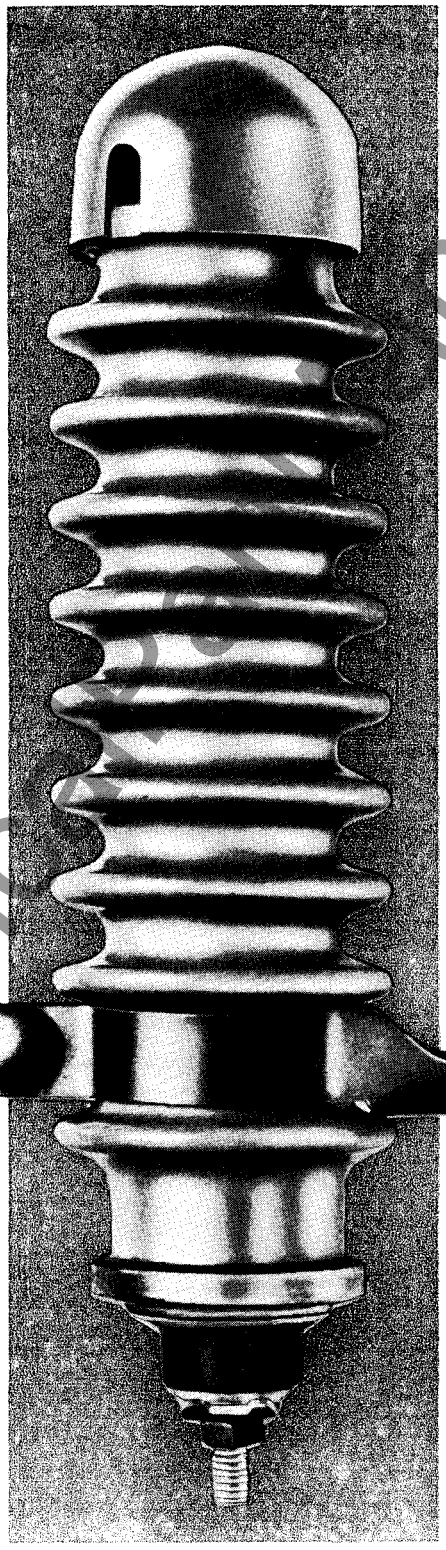
Westinghouse

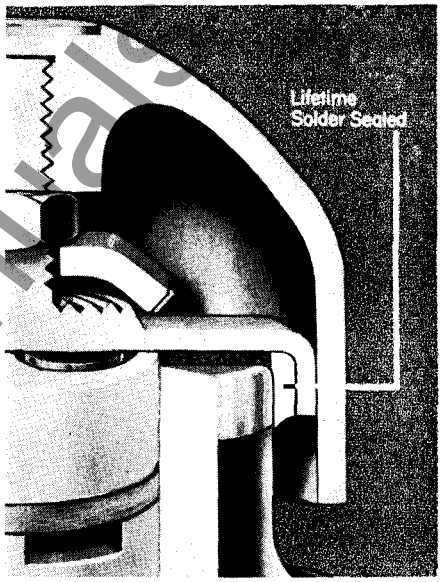
Lightning Arresters

Distribution Class, Type LV

0 to 10,000 Feet Altitude
Indoor or Outdoor, Single Pole
3 to 21 Kv

Solder-Sealed Arresters Provide the *Best* Protection Available for Distribution Systems.





Lifetime . . . Solder-Sealed

Eliminates Major Cause of Distribution Arrester Failure . . . *Moisture!*

Utility companies know the major cause of distribution arrester failure is failure of the seals. Arrester manufacturers agree.

Why? Conventional gasket seals age and set . . . in short, ***they leak!*** Utility records prove this.

The answer . . . Solder-sealing. The solder-seal is a permanent metal to porcelain bond (see photo above). ***It does not leak!***

See why on the following pages!

