inch by half-inch channel steel. Seat bars are of $\frac{3}{8}$ -inch square steel, secured to the frame so as to leave no projecting ends. Riveted joints are relieved of all strain. Bars are placed corner up to prevent slipping. Mounted with lag screws.

Cat. No.	Seat Size, In.	Wt. Each, Lbs.
S-6768	12 x 13 $\frac{7}{8}$	14
S-6770	12 x 11	13

Samson Pole Stubbing Clamps

Hot Galvanized



Samson Stubbing Clamps are designed with a heavy clamping band, two saddle plates and a special staple for fastening the loose end of the band to the pole or stub. Generally two clamps are used—one near the ground, the other near the top of the stub. Available in two sizes—the Giant and the Junior. The Giant band is 2 $\frac{1}{2}$ inches by eight feet. The Junior band is 2 $\frac{1}{2}$ inches by five feet, ten inches. Both sizes have $\frac{11}{16}$ inch holes to permit use of $\frac{5}{8}$ inch bolts.

Not furnished with bolts or washers—order separately. Bolt length should be slightly more than diameter of pole. (For bolts, washers see pages 10, 14.)

To simplify installation use the Samson installing wrench. This wrench is made of forged steel. One end is used for pulling the bands tight; the other (pointed) end is for lining up the holes.

Cat. No.	Description	Pole Size In.	Weight per 100, Lbs.
S-3538	Giant No. 1 Clamp	13 to 18	950
S-3540	Junior No. 2 Clamp	7 to 12	625
S-8050	Installing Wrench		1000

Aluminum Letters and Numbers



For pole numbering, transposition marking and cable terminal designation. Made of special 99% pure rolled aluminum, they will not rust, tarnish or corrode. Perfectly smooth, they will not catch, or hold dust and dirt.

Most widely used by telephone companies are two-inch and three-inch sizes. Others available run from half-inch to six inches.

Order according to sizes and numbers needed.

Pole Tags



For identification of poles and other properties, these convenient tags have found wide use among telephone companies. Available in standard and special designs, they are made with raised letters on pure aluminum plates. Standard style illustrated—other standard styles below. (Special designs can be quickly supplied on request.)

Cat. No.	Letter Size, In.	Plate Width, In.
78	$\frac{7}{8}$	1 $\frac{3}{4}$
787 (two lines)	$\frac{7}{8}$ and $\frac{7}{8}$	1 $\frac{3}{4}$
716	$\frac{7}{8}$	$\frac{3}{4}$
114	1 $\frac{1}{4}$	2 $\frac{1}{4}$
12 (Illustrated)	$\frac{1}{2}$	$\frac{3}{4}$

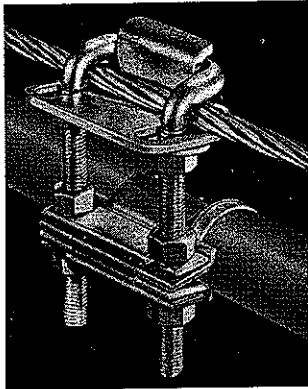
Steel Girder Clamps



Malleable iron clamps fitted with cup-pointed, case-hardened steel set-screws for use with type K or M bridle rings. Set screws are plated, electro-galvanized or sherardized.

Cat. No.	Type	Size, In.	Standard Tapping	Wt. per 100, Lbs.
S-7376	509	1	10/24	20

Kearney Grade Clamps



Adjustable grade clamps designed to keep cable from slipping. They have a permanent, firm grip yet do not compress or injure cable in any way. Once the distance from the messenger to cable has been established by means of rings Kearney Grade Clamps can be installed and will maintain proper clearance indefinitely. All cable sizes, as listed below, are based on 22-gauge.

Cat. No.	Max. Cable Size, Pr.	Max. Cable Diam., In.	Wt. per 100, Lbs.
S-3406	100	1	106
S-3408	400	1 5/8	114
S-3409	900	2 5/8	122
S-3413	400	2 Cables 1 5/8 In. Ea.	173

Cable Suspension Clamp Hot Galvanized



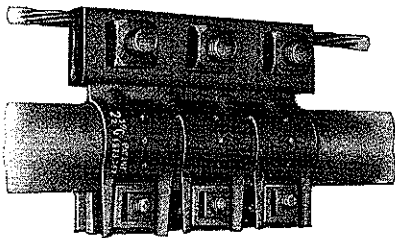
The one-bolt type is used for light cables and on cable arms. The three-bolt types are for heavy cables and long spans. The one-bolt clamp is furnished without a bolt—a 5/8-inch Through Bolt is used both for attaching the clamp to the pole and tightening the clamp on the strand. Both take 1/4 to 7/16-inch strand.

The three-bolt clamp is furnished with two 1/2-inch high-carbon steel bolts with the center hole left blank for a 5/8-inch through bolt.

In attaching to the pole a nut and square washer are placed between the pole and the clamp to provide clearance for the cable. Where cables are to be mounted on both sides of the poles, double arming bolts are used, instead of through bolts.

Cat. No.	Type	Center Hole, In.	Length, In.	Weight per 100, Lbs.
S-3416	One-Bolt	11/16	2 3/8	84
S-3418	Three-Bolt	11/16	5 5/8	224

Diamond Grade Clamp



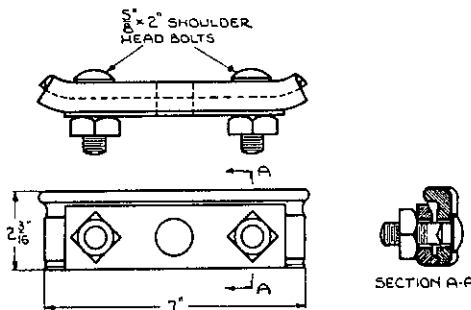
Made of cold-rolled steel strip, complete with three lower bolts for gripping to lead cable. The guy clamp shown is standard type but is not included as part of this clamp (see page 10).

Generally used two on each side of a pole to overcome the tendency of cables to slide when messenger is set on a grade. Flexible material used guards against damage to cable sheath.

Galvanized by the exclusive patented Diamond Process.

Cat. No.	Cable Diam., In.	Clamp Size, In.	Wt. per 100, Lbs.
S-3407	1 1/2	2 1/2	110
S-3425	1 1/8	2 1/2	112
S-3426	1 1/8	2 1/2	114
S-3427	2 1/8	3	130
S-3428	2 5/8	3 1/2	140
S-3429	3 1/4	4	165

Cable Suspension Clamp, Curved Hot Galvanized

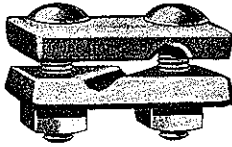


Similar to the S-3418 three-bolt cable suspension clamp except that the messenger grooves are curved at either end to support and relieve strain on the strand when line is set at an angle or around corners. The messenger fits into, and pulls against the full length of, the groove, eliminating sharp angles. Has 1-3/32 inch hole for mounting. Use 3/4 inch through-bolt for 3/8 inch strand and smaller, 1 inch through-bolt for 7/16 inch strand.

Cat. No.	Overall Length, In.	Strand Size, In.	Wt. per 100, Lbs.
S-3420	5 5/8	1/4 to 7/8	224

Crossover Clamp

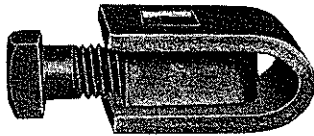
Hot Galvanized



Used for joining two messenger cables when they cross at right angles. Also for telephone work where cables turn corners or where branch cables leave line at points distant from pole.

Cat. No.	Size, In.	Strand Size, In.	Wt. per 100, Lbs.
S-3506	1/2 x 1 1/2 x 3 1/4	1/8 to 1/2	170

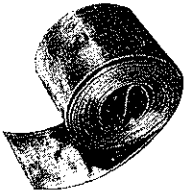
Strand Ground Clamp



Used for grounding the sheath of overhead cables to the supporting messenger strand. Bolt turns against collar, giving added grounding surface.

Cat. No.	Wt. per 100, Lbs.
S-3465	34

Lead Serving Tape

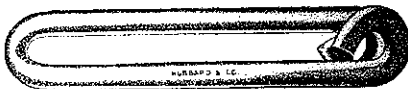


Used with grade clamps to protect cable sheath by wrapping under clamp, or, for building up sheath when too small for clamp. Standard one pound roll.

Cat. No.	Width, In.	Thickness, In.	Wt. per 100, Lbs.
S-7444	1 1/2	3/8	100

Reinforcing Links

Hot Galvanized

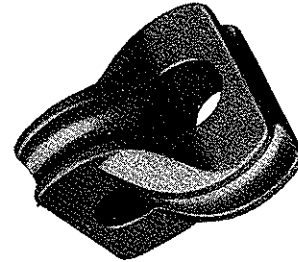


Used to relieve side strains at angles in the line. The links are fastened to the pole on each side of the cable suspension clamp by means of half-inch lag-screws. Made of half-inch open-hearth steel, they will take strains up to 4000 pounds.

Cat. No.	Length, In.	Wt. per 100, Lbs.
S-5260	8 3/8	107
S-5262	5 3/4	125

Strand Connector

Hot Galvanized

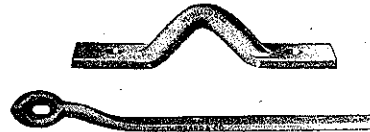


Designed to connect dead ends of messenger strands, when they occur between poles. The strands are looped around the connector and then held by guy clamps. For strand up to 1/2 in.

Cat. No.	Length, In.	Wt. per 100, Lbs.
S-3846	2 3/8	100

Wall Straps

Hot Galvanized



Used for attaching messenger or strand wires on buildings or walls. Supplied in two types, as illustrated. Loop type is used for dead ending against a flat surface, such as the face of a building. Guyeye types are used where the messenger fastens to the corner of the building. Both are 1/4-inch steel with 1/8-inch mounting holes.

Cat. No.	Type	Length, In.	Width, In.	Wt. per 100, Lbs.
S-7318	Loop	8	1 1/4	105
S-7320	Guyeye	16 3/8	1 1/2	264
S-7322	Guyeye	24 3/8	1 1/2	351

Alley Arm Braces

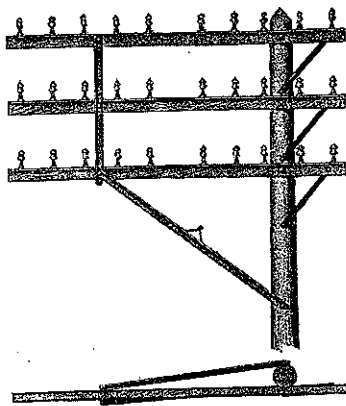
Hot Galvanized



Used where it is necessary to support lines on one side of a pole only, or, where pole must be offset to avoid angle in line. Furnished with linemen's steps. Use half-inch lag screws for attaching to pole, half-inch machine bolts for attaching to cross arm.

Cat. No.	Length, Ft.	Angle Size, In.	Weight per 100, Lbs.
S-3023	6	1 1/2 x 1 1/2 x 1 1/8	1200
S-3026	7	1 1/2 x 1 1/2 x 1 1/8	1400

Side Extension Fixtures



When it is necessary to clear buildings or trees these fixtures furnish a rigid and economical construction. Also used to offset cross arms to relieve strain from an angle in the line where lines follow country roads with bends and twists. Set consists of parts below:

Vertical Brace standard for cross arm construction. For three arms 12, two arms 24 inches apart. Additional arms accommodated by placing braces in series. Fastens with 1/2-inch bolts (not included). 1 3/4-inch by 1 3/4-inch by 1/4-inch angle steel.

Diagonal Brace—for six and ten-pin arms. Six inch step for line-man. Fastens by 1/2-inch lag screw; to cross arm by 1/2-inch bolt. Two-inch by two-inch by 3/16-inch angle steel. Bolts not included.

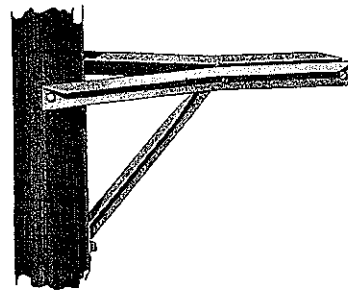
Back Brace — mounts from pole side opposite cross arm to cross arm. Fastens with 5/8-inch through bolt; to cross arm by 1/2-inch bolt. Two-inch by two-inch by 1/4-inch angle steel. Bolts not included.

(Short braces shown are standard Flat Cross Arm Braces— See page 12.)

Cat. No.	Description	Overall Length In.	Weight per 100, Lbs.
S-3058	Diagonal Brace	83	1720
S-3032	Back Brace	66 7/8	1720
S-3063	Vertical Brace	30 3/8	720

Cable Extension Arms

Hot Galvanized

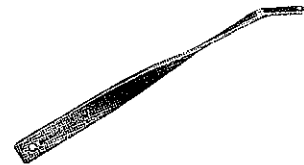


Used where it is necessary to support the cable at a distance from the pole. Attached at top by 5/8-inch through bolt; lower brace is fastened by lag screws. Cables are attached by means of a 5/8-inch machine bolt with washer under head and with three-bolt cable suspension clamp (see page 17) under the arm. Placed in flat position, suspension clamp holds cable firmly when the 5/8-inch machine bolt is drawn tight.

Cat. No.	Extension from Pole to Center, In.	Angle Size, Inches	Weight per 100, Pounds
S-2171	26	3 x 2 1/2 x 1/4	3050
S-2174	44 1/2	3 1/2 x 2 1/2 x 3/8	6050

Guard Arm Brace

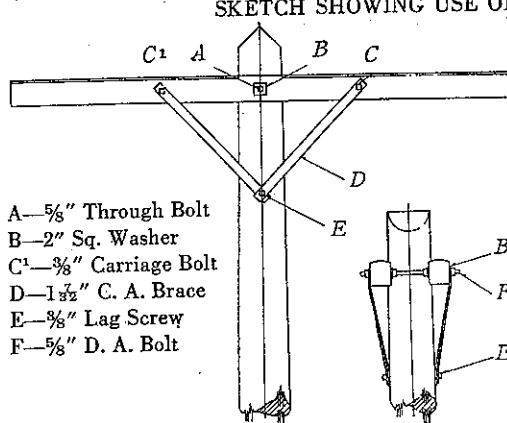
Hot Galvanized



Used for supporting guard-arms on pole where a cable is suspended. Shaped as indicated with half-twist, of 1-7/32 by 1/4-inch steel. 18 inches long.

