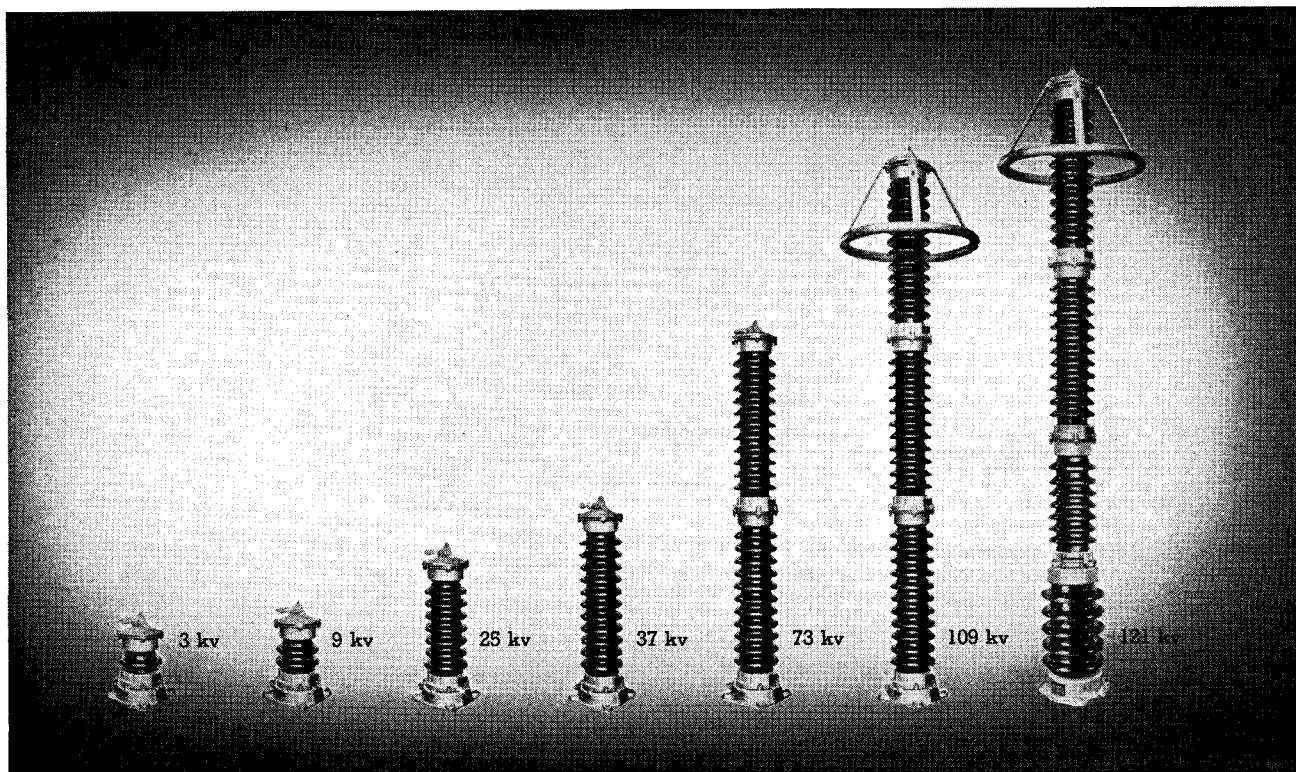




ERECTION • TESTING • MAINTENANCE INSTRUCTIONS

TYPE SV AUTOVALVE LIGHTNING ARRESTERS

Station Type for Indoor or Outdoor Service
3000 through 121,000 Volts, A-C



AUTOVALVE LIGHTNING ARRESTERS,
Type SV described in this leaflet are station-type arresters for the protection of power apparatus such as oil insulated transformers and circuit breakers. (For surge protection at the terminals of rotating machinery or of dry type air insulated transformers, arresters designed especially for the purpose should be used. They are described in separate listings.)

Each arrester is a single pole unit. For three phase installations three arresters must be used.

RECEIVING

Each single pole station type arrester consists essentially of one or more porcelain clad arrester units, depending on the rating. In addition, there are included various attachments as required. These are described in more detail later. When

the arrester is erected, the parts of which the complete arrester pole consists must be assembled. The parts as packaged, consist of the following:

- (a) The arrester unit or units; these are the porcelain weather casings with metal end castings, Figs. 1, 2, 3. They contain all of the operating elements. Each unit has a small nameplate mounted on the bottom end casting giving the identification and rating of the unit only. The necessary hardware is in a sack tied to one end casting of each unit.
- (b) Cap with line terminal attached, Figs. 1, 2, 3.
- (c) Base with ground terminal and nameplate giving the identification and rating of the complete arrester pole, Fig. 1. This separate base is not furnished with the 121 kv arresters, Fig. 2.

- (d) In the case of arresters with ratings of 97 kv and higher a grading ring, as shown at the right of Fig. 2, to be attached to the top of the column of units, between the top unit casting and the cap.

Unpacking. Before unpacking, examine the containers for any visible signs of damage or abuse. Any damage should be noted carefully. If after unpacking, the arrester parts are found to be damaged, the container should be saved for evidence.

Unpack the parts carefully and examine for breakage or other damage. Inspect particularly the porcelains for any breakage. If damage exists, save the containers and packing material and notify the Carrier.

Shortages should be checked with the Carrier, or if the shortages are not the fault of the Carrier, with the nearest Westinghouse Sales Office. If parts do not agree with packing list, contact the nearest Westinghouse representative, giving him the order reading and other identification.

The following table indicates the number of parts to look for when unpacking any one arrester of a given rating.

CHECK-LIST OF COMPONENT PARTS

Standard Type SV Arresters

RATINGS	PARTS REQUIRED
3 to 37 kv inclusive	One arrester unit plus base and cap. (See Fig. 1).
40 to 73 kv inclusive	Two arrester units plus base and cap.
97 to 109 kv inclusive	Three arrester units plus base, cap, and grading ring.
121 kv	Four arrester units plus cap and grading ring.
Higher than 121 kv	Require mechanical bracing, and are discussed in a supplemental leaflet.

The 121 kv arresters include a large substantial unit to be used as the bottom unit as illustrated in Fig. 2. These arresters do not have separate bases, but the bottom arrester unit is bolted directly to the foundation. Standard units are bolted to this unit to make the complete arrester pole. 121 kv arresters include a grading ring and a cap.

Nameplates. Each arrester unit has a small nameplate attached to the bottom unit casting.

This gives the rating and style number of the unit itself, not of the complete arrester.

The nameplate for the entire arrester is a large nameplate usually attached to the base casting, or in the case of the 121 kv arrester to the bottom casting of the large bottom unit. Should the main arrester nameplate be shipped separately, it should be attached by the installer so that the arrester can be identified in the future.

A typical main nameplate is shown in Fig. 2. It gives the voltage rating and style number of the complete arrester. In addition to this, the lower part of the nameplate shows the voltage ratings and style numbers of the arrester units of which the arrester consists, listed in the proper order of assembly, starting from the bottom. In any inquiries about the lightning arrester, refer to the type, voltage rating, and style number given at the top of the large nameplate covering the complete arrester.

ERECTION

For the best protection, the arresters should be located as close as possible to the apparatus to be protected. All leads should be as short as possible.

Start with the base. For all arresters of 3 kv to 109 kv inclusive, the same base is used. This base (shown in Fig. 1) has no flexible steel spring ring, such as is supplied with the high voltage, braced arresters (Fig. 3). Make sure that the proper base is received. Should a base with a spring ring as shown in Fig. 3, be shipped by mistake, remove the spring ring and discard it.

These arresters should be anchored firmly since their only point of support is at the base.

Bolt the base to the foundation. Then add the arrester units as specified on the main nameplate and as indicated on the outline drawings at the end of this leaflet.

On 97, 109, and 121 kv arresters add the grading ring and the cap as in Fig. 2. The arrester is now complete except for the connection of the line and ground leads.

Use of Crane. If a crane or other type of lifting equipment is used during the erection of the arrester, it may be found easier to assemble the arrester from the top down than to start from the bottom up. To do this, set the top unit on the ground, attach the grading ring, etc., then lift the entire assembly high enough to set it on the second unit from the top. Bolt the two units together then raise this assembly and attach the third unit from the top and so on until the stack is assembled.

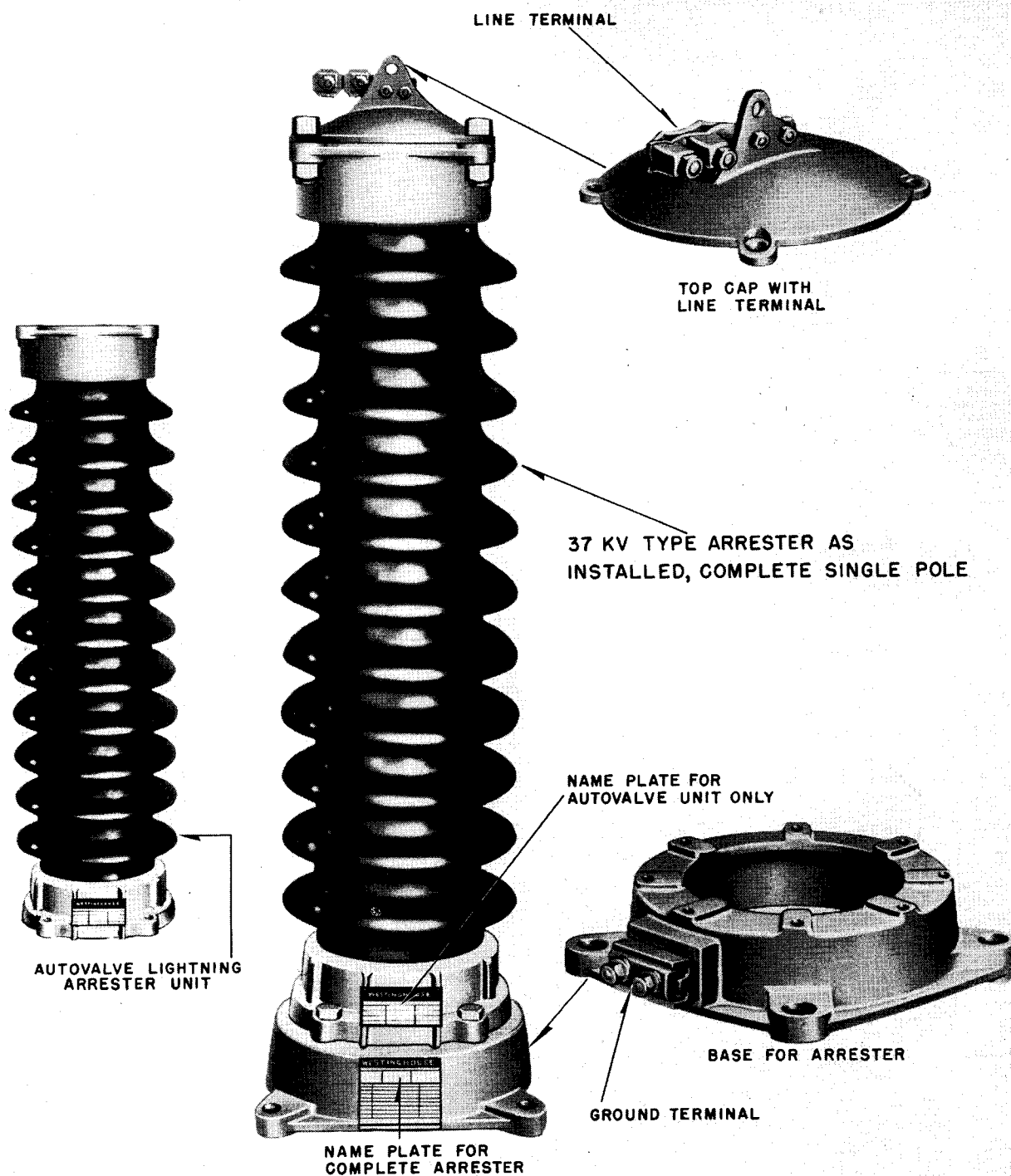


FIG. 1. Typical 37 kv Type SV Autovalve Lightning Arrester
Complete Single Pole and Component Parts

