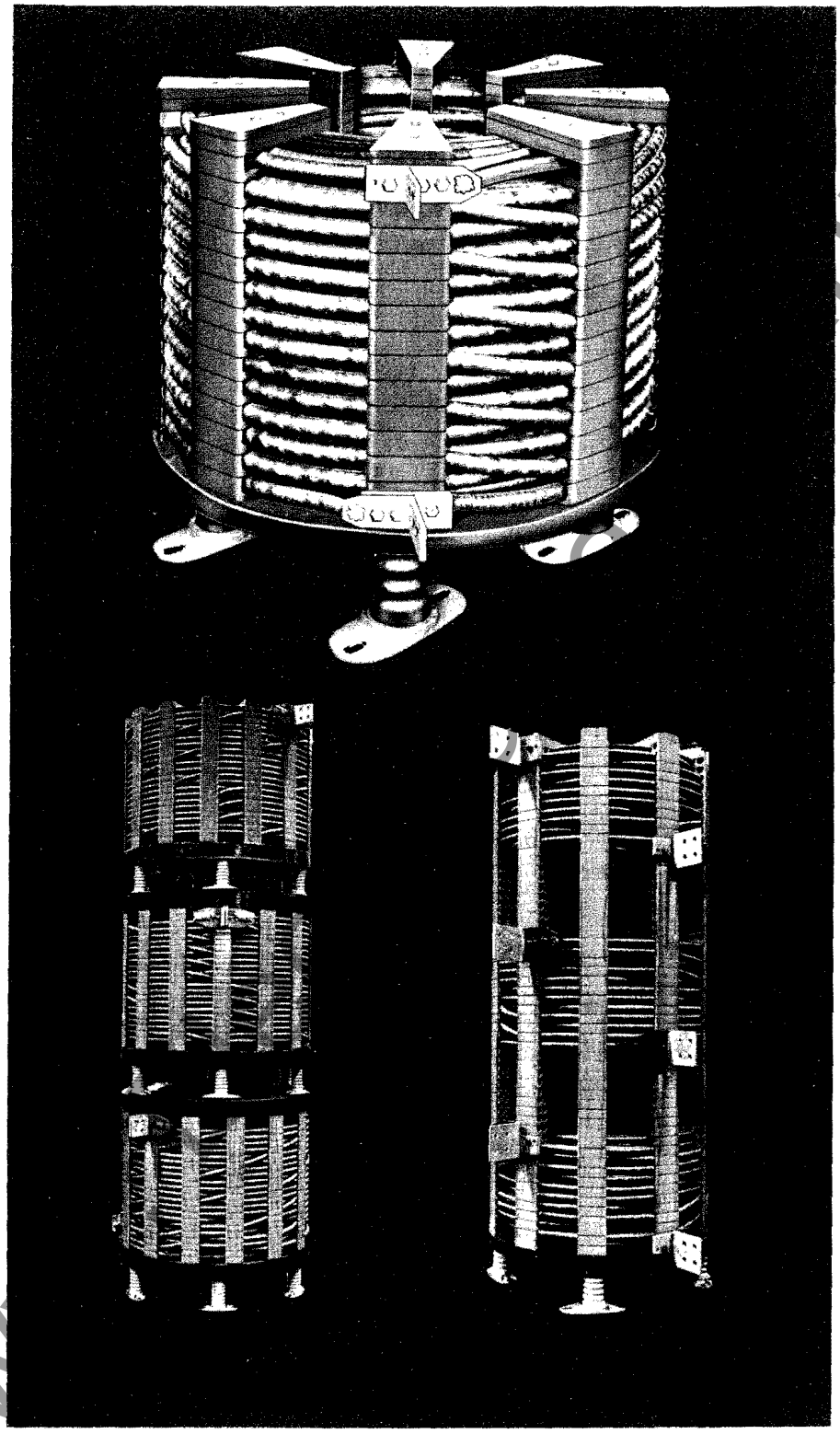
Westinghouse

Current Limiting Reactors

Dry Type

5 to 6000 Kva, 1200-34500 Volts,
Single and Three Phase
80°C Rise, 60 Hertz



Application

Westinghouse dry-type current limiting reactors are designed for use where it is necessary to limit short circuits to safe values and thereby reduce the resulting effect of voltage disturbances. This application subjects the reactor to thermal and mechanical forces of a large magnitude. It is important, therefore, to use materials that will stand up under these stresses. The polyester-glass resin cleats and glass reinforced epoxy-resin tie rods used in the Westinghouse reactor have three times the compressive strength and ten times the tensile strength of the concrete products commonly used for reactor construction.