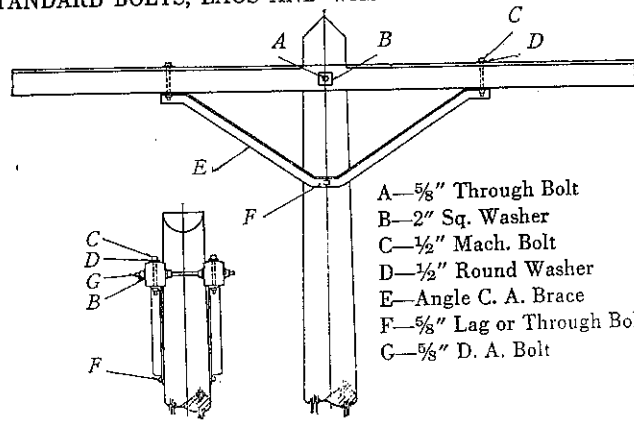
Cat. No.	Hole St. End, In.	Hole Bent End, In.	Wt. per 100, Lbs.
S-3060	7/16	9/16	170

SKETCH SHOWING USE OF STANDARD BOLTS, LAGS AND WASHERS



- A—5/8" Through Bolt
- B—2" Sq. Washer
- C—3/8" Carriage Bolt
- D—1 1/2" C. A. Brace
- E—3/8" Lag Screw
- F—5/8" D. A. Bolt

FLAT BRACE



- A—5/8" Through Bolt
- B—2" Sq. Washer
- C—1/2" Mach. Bolt
- D—1/2" Round Washer
- E—Angle C. A. Brace
- F—5/8" Lag or Through Bolt
- G—3/8" D. A. Bolt

DOUBLE ARMING

ANGLE BRACE

W. U. Wood-Top Steel Pins

Hot Galvanized



High-carbon steel. Threads and nuts are cleanly cut and smoothly finished to assure perfect fit. Furnished with high-quality wood cobs.

All pins are 4 1/4-inch above cross arm. Long shank pins are for wood arms; short shank for steel, transposition brackets and break irons. Long shank pins furnished with square nuts and round washers. Both take standard insulators having one-inch pin holes.

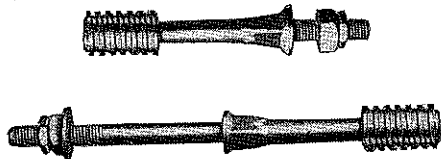
Long Shank Type



Cat. No.	Diameter, In.	Below		Wt. per 100, Lbs.
		Diameter, In.	Shoulder, In.	
S-5696	1/2		5	88
S-5697	5/8		5	125
Short Shank Type				
S-5698	1/2		1	55
S-5700	5/8		1	82
S-5730	5/8		1 1/8	102

Steel Pins with Lead Threads

Hot Galvanized



Equipped with one-inch lead thread for standard insulators having a one inch pin hole. Pins are half-inch diameter—long shanks for wood cross arms; short shanks for steel cross arms. Pins for steel cross arm furnished with spring locking washer.

Cat. No.	Type	Overall Length, In.	Wt. per 100, Lbs.
S-5694	Long	9 3/4	162
S-5695	Short	6	125

Pole Dating Nails

Hot Galvanized

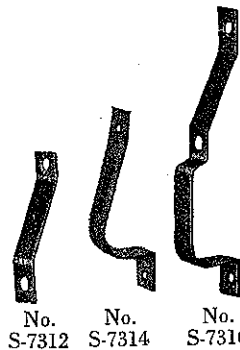


Made of galvanized steel with two numerals on end. Used for indicating year poles are set or to indicate pole height. Special markings can be furnished in keg lots of 2000 pieces, or more.

Cat. No.	Length, In.	Wt. per 100, Lbs.
S-5414	2 1/4	4

Reinforcing and Safety Straps

Hot Galvanized



No. S-7312 is used to support the messenger bolt at points of extreme stress, such as long spans. No. S-7314 is a safety strap, to prevent the cables falling if the messenger gives way. The upper hole fits over the messenger bolt and the lower end fastens on the pole by a 1/2-inch lag screw. No. S-7316 is a combination strap to serve both purposes.

Cat. No.	Description	Weight per 100, Lbs.
S-7312	Reinforcing Strap	40
S-7314	Safety Strap	79
S-7316	Combination Strap	122

Guard Arm Hook

Hot Galvanized

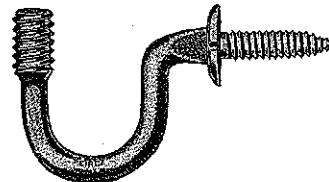


Used on guard arms as dead-ends for telephone services. Threaded for 1/2-inch square nut, they bolt through the arm. Furnished with nut as illustrated.

Cat. No.	Eye Diam., In.	Size, In.	Wt. per 100, Lbs.
S-4842	7/8	1/2 x 5 3/8	45

Hook Brackets

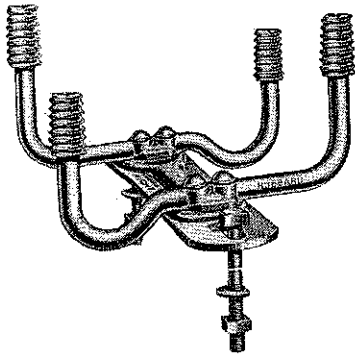
Hot Galvanized



Drop-forged from open-hearth steel, 5/8-inch square. Used for running secondaries on poles and for making service attachments on buildings. Furnished with lead threads for insulators having standard one-inch pin holes.

Cat. No.	Type	Height, In.	Overall, In.	Wt. per 100, Lbs.
S-3114	314	4 5/8	7 3/4	181

Hubbard Transposition Brackets

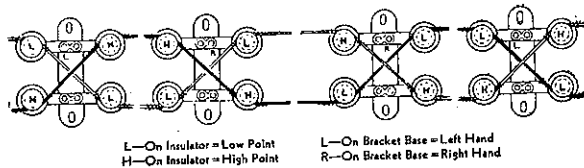


Point-Type Transposition Brackets

Hubbard Point-Type transposition brackets are furnished in rights and lefts. They are a solid unit. The cross pins are riveted or welded to the base, which is channeled for additional strength. There are no pins to adjust or nuts to loosen.

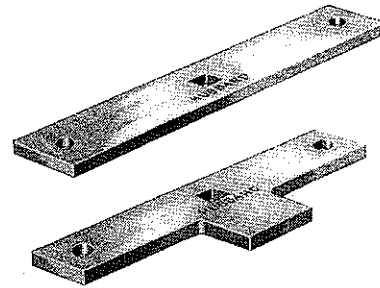
Furnished with one-inch wood cobs for standard insulators. Mounting slots are spaced to fit standard drilled ten-pin arms and have a 2-inch adjustment; two 1/2 by 6 inch crossarm bolts with clipped washers, are furnished with each bracket. Transposition takes place on a rigid bracket mounted above the arm, and wire spacing is maintained uniformly throughout the entire length of the span. There is no spiralling of wires about each other as in the case of ordinary transposing methods. In cases of damaged or destroyed lines where restoration of transpositions must be made, it is unnecessary to cut wires to straighten out tangles—simply untie the transposed wires and pull out the working lengths of line ready for restringing.

Diagram of Transposition System



To analyze the system of transposing on Hubbard Point-Type brackets, follow the black wire in relationship to the white wire in the above diagram noting the position of the high and low points.

Cat. No.	Type	Wt. per 100, Lbs.
S-3158	Right-Hand Bracket	900
S-3159	Left-Hand Bracket	900

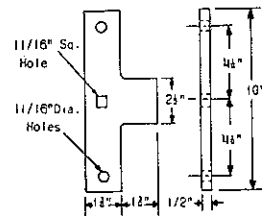
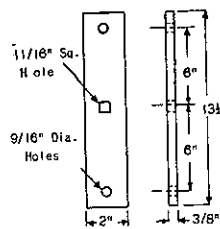


Tandem Transposition Brackets

Hubbard Tandem Transposition Brackets are used in conjunction with transposition insulators. The transposed lines are crossed on a single bracket employing two pins, and mounted above the arm. Brackets are mounted sufficiently loose on the arm so they may swing freely during the operation of transposing the wires. Tighten them down and the job is finished.

Hubbard Tandem Transposition Brackets are used in lines having an average span length of 150 feet or more. Straight bracket No. S-3163 is recommended for straight sections and corners where the pull is 15 feet or less. Offset bracket No. S-3164 is used at corners where the pull is 15 to 50 feet.

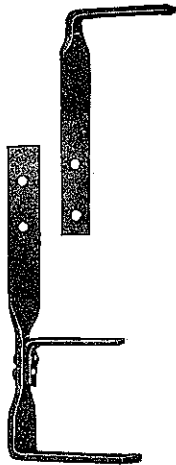
No. S-3164 is manufactured from 1/2 inch stock to better withstand the corner strains and for the same reason employs a slightly heavier pin. The leg is mounted toward the inside of the angle. No. S-3163 is manufactured from 3/8 inch stock.



Dimensions—Inches

Stock No.	Description	Use Pin No.	Size Steel	Pin Spacing	Approx. Shpg. Wt. Lbs. 100 Pcs.
S-3163	Straight	S-5698	13 1/2 x 2 x 3/8	12	280
S-3164	Corner	S-5730	10 x 1 3/4 x 1/2 (Offset)	8 1/2	300
S-2822	Mounting Bolt	(order 1 per bracket)			

**Two-Piece Transposition Brackets
For Phantom Circuits**

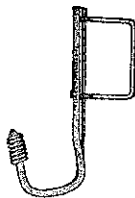


Hot Galvanized

Transposition brackets for four-wire circuits. They are fastened to the cross arm by two half-inch by 4¾-inch machine bolts, spaced 2⅞ inches apart. They have holes for half-inch pins. Furnished with two parts shown, the smaller of which projects above the arm. Bolts and pins not included—for bolts see S-2880 (page 13), for pins see S-5698 (page 20).

Cat. No.	Size Steel, In.	Cross Arm, In.	Wt. per 100, Lbs.
S-3157	1½ x ¾	3¼ x 4¼	797

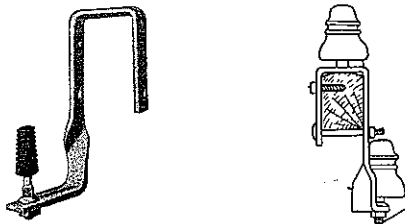
**Transposition Brackets
Hot Galvanized**



Single-point U-bolt mounting brackets, furnished with ⅜-inch U-bolts. Brackets are threaded for insulators having standard one-inch pin holes.

Cat. No.	Crossarm Size	Wt. per 100, Lbs.
S-3144	2¾ x 3¾	101
S-3145	3¼ x 4¼	101

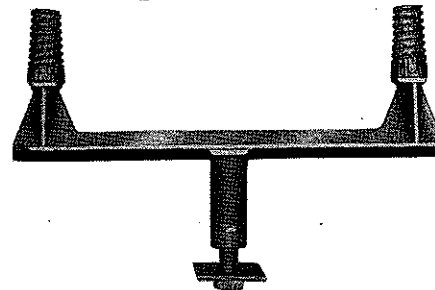
**Transposition Brackets
Hot Galvanized**



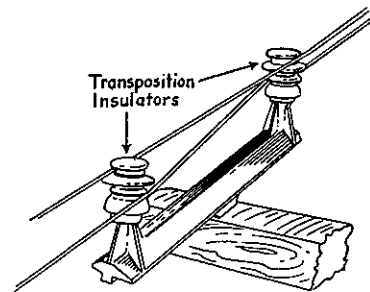
Two sizes, each furnished with ⅜-inch round hole for a two-inch, No. 14 R. H. galvanized wood screw, used to prevent bracket pulling to one side of the cross arm. No. S-3149 clamps on cross arm with ⅜-inch by four-inch carriage bolt; No. S-3155 uses ⅜-inch by 4½-inch carriage bolt. Both brackets have holes for half-inch insulator pins (shown on page 20). Pins are not included—if desired please specify.

Cat. No.	Size Steel, In.	Cross Arm, In	Wt. per 100, Lbs.
S-3149	1¼ x ⅞	2¾ x 3¾	277
S-3155	1¼ x ⅞	3¼ x 4¼	284

**All-Aluminum
Transposition Bracket**



All-aluminum transposition brackets are made of an aluminum alloy having a strength comparable to steel. They are cast in permanent molds, are non-corrosive and come completely assembled with hot dip galvanized bolt, washer, and wood cobs, ready to install on the crossarm, saving additional assembly costs. Mounting Bracket fits in 1¼ inch hole.



Method of mounting transposition bracket

In mounting, the brackets are allowed to swing freely during the transposing of the wires and tightened down after the wires have been transposed.

Aluminum transposition brackets are used on lines having an average span length of 150 feet or more and at corners where the pull is not more than 15 feet.

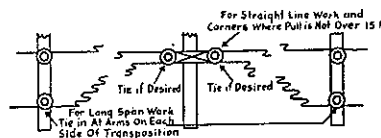
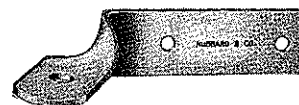


Diagram of Transposition System

Cat. No.	Wt. per 100, Lbs.
S-3154	250

**Corner Brackets
Hot Galvanized**

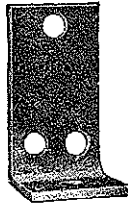


Used where the lead from the poles comes to a building at an angle, or, to carry leads around corners of buildings.

Cat. No.	Legs, In.	Steel Size, In.	Weight per 100, Lbs.
S-3100	2¼ x 4¾	¾ x 1 ½	66
S-3102	1 ⅞ x 8 ½	¾ x 1 ½	96

Distributing Brackets

Hot Galvanized
Pole Bracket



For taking off telephone services, or for short runs on poles, the S-3116 bracket is used with one S-2858 machine bolt and one S-5126 knob. Two No. S-5126 knobs can be used when an S-2868 machine bolt is used. Not furnished unless specified.

Cat. No.	Legs, In.	Steel Size, In.	Wt. per 100, Lbs.
3-3116	2x4	1/4x2	97



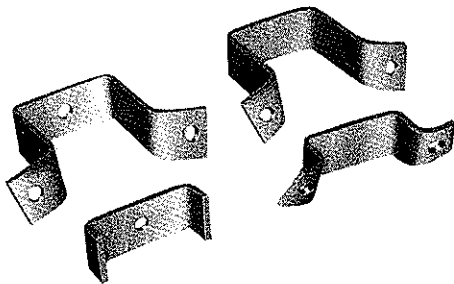
House Bracket

Bracket for attaching drops to buildings, or for dead-ending twisted pairs. Use S-5118 knob and S-2930 Stove Bolt with this bracket. (Not furnished unless specified.)