Arresters rated 3 to 37 kv have one arrester unit; 40 to 73 kv have two units; 97 and 109 kv have three units

TYPE SV ARRESTERS

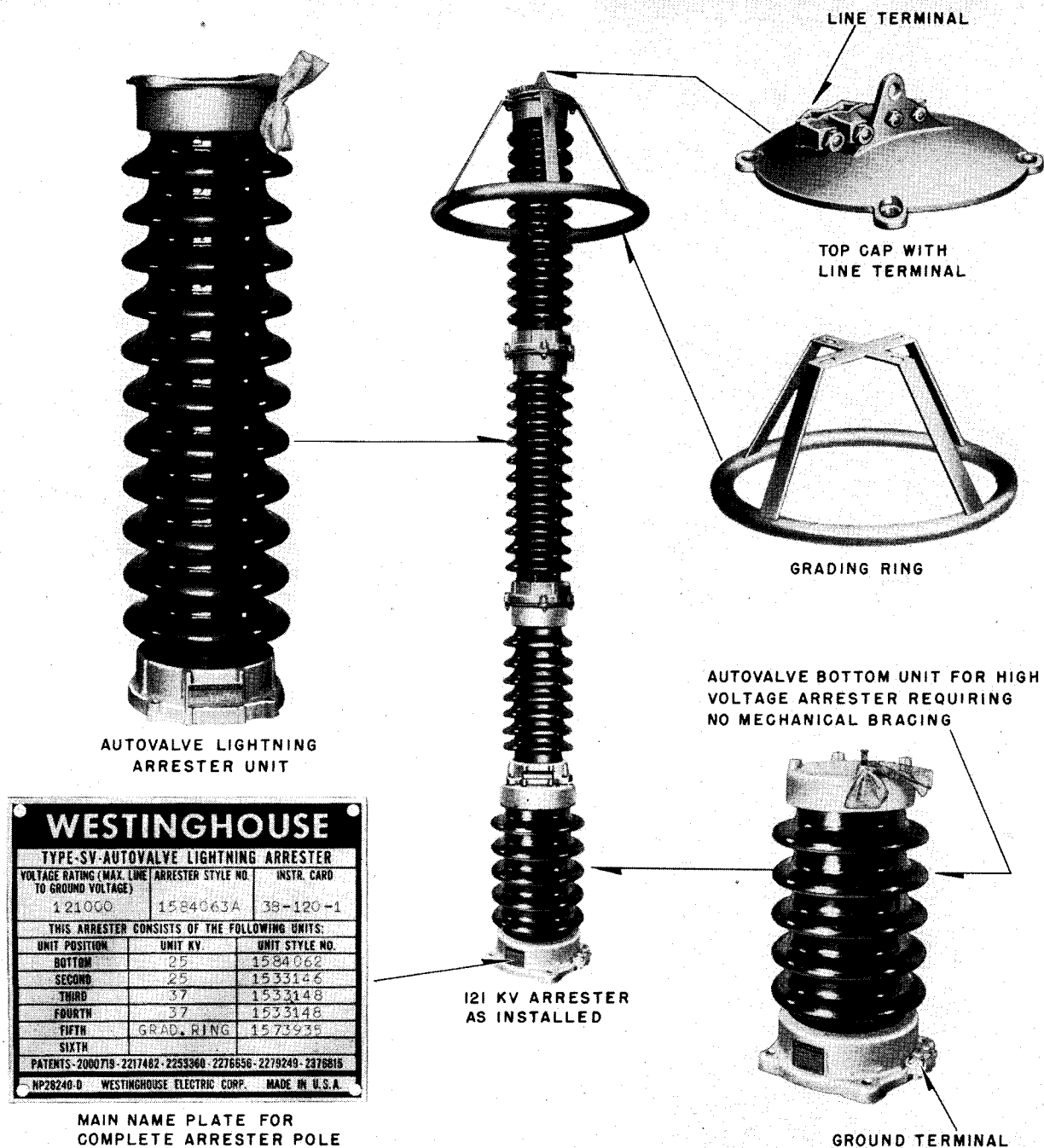


FIG. 2. 121 kv Type SV Autovalve Lightning Arrester Complete Single Pole and Component Parts

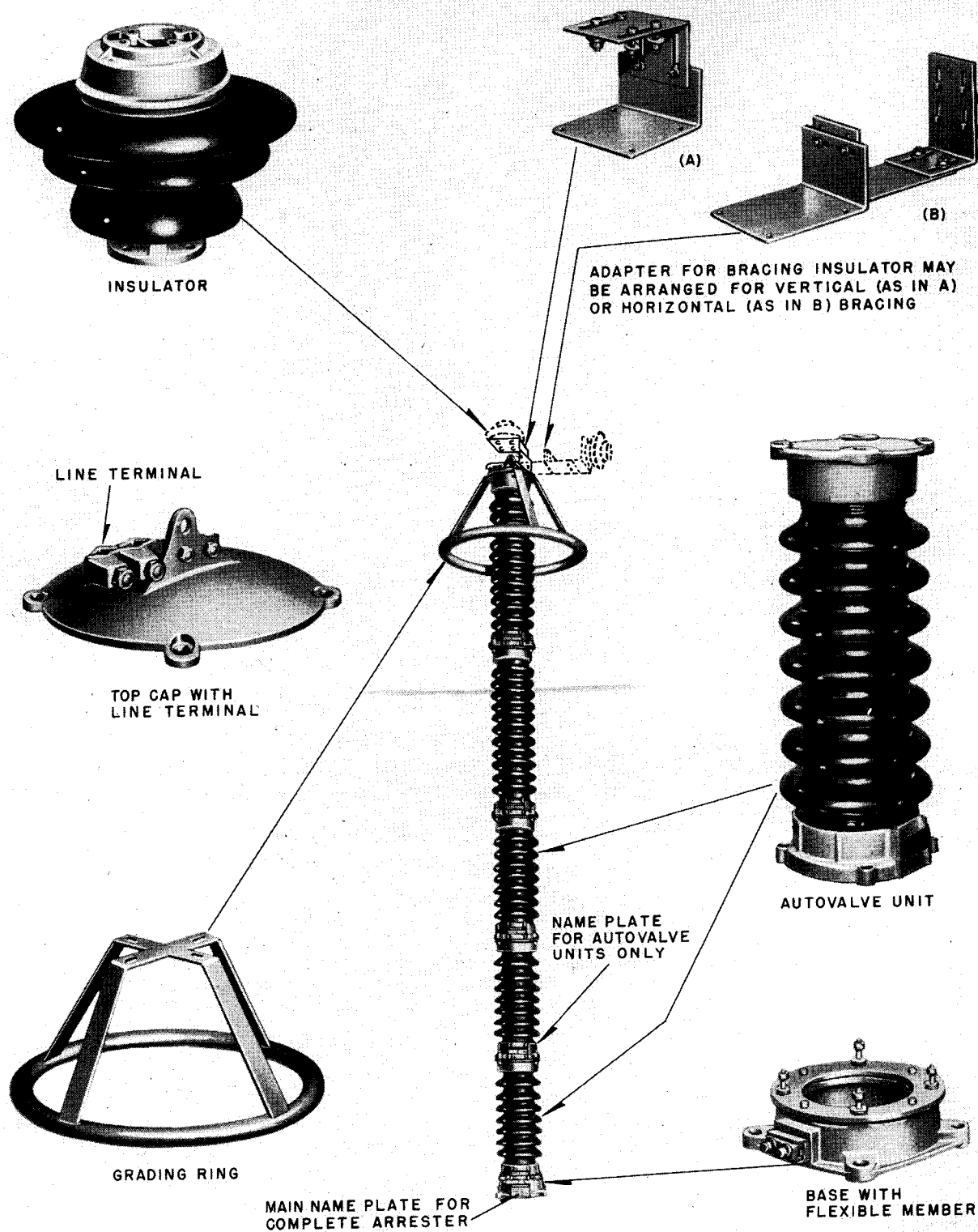


FIG. 3. 145 kv Type SV Autovalve Lightning Arrester

Typical of high voltage arresters 145 to 242 kv requiring mechanical bracing

NOTE: Arresters rated 195 to 242 kv use V-bracing not shown.

TYPE SV ARRESTERS

Then swing the whole stack into place on the base already attached to the foundation.

In the case of 121 kv arresters it is not recommended that the crane procedure described above be followed entirely. Place the heavy bottom unit in position on the foundation first. The remaining units may then be assembled as described in the preceding paragraph.

Terminals. The standard terminals furnished with the standard arresters will handle the following cable sizes:

Line terminal: solid #0 to 6/0, or cable #2 to 350 MCM.

Ground terminal: solid #4 to 5/0, or cable #5 to 200 MCM.

If special terminals are ordered, they may be received packed separately and the standard terminals may be found attached to the base and cap. If so, remove the standard terminals, discard them and attach the special terminals in their place.

Grounding. Each arrester should be effectively grounded. It is recommended that the arrester ground terminal be interconnected with the tanks or frames of the protected equipment and that the resulting connection to earth be low in resistance.

Insulating Base. The insulating base (Figs. 4 and 5) is a porcelain unit with metal end castings. It is used to insulate the arrester proper from ground if it is desired to record or measure discharges through the arrester. The insulating unit is not included as a part of standard arresters and is not covered in the style numbers of arresters listed in this leaflet. When the unit is to be installed as part of an arrester, it should be placed between the foundation base, and the bottom unit of the arrester, as if it were an additional arrester unit.

On the 121 kv arresters (Fig. 2) the unit is placed between the foundation and the bottom arrester unit.

The insulating base for all arresters except the 121 kv is S#1573926. The unit for use with the 121 kv SV is S#1318340. S#1573926 is 9 inches high, and S#1318340 is 12 inches high. When these units are used, the overall heights of the arresters shown in the outline drawings will be increased correspondingly.

If arresters are erected with insulating units and recording or measuring equipment is not used, the insulating unit must be short-circuited. A cable shunt is furnished for this purpose as part of the insulating base.

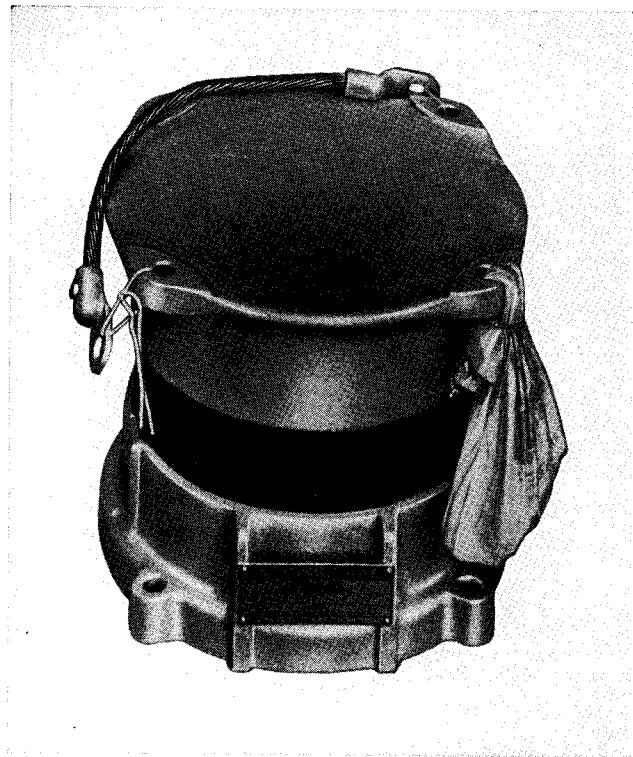


FIG. 4. Insulating Base as Shipped

RATINGS

The voltage rating given on the nameplate is a maximum rating. It designates the maximum voltage applied across the arrester line and ground terminals, against which the arrester is able to return itself to an insulator after having been discharged by a surge. If the system voltage applied to the arrester terminals under normal or abnormal operating conditions such as faults, exceeds the arrester rating then the arrester is likely to remain conducting after it has been discharged by a surge, and it will be damaged.