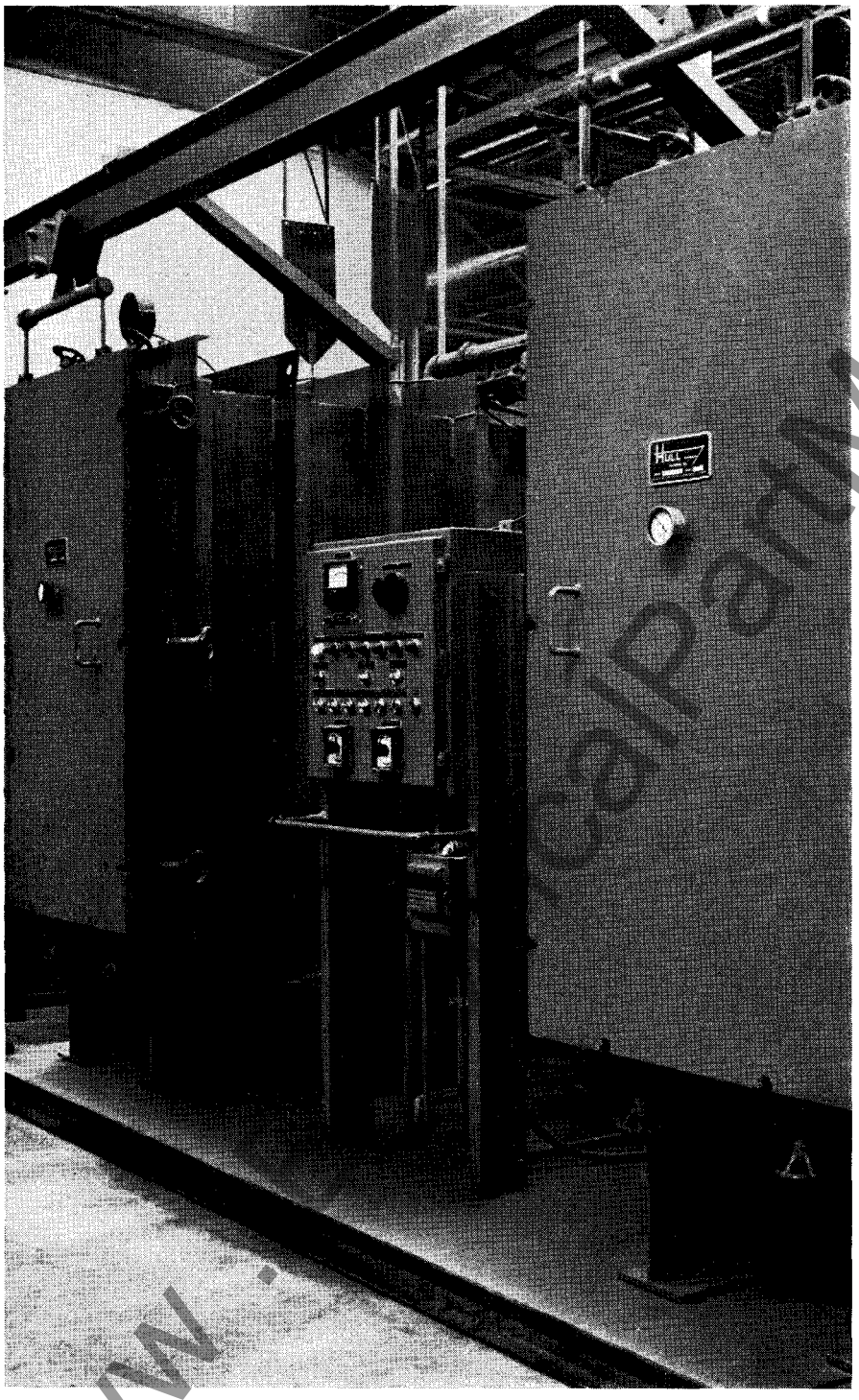
Superior Field Service Since 1934

Utilities field experience with solder-sealed devices over many years has proven the solder-seal superior to any type of conventional seal.

Developed and patented by Westinghouse in 1934, solder-sealing has been used to seal more than 10 million distribution arresters, intermediate arresters, capacitor bushings and submersible transformer bushings.