Cat. No.	Legs, In.	Steel Size, In.	Wt. per 100, Lbs.
S-3112	2x3-7/16	3/16x1-3/4	56

Bracket Straps and Clips

Hot Galvanized



For use in carrying wood brackets bearing heavy loads—as in long-span construction using high-strength wires. Straps are generally fastened with two No. 20 galvanized nails (see page 24). Straps S-7244, S-7246 and clips S-3610 and S-3612 are of 14-gauge steel. CU and CL straps—S-7245, S-7247—are of 12-gauge steel. CU and CL are illustrated at right, above.

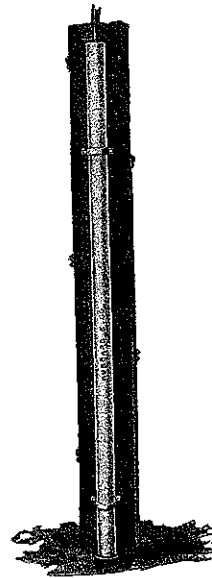
Cat. No.	Description	Width, In.	Wt. per 100, Lbs.
S-7244	Top Strap	1 1/2	17
S-3610	Bottom Clip	1 1/2	6
S-7246	Top Strap	2	20
S-3612	Bottom Clip	2	8
S-7245	CU Top Strap	2	25
S-7247	CL Bottom Strap	2	16

U-Guards and Straps for Cable

Hot Galvanized

Designed to protect cables on poles or sides of buildings, immediately above ground. Formed from 14-gauge flat steel pressed into a U-shape. Straps are shaped to fit cable guards.

Guard No. S-4516 has 2 1/8" inside diameter belled bottom to fit over conduit entering ground.



U-Guards

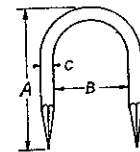
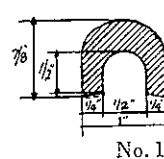
Cat. No.	Length, Ft.	Diameter, In.	Wt. per 100, Lbs.
S-4510	6	1 1/8	495
S-4511	8	1 1/8	850
S-4512	8	2 1/8	1408
S-4514	8	3 1/8	1925
S-4516	8	1 1/4	875

Mounting Straps

Cat. No.	For Guard No.	Hole Diam., In.	Wt. per 100, Lbs.
S-7304	S-4510*	3/2	19
S-7306	S-4512	3/2	23
S-7308	S-4514	1 1/2	61
S-7310	S-4516	3/2	19

*(S-7304 Strap also fits S-4511)

Ground Wire Moulding



Kiln dried Douglas fir, highly resistant to weather, warping and twisting. Quantity per bundle is 200 feet. Can be installed with special moulding staple (as shown).

Staples illustrated are 3/16-inch wire, two inches long with a 1 1/8-inch spread. They must be ordered separately by catalog number below.

Cat. No.	Description	Weight, Lbs.
S-5334	Bundle of Moulding	12 per 100 feet
S-7168	Installing Staple	3 1/2 per 100 pieces

Galvanized Ground Rods



Hot-galvanized open-hearth steel with long, sharp points for driving into any kind of ground with a minimum of resistance. Wired rods have a 12-NBS-104 copper wire firmly soldered to upper end. Unwired rods have hole drilled one inch from upper end for quick, easy attachment of ground wire. Holes are 1/8-inch diameter in 3/8-inch rod; five thirty-seconds in half-inch rods and three sixteenths-inch in the 5/8-inch rods.

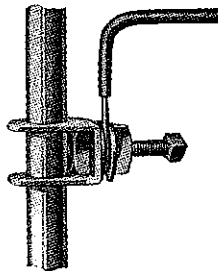
With Copper Wire

Cat. No.	Diameter, In.	Length, Ft.	Wt. per 100, Lbs.
S-6240	1/2	5	320
S-6244	1/2	6	395
S-6250	5/8	6	595

Without Copper Wire

S-6234	3/8	5	185
S-6236	3/8	6	223
S-6238	1/2	5	300
S-6242	1/2	6	360
S-6246	1/2	7	420
S-6248	5/8	6	600
S-6252	5/8	8	800

Kling Ground Clamps



Galvanized steel clamps for connecting ground wires to ground rods. Cup-pointed set screw bites a circle into rod, insuring good contact. Clamps usually attached before rod is driven. Used with copper or iron ground wires.

Cat. No.	For Rod Size		Wt. Per 100, Lbs.
	Max.	Min.	
S-5058	1/8	3/8	13 1/2
S-5060	5/8	1/2	14 1/2

Adjustable Ground Clamps



Plain copper strips with adjustable screw attachment. Close fitting threads. Maximum clamp diameter, 1 1/4 in.

Cat. No.	Pipe Size	Wt. Per 100, Lbs.
S-3412	3/8" to 1 1/4"	6

Staples



Three sizes of staples most commonly used in telephone work.

No. S-7162 is the smaller size generally used for a ground wire staple; it is sold in one pound packages. The other sizes are sold in bulk—when ordering specify number of pounds.

Cat. No.	Size, In.	Description	Staples Per Lbs.
S-7164	5/8 x 2	Long Guy	37
S-7166	1/4 x 1 1/4	Standard	87
S-7162	1/4 x 5/8	Small	1500

Common Nails and Spikes



Standard flat head diamond point nails heavily galvanized. Can be supplied in the following sizes which are those most generally employed in telephone work. All sizes furnished in 100 lb. kegs.

Cat. No.	Size	Length, In.	Gauge	Approx. No. per Keg
S-5396	6d	2	11.5	17400
S-5398	8d	2 1/2	10.25	10600
S-5400	10d	3	9	6900
S-5402	20d	4	6	3100
S-5404	30d	4 1/2	5	2400
S-5406	40d	5	4	1800
S-5408	50d	5 1/2	3	1400
S-5410	60d	6	2	1100
S-5411	60d**	3 1/2	1	1500
S-5526	Strap Nail 3/16" Shank. 2" Long. Oval Head			

Following are some recommended uses of various size nails:

- 6D for nailing pins to crossarms.
- 8D for a general purpose nail.
- 10D for fastening strain plates.
- 20D lower nail for fastening No. 1 brackets to pole.
- 30D lower nail for fastening W.U. and No. 2 brackets to pole.
- 50D upper nail for fastening No. 1 brackets to pole.
- 60D upper nail for fastening W.U. and No. 2 brackets to pole.
- 30D lower nail for fastening pole steps.
- 60D upper nail for fastening pole steps.

**Stub spike for use with creosoted pine poles to avoid striking heartwood.

Pole Shims



Used to keep guy strand from cutting into pole. Nail holes are 1/4-inch in diameter.

Cat. No.	Size, In.	Weight per 100, Lbs.
S-6812	1-7/32 x 7/32 x 8	57

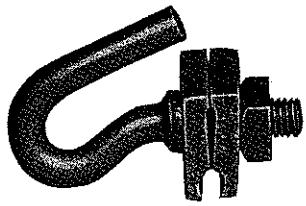
Span Clamp



Used for service connections at points between poles. Span clamp is fastened to messenger cable, drop wire is fastened to knobs on span clamp.

Cat. No.	Insulator Spacing, In.	Wt. per 100, Lbs.
S-3424	5 3/4	152

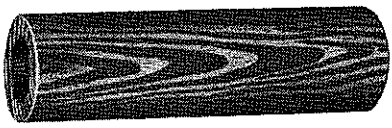
Span Clamp



Used for service connections at points between poles. Adaptable for either suspended or lashed cable.

Cat. No.	Wt. Per 100, Lbs.
S-3421	41

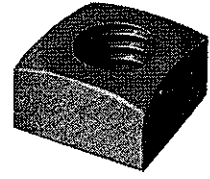
Locust Pin Bushing



Used for plug of locust pin hole in cross arm when steel pin is used in place of wood pin. Bushing is 1 1/4 inches by 3 7/8 inches long.

Cat. No.	Hole Size	Steel Pin Size	Wt. per 100, Lbs.
S-3219	11/16	5/8	150
S-3221	9/16	1/2	150

Galvanized Nuts only for Machine and Double Arming Bolts

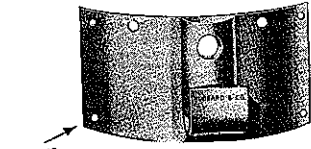


Cat. No.	Bolt Size In.	Wt. per 100, Lbs.
S-5542	1/2	8
S-5544	5/8	13
S-5551	3/4	24

Galvanized Nuts only for Anchor Rods

Cat. No.	Rod Size In.	Wt. per 100, Lbs.
S-5555	1/2	8
S-5556	5/8	13
S-5557	3/4	24

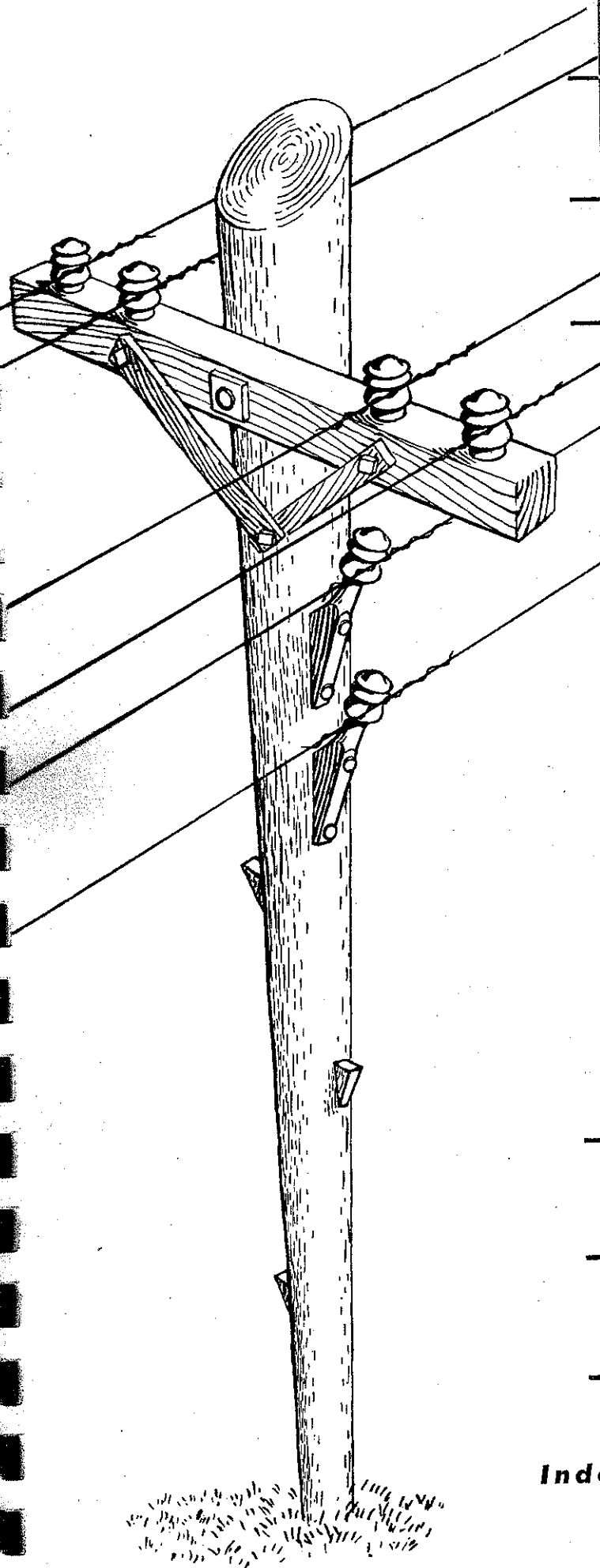
**Guy Hook Strain Plate
Hot Galvanized**



No. 5722

Has heavy welded hook. Serves the double purpose of protecting the pole and preventing the strand from slipping. Has one 11/16-inch guy hook hole, four 7/32-inch nail holes and two 7/16-inch lag screw holes. Size; 4 x 8 inches.

Cat. No.	Type	Wt. per 100, Lbs.
S-5722	With Hook	134
S-5720	Without Hook	95



PINE POLES

CEDAR POLES

VAPOR DRYING PROCESS

2

Wood

CROSS ARMS

PINS

POLE STEPS

Index for this section on reverse side



Index for Section Two

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30....	Measurements	39....	Crossarm Specifications
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32....	Poles	41....	Crossarm Specifications Wood Insulator Pin Specifications
33....	Poles	42....	Pins Brackets Pole Steps
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35....	Poles		

AUTOMATIC  ELECTRIC

Telephone Poles—Pine and Cedar

Three species of wood are generally used throughout the country for telephone poles: Southern Yellow Pine (SYP), Western Red Cedar (WRC), and Northern White Cedar (NWC). These woods comprise about 90% of the poles currently in use with the remainder taken from various other woods. All three of these have definitely proved their fitness and, when selected and treated to proper specifications, will give a lifetime of satisfactory service. We are equipped to furnish all sizes and types of poles to meet your needs and preferences.

Instructions for Ordering

Freight charges represent a large part of the cost of poles. It is imperative that complete information be given when ordering, or requesting quotation, to avoid errors and assure shipment of correct poles. Note carefully the following points for ordering.

1. **Quantity:** Be sure to order at least a minimum car. (See paragraph headed "Carload Quantities".)
2. **Sizes:** Give A.S.A. class and length.
3. **Species:** See sections headed "Creosoted Southern Pine Poles" and "Northern White and Western Red Cedar Poles".
4. **Treatment:** For cedar poles, state choice of treatment; poles cannot be shipped unless treatment is clearly specified. For pine poles, "eight-pound" treatment is standard, and will be supplied unless otherwise specified (for details, see section on "Treatments", on following pages).
5. **Framing Instructions:** Complete framing instructions are an aid to the prompt handling of pole orders. When order does not give framing instructions, cedar poles will be shipped without framing. Because creosoted pine poles should always be framed before treatment, poles with standard framing are furnished, unless otherwise specified (for details, see "Framing Specifications").
6. **Destination:** Give freight address and name of delivering railroad.

Carload Quantities

Poles are almost invariably sold in carlots because of excessive freight penalties for less. It is very important to specify sufficient quantities to make full railroad minimums. Following weights apply for single and double carload.