To Change Rating. The voltage ratings of arresters may be altered in the field by adding or subtracting or changing arrester units. The units which have been described in this leaflet are not interchangeable with units of certain obsolete designs (before 1940).

Units of the following style number series are electrically the same, have the same bolt hole dimensions, but have slightly different outside shapes and in some cases, lengths. They may be interchanged: Styles 1124288, etc.; 1418181, etc.; 1533140, etc. Consult the nearest district office for recommendations before making changes in ratings.

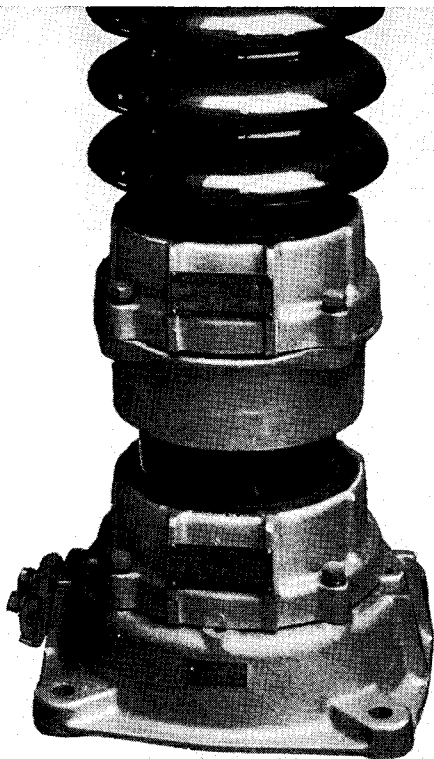


FIG. 5. Insulating Unit Installed Between Arrester Unit and Foundation Base

TESTING

All Autovalve lightning arresters are tested in the factory. Each valve element is surge tested, and complete arrester units are tested for 60 cycle sparkover. Each unit is also tested with air pressure to assure that it is tightly sealed so that it will not accumulate moisture internally in service. It is recommended that the unit not be opened in the field as this may break the seals and admit moisture, leading to radio interference and eventual damage to the arrester.

There are no simple field tests that will tell the complete characteristics of the lightning arrester. This requires considerable laboratory equipment. If 60 cycle voltage tests for sparkover are made, it should be noted that lightning arresters do not have unlimited capacity for dynamic current flow. In such tests sufficient series resistance should be used to limit the 60 cycle current that flows after sparkover to 100 milliamperes or less and the duration of the current flow to not more than 5 seconds. The voltage should be run up to sparkover quickly

so that the gap shunting resistors will not be overloaded.

The series gaps of Westinghouse SV arresters are shunted by high resistance. With 60 cycle voltage equal to the arrester rating applied to the arrester line and ground terminals, the leakage current is approximately 0.45 milliamperes. Hence, tests made with a megger will not show infinite resistance. Tests made to measure the leakage current or watts loss will show readings that are high compared to the leakage or watts loss for insulators, for example.

If Doble tests are made on lightning arrester units to determine the degree of insulation and to determine whether there is any deterioration of the insulation, it may be found that different units of the same rating will give different readings. It is recommended that if such tests are made they be made periodically and the trends of the readings observed.

If the readings remain consistent or decrease slightly, then the units are in good insulating condition. If the watts loss or leakage current increase markedly then an investigation should be made. If a number of units of the same rating are tested and one shows a considerable deviation from the rest, its condition may be open to question. If any such tests are made, care should be taken that the outside of the porcelain housing is clean and dry, otherwise leakage current over the surface may produce misleading results.

MAINTENANCE

The Autovalve arrester requires no regular maintenance other than an occasional inspection. In locations where dirt and soot collect, it is recommended that the arresters be cleaned periodically.

Caution: Do not wash lightning arresters by hosing while they are energized.

Correspondence. Direct any inquiries pertaining to the lightning arrester to the nearest Westinghouse Sales Office giving the type, voltage rating, and style number of the complete arrester as stated on the main lightning arrester nameplate.

ENLARGED VIEW OF CAP

3 HOLES FOR $\frac{1}{2}$ " DIA. BOLTS FOR TERM.

CABLE SIZE # 2 TO 350 MCM (STR.), .255 TO .681

DRILLING PLAN FOR 3-PHASE INSTALLATION

15" DIA. B.C.

MTG. HOLES FOR $\frac{3}{4}$ " BOLTS

ENLARGED VIEW OF BASE

$\frac{1}{2}$ " - 13 TAPPED HOLES (4) FOR TERM.

NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

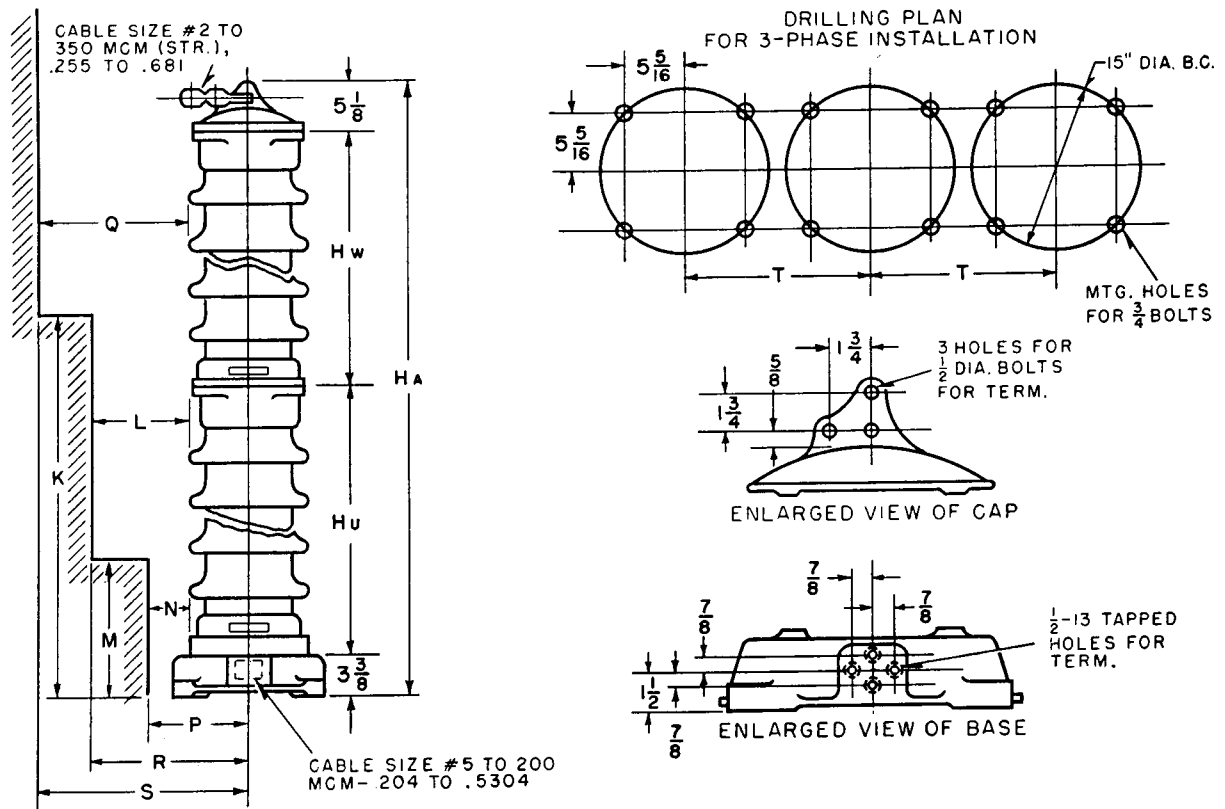
VOLTAGE RATING KV RMS	STYLE NUMBER*	NO. SHEDS	DIMENSIONS IN INCHES							
			H _A	H _U	M _Δ	N	Q	P	R	S _Ø
3	1533 113	1	20½	12	7	2	3	7⅞	8⅜	14¾
6	1533 114	1	20½	12	7	2	4	7⅞	9⅜	16¼
9	1533 115	2	24½	16	7	3	5	8⅜	10⅜	17¾
12	1533 116	2	24½	16	8	3	6	8⅜	11⅜	19¼
15	1533 117	4	28½	20	9¼	4	7½	9⅜	12⅞	20¾
20	1533 118	7	38½	30	11½	5	9½	10⅜	14⅞	23¼
25	1533 119	7	38½	30	13½	5	11	10⅜	16⅜	25¾
30	1533 120	9	44½	36	15	5	13	10⅜	18⅜	28¾
37	1533 121	11	50½	42	19	5	15	10⅜	20⅜	31¼

* Style number covers one complete single pole arrester. For three phase installation, three poles are required.

Δ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N & P may be used as shown in the figure.

Ø Minimum distance center line to center line between arrester phase legs.

FIG. 6. Outline Dimensions for 3 to 37 kv Type SV Arresters



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES											
		M Δ	N	P	K \odot	L	R	Q \square	S	Hu	HA	T \oslash	Hw
40	1533 122	11 $\frac{1}{2}$	5	10 $\frac{3}{8}$	44	9 $\frac{1}{2}$	14 $\frac{3}{8}$	16	21 $\frac{3}{8}$	30	68 $\frac{1}{2}$	32 $\frac{3}{4}$	30
50	1533 123	13 $\frac{1}{2}$	5	10 $\frac{3}{8}$	46	11	16 $\frac{3}{8}$	20	25 $\frac{3}{8}$	30	68 $\frac{1}{2}$	37 $\frac{3}{4}$	30
60	1533 124	15	5	10 $\frac{3}{8}$	54	13	18 $\frac{3}{8}$	24	29 $\frac{3}{8}$	36	80 $\frac{1}{2}$	43 $\frac{3}{4}$	36
73	1533 125	19	5	10 $\frac{3}{8}$	64	15	20 $\frac{3}{8}$	29	34 $\frac{3}{8}$	42	92 $\frac{1}{2}$	50 $\frac{3}{4}$	42

* Style number covers one complete single pole arrester. For three phase installation, three poles are required.

Δ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N & P may be used as shown in the illustration.

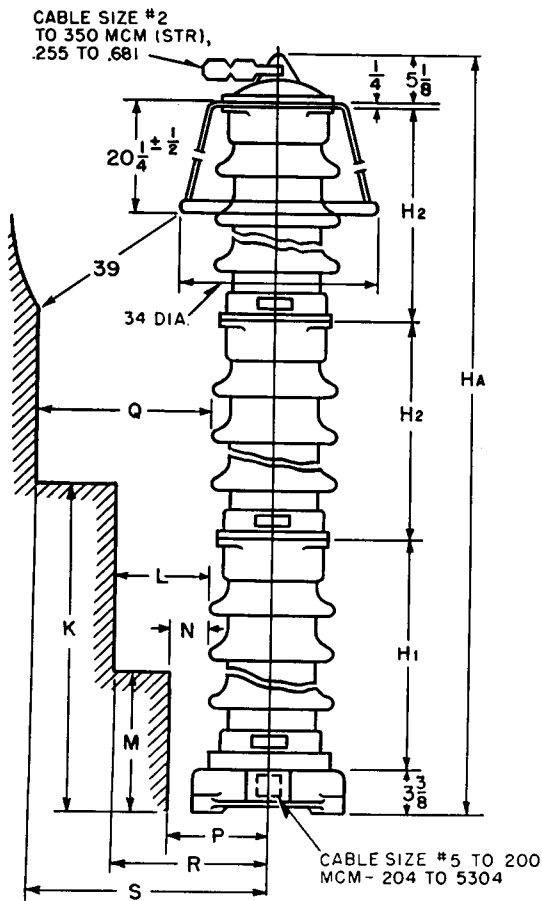
\odot If a near-by grounded object does not exceed "K" in height, then the minimum clearance dimensions L & R may be used as shown in the illustration.

\square If a near-by grounded object exceeds "K" in height then minimum clearance dimensions Q & S must be used.