Advantages

USASI and AIEE Standards: Cleats, tie rods, coil insulation, discs and supporting feet are selected materials that provide the dielectric strength, mechanical strength and heat resistance required to meet applicable standards.

High Dielectric Strength: Polyester-glass resin cleats and epoxy-resin (reinforced with glass fiber) tie rods used in Westinghouse reactors have been selected for insulator construction because of excellent dielectric properties and mechanical strength. Concrete columns, frequently used in reactor construction, provide a high resistance path to ground and resulting leakage currents may hasten deterioration.

Heat Resistance: Polyester resins have high heat resistant qualities. Polyester will not crack or shatter when subjected to extremely high temperatures.

Mechanical Strength: Columns of cleats are bonded together with a high strength reinforced resin and are better able to withstand the forces generated by heavy short circuits because of the great strength and resilience of this material. These characteristics of the columns also insure that cracking will not take place during heavy overloads when the conductor expands or contracts.

Available Ratings

Kva: Through 6000 Kva single or three phase

Frequency: 60 Hertz

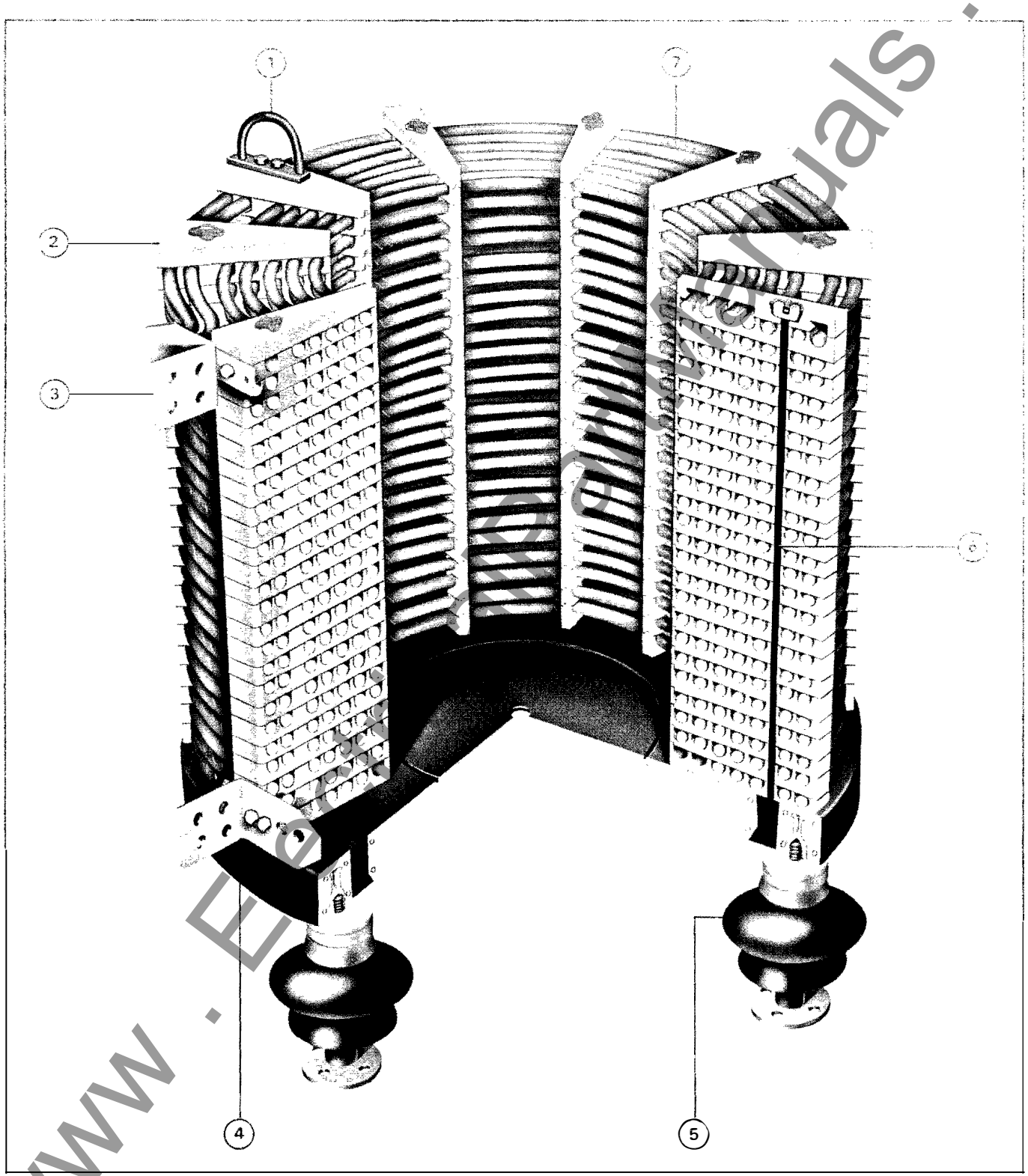
Voltage: Through 34.5 Kv (200 Kv BIL) (Integral Units—through 95 Kv BIL only)