Minimum Weights Single Carloads

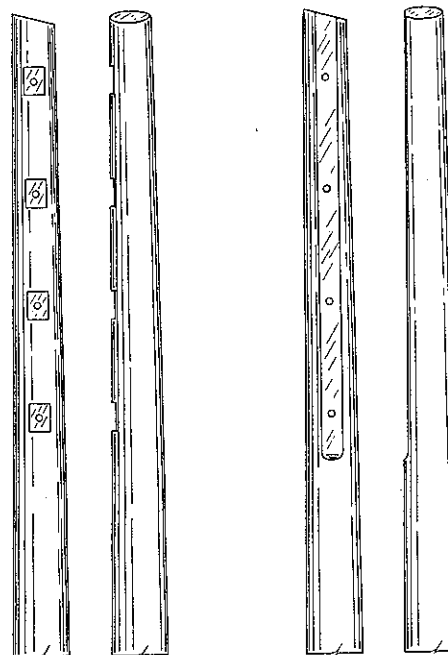
Poles 40 feet and under 40,000 lbs.

Minimum Weights Double Carloads

Poles 40 feet and over 60,000 lbs.

Approximate weights for Northern White, Western Red Cedar and Creosoted Yellow Pine Poles are shown on pages 28 and 29.

Framing Specifications



Notch Gaining

Slab Gaining

In ordering poles be sure to specify number of gains and spacing between centers. For slab gains specify number of bolt holes and distance between centers. If no framing instructions are given, poles will be furnished with one-way roof, slab gain and bolt holes on 24-inch centers. Two gains will be placed on poles up to and including, 30 feet; three gains on longer ones. Notch gains are 1/2-inch deep and 4 3/4 inches wide. Slab gains are cut to 1/2-inch depth.

Prices quoted on pine poles include all framing. On cedar poles, however, an extra charge is made for all roofing and gaining. When ordering poles with special framing, give the following information:

1. No. of gains (all same size?).
2. Width and depth of gains.
3. Distance, apex of roof to center of first gain.
4. Spacing of gains, center to center.
5. Diameter through-bolt hole (21 32 inch unless specified).

Creosoted Southern Pine Poles

Properly produced Southern Pine Poles have the unique advantage of retaining their high original strength for their full life. Average service life, varying somewhat with size of pole and location of installation, will range from 35 to 45 years under ordinary conditions.

This ability to retain original strength, given by full length pressure treatment, accounts for Creosoted Southern Pine Poles standing through ice and sleet storms, under extremely adverse conditions, where many other poles have failed.

In order to realize these service possibilities, however, it is necessary to exercise utmost care in selecting timber, in moving it rapidly to sterile storage yards after felling, in seasoning and applying adequate preservative treatment.

Pine is one of the strongest commercial timbers but is susceptible to rapid decay unless quickly and prop-

erly stacked in well drained yards, free from vegetation and debris and located well away from forest areas.

Combined with lasting strength and natural shapeliness is a symmetrical, smooth appearance obtained by machine trimming. The poles are clean and dry, with color ranging from brown to almost black. This is produced by use of highest grade creosote and a combination steam and vacuum bath after treatment.

Available in standard lengths, from 16 to 90 feet, Creosoted Southern Yellow Pine Poles graded according to A.S.A. dimensions are designated as "class" poles. A.S.A. specifications and shipping weights are in the following tables.

Pole timber is furnished in accordance with specifications which follow. Treatment is to a retention of eight pounds creosote per cubic foot of wood—in accordance with specifications following those for timber.

Tables of Pole Weights and Measurements

Approximate Weights of Creosoted Yellow Pine Poles — A. S. A. Measurements

Length Feet	Class 1 (Lbs.)	2 (Lbs.)	3 (Lbs.)	4 (Lbs.)	5 (Lbs.)	6 (Lbs.)	7 (Lbs.)	9 (Lbs.)	10 (Lbs.)
16.....					234	202	165	138	110
18.....			380	326	275	234	188	151	133
20.....	710	564	467	394	330	284	234	202	160
22.....	825	674	559	463	398	339	284	234	188
25.....	990	811	674	573	490	422	344	289	235
30.....	1280	1082	921	784	660	550	454	371	
35.....	1567	1343	1155	1004	862	742	646		
40.....	1884	1622	1403	1219	1059	921	807		
45.....	2222	1911	1664	1444	1274	1114	976		
50.....	2585	2214	1925	1687	1494	1329	1169		

Approximate Weights of Western Red Cedar Poles—A.S.A. Measurements

Length Feet	Class 1 (Lbs.)	2 (Lbs.)	3 (Lbs.)	4 (Lbs.)	5 (Lbs.)	6 (Lbs.)	7 (Lbs.)	8 (Lbs.)	9 (Lbs.)	10 (Lbs.)
20.....	560	480	320	240	180	160	160	120	90	
25.....	560	480	400	320	240	180	160	160	120	90
30.....	680	575	490	385	320	255	200	205	180	120
35.....	800	680	585	490	400	335	280	295	225	
40.....	960	800	680	600	520	450	375	405		
45.....	1200	1040	880	720	640	560	560			
50.....	1440	1240	1040	920	800					
55.....	1600	1440	1240	1120	1040					
60.....	1840	1600	1400	1280	1280					
65.....	2080	1760	1600	1520						

Approximate Weights of Northern White Cedar Poles—A.S.A. Measurements

Length Feet	Class 1 (Lbs.)	2 (Lbs.)	3 (Lbs.)	4 (Lbs.)	5 (Lbs.)	6 (Lbs.)	7 (Lbs.)	8 (Lbs.)	9 (Lbs.)	10 (Lbs.)
16					230	190	135	135	105	85
18			540	350	300	230	190	190	130	100
20	720	600	540	350	300	230	190	190	130	100
22	1020	780	540	500	420	300	225	225	200	150
25	1020	780	600	515	420	300	250	250	200	150
30	1320	1170	870	630	520	420	350	350	275	
35	1620	1380	1060	820	720	510	450	450	350	
40	2040	1675	1280	1020	790	740				
45	2640	1970	1535	1215	1080	790				
50	3200	2640	1860	1470	1380	1080				

A.S.A. Dimensions for Creosoted Yellow Pine Poles

Class	1	2	3	4	5	6	7	9	10
Min. Top Circ., In.—	27	25	23	21	19	17	15	15	12
Length of Pole Feet	Minimum Circumference at Six Feet From Butt, In.								
16	3½					21.5	19.5	18.0	No Butt Requirement
18	3½			26.5	24.5	22.5	21.0	19.0	No Butt Requirement
20	4	31.5	29.5	27.5	25.5	23.5	22.0	20.0	No Butt Requirement
22	4	33.0	31.0	29.0	26.5	24.5	23.0	21.0	No Butt Requirement
25	5	34.5	32.5	30.0	28.0	26.0	24.0	22.0	No Butt Requirement
30	5½	37.5	35.0	32.5	30.0	28.0	26.0	24.0	No Butt Requirement
35	6	40.0	37.5	35.0	32.0	30.0	27.5	25.5	No Butt Requirement
40	6	42.0	39.5	37.0	34.0	31.5	29.0	27.0	No Butt Requirement
45	6½	44.0	41.5	38.5	26.0	33.0	30.5	28.5	No Butt Requirement
50	7	46.0	43.0	40.0	37.5	34.5	32.0	29.5	No Butt Requirement
55	7½	47.5	44.5	41.5	39.0	36.0	33.5		No Butt Requirement
60	8	49.5	46.0	43.0	40.0	37.0	34.5		No Butt Requirement

A.S.A. Dimensions for Northern White Cedar Poles

Class	1	2	3	4	5	6	7	8	9	10
Min. Top Cir., In.—	27	25	23	21	19	17	15	18	15	12
Length of Pole Feet	Minimum Circumference at Six Feet From Butt, In.									
16	3½				26.0	24.0	22.0		No Butt Requirement†	No Butt Requirement†
18	3½		32.5	30.0	28.0	25.5	23.5		No Butt Requirement†	No Butt Requirement†
20	4	39.5	37.0	34.0	31.5	29.0	27.0	25.0	No Butt Requirement†	No Butt Requirement†
22	4	41.0	38.5	36.0	33.0	30.5	28.0	26.0	No Butt Requirement†	No Butt Requirement†
25	5	43.5	41.0	38.0	35.5	32.5	30.0	28.0	No Butt Requirement†	No Butt Requirement†
30	5½	47.5	44.5	41.5	38.5	35.5	33.0	30.5	No Butt Requirement†	No Butt Requirement†
35	6	50.5	47.5	44.0	41.0	38.0	35.0	32.5	No Butt Requirement†	No Butt Requirement†
40	6	53.5	50.0	46.5	43.5	40.0	37.0		No Butt Requirement†	No Butt Requirement†
45	6½	56.0	52.5	49.0	45.5	42.0			No Butt Requirement†	No Butt Requirement†
50	7	58.5	55.0	51.5	47.5	44.0			No Butt Requirement†	No Butt Requirement†
55	7½	61.0	57.5	53.5	49.5	46.0			No Butt Requirement†	No Butt Requirement†
60	8	63.5	59.5	55.5	51.5				No Butt Requirement†	No Butt Requirement†

*The figures in this column are intended solely for use whenever a definition of ground line is necessary in order to apply specification requirements relating to scars, straightness, etc.

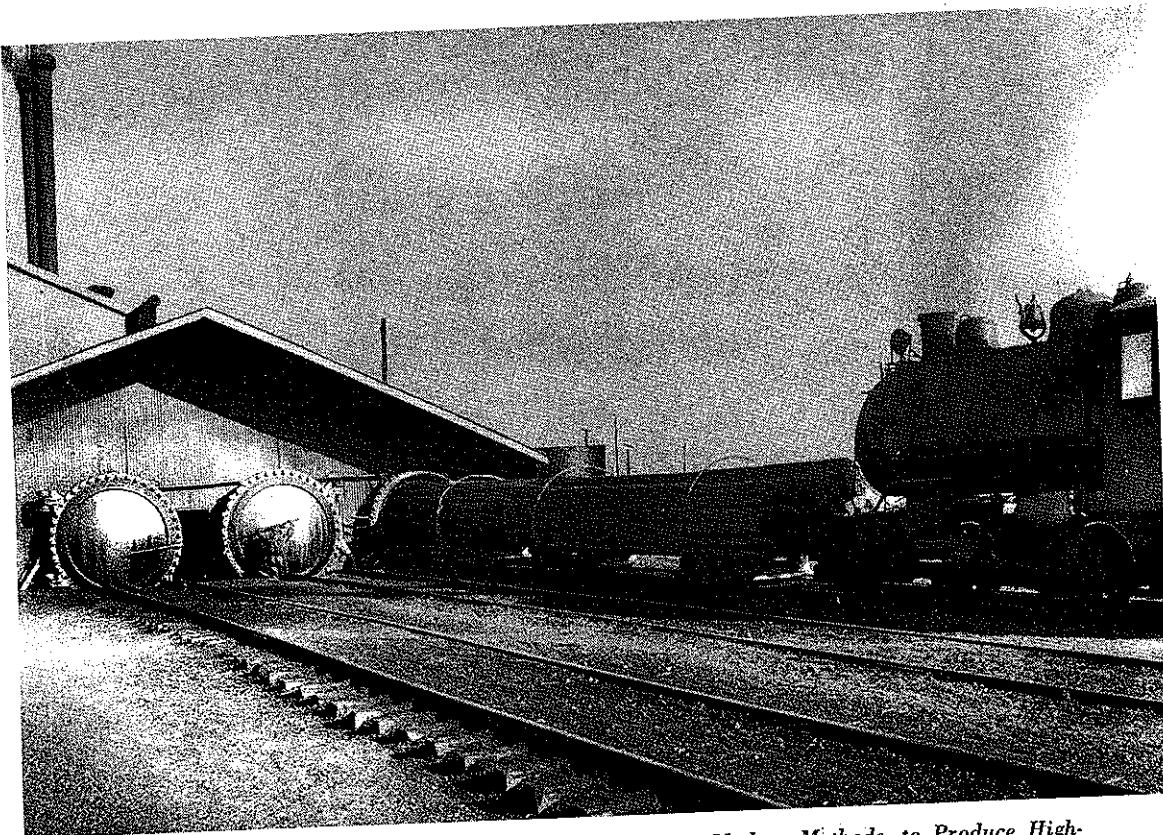
†Lines indicate length limits.

A.S.A. Dimensions for Western Red Cedar Poles

Class	1	2	3	4	5	6	7	8	9	10
Min. Top Cir., In.— 27		25	23	21	19	17	15	18	15	12
Length of Pole Feet	*Ground Line Dist. From Butt Feet	Minimum Circumference at Six Feet From Butt, In.								
16	3½				23.0	21.5	19.5	No Butt Requirements†	No Butt Requirements†	No Butt Requirements†
18	3½		28.5	26.5	24.5	22.5	21.0			
20	4	34.5	32.0	30.0	28.0	25.5	23.0	22.0		
22	4	36.0	33.5	31.5	29.0	27.0	25.0	23.0		
25	5	38.0	35.5	33.0	30.5	28.5	26.0	24.5		
30	5½	41.0	38.5	35.5	33.0	30.5	28.5	26.5		
35	6	43.5	41.0	38.0	35.5	32.5	30.5	28.0		
40	6	46.0	43.5	40.5	37.5	34.5	32.0			
45	6½	48.5	45.5	42.5	39.5	36.5				
50	7	50.5	47.5	44.5	41.0	38.0				
55	7½	52.5	49.5	46.0	42.5	39.5				
60	8	54.5	51.0	47.5	44.0					
65	8½	56.0	52.5	49.0	45.5					
70	9	57.5	54.0	50.5	47.0					
75	9½	59.5	55.5	52.0	48.5					
80	10	61.0	57.0	53.5	49.5					
85	10½	62.5	58.5	54.5						
90	11	63.5	60.0	56.0						

*The figures in this column are intended solely for use whenever a definition of ground line is necessary in order to apply specification requirements relating to scars, straightness, etc.

†Lines indicate length limits.



Southern Yellow Pine Timber is Processed by the Most Modern Methods, to Produce High-Strength Long-Lasting Poles.

Northern White and Western Red Cedar Poles

All Northern White and Western Red Cedar poles are carefully graded under the American Standard Associations Specifications. These specifications were sponsored by the A. S. A. telephone group and have met with wide acceptance by the telephone companies.

Our supplier of Northern White and Western Red Cedar poles, *Page and Hill Inc.*, have pioneered the specifications for treating of poles and recommend "P&H PENTA" poles which provide full-length treating with Pentachlorophenol.

American Standard Specifications and Dimensions for Wood Poles

These American Standard Specifications and Dimensions for Wood Poles were developed by a sectional committee under the sponsorship of the ASA Telephone Group (Bell Telephone System and United States Independent Telephone Association). This sectional committee has been in existence since it was organized in December, 1924, and has produced revisions of the pole specifications from time to time as required.