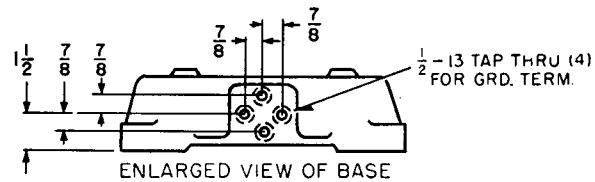
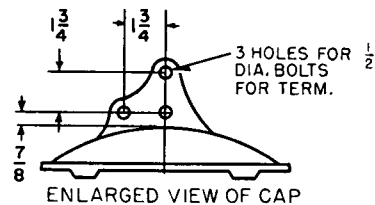
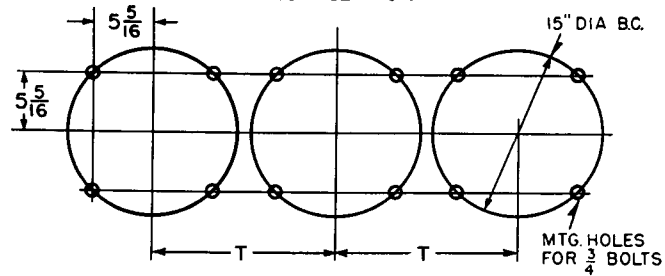
\oslash Minimum distance center line to center line between arrester phase legs.

FIG. 7. Outline Dimensions for 40 to 73 kv Type SV Lightning Arresters

TYPE SV ARRESTERS



DRILLING PLAN FOR 3 PHASE INSTALLATION



NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES											
		M△	N	P	K●	L	R	Q□	S	H ₁	H ₂	H _A	T∅
97	1533 126	12	8	13 3/8	36	24	29 3/8	44	49 3/8	30	42	122 3/4	79

* Style number covers one complete single pole arrester. For three phase installation three poles are required.

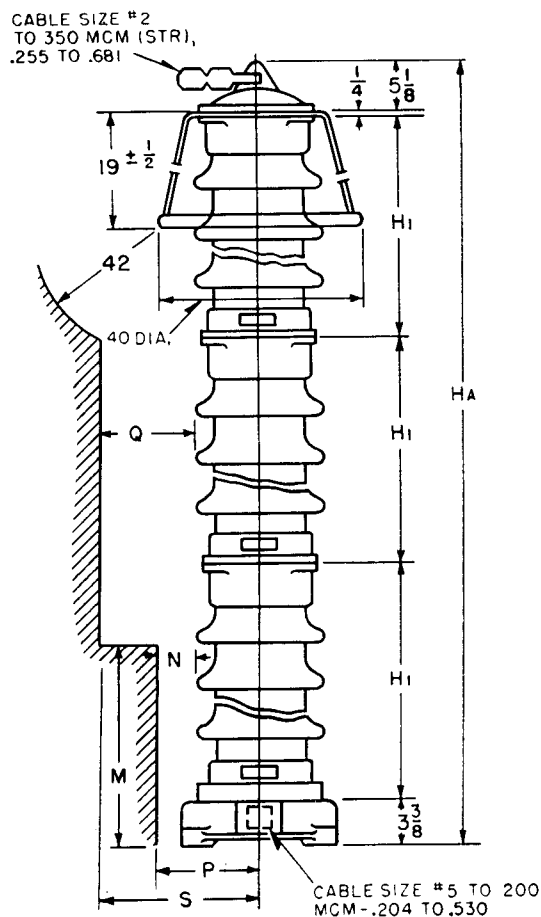
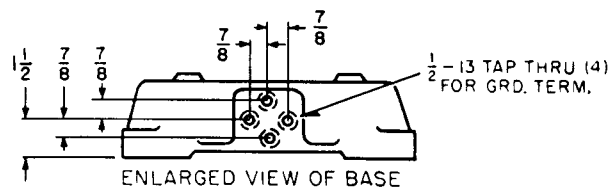
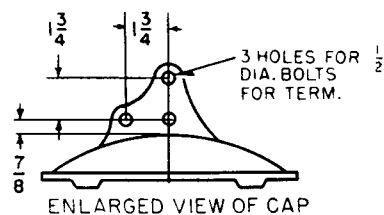
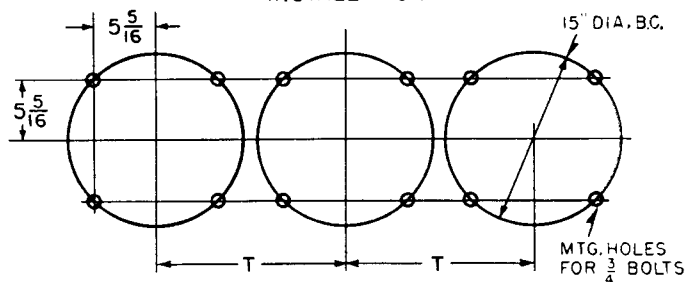
△ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N & P may be used as shown in the illustration.

● If a near-by grounded object does not exceed "K" in height, then the minimum clearance dimensions L & R may be used as shown in the illustration.

□ If a near-by grounded object exceeds "K" in height, then the minimum clearance dimensions Q & S must be used.

∅ Minimum distance center line to center line between arrester phase legs.

FIG. 8. Outline Dimensions for 97 kv Type SV Lightning Arrester

DRILLING PLAN FOR 3 PHASE
INSTALLATION

NOTE: Arresters to be mounted on pedestal sufficiently high to elevate bottom of arrester above flood level and drifted snow. All ground terminals to be permanently connected to ground.

VOLTAGE RATING KV RMS	ARRESTER STYLE NUMBERS*	DIMENSIONS IN INCHES							
		M Δ	N	P	Q \square	S	H1	HA	T \emptyset
109	1573 939	27	15	20 3/8	24	29 3/8	42	134 3/4	94

* Style number covers one complete single pole arrester. For three phase installation three poles are required.

Δ If a near-by grounded object does not exceed "M" in height, then the minimum clearance dimensions N and P may be used as shown in the illustration.

\square If a near-by grounded object exceeds "M" in height then the minimum clearance dimensions Q and S must be used.

\emptyset Minimum distance center line to center line between phase legs.

FIG. 9. Outline Dimensions for 109 kv Type SV Lightning Arrester

TYPE SV ARRESTERS

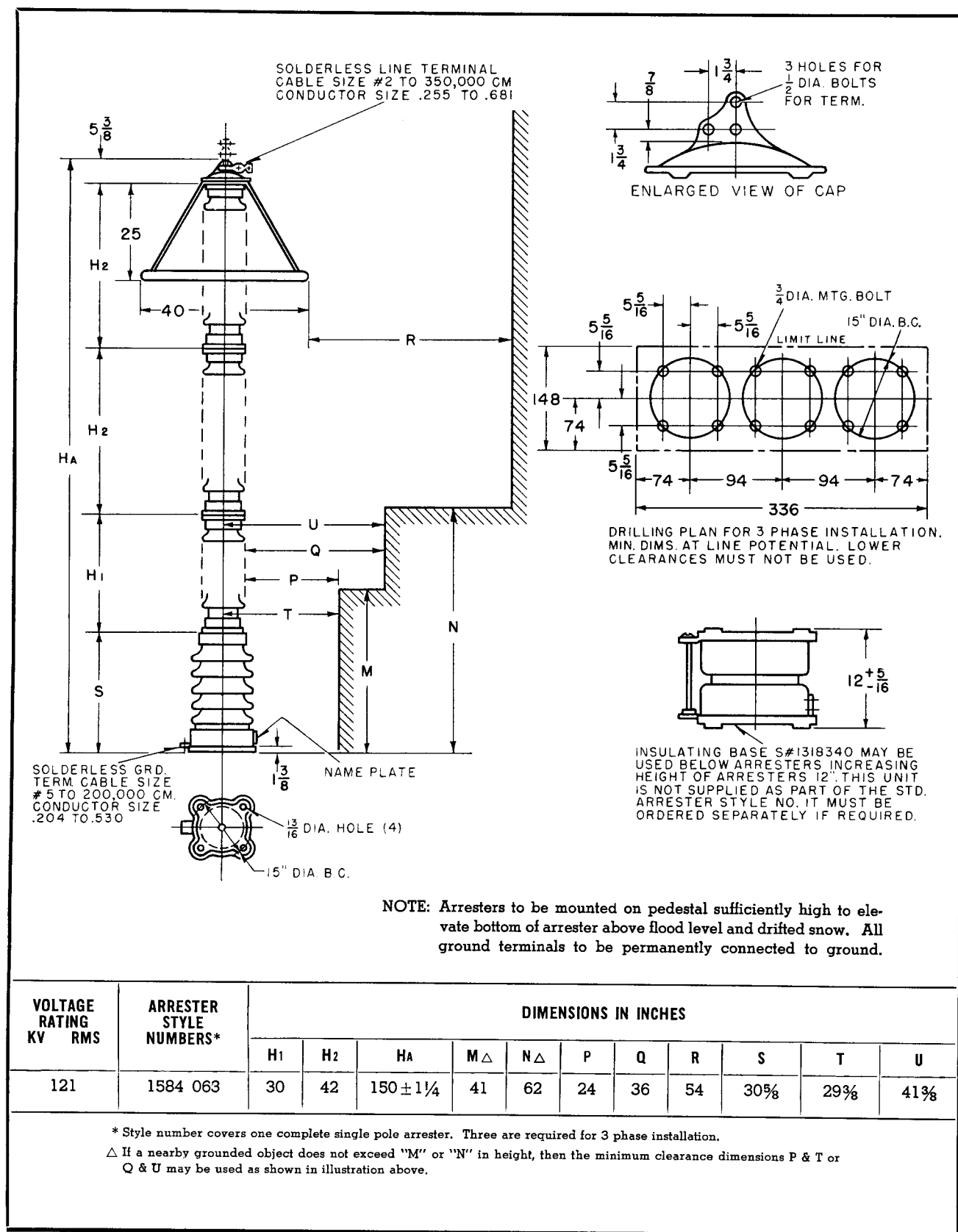


FIG. 10. Outline Dimensions for 121 kv Type SV Autovalve Lightning Arrester



WESTINGHOUSE ELECTRIC CORPORATION
 EAST PITTSBURGH PLANT • SWITCHGEAR DIVISION • EAST PITTSBURGH, PA.

(Rep. 4-56) Printed in U.S.A.



RECEIVING

• INSTALLATION

• MAINTENANCE

INSTRUCTIONS

TYPE SV AUTOVALVE LIGHTNING ARRESTERS WITH TYPE PR PRESSURE RELIEF DEVICE STATION TYPE FOR INDOOR OR OUTDOOR SERVICE For Use at 0 to 6,000 Feet Altitude

TYPE SV AUTOVALVE LIGHTNING ARRESTERS described in this leaflet are station-type arresters for the protection of power apparatus such as oil insulated transformers and circuit breakers. (For surge protection at the terminals of rotating machinery or of dry type air insulated transformers, arresters designed specially for the purpose should be used. They are described in separate listings.)

Arresters described in this leaflet are of a single column, self-supporting design; and require no mechanical bracing. Type SV arresters rated above 145 Kv do require mechanical bracing, and are described in supplemental Instruction Leaflets.

Arresters for use at altitudes above 6,000 feet are also described in supplemental leaflets.

Standard SV arresters are equipped with the Type PR (pressure relief) device; a combination of pressure relief diaphragms and specially designed exhaust ports. If for any reason an arrester should be damaged and thereby lose its ability to limit or interrupt power follow current after sparkover, full system fault current will eventually pass through the arrester. The amount of gas developed by this concentration of fault current inside a porcelain housing is a function of the available fault current and the length of time it is permitted to exist. In cases of high fault current, a relief diaphragm alone is not sufficient to prevent shattering of the porcelain; it is also necessary to remove the arc to the outside of the porcelain within a half cycle or less of fault current. This is accomplished by the specially designed exhaust ports which cause the ionized gas streams from each end of the arrester to meet outside the arrester and thereby cause the fault current arc to transfer to the outside of the porcelain. The arresters described in this leaflet, are of the unit type, to obtain arresters of higher ratings the units are to be connected in series.