March 1970
Supersedes DB 38-140, pages 1-8, dated November, 1965
E, D, C/1982/DB

Westinghouse



Insulating Gas Seal Test Equipment

Why So Much Concern About Seals?

An arrester is a protective device . . . it must protect distribution systems from lightning, and it must do it consistently.

The protective characteristics of the arrester cannot be maintained if moisture is allowed to enter. The arrester will fail . . . but more important, the system will be unprotected.

A permanent seal is a *must!*

Testing The Seal

The seal is the most important part of any distribution arrester. If moisture laden air is allowed to enter the arrester through a defective seal, deterioration of the internal components will result in arrester failure.

It is essential that the integrity of *every* seal be assured. Westinghouse has developed a unique insulating gas seal test to provide this assurance.

The photograph shows the production test equipment used to test every solder-sealed distribution arrester.

The arresters are placed in test chambers. The chambers are sealed and evacuated to a pressure of less than 1 mm of Mercury. The arresters are held under vacuum for a specified period and then the chambers are backfilled to a positive pressure with insulating gas. After the required "soaking" time, the arresters are removed and tested for 60 Hertz sparkover voltage.

What Does The Test Mean?

If an arrester is defectively sealed, the air inside the unit is evacuated during the vacuum cycle and replaced with insulating gas during the positive pressure cycle. A *substantial* increase in 60 Hertz sparkover voltage provides a positive identification of a "leaker."

The result: every arrester is tested to assure 100% reliability of the seal.

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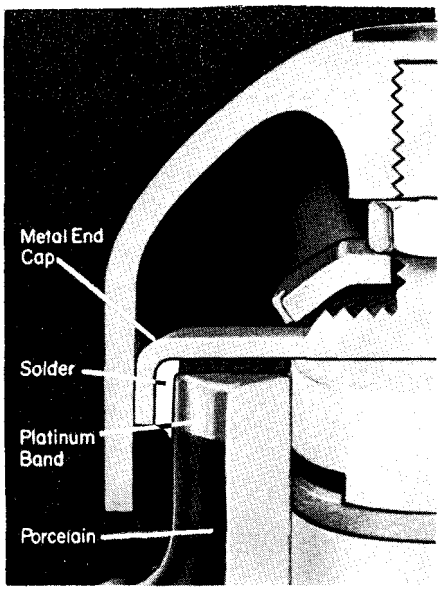
More About The Solder-Seal



How important is the seal in a distribution arrester? Nearly 90 percent of all distribution arrester failures are caused by moisture entering the arrester through failed seals. This fact is acknowledged by utilities and manufacturers alike!

Only a hermetic seal, like the solder-seal can provide a permanent bond that seals out moisture, permanently!

What Is Solder-Sealing?

Very simply, the solder-seal is a fusion between porcelain, solder and metal. It starts with the manufacture of the arrester porcelain. Special platinum bands are applied on both ends of the porcelain . . . when fired, the bands become an integral part of the porcelain. This provides the necessary transition medium between the porcelain and the metal end cap of the arrester.

The resulting seal will not age, deteriorate or weather. The arrester is sealed forever!

Design Features:

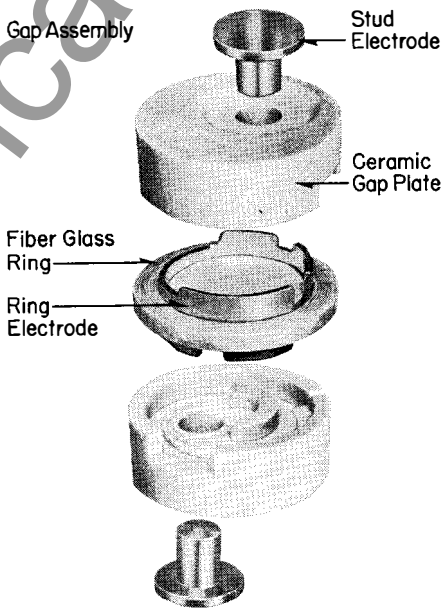
To protect distribution systems from lightning, a valve type arrester depends on a balanced design between gap and valve block.