The work on these new specifications and dimensions was initiated at a meeting of the committee held in Minneapolis, Minn., March 13-14, 1947. The specifications and dimensions were approved as American Standard on April 9, 1948. This new standard comprises all specifications and dimensions for wood poles which have been approved as American Standard up to this time.

Scope and General

Scope. This standard consists of specifications and dimensions for wood poles that are to be given a preservative treatment.

General. The species, the length and class of poles, the type of treatment (including seasoning details, if seasoning is desired), and complete details for the roofing gaining, boring, and branding shall be given in the purchase orders.

Complete detailed instructions shall be given the supplier whenever the requirements of these specifications are modified to meet special conditions.

Definitions. For definitions of terms used in these specifications see Section 6.

Specifications

Material Requirements

Species. Group I: Fiber stress 3600 pounds per square inch Northern white (Eastern) cedar (*Thuja Occidentalis*)

Group II: Fiber stress 5600 pounds per square inch Western red cedar (*Thuja Plicata*)

Group III: Fiber stress 6000 pounds per square inch Ponderosa pine (*Pinus ponderosa*)

Group IV: Fiber stress 6600 pounds per square inch

- Western firs (*true firs*)
- California red fir (*Abies Magnifica*)
- Grand fir (*Abies grandis*)
- Noble fir (*Abies nobilis*)
- Pacific silver fir (*Abies amabilis*)
- White fir (*Abies concolor*)
- Lodgepole pine (*Pinus contorta*)
- Northern pines
- Jack pine (*Pinus banksiana*)
- Red (Norway) pine (*Pinus resinosa*)

Group V: Fiber stress 7400 pounds per square inch

- Douglas fir—all types (*Pseudotsuga taxifolia*)
- Western hemlock (*Tsuga heteropylla*)
- Southern pines
- Longleaf pine (*Pinus palustris*)
- Shortleaf pine (*Pinus echinata*)
- Loblolly pine (*Pinus caribaea*)
- Pond pine (*Pinus rigida serotina*)

Group VI: Fiber stress 8400 pounds per square inch

- Western larch (western tamarack)

Prohibited Defects

- Cross-breaks (cracks)
- Bird holes
- Plugged holes, except increment borer holes
- Hollow butts or tops, except as permitted under "Hollow Pith Centers" and "Defective Butts"
- Marine borer damage
- Splits or through-checks in the top
- Decay, except as permitted under "Firm Red Heart," "Dead Knots," and "Defective Butts"
- Nails, spikes, and other metal not specifically authorized by the purchaser

Permitted Defects

Sap Stain. Sap stain that is not accompanied by softening or other disintegration (decay) of the wood is permitted.

Firm Red Heart. Firm red heart not accompanied by softening or other disintegration (decay) of the wood is permitted.

Spiral Grain. Spiral grain (twist grain) is permitted as follows:

Length of Pole	Maximum Twist of Grain Permitted
Less than 30 Feet	1 complete twist in any 10 feet
35 to 45 Feet	1 complete twist in any 16 feet
Over 50 Feet	1 complete twist in any 20 feet

Hollow Pith Centers. Hollow pith centers in the tops or butts and in knots are permitted in poles that are to be given full-length treatment.

Limited Defects

Checks and Splits in Butts. Through-checks or splits in the butt surface are permitted, provided that their height from the butt along the side surface does not exceed 2 feet.

Shakes. Shakes in the butt surface extending through an arc of not more than 90 degrees are permitted. Shakes extending through an arc of more than 90 degrees are permitted when they are inside of a circle the center of which corresponds to the center of the butt surface and the diameter of which is not greater than one-half the average butt diameter.

Shakes in the top surface are permitted in poles that are to be given full-length treatment provided that the width of the shake does not exceed 1/16 inch and provided that the diameter of the shake is not greater than one-half the diameter of the top of the pole.

Insect Damage. Insect damage consisting of holes 1/16 inch or less in diameter, or surface scoring or channeling are permitted. All other forms of insect damage are prohibited, except that associated with hollow heart in cedar poles.

Knots. The diameter of any single knot or the sum of the diameters of all knots in any 1-foot section shall not exceed the limits set up in the following table. Knots 1/2 inch or less in diameter shall be ignored in applying the limitations for the sum of diameters.

Limitations of Knot Size

Length of Pole, (Feet)	Diameter of Any Single Knot, (Inches) Classes		Sum of Diameters of All Knots in Any One-Foot Section, (Inches)
	1 to 3	4 to 10	
45 and shorter	4	3	8
50 and longer	5	5	10

Dead Knots. Decay is permitted in knots provided it is not associated with heart rot.

Scars. No pole shall have a scar or turpentine face (southern pine) located within 2 feet of the ground line. Turpentine scars need be trimmed only to the extent necessary to examine for evidence of fungus infection and insect damage. Other sound scars are permitted elsewhere on the pole surface, provided they are smoothly trimmed and do not interfere with the cutting of any gain, and provided:

(a) That the circumference at any point on trimmed surfaces located between the butt and 2 feet below the ground line is not less than the minimum circumference specified at 6 feet from the butt for the class and length of the pole; and

(b) That the depth of the trimmed scar is not more than 2 inches, if the diameter is 10 inches or less, or one-fifth of the pole diameter at the location of the scar if such diameter is more than 10 inches.

Dead Streaks. Sound dead streaks, not wider than one-fourth of the circumference of the pole at the point of measurement, are permitted.

Compression Wood. The outer 1 inch of all poles shall be free from compression wood.

Defective Butts. Hollowing in the butt caused by "splinter-pulling" in felling the tree is permitted, provided that the area of such a hollow is less than 10 percent of the butt area. Hollow heart is permitted in cedar poles only, provided that the area of the hollow does not exceed 10 percent of the butt area, and that the depth of the hollow does not exceed 2 feet measured from the butt surface.

Decay is permitted in the butt of cedar poles only, provided that the aggregate area of decay and hollow heart does not exceed 10 percent of the entire butt surface.

Shape. Poles shall be free from short crooks.

A pole may have sweep subject to the following limitations:

(a) Where sweep is in one plane and one direction only, a straight line joining the surface of the pole at the ground line and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 1 inch for each 6 feet of length between these points, except in northern white cedar poles.*

(b) Where sweep is in two planes (double sweep), except in northern white cedar poles,† or in two directions in one plane (reverse sweep), a straight line connecting the mid-point at the top shall not at any intermediate point pass through the surface of the pole.

Dimensions

Length. Poles less than 50 feet in length shall be not more than 3 inches shorter or 6 inches longer than nominal length. Poles 50 feet or more in length shall be not more than 6 inches shorter or 12 inches longer than nominal length.

Length shall be measured between the extreme ends of the pole.

*For northern white cedar poles the straight line between the edge of the top and the ground line shall not be distant from the surface of the pole at any point by more than 1 inch for each 4 feet of length between those points.

Circumference. The minimum circumferences at 6 feet from the butt (except for Classes 8, 9, and 10) and at the top, for each length and class of pole, are listed in the tables of dimensions. The circumference at 6 feet from the butt of poles in Classes 1 to 7, inclusive, shall be not more than 7 inches larger than the specified minimum.

The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole.

Classification. The true circumference class shall be determined as follows:

Measure the circumference at 6 feet from the butt. This dimension will determine the true class of the pole, provided that its top (measured at the minimum length point) is large enough. Otherwise the circumference at the top will determine the true class, provided that the circumference at 6 feet from the butt does not exceed the specified minimum by more than 7 inches.

Manufacturing Requirements

Bark Removal. Outer bark shall be completely removed from all poles.

On all poles no patch of inner bark more than 1 inch wide shall be left on the pole surface between the butt and 2 feet below the ground line.

On poles that are to be full-length treated, no patch of inner bark larger than 1 inch wide and 6 inches long shall be left on the pole surface between the top and 2 feet below the ground line.

On poles that are to be butt treated, no patch of inner bark larger than 1 inch wide and 6 inches long shall be left on the pole surface between points 1 foot above and 2 feet below the ground line.

Sawing. All poles shall be neatly sawed at the top (unless otherwise ordered) and at the butt along a plane which shall not be out of square with the axis of the pole by more than 2 inches per foot of diameter of the sawed surface. Beveling at the edge of the sawed butt surface not more than one-twelfth of the butt diameter in width, or an equivalent area unsymmetrically located, is permitted.

Trimming. Completely overgrown knots rising more than 1 inch above the pole surface, branch stubs, and partially overgrown knots shall be trimmed close. Completely overgrown knots less than 1 inch high need not be trimmed. Trimming may be done by shaving machine or by hand.

Framing. All poles that are to be given a full-length preservative treatment shall be roofed, gained,

and bored in accordance with the terms of the purchase order before treatment.

All gains (mortise or slab type) shall be cut on the face of the pole; and the gained surfaces shall be in approximately parallel planes.

Marking. The following marks shall be stamped or branded legibly on the face and the butt of each pole (see note below):

- (a) The supplier's code or trade-mark;
- (b) The plant location and the year of treatment;
- (c) Code letters denoting the pole species and preservative used;
- (d) The true circumference class numeral and numerals showing the length of the pole. The letter "C" shall circumscribe the true class numeral on the butt.

NOTE: The suppliers' code or trade-mark, the plant location and year of treatment (a) and (b) above may be omitted from the butt by agreement of supplier and purchaser.

The code letters, not less than 5/8 inch high, designating the pole species and preservative used shall be as follows:

<i>Species</i>	<i>Species and Preservative (Creosote) Code Letters</i>
Northern white (eastern) cedar	ECC
Western red cedar	WCC
Western firs	WFC
California red fir	
Grand fir	
Noble fir	
Pacific silver fir	
White fir	
Douglas fir	DFC
Western hemlock	WHC
Western larch (Western tamarack)	WLC
Lodgepole pine	LPC
Northern pines	NPC
Jack pine	
Red pine	
Southern pines	SPC
Longleaf pine	
Shortleaf pine	
Loblolly pine	
Slash pine	
Pond pine	
Western pine	WPC
Ponderosa pine	

The appropriate preservative code letter shall be chosen from the following list:

- C = Creosote
- T = Creosote-coal-tar solutions
- X = Creosote-petroleum solutions

† The double sweep limitation for northern white cedar poles shall be as follows:

"Where sweep is in two planes (double sweep), the sum of the sweeps in the two planes (each sweep being measured as shown on Diagram 1 of the subsidiary drawing) shall be not greater than the allowance for sweep in one plane and one direction for a pole of the same length."

N=Copper naphthenate solutions
P=Pentachlorophenol solutions
S=Salt solutions (any type)

Code letters designating preservatives other than those listed, or modifications of the letters listed with a view to designating specific types rather than broad classes of solutions, may be used on agreement between supplier and purchaser.

On the face of the pole the brand or mark shall be placed squarely and so located that the bottom of the brand or mark will be at a point designated by the purchaser.

If the supplier's name, plant location, and year of treatment are included, the arrangement and order of the code letters and figures shall be as follows:

Interpretation

PCC	Supplier's code or trade-mark Pole Creosoting Company
C-48	Plant location and year of treatment City Year, as 1948
SPC	Species and preservative code Southern pine, Creosote
5-35	Size Class 5 — 35-foot pole

On the butt of the pole the brand or mark may be the same as that placed on the face of the pole, in which case the class numeral need not be circumscribed with a C; or the code letters for species and preservative may be stamped into the butt with a die or hammer.

Storage and Handling

Storage. When it is necessary to hold poles in storage, they shall be stacked on treated skids of such dimensions and so arranged as to support the poles without producing noticeable distortion of any of them. The height of the piles shall be limited so as to avoid damage to poles on the bottom layers.

Handling. Treated poles shall not be dragged along the ground. Cant hooks, pole tongs, or other tools shall not be applied to the ground line section of any pole.

Definition of Terms

The following definitions shall apply in these specifications.

Check. A check is a separation of the wood along the grain, the greater part of which occurs across the rings of annual growth. A through check extends from surface to surface of the pole, usually through the pith center.

Compression Wood. Compression wood is abnormal wood that often forms on the lower side of branches and inclined trunks of coniferous trees. Compression wood is:

(a) Characterized by relatively wide annual rings, usually eccentric;

(b) Has a relatively high proportion of summerwood (frequently more than 50 per cent of the width of the annual rings in which it occurs);

(c) Exhibits but little contrast in color between springwood and summerwood; and

(d) Shrinks excessively lengthwise as compared with normal wood.

Cross-break (Crack). A cross-break is a separation of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage or to external forces.

Dead Knot. A dead knot is a knot left by a branch that dies before the tree is cut. An encased knot is a dead knot in which the growth layers are not intergrown with those of the surrounding wood. Dead knots may contain soft fibers (decay) that usually do not extend deeper than an inch or two from the pole surface. They are distinct from rotten or decayed knots in which the loose or soft fibers (decay) may extend the full length of the knot into the pole, and which are frequently associated with heart rot.

Dead Streak. A dead streak is any portion of the sapwood in which the life processes had ended prior to the cutting of the tree. A dead streak starts from the butt and differs from a wound, such as a cat face or scar, where the growth of new wood shows that life processes are still acting to repair the injured part.

Decay. Decay is the disintegration of wood substance due to the action of wood-destroying fungi. Rot and dote mean the same as decay.

Face of Pole. The face of a pole is the concave side, or the side of greatest curvature in poles having reverse or double sweep, between the ground line and top.

Ground Line Section. The ground line section is that portion of a pole between 1 foot above and 2 feet below the ground line as defined in the pole dimension tables.

Hollow Heart. A hollow heart is a hollow in the heartwood of a living tree caused by insects or fungi.

Hollow Pith Center. A hollow pith center is a small hole at the pith center of the trunk or of a knot, caused by disintegration of the pith (small soft core occurring in the structural center of a tree or branch).

Insect Damage. Insect damage is the result of boring in the pole by insects or insect larvae. Scoring or channeling of the pole surface is not classed as insect damage.

Knot Diameter. A knot diameter is the diameter of a knot on the surface of the pole measured in a direction at right angles to the lengthwise axis of the pole.

Red Heart. Red heart is caused by a fungus, *Fomes pini*, that occurs in the living tree. It is characterized in the early stages of infection by a reddish or brownish color in the heartwood. This is known

as "firm red heart." Later the wood in the case of the living tree disintegrates (decays) in small, usually distinct, areas that develop into white-line pockets.

Sap Stain. Sap stain is a discoloration of the sapwood caused by the action of certain molds and fungi that is not accompanied by softening or other disintegration of the wood.

Scar (Cat Face). A scar is a depression in the surface of the pole resulting from a wound where healing has not re-established the normal cross section of the pole.

Shake. A shake is a separation along the grain, the greater part of which occurs between the rings of annual growth.