Service: Indoor or Outdoor (Integral units —Indoor only)

Refer to Price List 45-420 for listing of standardized ratings with weights and dimensions.

October 1969
Supersedes DB 45-450
dated March, 1966
E, D, C/2051/DB

Westinghouse



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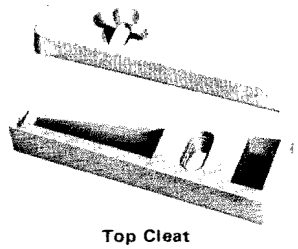
Design Features

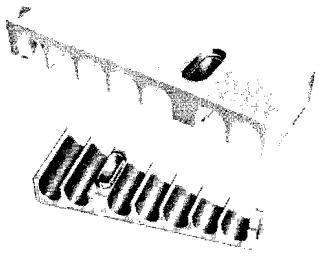
1 Lifting Lugs

A means of handling the reactor is provided to facilitate customer's installation. The device must be removed before reactor is put into operation.

2 Cleats



Top Cleat



Column Cleats

The wedge-shaped cleat used in the Westinghouse reactor has a two-fold purpose. By being previously molded from polyester-glass resin, it provides columns having high dielectric value; its resiliency to thermal and mechanical shock practically eliminates aging and maintenance problems; the wedge shape of the cleat assures proper cooling under all conditions. This increases the radiating surface on the inside turns and provides additional mechanical strength by making shorter unsupported spans of cable on the outside turns. Polyester, which is impervious to moisture, insures high resistance to deterioration under severe atmospheric conditions.

3 Terminal Supports

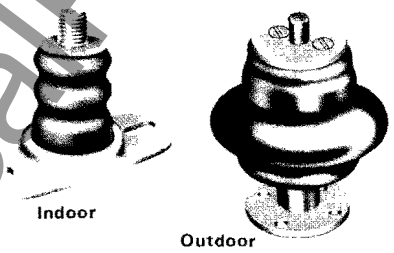
Solid and dependable terminal supports for connection to customer's leads. All reactor terminals will be of the same material as the reactor winding. Vertical terminals are standard and will be supplied unless horizontal terminals are specified on the order. For applications where aluminum wound reactors will be connected to copper bus and plating is required, tin plated terminals will be supplied on request.

Blade type terminals on aluminum wound reactors 500 amperes continuous and below have two 9/16 inch bolt holes located on 1¾ inch centers. For continuous currents above 500 amperes, four 9/16 inch holes on 1¾ inch centers will be provided. On standard aluminum wound reactors rated 1201 amperes through 2000 amperes, two or more blades per terminal with ¼ inch space between blades will be furnished. On all reactors above 2000 amperes special consideration will have to be given to terminal spacing on each negotiation.

4 Disc

Cleat columns, solidly bonded together, are firmly mounted on a concrete or asbestos lumber disc. The mounting platform does not come in direct contact with the cables—hence, it is not subjected to dielectric stresses. Inserts are provided in the disc for mounting insulators. The concrete disc is reinforced with steel rods to provide necessary strength. The ends of the overlapping reinforcing rods are separated to prevent excessive losses.

5 Mounting Insulators



Indoor Outdoor

Mounting insulators screw into the inserts in the disc, thus providing a means of accurate height adjustment and leveling. For indoor service, the mounting insulators are made from polyester-glass resin with non-magnetic base. The high impact strength of the polyester enables the insulator to withstand the sudden surges of mechanical forces encountered during short circuits. For outdoor service, the standard outdoor apparatus insulator with stud adapters are provided.

6 Tie Rods

Each column of cleats supporting the cable is solidly bonded together by a special high strength glass reinforced epoxy-resin tie rod. This provides the column with two outstanding characteristics. First, it has three times the compressive strength and ten times the tensile strength of concrete, Second, its great resilience to thermal and mechanical shocks will withstand the forces generated by heavy short circuits and expansion of the conductors during overloads.