The gap limits the voltage on the system to its sparkover value. Once the gap sparks over, the blocks must take over the job of limiting the "discharge voltage" that the system sees, and limiting the flow of power-follow current to a value that the gap can interrupt.

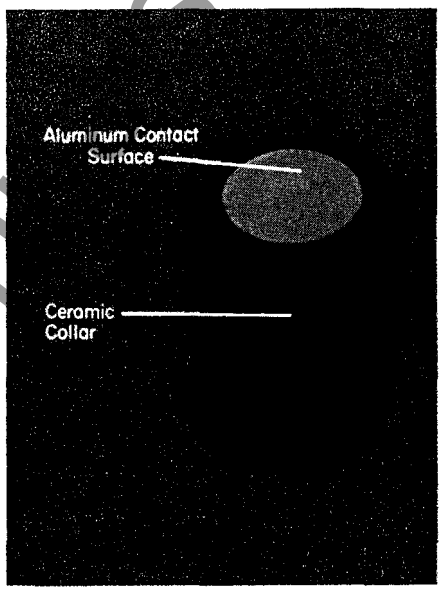
Gap Operation

The Westinghouse LV arrester uses a unique self-driving gap consisting of a series of brass electrodes separated by ceramic plates. When the gap sparks over, the "current loop" formed by the flow of power-follow current provides a magnetic flux build-up within the loop that forces the arc from the point of initial sparkover.

The arc is stretched over the cool ceramic gap plates, enabling the arrester to more easily reseal against system voltage after passing power follow current. In addition, movement of the arc prevents electrode pitting and burning that would normally result in radio noise, erratic sparkover characteristics, and reduced arrester life.



Autovalve® Block



The valve blocks, made of ceramic bonded silicon carbide, display the peculiar characteristic of posing a very low resistance to lightning surges, but offering a very high resistance to 60 Hertz system voltage.

Silicon carbide crystals are mixed with a ceramic binder and molded under tons of pressure into cylindrical blocks. Each block has a ceramic collar, to protect against external flashover, and is fired in high temperature kilns.

After firing, the ends of the cylindrical blocks are sprayed with molten aluminum to assure good electrical contact.

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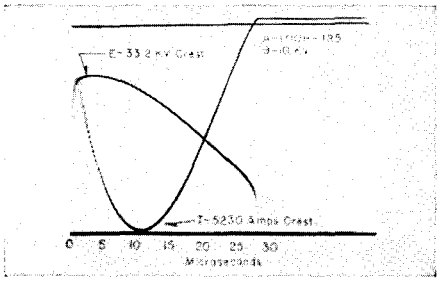
Performance Specifications①

The following oscillograms and test results verify that Solder-Sealed lightning arresters conform to all applicable American standards as described in USAS Standard C62.1-1967 and NEMA publication No. LA1-1968.

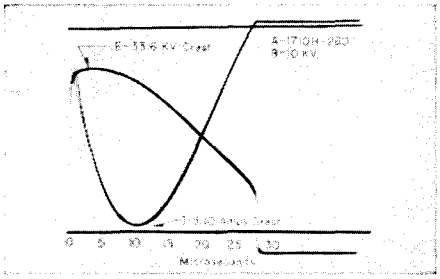
① All values apply to both the positive and negative polarity surges.

Typical Duty Cycle 9-10 Kv Arrester

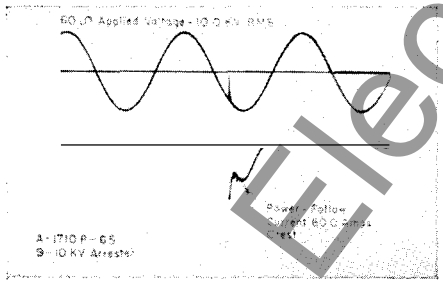
Discharge voltage using 5,000 ampere surge.