Short Crook. A short crook is a localized deviation from straightness which, within any section 5

feet or less in length, is more than one-half the mean diameter of the crooked section.

Spiral Grain (Twist Grain). Spiral grain is a type of growth in which the fibers take a spiral course about the bole of a tree instead of the normal vertical course. The spiral may extend right-handed or left-handed around the tree trunk. The amount of spiral grain in a pole is measured as the distance in feet, along the axis of the pole, in which one complete twist of the spiral occurs, and is expressed as, for example, 1 in 10.

Split. A split is a lengthwise separation of the wood due to the tearing apart of the wood cells, extending from surface to surface of the pole.

Sweep. Sweep is the deviation of a pole from straightness.

The Preservative Treatment of Southern-Pine Poles by Pressure Processes (A.W.P.A. 36C)

General Requirements

The following requirements apply to each of the treatment processes. If these requirements are to be modified to meet special conditions, complete detailed instructions shall be given.

Plant equipment. Treating plants shall be equipped with the thermometers and gauges necessary to indicate and record accurately the conditions at all stages of treatment, and all equipment shall be maintained in acceptable, proper working conditions. The apparatus and chemicals necessary for making the analyses and tests required by the purchaser shall also be provided by plant operators, and kept in condition for use at all times.

Conditioning. Poles shall be conditioned by air-seasoning or by steaming or by a combination of both as agreed upon, in such a manner as will not cause injurious checking, splitting or warping.

When air-seasoning is employed the material shall be treated before it begins to decay.

When steam conditioning is employed poles shall be steamed in the cylinder at temperatures between 254 deg., F., and 259 deg., F. (approximately 20 lb. pressure per sq. in.) for not less than 6 hr. and not more than 15 hr., which temperature maximum shall not be reached in less than 1 hr. The cylinder shall be provided with vents to relieve it of air and insure proper distribution of steam. After steaming is completed, a minimum vacuum of 24 in. at sea level shall be maintained for not less than 1 hr. The cylinder shall be relieved continuously or frequently enough to prevent condensate from accumulating in sufficient quantity to reach the wood. Before the preservative is introduced the cylinder shall be drained of condensate.

Sorting. Whenever it is practicable, poles should be sorted into size and seasoning groups, and the treatment of large and small pieces or green and seasoned pieces in the same charge should be avoided.

Framing. So far as practicable all surfacing, framing, and boring shall be done prior to treatment; but gaining and boring bolt holes and step holes shall be permitted after treatment on poles with 100 per cent sapwood penetration, provided the surfaces of such gains and holes are painted or swabbed with hot preservative.

Treatment Oil Treatment

Manner of Treatment. Following the conditioning period, the poles shall be treated by an empty-cell process whenever practicable, in order to obtain as deep and uniform penetration as possible with the retention of preservative stipulated. Poles shall be treated by the full-cell process only when the maximum net retention is desired and where pressure is held to refusal, or when the stipulated retention is greater than can be obtained by the use of an empty-cell process. The ranges of pressure, temperature and time duration shall be controlled so as to get the maximum penetration by the quantity of preservative injected.

Standard Processes Empty-cell . . . Rueping

Poles shall be subjected to initial air pressure of the necessary intensity and duration. The preservative shall be introduced until the cylinder is filled, the

air pressure being maintained constant during the filling operation. The pressure shall be raised to not more than 200 lb. per sq. in. Poles shall be held under pressure until there is obtained the largest practicable volumetric injection that can be reduced to the stipulated retention by ejection of surplus preservative from expansion of the air and by a quick high vacuum.

The temperature of the preservative immediately after the cylinder is filled and during the entire pressure period shall be not more than 210 deg., F., and shall average at least 180 deg., F.

After pressure is completed the cylinder shall be emptied speedily of preservative, and a vacuum of not less than 22 in. at sea level shall be created promptly and maintained until the wood can be removed from the cylinder free of dripping preservative.

Results of Treatment

Retention of preservative. The net retention in any charge shall be not less than 95 per cent of the quantity of preservative that may be specified; but the average retention by the material treated under any contract or order and the average retention of any five consecutive charges shall be at least 100 per cent of the quantity specified. The amount of preservative retained shall be calculated from readings of working tank gauges, or scales, or from weights before and after treatment of loaded trams on suitable track scales.

The volume of preservative shall be calculated on the basis of 100 deg., F. Calculations of volume or weight shall be made by the use of temperature or specific gravity factors contained in the Volume and Specific Gravity Correction tables of the American Wood-Preservers' Association.

The amount of preservative retained shall be as follows, depending upon use requirements, and as stipulated in purchaser's order and in accordance with Section 3.1:

- 3.21 8 lb. of creosote per cu. ft. of wood in charge, or
- 3.22 10 lb. of creosote per cu. ft. of wood in charge, or
- 3.23 12 lb. of creosote per cu. ft. of wood in charge.

Penetration

The penetration in any pole treated to an 8-lb. retention shall be not less than 2.5 in. unless 85 per cent of the sapwood is penetrated.

The penetration in any pole treated to a 10-lb. retention shall be not less than 3 in. unless 90 per cent of the sapwood is penetrated.

The penetration in any pole treated to a 12-lb. retention shall be not less than 3.5 in. unless 90 per cent of the sapwood is penetrated.

Determination of Penetration. To facilitate inspection for conformance to the penetration requirements poles should be considered as divided into the classes and lengths.

Grouping poles for penetration inspection. Poles shall be divided for inspection for the penetration requirements into two groups, viz:

Group A. Small poles, of the following classes and lengths:

- Class 1, 25 ft. and shorter
- Class 2, 30 ft. and shorter
- Class 3, 35 ft. and shorter
- Class 4, 45 ft. and shorter
- Class 5, 55 ft. and shorter
- 6 to 10, all lengths

This group includes all guy stubs, reinforcing stubs and push braces.

Group B. Large poles, including all classes and lengths not in Group A.

Poles in Group A. An increment borer core shall be taken approximately midway between the butt and top of each of 20 poles in each charge.

If 18 of the 20 borings meet the penetration requirements, the charge as a whole shall be considered as conforming.

If 16 or 17 of the 20 borings meet the penetration requirements each pole in the charge shall be bored as previously indicated and only those poles that meet the penetration requirements shall be considered as conforming.

If less than 16 of the 20 borings meet the penetration requirements the charge as a whole shall be considered as nonconforming.

Poles in Group B. An increment borer core shall be taken approximately midway between the butt and top of all poles in Group B, and only those poles that meet the penetration requirements shall be considered as conforming.

Note: If the poles are not handled on the class and length basis shown in the table an approximately comparable division may be made by listing all poles with circumferences at 6 ft. from the butt less than 37.5 inches as Group A poles, and all poles with circumferences at 6 ft. from the butt of 37.5 inches or more as Group B poles.

Plugging Increment Borer Holes. All holes made with an increment borer for determining penetration shall be plugged tightly with creosoted plugs or with untreated plugs of durable heartwood approved by the purchaser.

Preservatives

The Preservative used shall conform to the American Wood-Preservers' Association Standard 4e—Standard Specification for Creosote.

Inspection

Inspection of poles for conformity to the requirements of this specification shall be in accordance with American Wood-Preservers' Association Standard 33, amplified by above.

Retreatment

Poles not conforming to the stipulated minimum requirements may be retreated and may be reoffered for acceptance but retreatment should be avoided so

far as practicable. If retreatment is necessary it shall be under the following conditions:

The maximum limits for temperature of steam or preservative and the maximum limit for preservative pressure, that apply to original treatments, shall not be exceeded during retreatment.

When a charge to be retreated is made up entirely of black non-conforming or rejected poles, the amount of preservative retained in the retreatment shall be at the discretion of the creosoter, provided

the total net retention does not fall below the minimum requirements.

When it is necessary to retreat black poles in the same charge with white untreated poles, the number of black poles in the charge shall not exceed 5 per cent of the total poles in the charge.

In the computation of the required minimum net retention in any charge containing both black and white poles, all poles in charge shall be considered as untreated.

The Taylor-Colquitt Vapor-Drying Process



The Taylor-Colquitt Co. after years of intensive research has developed a method of artificially seasoning wood products. This process known as *Vapor-Drying* has solved many of the problems of steam seasoning of poles in that it eliminates seasoning defects and offers generally better impregnation.

Poles dried by the Vapor-Drying process retain the original strength of green poles which increases the breaking strength over steam dried poles by 20 per cent. The weight of Vapor-Dried poles is approximately 4 pounds per cu. ft. less than green steam seasoned poles. Vapor-Drying also eliminates bleeding because a higher percentage of the preservative is retained deeper in the sapwood.

Seasoning by means of Vapor-Drying is accomplished through exposure of wood in a closed vessel to the action of vapors from boiling suitable organic liquids at atmospheric or sub-atmospheric pressures. The vapor is introduced into the bin containing the poles in sufficient quantity to maintain a high concentration of the chemical in the atmosphere of the drying vessel. The mixture of steam and vapor is discharged to a condenser and the liquids are separated by gravity, the water measured and discharged and the water-free drying agent returned to the evaporator to be used again. For purposes of wood preservation the drying agents used are coal tar or petroleum fractions having narrow boiling ranges with the initial boiling point between 212° and 400° F.

Several factors involved in the operation of the process make it possible to utilize this high temperature range without detrimental effect to the wood, viz.,

- (1) The chemicals used are inert with respect to any injurious reaction with the wood.
- (2) Oxygen is excluded from the system by dis-

placing it with the organic vapor, preventing oxidation.

(3) While the wood still contains water, elevation of its temperature much beyond that of the boiling point of water is prevented since the contained water is free to vaporize at approximately its atmospheric boiling point; and steam evolved from the wood, mixing with the surrounding highly heated vapor, is kept at a very low concentration so that hydrolysis is negligible.

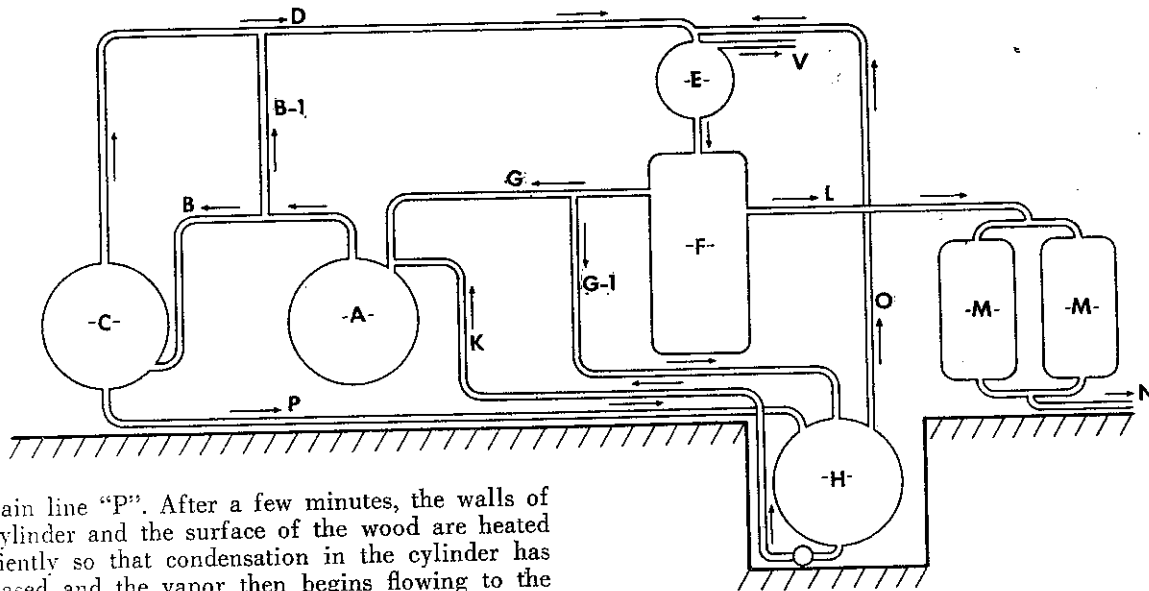
(4) The duration of exposure required to effect drying is relatively short, and time is a more important factor than is temperature in producing thermal changes in the temperature range which actually obtains in the wood under the conditions of operation, therefore injury from thermal action is inappreciable.

The Vapor-Drying Process

The Vapor-drying process employs many of a large number of organic drying agents that are immiscible with and lighter than water, thus a simple gravity separation of water and drying agent is secured. In selecting drying agents, several factors must be considered. One of major importance is the working temperature available in the plant for boiling the drying agent; since in most cases the source of the heat will be saturated steam, the criterion for this factor is boiler pressure. The drying agent should have sufficient compatibility with the preservatives used to prevent the formation of insoluble resinous products that would be deposited on the evaporator heating surfaces, thereby reducing the rate of heat transfer.

Drying Operation

The accompanying diagram illustrates the method of operation. The drying agent is boiled in an evaporator "A"; after the wood has been placed in retort "C", the dry organic vapor is introduced through pipe "B". Pipe B-1 is a by-pass from the evaporator to the condenser and is used when heating the drying agent preparatory to beginning the drying cycle. The entering vapor immediately condenses on contacting the cool wood and the walls of the cylinder; the resultant condensate returns to tank "H" by means



of drain line "P". After a few minutes, the walls of the cylinder and the surface of the wood are heated sufficiently so that condensation in the cylinder has decreased and the vapor then begins flowing to the condenser "E" through line "D". The air in the cylinder is displaced and escapes through vent "V" to the atmosphere. By the time the vapor is passed over to the condenser it will contain a substantial amount of water vaporized from the wood which has been heated by the condensing vapor. This first condensate will be composed of approximately $\frac{1}{2}$ water and $\frac{1}{2}$ organic drying agent. As the heating continues the percentage of water decreases sharply although the actual amount delivered to the condenser remains about the same. This is occasioned by the fact that as the cylinder walls and contents are heated, less of the organic drying agent condenses in the cylinder and, since the heat in-put remains about the same, more of the drying agent will pass over to the condenser.

The amount of organic agent in the vapor entering the condenser is allowed to increase to a point between 65% and 90% and this range is maintained by controlling the heat in-put to the evaporator. This control is governed by temperature of the effluent vapors; the partial pressure of the drying agent establishes the percentage composition of the effluent vapors, since the water vapor component behaves as a fixed gas. At organic agent concentrations below 65% the drying rates decrease rapidly, while above 90% they increase but little, even though the heat in-put required to maintain the higher concentrations rises sharply.