RECEIVING

Each single pole arrester consists of one or more porcelain clad arrester units and various attachments as required. When the arrester is installed,

the various parts must be assembled to form the complete arrester pole. The parts as packaged, consist of the following:

(1) **Arrester Units.** These are the porcelain housings, containing the operating parts. Each unit is an arrester in itself. Units rated 20-37 kv have metal fittings at each end. The standard arrester rated 3-15 kv have porcelain tops Fig. 3. Units rated 3-15 kv having metal end fittings are available for use in arresters of our standard ratings. The porcelain top units should not be used in arrester poles consisting of more than one unit.

(a) For arresters up to and including 121 kv; the standard unit incorporating the PR (pressure relief) device as described earlier. Each unit has a nameplate attached to the vent port of the bottom end casting, giving the identification and rating of the unit only. Necessary hardware is in a sack tied to one of the end castings.

(b) For arresters of 133 and 145 kv rating; in addition to units described in (a), an extra large unit is used as the bottom unit to give a more substantial base to the complete arrester. The unit nameplate is located on the bottom end casting. Typical arrester units are shown in Fig. 1.

(2) Line terminal and top cover assembly. Fig. 1.

(3) Two angular mounting brackets, Fig. 1, which are used at the bottom of arresters up to and including 121 kv rating. One bracket includes the ground terminal; the other has attached the main arrester nameplate giving the complete arrester identification and rating, as well as the unit ratings used and their position in the complete arrester. In the case of arresters using the extra large arrester unit, as described in (1) (b), these brackets are not furnished. Instead, the ground terminal is furnished separately, along with a small (L) shaped bracket containing the main nameplate.

(4) A grading ring assembly; which may be of one piece or multiple piece construction depending on the rating. Rings are not used with arresters rated 73 kv and lower.

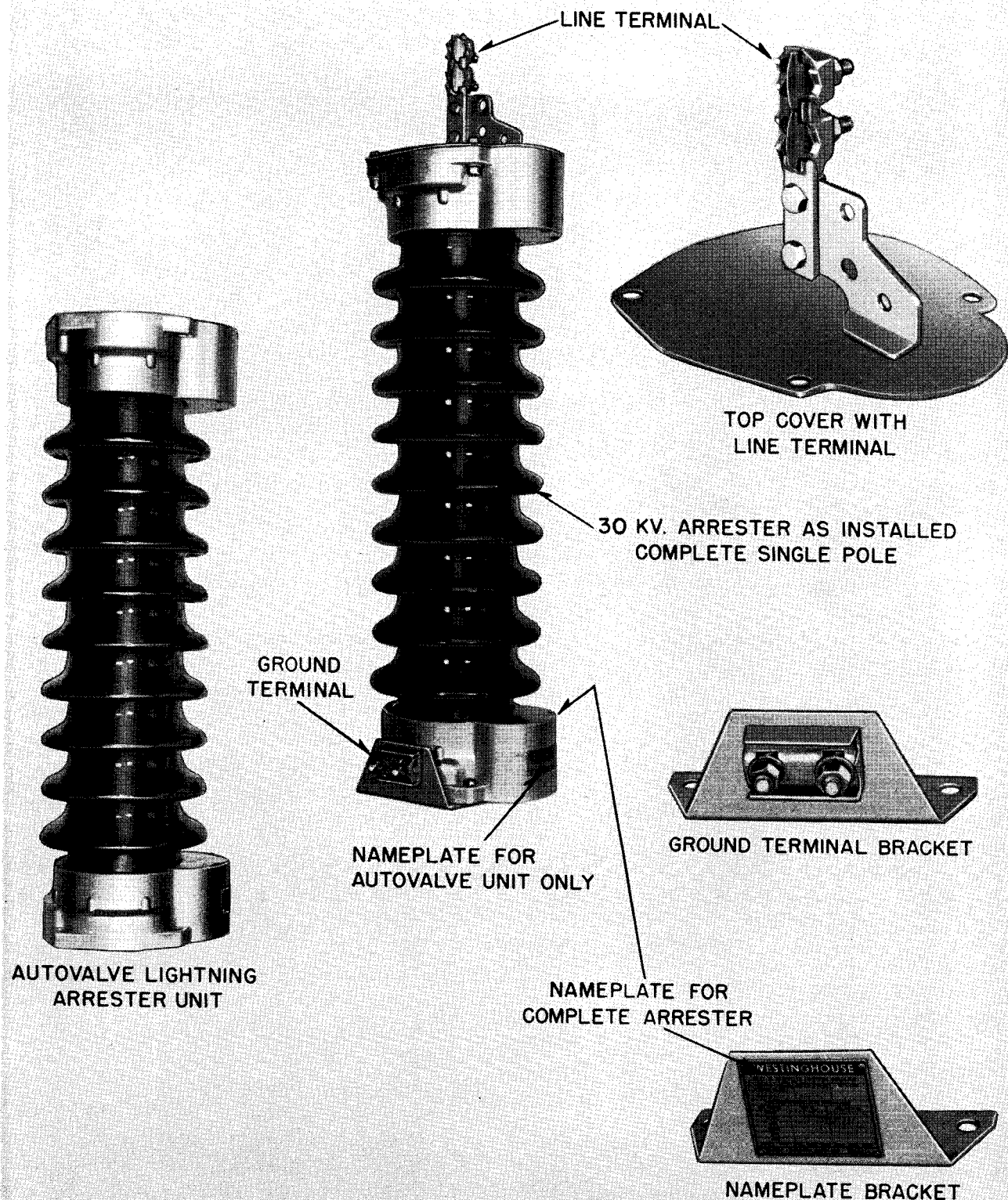


FIG. 1. Typical 30 KV Type SV Autovalve Lightning Arrester, Complete Single Pole and Component Parts.
Arresters rated 3 to 37 KV have (1) arrester unit; 40 to 73 KV have (2) units; 97 to 109 KV have (3) units; 121 KV has 4 units

Unpacking. Before unpacking, examine the containers for any visible signs of damage.

Unpack the parts carefully and examine for breakage or other damage. Inspect particularly the

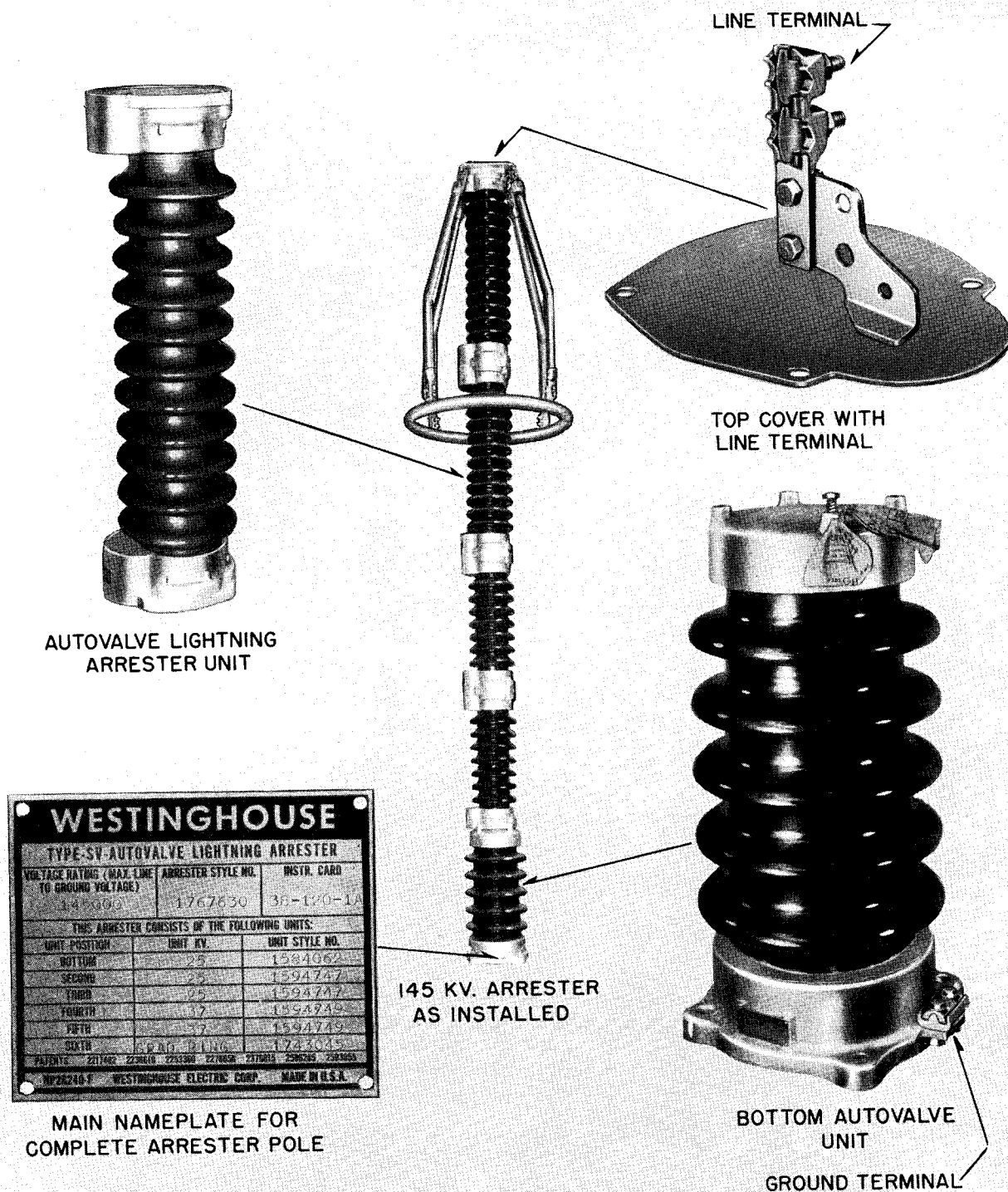


FIG. 2. 145 KV Type SV Autovalve Lightning Arrester, Complete Single Pole and Component Parts

porcelains for any breakage. If damage exists, save the container and packing material and notify the carrier.

Shortages should be checked with the carrier, or if the shortages are not the fault of the carrier, with

the nearest Westinghouse Sales Office. If parts do not agree with the packing list, contact the nearest Westinghouse representative, giving him the order reading and other identification.

The following table indicates the number of parts

Check List of Component Parts

RATINGS	PARTS REQUIRED
3 to 37 Kv Inclusive	One Arrester unit, 1 line terminal and cover assembly, 1 set of ground terminal and nameplate brackets, for porcelain top design the line terminal and cover assembly is not needed.
40 to 73 Kv Inclusive	Two arrester units, 1 line terminal and cover assembly, 1 set of ground terminal and nameplate brackets.
97 to 109 Kv Inclusive	Three arrester units, 1 line terminal and cover assembly, 1 set of ground terminal and nameplate brackets, 1 grading ring.
121 Kv	Four arrester units, 1 line terminal and cover assembly, 1 set of ground terminal and nameplate brackets, 1 grading ring.
133 Kv	Four arrester units (one of which must be an extra large base unit), one line terminal and cover assembly, one nameplate and bracket, one grading ring.
145 Kv	Five arrester units, (one of which must be an extra large base unit,) one line terminal and cover assembly, one nameplate and bracket, one grading ring.

to look for when unpacking any one arrester of a given rating.

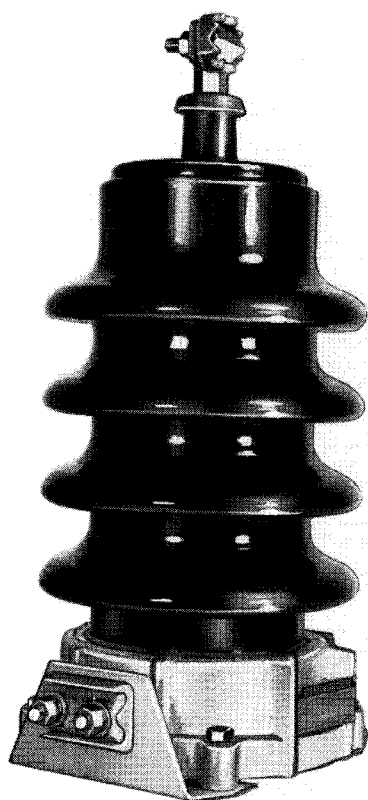


FIG. 3. Porcelain Top Arrester

INSTALLATION

To afford the highest degree of protection, the arrester should be located as close as possible to the apparatus to be protected. All leads should be as

short as possible; and the ground connection should be made to a low resistance ground, preferably interconnected with the tank or frame of the apparatus.