Before Duty Cycle

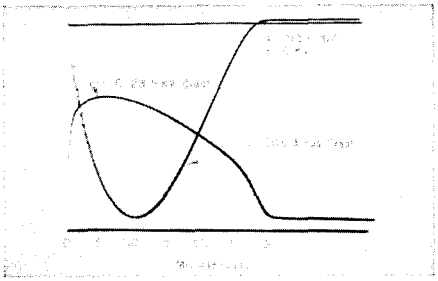


After Duty Cycle (20 Shots)

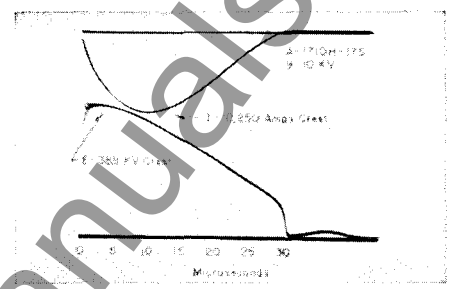


Typical Operating Cycle Using 5,000 Ampere Surge

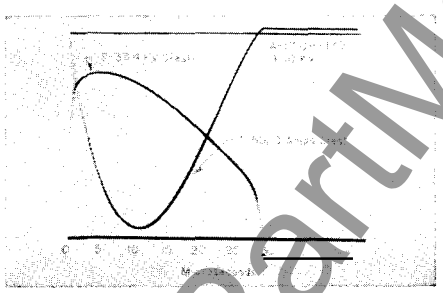
Typical Discharge Voltage Oscillograms 9-10 Kv Arrester



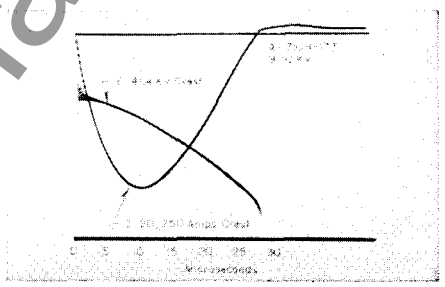
1500 Amperes



10,000 Amperes



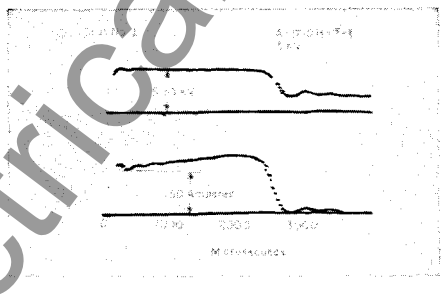
5000 Amperes

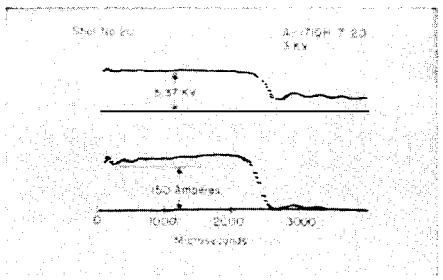


20,000 Amperes

Typical Low Current, Long Duration Surges 3 Kv Arrester

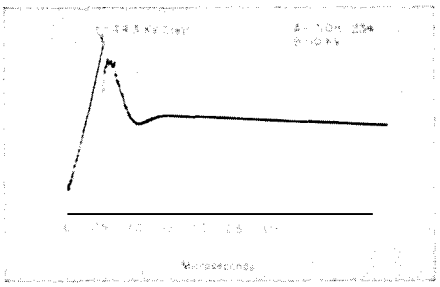
Total time required for test: 20 minutes.





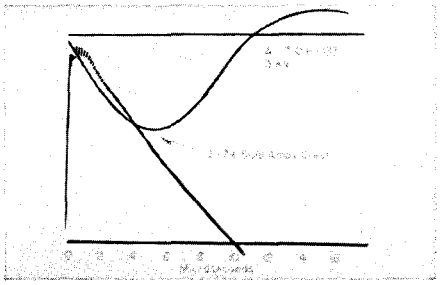
Typical Impulse Sparkover, Front of Wave 9-10 Kv Arrester

Rate of rise of test voltage: 100 kv per microsecond for each 12 kv of arrester rating.



Discharging Two High Current Surges 3 Kv Arrester

Sixty cycle sparkover before and after two high current surges was 8,000 volts.



Further Information

Prices: PL 38-320