At the condenser, the vapor mixture is cooled to about 180° F. and the resultant condensate passes downward into tank "F" where gravity separation takes place, the water-free drying agent returning to the evaporator through pipe "G". Line "G-1" is a bypass for the water-free agent from the separator to the return tank. The water passes through "L" into the drain tanks "M" for measurement and is then discharged to the drain through line "N". Reboil line "O" is to carry off any steam to the condenser that

has formed in the return tank. Dry organic liquid is pumped from the condensate tank through "K" to the evaporator. Stable operating conditions are established when the effluent vapor temperature indicates that the composition with respect to organic agent in the vapor discharging from the cylinder is at the desired level; the water removal will then have reached a maximum. A period of about 30 minutes is required to reach this point, but from there on the amount of water removed decreases as drying progresses.

Vacuum Cycle

During the period of heating in vapor, much of the drying agent that condenses to supply heat is absorbed by the wood, although the amount is not as great as the quantity of water being lost. When the moisture content of the wood has been reduced to the desired level which is determined by measuring the water in the drain tanks, the evaporator is shut off from the cylinder and a vacuum is impressed on the system to recover the drying agent that has condensed in the wood. Duration of the vacuum varies from 30 minutes to 2 hours depending on the size of the poles, and its depth reaches 22 to 26 inches of mercury. For poles that are dried preparatory to preservative treatment, the final moisture content usually ranges from 25% to 40%.

During the vacuum some water is removed from the poles along with the drying agent. This requires the twin water tanks "M" in order that one tank may be draining while the other is filling. The amount of water recovered in the vacuum is usually 10% to 20% of the total removed from the charge during the heating cycle. The amount of drying agent finally retained by the wood ranges from 0.25 to 0.50 lbs per cu. ft. following the vacuum in woods that are dried preparatory to impregnation.

Rainier Crossarms

Indispensable characteristics in crossarms are strength and durability. Strength is necessary to carry the dead load of conductors, to withstand sleet and wind, and to stand shock any combination of these two duties impose on the arm in service. Durability is necessary because the arm is intended for years of service and the cost of replacing an arm in the line is more than the price of the arm itself.

Weight is also important. The lighter arms cost less to transport and install and place less burden on pole structures.

Rainier fir crossarms meet these requirements. They are carefully graded, with strength reducing defects eliminated. They are seasoned to approximately equilibrium moisture content which adds to the strength. They are seasoned slowly and under such control that, from the start to the finish of the seasoning process, the moisture content of the interior is substantially the same as at the surface of the arm. Microscopic, as well as visible, checking is held to a minimum, in order that finished arms are sound and solid and will not readily soak up moisture nor admit decay fungi to the interior.

The largest factory is at Chehalis, Washington, where the finest dry kilns and kiln control equipment is located. The dry kiln operations are supervised by men who are specialists and experts in the drying of crossarm sizes of Douglas fir. Carload orders can be shipped economically from Chehalis to all parts of the United States.

For the benefit of customers who desire LCL quantities of crossarms, particularly with drillings of non-standard sizes or specially spaced, and to provide immediate delivery of any quantities in emergencies, factories are maintained at Chicago, Illinois; Kansas City, Missouri; Texarkana, Texas; Newark, New Jersey; and Minneapolis, Minnesota. These factories are fully provided with manufacturing equipment and are heavily stocked with crossarm lumber which permits prompt attention to the needs of users in all parts of the country. Kiln drying at these factories is not economical due to the cost of fuel, but each point carries a reasonable stock of blanks, kiln dried on the West Coast, for customers who ask for kiln dried arms. All these factories have well designed drying sheds in which the ventilation is controlled. Also they are equipped with the instruments necessary to check the character of drying while the lumber is being conditioned, and they observe the same high standards for grading lumber and eliminating inferior pieces, as the organization at Chehalis.

Southern yellow pine when properly graded is rated equal in strength to Douglas fir. With proper care before treatment, then with pressure treatment under the recognized standards with high grade creosote oil,

there can be no question of such arms lasting as long as any other part of the line structure. Pine arms are considerably heavier than fir, but are preferred in a good many localities, due to shorter distances from the source of supply and consequent saving in freight rates. Creosoted yellow pine crossarms are produced at Texarkana, Texas, and we can vouch that these arms will conform to our high standards of quality in every respect.

Rainier Clear Douglas Fir Crossarm Specifications

General

This specification covers clear Douglas fir crossarms in sizes five by six-inch cross-section and smaller.

Dimensions. All arms furnished shall conform to the design and dimensions specified by the purchaser. Where allowable variations are not shown, approximate conformity to the dimensions given, consistent with good commercial practice, is required.

Seasoning. The average moisture content in any lot of arms shall be not less than 12% nor more than 20% of the oven dry weights. The difference between the moisture content of a one-inch cube cut from the center and that of a slab one-half-inch thick cut from the outer surface of any cross-section, shall be not more than four percent.

Annual Rings. Not less than eight annual rings per inch on each end of the piece, except that arm having 33 $\frac{1}{3}$ % summer-wood may have not less than six rings per inch.

Checks, Shakes and Splits. No arm shall contain shakes or splits. On top of arm, no checks more than six inches long. No checks anywhere shall measure more than one-third the length of the arm nor more in depth than one-fourth the distance to the opposite face.

Grain. Except in deviations at knots and pitch-pockets, arms shall be free from spiral or diagonal grain with a slope of more than one-inch in 12 inches.

Knots. No knots in clusters. No knot exceeding 1 $\frac{1}{8}$ inches in any part of the arm. No six-inch section in the middle half shall contain plurality of knots of which the diameters added together exceed one inch and no 12-inch section elsewhere shall contain knots of which the diameters added together exceed 1 $\frac{1}{4}$ inches.

No knot exceeding one-half inch shall intersect any pin or bolt hole, and no knot exceeding $\frac{3}{4}$ inch shall be closer than its own diameter to any hole bored for a wood pin.

The size of any knot shall mean its measurement across the smallest diameter.

Pitch Pockets. No pitch pocket on top of an arm more than four inches in length, nor more than eight inches in length elsewhere.

Sapwood. Not over 25% on any cross-section.

Loose Heart or Boxed Heart. No loose heart nor heart centers.

Rot. No stain, rot or decay.

Wane. No wane within 1/4 inch of pin or bolt hole or on more than one edge. No wane surface more than 3/4 inch wide within 12 inches of the middle bolt hole, or 1 1/2 inches elsewhere.

Warp. A straight edge laid lengthwise on the concave surface of an arm shall show no offset for the arm greater than 1/10-inch per foot of length. No arm shall be twisted nor bent in more than one direction.

Finish. Arms shall be planed smooth on all four sides, cut accurately to length, ends coated with transparent but moisture-resistant gloss oil compounds, bored and roofed as ordered.

Pin and bolt holes shall be bored so as to take steel gauges as follows: W, pin holes, 1 1/4-inch gauge without forcing, but not 1 3/4-inch gauge; Y, brace bolt holes, 3/8-inch gauge without forcing; and Z, middle bolt hole, 5/8-inch gauge without forcing.

Size, Spacing and Weight of Standard Fir Arms

3 1/4 x 4 1/4—Standard Cross Arms

Cat. No.	Type	Pole Pins In.	Side Pins In.	Brace Bolts In.	Weight per 100, Lbs.
120-Inch Length—10 Pin					
S-2183	A	16	12	42	3540
S-2184	B	32	10	42	3540

102-Inch Length—10 Pin

S-2185		16	9 3/4	32	3009
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“Six-Foot, Six Pin”

S-2186		16	12	32	2124
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2 3/4 x 3 3/4—Pony Cross Arms

Cat. No.	Pin Holes	Length, In.	Center Space In.	Side Pins In.	Brace Bolts In.	Wt. per 100, Lbs.
S-2180	10	102	16	9 3/4	28	2295
S-2179	8	82	16	9 3/4	28	1845
S-2178	6	62	16	9 3/4	28	1395
S-2177	4	42	16	9 3/4	28	945

NOTE: Above specifications and dimensions pertain to Fir Crossarms. Table below gives additional information and comparative weights and measurements of Fir and Pine Crossarms.

Comparative Dimensions of Standard Cross Arms

Size and Length	Pin Hole Spacings			Pin Hole Size	Center Bolt Hole	Brace Bolt Spacing	Use Length	Brace	Weight Per Arm Fir, Lbs.	Weight Per Arm Pine, Lbs.
	Center	Sides	Ends							
Standard Telephone Arms										
3 1/4 x 4 1/4										
16 1/2 in. 2 pin	10	—	3 1/2	1 3/8	5/8	7	20		5.00	7.50
6 ft. 6 pin	16	12	4	1 3/8	5/8	32	24, 26		21.24	30.48
8 ft. 8 pin	16	12	4	1 3/8	5/8	32	24, 26		28.32	40.64
8 1/2 ft. 10 pin	16	9 3/4	4	1 3/8	5/8	32	24, 26		30.09	43.18
10 ft. 10 pin	16	12	4	1 3/8	5/8	42	30, 32		35.4	50.80
10 ft. 12 pin	16	9 5/8	3 3/8	1 3/8	5/8	42	30, 32		35.4	50.80
Pony Telephone Arms										
2 3/4 x 3 3/4										
42 in. 4 pin	16	9 1/2	3 1/2	1 3/8	5/8	28	22		9.45	13.13
62 in. 6 pin	16	9 3/4	3 1/2	1 3/8	5/8	28	22		13.95	19.38
82 in. 8 pin	16	9 3/4	3 3/4	1 3/8	5/8	28	22		18.45	25.63
102 in. 10 pin	16	9 3/4	4	1 3/8	5/8	28	22		22.95	31.88
120 in. 12 pin	16	9 5/8	3 3/8	1 3/8	5/8	28	22		27	37.50

Dead End Cross Arm, C. Y. P.

Length	Dimensions	Weight, Lbs.
6'	3 3/4" x 5"	40

Guard Arm, Fir

Length	Dimensions	Weight, Lbs.
4'	3 1/4" x 4 1/4"	14

Specially manufactured arms to meet particular requirements and arms for high voltage transmission lines can be furnished promptly from the mill; not returnable.

Ordinarily no extra charge is made for arms bored for special requirements.

Care should be taken in ordering arms with special boring or spacing of holes. Working drawing should accompany order.

Unless otherwise ordered, all arms will be bored for 1 1/4-inch pins and roofed or rounded on top to shed water.

Rainier Pine Crossarm Specifications Pressure Treated—For Telephone Use

This specification covers Southern yellow pine crossarms, pressure creosoted for telephone use.

Defects Prohibited. No shakes, through checks, splits, pitch seams, cracks, rot, red-heart, decayed knots, or unsound knots.

Grain. Except in the case of deviations at knots and pitch pockets the general direction of the grain shall not slant from the lengthwise edge of an arm by more than one inch to 12 inches.

Knots. The maximum size of single sound knots measured across the smallest diameter including permissible and incased knots that are permitted in the tops or sides of the arms. Sound knots appearing only on the bottom of an arm may have a diameter 50% greater, provided that the diameter of any knot does not exceed two inches. Loose knots not greater in diameter than sound knots permitted in the top of the arm, are permitted in the bottom of an arm only.

Pitch Pockets. Pitch pockets shall not be over 1 1/2 inches deep. Pitch pockets entering pin holes may be four inches long, provided they are not more than 1/4 inch in width.

Pitch pockets up to and including 1/8 inch in width, shall not be more than eight inches long in any part of the arm, over 1/8 inch and up to 3/8 inch the length shall be reduced proportionately, so that a 3/8 inch pitch pocket, the maximum width allowed anywhere, shall not exceed four inches in length.

Checks. Checks in the pin holes of crossarms shall be not more than two inches long. Checks in pin holes shall not appear along the same line of grain at adjacent pin holes. Checks that do not intersect pin holes shall be not more than 1/2 inch deep in the top surfaces nor more than 3/4 inch deep in the sides and bottom surfaces. The length of such checks shall not exceed 12 inches divided by the depth of the checks.

Wane. Wane shall not appear on more than two edges of a crossarm nor shall it approach a pin hole closer than 1/4 inch nor extend across the full width of either side surface.

Insect Damages. Insect damages are prohibited in the middle half of the crossarm.

Warp. Warp is permitted in one direction only. When a straight-edge is laid full length on the concave side of a warped arm, the offset shall not exceed 1/10 inch for each foot of arm length.

Finish. All lengthwise surfaces of the arm shall be dressed or planed, except that one side or bottom may be rough sawn on not more than three percent of a lot or shipment. Pin and bolt holes shall be reasonably smooth inside and shall not intersect. The arms shall not be splintered to a depth of more than 1/4 inch on the side or bottom where the bits break through.

Treatment. Specifications governing the quality of the coal tar creosote, the preparation of the arms for impregnation, and the treatments, shall be those adopted as standard by the American Wood Preservers' Association and published in its manual of recommended practice for the empty cell process with initial air pressure and a final retention of not less than eight pounds of creosote per cubic foot of timber.

Rainier Wood Insulator Pin Specifications

Scope

This specification covers wood pins made of yellow locust (sometimes called black locust from the color of its bark).

General

The specification and drawings are intended to include all instructions necessary for the guidance of the manufacturer in his work. They are intended to supplement each other and any details indicated in one and not in the other shall be executed the same as if indicated in both.

Dimensions. Pins shall be of the style and dimensions shown, and allowable variations must not be exceeded. Pins and threads shall be smoothly and accurately formed. Figures on the drawing shall be followed in preference to scale measurements.

Seasoning. Pins manufactured from green or partially seasoned wood shall, when seasoned, conform to the requirements of this specification.

Material. Finished pins shall not contain any of the following defects, and, where any of these defects are present, they shall be cause for rejection.

Annular Rings. Rings which depart from parallelism with the center line of pin by a sufficient amount to allow a ring starting at the center of the bottom of the pin to run out of the side below the lower thread.

Checks. Checks exceeding three inches in length or $\frac{1}{16}$ inch in width.

Knots. Loose or unsound knots. Sound knots exceeding $\frac{1}{8}$ inch in diameter above the shoulder or exceeding $\frac{1}{4}$ inch in diameter below the shoulder. The least diameter of a knot shall be considered its diameter for the purpose of this specification.

Loose Heart

Pitch Pockets

Rot

Sapwood. Sapwood exceeding $\frac{1}{8}$ inch in thickness except on the shoulder of the pin.

Shakes. Cracks or splits concentric to the annular rings of the wood.

Wane. Wane or bark above the shoulder.

Worm Holes. Worm holes in the top seven-inch section of the pin.

Allowable Variations

8-Inch and 9-Inch

Dimension	Base of Thread	Base of Flange	Shank Length
Over, inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$
Under, inches	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Taper of threaded portion shall not be more than 1.25-inch or less than .95-inch per foot.