Installation is begun by laying out a suitable foundation in accordance with the outline drawing for the arrester. (Note that the mounting bolt circle diameter is greater for the 133 and 145 Kv arresters).

Once the foundation is prepared, bolt the bottom arrester unit directly to the foundation, at the same time—

(a) For arresters up to and including 121 Kv—insert the ground terminal and nameplate brackets between the foundation and end casting of the arrester unit.

(b) For the 133 and 145 Kv arresters—add the ground terminal and nameplate bracket to the special pad on the end casting of the extra large arrester unit. Fig. 2.

When the bottom unit is finally anchored, install the remaining units as indicated on the main nameplate and in the outline drawing.

When all units are bolted in place, add the line terminal and cover assembly to the top unit, for those arresters using no grading ring. When grading rings are used, add the ring first and then the line terminal and cover assembly.

NOTE: In the case of multiple piece rings, it will be found easier to assemble the ring prior to placing it in position on the top arrester unit.

In some cases it may be easier to assemble the arrester from the top down, rather than from the bottom up. To do so; set the top unit on the ground, attach the terminal and cover assembly (or grading

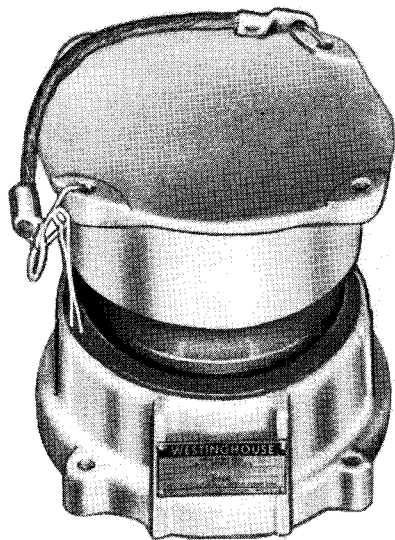


FIG. 4. Insulating Base

ring and terminal and cover assembly), then lift the entire assembly high enough to set it on the second arrester unit from the top. Bolt the units together, then raise and attach to the next unit, and so on until the arrester is complete. Then swing the entire arrester into place on the foundation, and anchor.

CAUTION: Do not lift by means of the line terminal.

In the case of the 133 and 145 Kv arresters, mount the extra large unit and the first standard unit on the foundation first, then assemble the balance of the arrester as just described.

Typical arrester assembly is shown in Fig. 2.

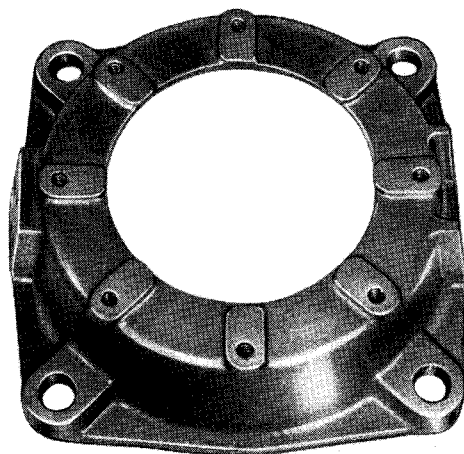


FIG. 5. Foundation Base as Shipped

Terminals. The standard terminals furnished with the arresters will handle the following:

Line terminal: cable size #2 to 350 MCM; conductor size .255 to .681

Ground terminal: cable size #5 to 200 MCM; conductor size .204 to .530

If special terminals are ordered, they may be received packed separately and the standard terminals may be found attached to the cover assembly and ground terminal bracket. If so, remove the standard terminals, discard them and attach the special terminals in their place.

Insulating Base. The insulating base (Fig. 4) is a small porcelain unit with metal end castings. It is used to insulate the arrester proper from ground if it is desired to record or measure discharges through the arrester. The insulating unit is not included as a part of standard arresters and therefore is not covered in the arrester style number. When the unit is to be installed as part of an arrester, it should be placed between the foundation and the bottom unit of the arrester, as if it were an additional arrester unit. The insulating base for all arresters except the 133 and 145 Kv is Style 1573926. The unit for use with the 133 and 145 Kv arresters is Style 1318340. Style 1573926 is nine inches high, and Style 1318340 is 12 inches high; when these units are used, the overall height of the arresters shown in the outline drawings will be increased correspondingly.

CAUTION: If arresters are installed with insulating units, and recording or measuring equipment is not used, the insulating units must be short-circuited. A cable shunt is furnished for this purpose as part of the insulating base.

Foundation Base. If it is desired to mount the arrester on a 15 inch bolt circle diameter instead of 10⁵/₁₆ inches (arresters up to and including 121 Kv), the foundation mounting base (Fig. 5) may be used. This mounting base is not included as part of standard arresters and is not covered in the style numbers of arresters listed in this leaflet. If used, the mounting base is bolted to the foundation and the arrester is then bolted to the base. The nameplate and ground terminal brackets are placed between the arrester unit and the base; there is no provision made on the foundation base for attaching either ground terminal or nameplate. Use of the base will add 3³/₈ inches to the overall height of the arresters as shown in the outline drawings.

RATINGS

The voltage rating given on the nameplate is a maximum rating. It designates the maximum sixty-

TYPE SV ARRESTERS

cycle rms voltage applied between the arrester line and ground terminals, against which the arrester is able to return itself to an insulator having discharged a surge. If the system voltage applied to the arrester terminals under either normal, or abnormal operating conditions (such as faults) exceeds the arrester rating; then the arrester is likely to remain conducting after it has discharged a surge, and will be damaged.

To Change Rating. The voltage ratings of arresters may be altered in the field by adding, subtracting, or changing arrester units. The units which have been described in this leaflet are not interchangeable with units of certain obsolete designs (before 1940).

Units of the following style numbers series are electrically and mechanically interchangeable although the performance is not the same in all. There

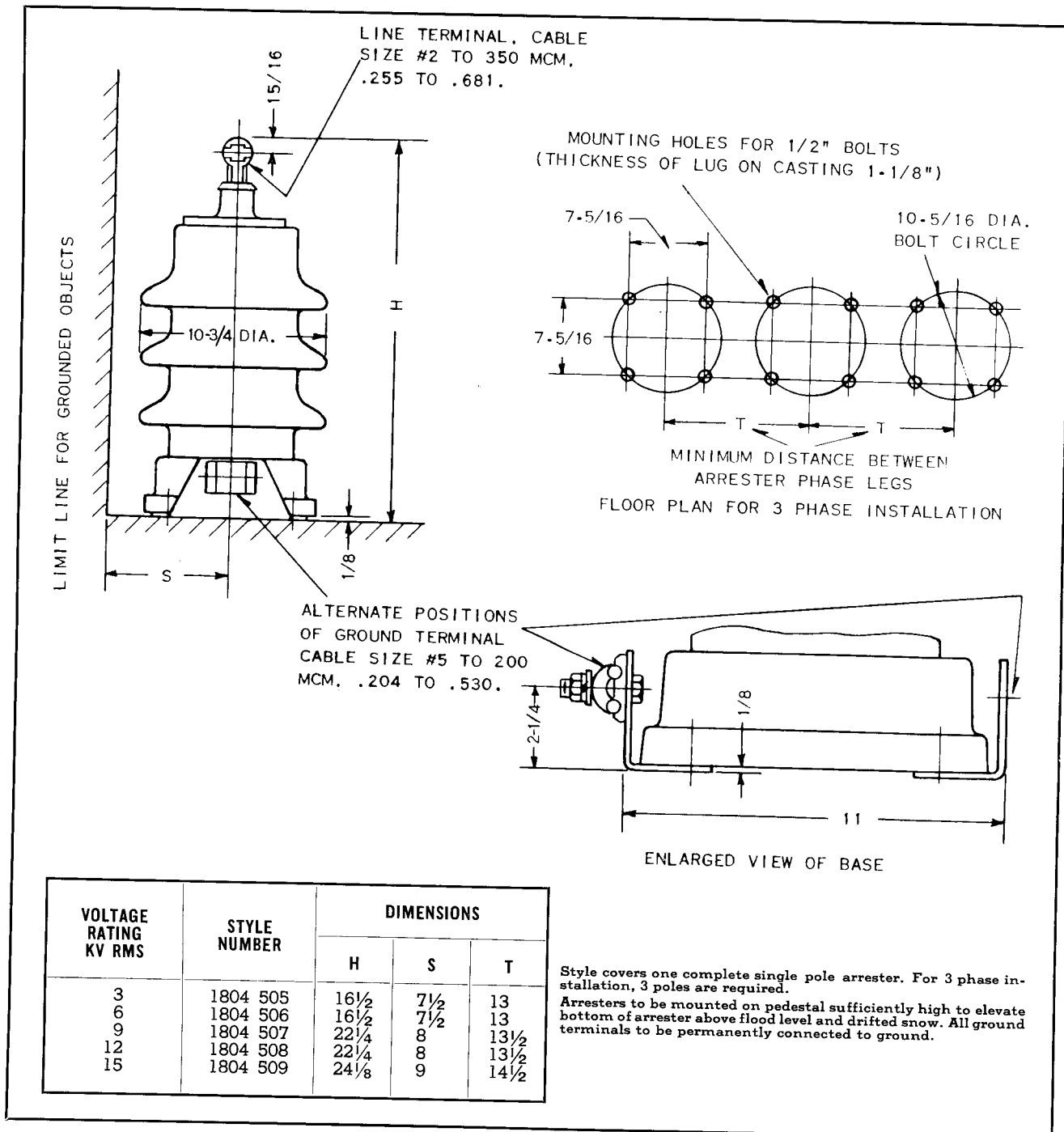


FIG. 6. Outline Dimensions for 3-15 KV Type SV Lightning Arrester

TYPE SV ARRESTERS

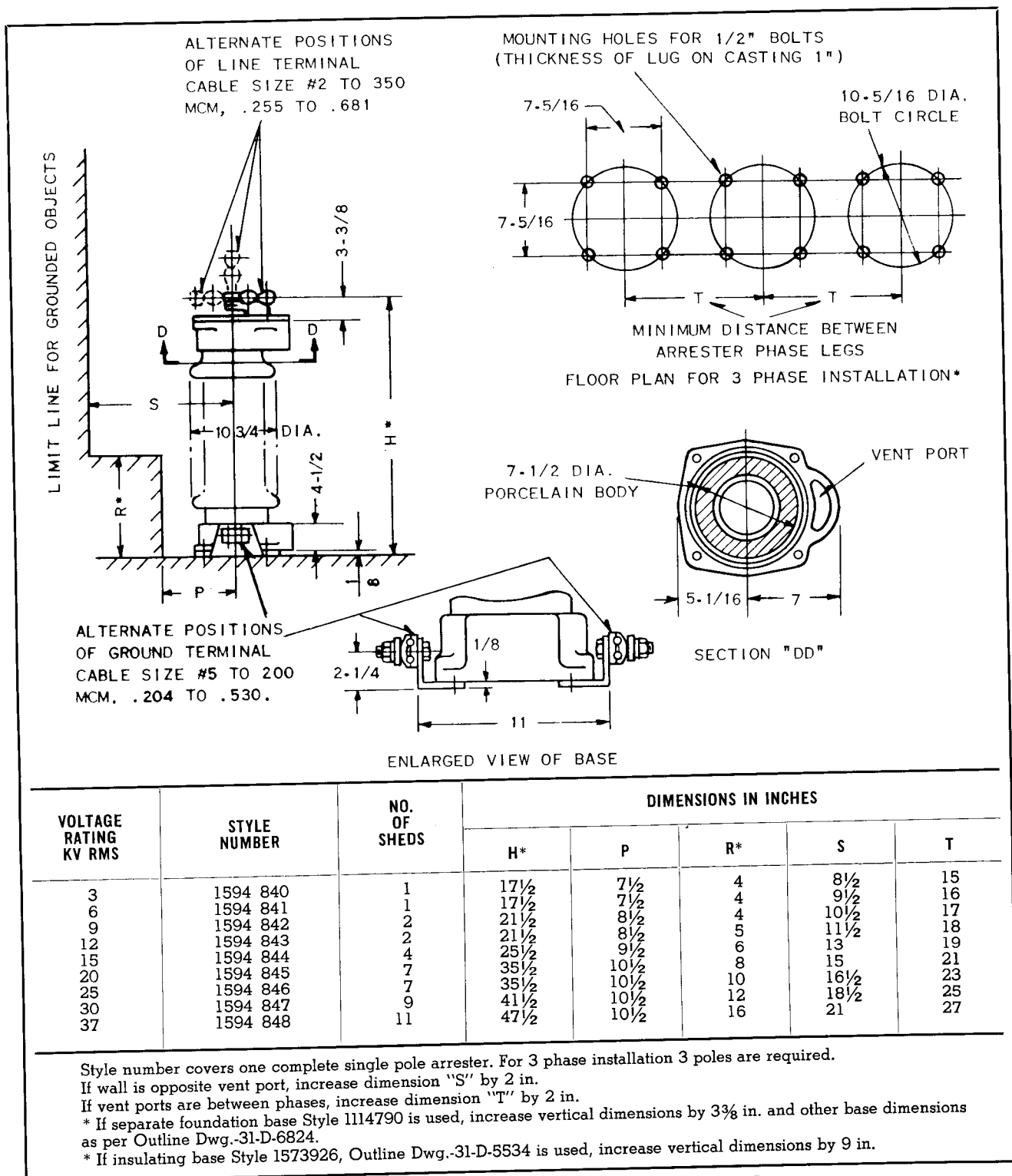


FIG. 7. Outline Dimensions for 3-37 KV Type SV Lightning Arresters

may be slight difference in outside shapes and lengths; Styles 1124288, etc.: 1418181, etc.: 1533140, etc.

The units described in this leaflet (styles 1594840, etc.) may be interchanged mechanically and electrically with the above styles, except that the dis-

charge voltage and impulse sparkover characteristics have been lowered; therefore, a complete arrester using some units of previous styles would have somewhat higher electrical characteristics than are published for the complete arresters described in this leaflet.

TYPE SV ARRESTERS

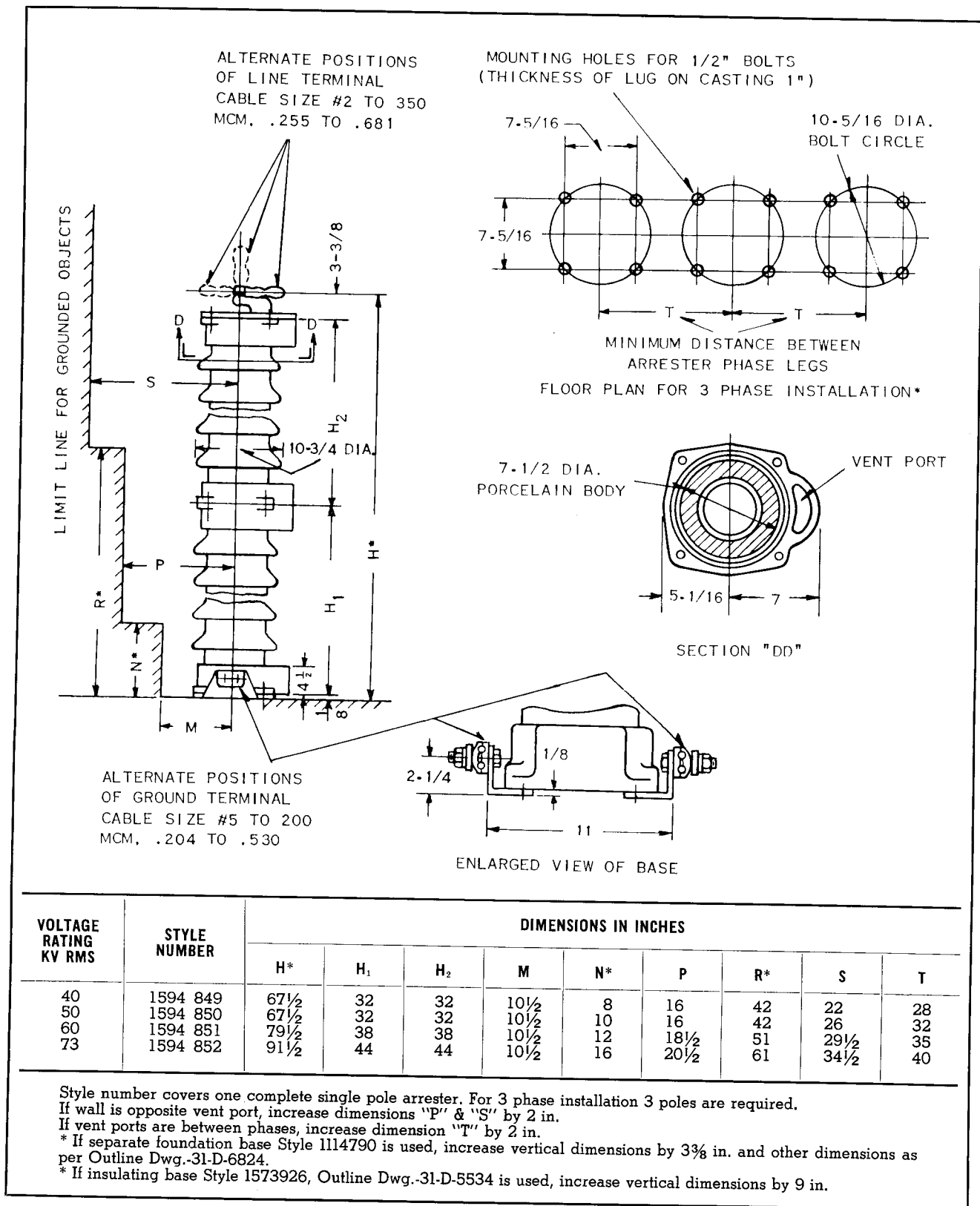


FIG. 8. Outline Dimensions for 40-73 KV Type SV Lightning Arrester

In all cases the nearest district office should be consulted for recommendations before making changes in ratings.

TESTING

All arrester units are tested at the factory. Each valve element is surge tested, and the complete

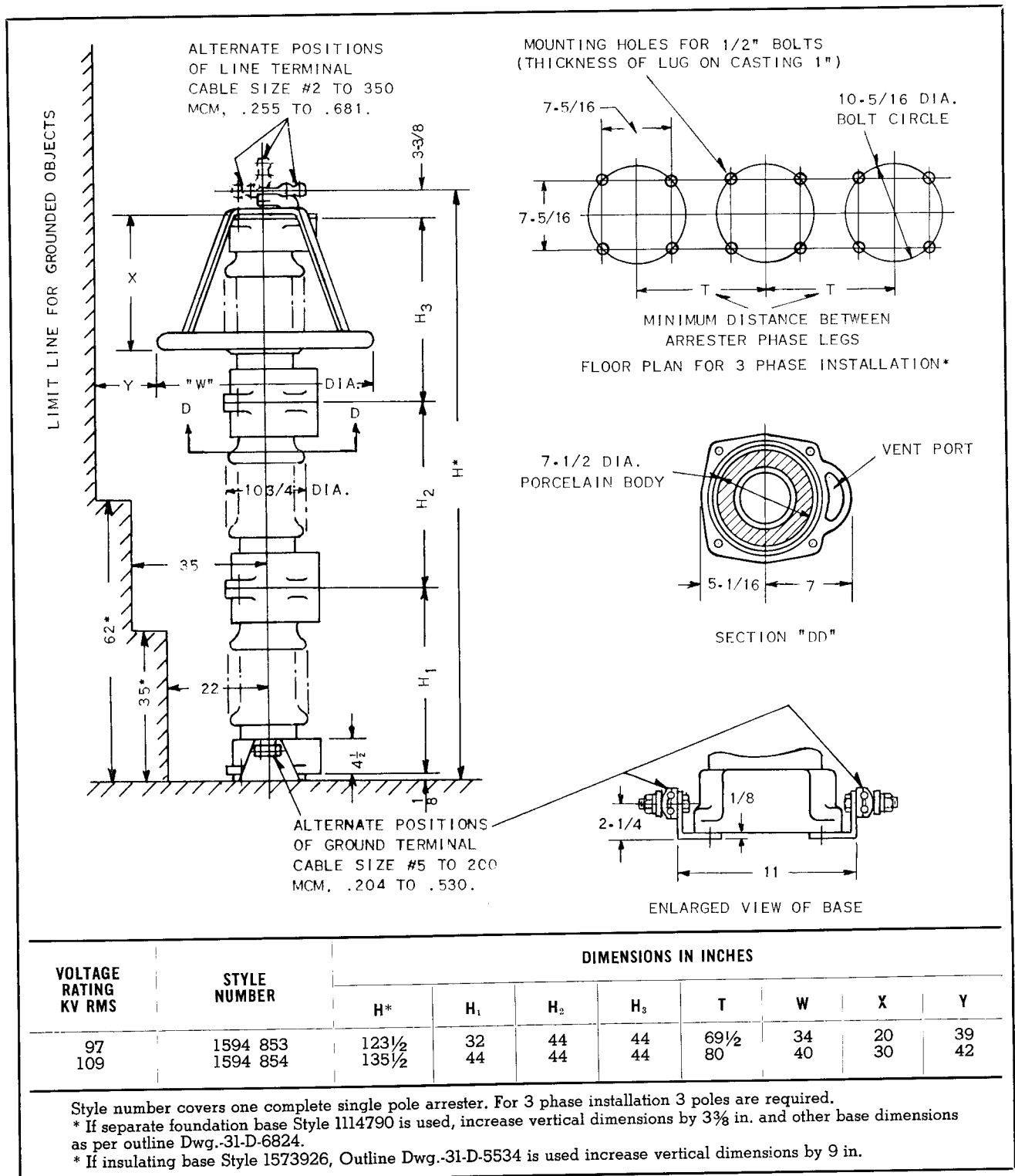


FIG. 9. Outline Dimensions for 97 and 109 KV Type SV Lightning Arresters

arrester unit is tested for sixty cycle sparkover and leakage current at rated voltage. In addition, each unit is pressure tested with dry nitrogen to insure that it is tightly sealed against entrance of moisture. Units should not be opened in the field, as to do so would break the seal; leading to the possibility of

moisture entrance and consequent deterioration of the arrester.

There are no simple field tests that will tell the complete characteristics of an arrester unit; to do so requires considerable laboratory equipment.