Wood Pins



Cat. No.	Standard		Diam. Top In.	Wt. per 1000, Lbs.
	Size In.	Std. Bag		
S-5676	1 1/4 x 8	300	1	325
S-5678	1 1/2 x 9	200	1	480
Transposition				
S-5680	1 1/4 x 9		1	400

Rainier Wood Insulator Bracket Specifications

Scope. This specification covers wood brackets made of oak.

General. Brackets shall be free from cracks, shakes, brashy wood and all other imperfections, except as hereinafter specified.

Seasoning. The maximum moisture content of seasoned brackets shall be 20%.

Checks. The presence of checks is permitted provided that they do not extend into the threaded section of the bracket or intersect any nail hole and are not greater than two inches in length.

Grain. The grain shall be straight and shall be practically parallel to the axis of the threaded portion of the bracket. The grain at either of the right-angled corners at the end of the bracket shall not run out below the bottom thread on the opposite side of the bracket.

Insect-Holes. In wood otherwise sound, a few small insect-holes not exceeding $\frac{1}{8}$ inch in diameter may be present, provided that they are scattered and appear only in the portion of the bracket between the turned section and the small nail hole. No more than five percent of the brackets furnished shall contain such insect-holes.

Knots. Brackets shall be free from loose or unsound knots. Sound knots are permitted in the turned section of the bracket up to a diameter not greater than $\frac{1}{4}$ inch, provided that the distance between any two knots is not less than one inch. Sound knots are also permitted in the portion between the turned section and the small nail hole up to a diameter not greater than $\frac{1}{2}$ inch, provided that not more than three knots are present in this portion of the bracket and that all such knots are at least $\frac{1}{4}$ inch distant from either nail hole.

Sapwood. Brackets may contain sapwood along any edge provided it does not appear on any face to a distance greater than $\frac{1}{4}$ inch from the edge.

Standard Unpainted Wood Brackets



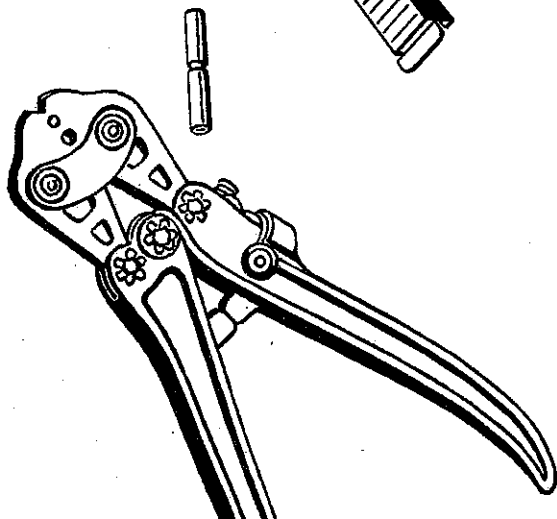
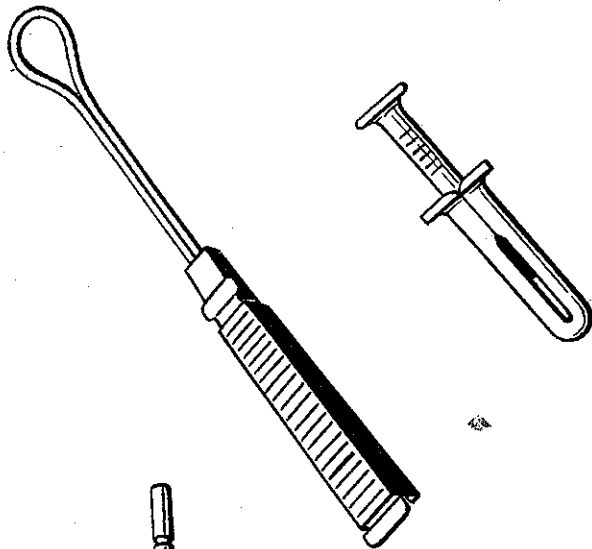
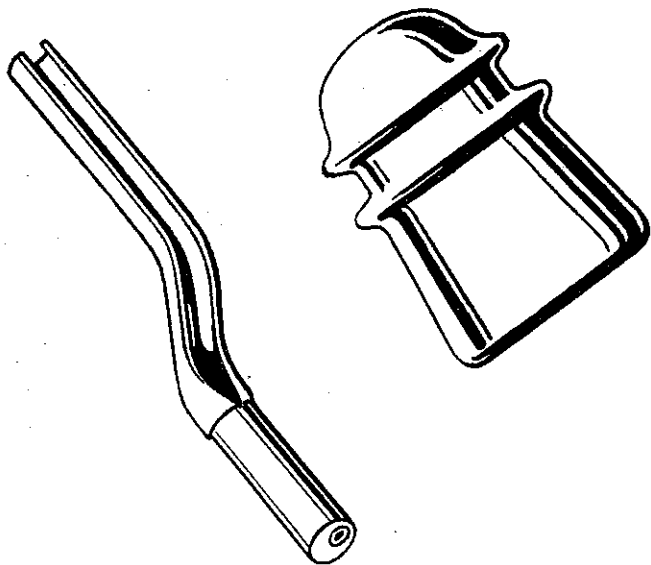
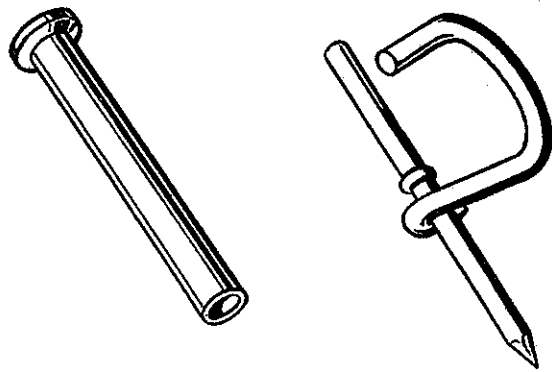
Cat. No.	Type	Size Inches	Wt. per 1000, Lbs.
S-3136	5	1 1/2 x 2 x 12	800
S-3140	WU	2 x 2 3/8 x 12	1000
S-3143	Hi Tensile	2 x 2 3/8 x 12 1/4	1000

Creosoted brackets are available on order.

Standard Wood Pole Steps



Cat. No.	Size, In.	Wt. per 1000, Lbs.
S-7206	1 3/4 x 2 3/4 x 7	700



INSULATORS

PLASTIC TUBES

NICOPRESS SLEEVES and TOOLS

3

Insulators and Fixtures

PV CLAMPS

BRIDLE RINGS

FLOOR DUCT

Index for this section on reverse side



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47 . . .	Kearney Connectors Reliable Connectors House Hooks Perforated Hanger Iron Drive Rings Toggle Bridle Rings
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49 . . .	Wiring Nails Ground Wire Staples Insulated Staples Ground Wire Clamps and Nails

Page	Item
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56 . . .	Nico Press Sleeves
57 . . .	Nico Press Sleeves
58 . . .	Double Tube Sleeves Knob Adapter CR Service Connectors Angle Screw Fixtures
59 . . .	Plastic Wire Guards

AUTOMATIC



ELECTRIC

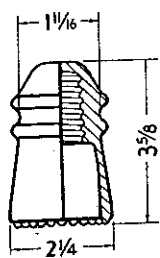
Hemingray Glass Insulators

Hemingray Glass Insulators—used by telephone companies for more than 50 years—are manufactured by the Hemingray Division of the American Structural Products Company. They are fabricated from a colorless glass which is non-porous, of high dielectric strength, and is highly resistant to temperature changes.

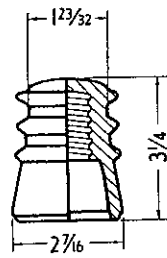
To give the most efficient service in conjunction with this glass the entire line of Hemingray Insulators is

constantly being improved. Extra strength has been incorporated, sharp corners have been eliminated, and special attention has been given to the shape and thickness of the petticoats and the distribution of mass in the body of each insulator.

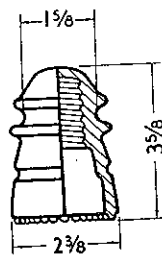
Supplied in clear glass only and packed in corrugated cardboard containers with each insulator in a separate compartment.



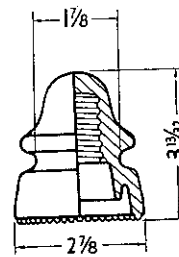
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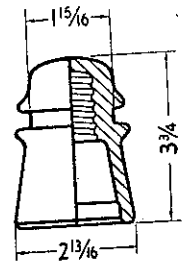
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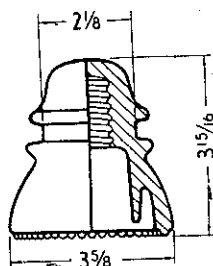
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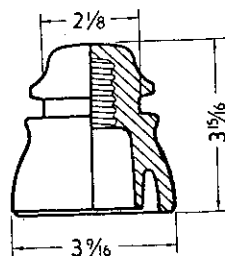
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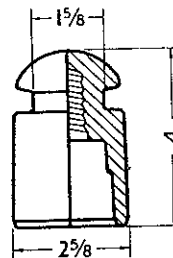
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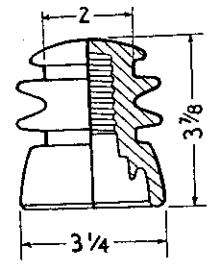
S-4916



S-4902



S-4918



S-4927

Cat. No.	Type	Diameter of Groove	Weight	Quantity Per Box	Weight Per Box
S-4910	9 Pony	3/8 In.	9 oz.	50	29 Lbs.
S-4901	10 Exchange Line	3/8 In.	10 oz.	50	35 Lbs.
S-4912	12 Double Groove Pony	3/8 In.	10 oz.	50	35 Lbs.
S-4914	14 Single Groove Double Petticoat	3/8 In.	12 oz.	50	35 Lbs.
S-4915	16 Long Distance	3/8 In.	15 oz.	50	53 Lbs.
S-4916	42 Double Petticoat	5/16 In.	24 oz.	40	66 Lbs.
S-4902	45 Double Petticoat	5/16 In.	24 oz.	40	65 Lbs.
S-4918	22 Carrier Circuit	1/2 In.	16 oz.	50	55 Lbs.
S-4927	56 Transposition	3/8 In.	22 oz.	40	59 Lbs.

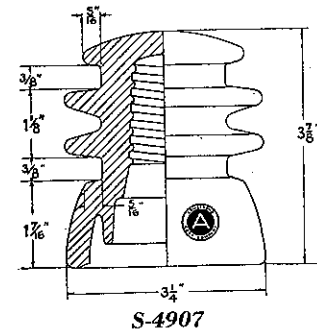
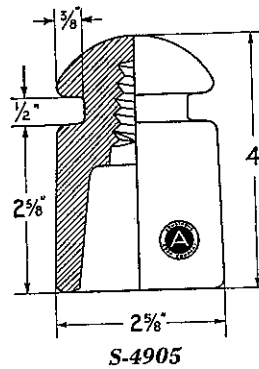
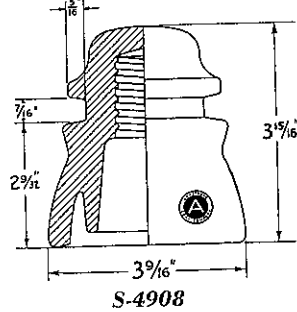
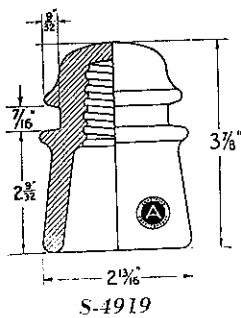
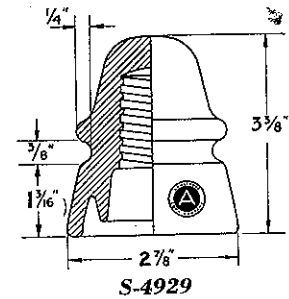
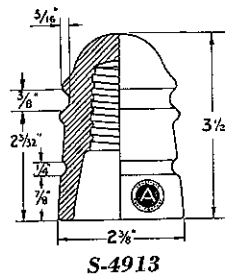
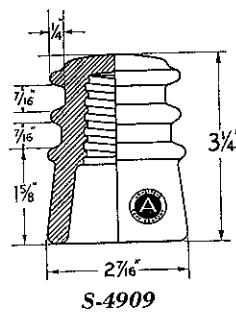
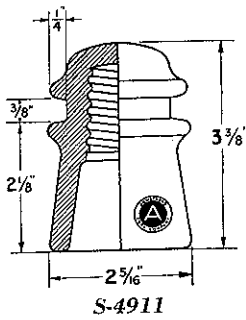
Equivalent Chart for Armstrong and Hemingray Glass Insulators

Manufacturer	Brand Name	Catalog Number							
		1	2	3	CSC	TW	9	13	14
Armstrong	Whitall Tatum								
Amer. Structural Prod.	Hemingray	42-45	16	10	22	56	9	12	14

Armstrong Glass Insulators

Constant research has greatly improved the quality of glass insulators over those made some years ago. For example, a new industrial glass is more chemically resistant than the glass previously used. This means that Armstrong glass insulators now have even greater resistance to weathering, and consequently a greater resistance to surface leakage. Newer and more accurate instruments control the mixing and melting of the basic glass. Precise control over the temperature of the glass as it passes through various steps in the molding operation and also as it passes through the tempering ovens, gives a much clearer and more

uniform insulator. In both laboratory tests and actual use, Armstrong glass insulators have proven stronger than their supporting pins. They withstand the strain of long spans or ice loaded lines. Made of clear glass, Armstrong insulators discourage malicious breakage because they're harder to see—harder to hit. Armstrong insulators are a special development of research in industrial glass, designed to withstand thermal shock, transparent to reduce breakage and smoothly molded to insure easier handling. You are assured of long, economical and satisfactory service when you install Armstrong glass insulators.



Cat. No.	Type	Diameter of Groove	Quantity Per Box	Weight Per Box
S-4911	9 Pony	3/8 in.	50	31 lbs.
S-4909	3 Exchange Line	7/16 in.	50	36 lbs.
S-4913	13 Double Groove Pony	3/8 in.	50	32 lbs.
S-4929	14 Deep Groove D. P. Pony	3/8 in.	50	41 lbs.
S-4919	2 Toll Line	7/16 in.	50	54 lbs.
S-4908	1 Double Petticoat	7/16 in.	40	65 lbs.
S-4905	CSC Carrier Service	1/2 in.	50	56 lbs.
S-4907	TW One-Piece Transposition	3/8 in.	40	64 lbs.