If an arrester is suspected of having been dam-

TYPE SV ARRESTERS

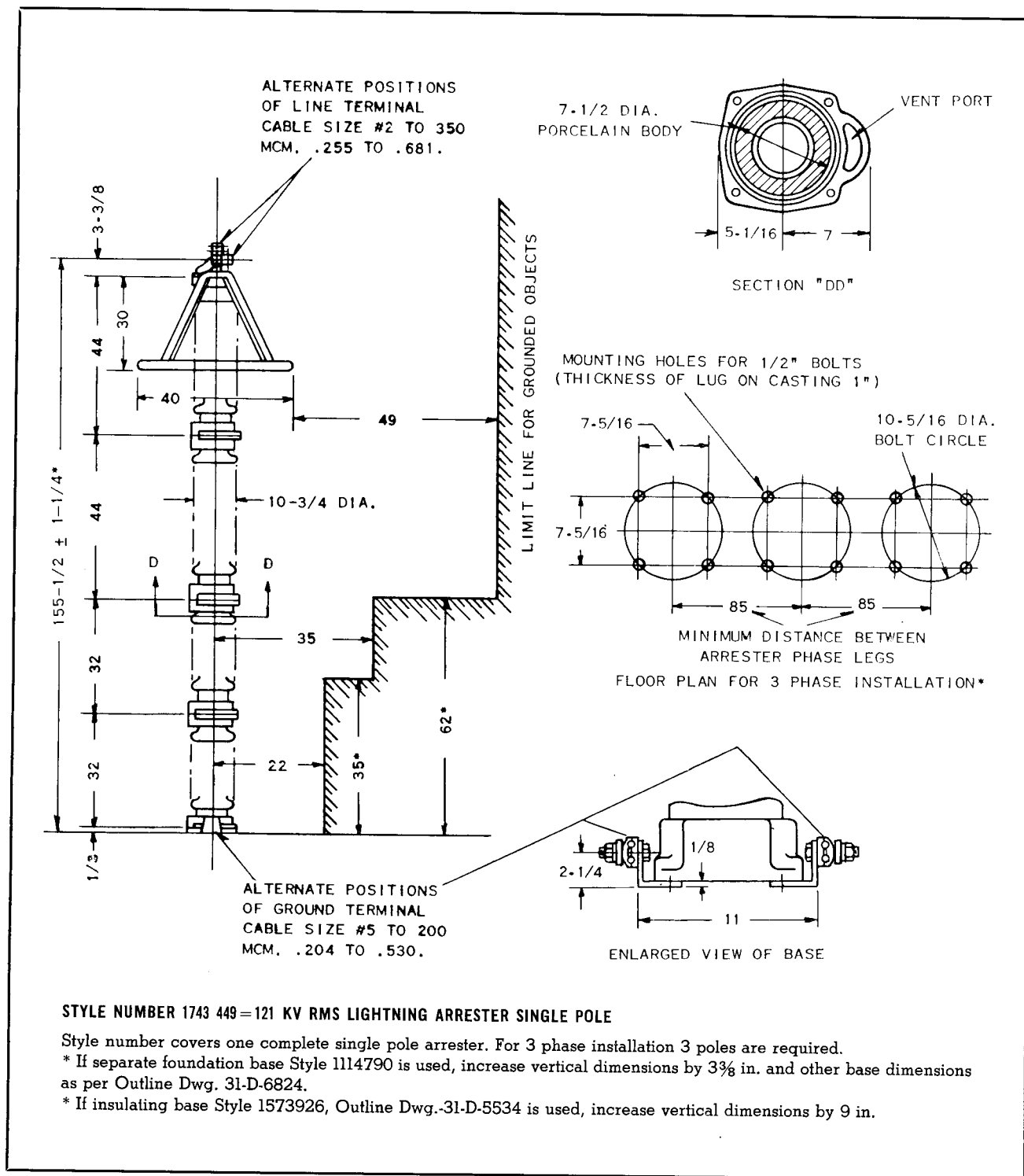


FIG. 10. Outline Dimensions for 121 KV Type SV Lightning Arresters

aged in service, the only field tests that should be attempted are sixty cycle sparkover, "Megger" or "Doble" tests. It must be understood, however, that such tests will not determine the condition of the valve elements; and therefore there is no way in the field, to determine an arrester's condition with complete certainty.

If sixty cycle tests are made sufficient series resistance must be used to limit the current after sparkover, to 100 milliamperes, or less; and the duration of current flow should be limited to not more than 5 seconds. The voltage should be run up to sparkover quickly, so as not to overheat the gap shunting resistors.

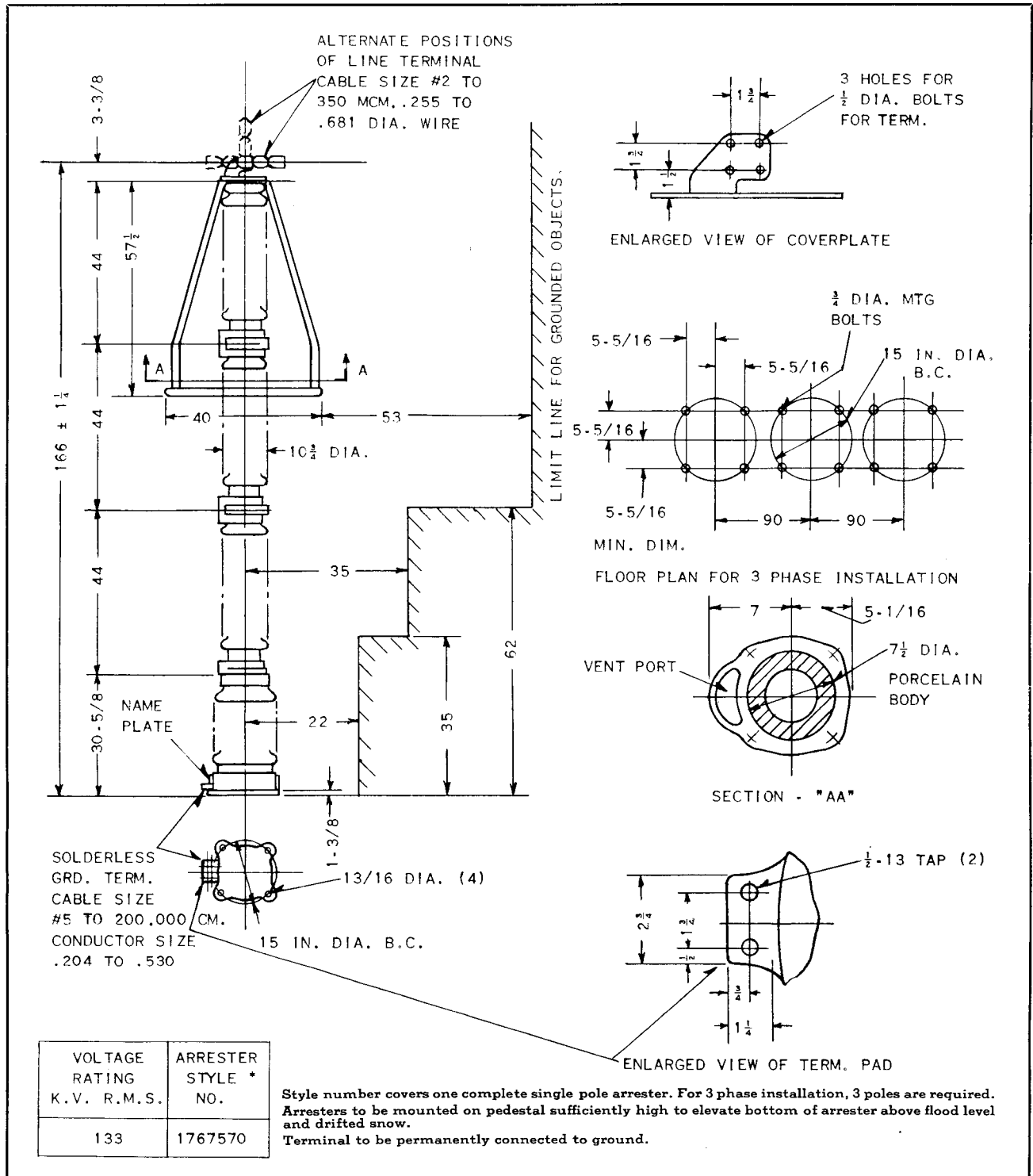


FIG. 11. Outline Dimensions for 133 KV Type SV Lightning Arresters

Since the series gaps are shunted by high resistance, an arrester will have approximately .4 to 1 milliamperes leakage current when energized at rated voltage, and a "Megger" will not show infinite resistance. Tests made to measure leakage current or watts-loss will therefore give readings that are high compared to insulators, for example.

If "Doble" tests are made on arrester units, it may be found that different units of the same rating will give different readings; however, if one unit shows a considerable deviation from the rest, its condition may be open to question. It is more significant to make periodic readings. Normally, readings should remain reasonably consistent or decrease

TYPE SV ARRESTERS

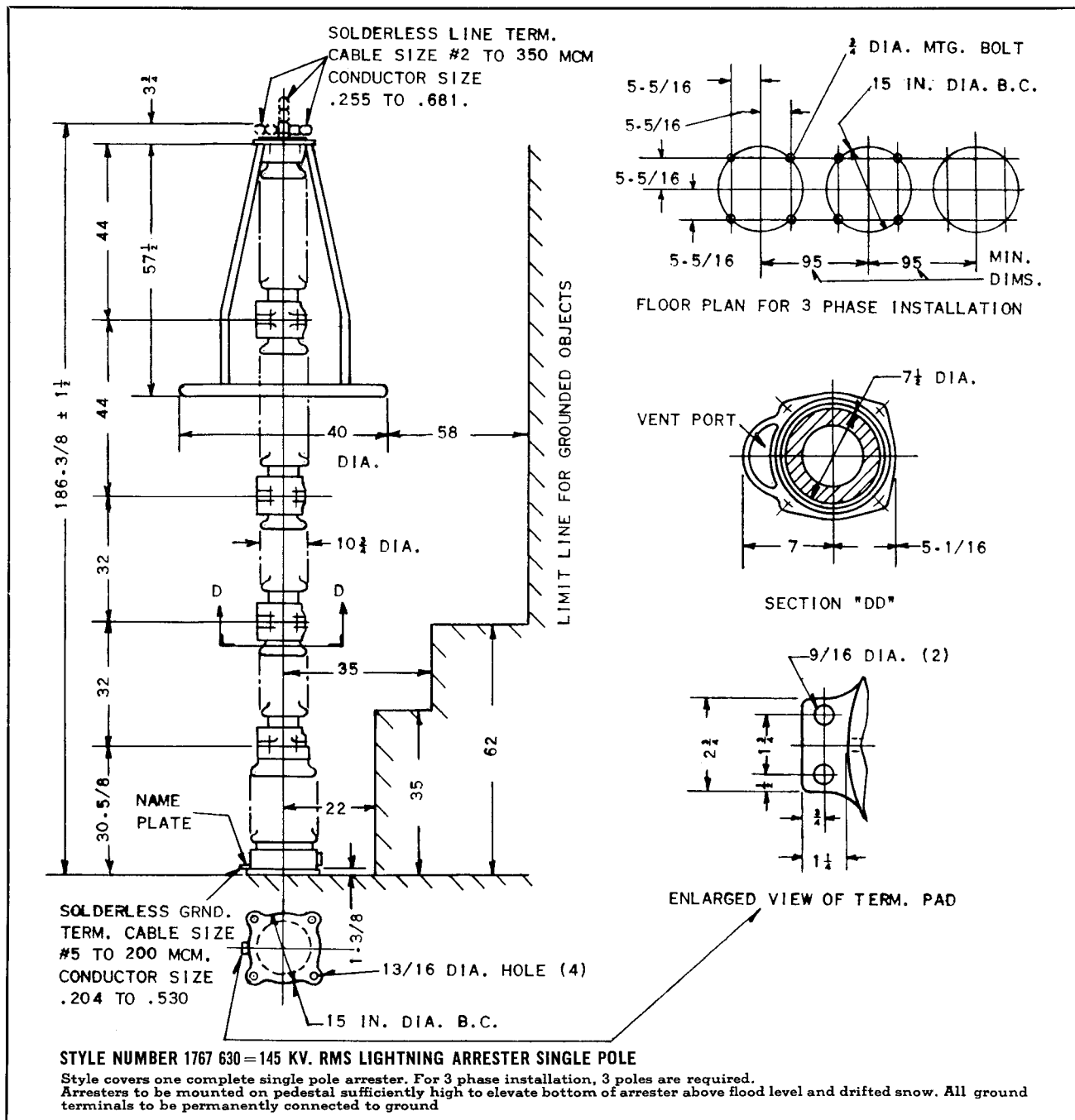


FIG. 12. Outline Dimensions for 145 KV Type SV Lightning Arrester

slightly; if the watts-loss or leakage current shows a marked increase then an investigation should be made.

In any tests, care should be taken to see that the outside of the porcelain is clean and dry; otherwise external leakage may produce misleading results.

MAINTENANCE

Arresters require no regular maintenance other than an occasional inspection. In locations where the porcelain becomes contaminated by dirt, soot, salt, etc.; it is recommended that the arresters be

cleaned periodically.

CAUTION: It is not recommended that arresters consisting of more than two units (over 73 Kv rating) be washed by hosing while they are energized.

CORRESPONDENCE: Direct any inquiries pertaining to the lightning arrester to the nearest Westinghouse Sales Office giving the arrester type, voltage rating, and complete arrester style number; as stated on the main arrester nameplate.