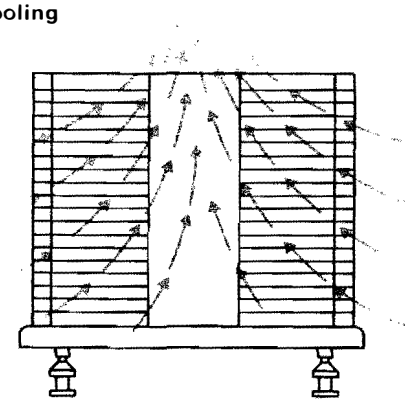
7 Insulated Cables

Westinghouse dry type reactors are wound with aluminum cable. An aluminum-oxide coating insulates the individual strands of aluminum cable to reduce eddy currents. The cable is then insulated with glass tape. The cable is thus protected against short circuits from conducting objects which may fall or be drawn into the coil. Copper wound reactors are available upon request. The copper cable used in winding reactors has alternate layers of strands enameled to reduce eddy currents.

Finish

To give the reactor a smooth, finish of high dielectric and mechanical strength, the entire assembled reactor is dipped several times into thermo-set varnish. Each coat of varnish is set by baking at 130°C.

Cooling



A low hotspot temperature is assured by the design of the disc at the bottom of the reactor. This causes the air to be drawn in through the sides of the reactor and exhausted at the top as in a chimney. This chimney action reduces hotspots.

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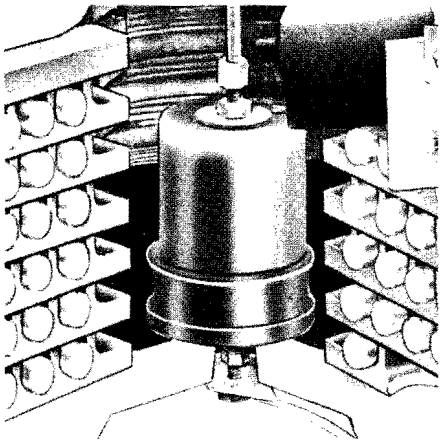
Accessories



Arresters: Auto-valve arresters can be supplied when required to prevent excessive overvoltage due to circuit characteristics. Refer to SA-10006 for further application information.

Bracing insulators: Bracing between reactors will be furnished when necessary; not supplied as a standard accessory.

Housing for vertical axis reactors: The standard housing consists of ⅛ inch metal plate with non-magnetic material where necessary. Arrangement is made to take all leads out at the bottom. No base is furnished with the housing.

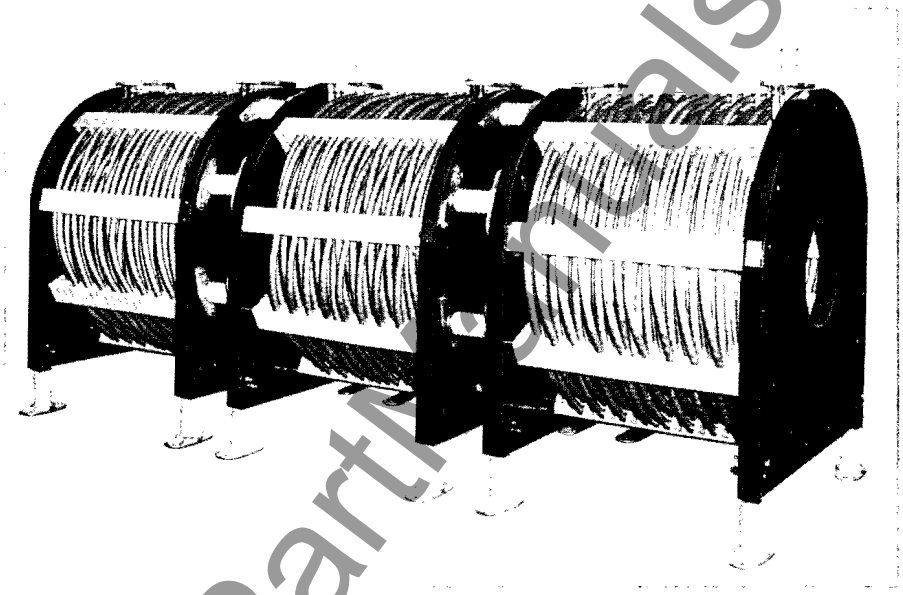
Outdoor

If the reactor is intended for outdoor service, the design will differ from indoor construction in that it will be able to withstand high frequency test voltages with crest values one-third greater than required for indoor units. Base insulators for outdoor units also differ from indoor units.

Notes On Impedance

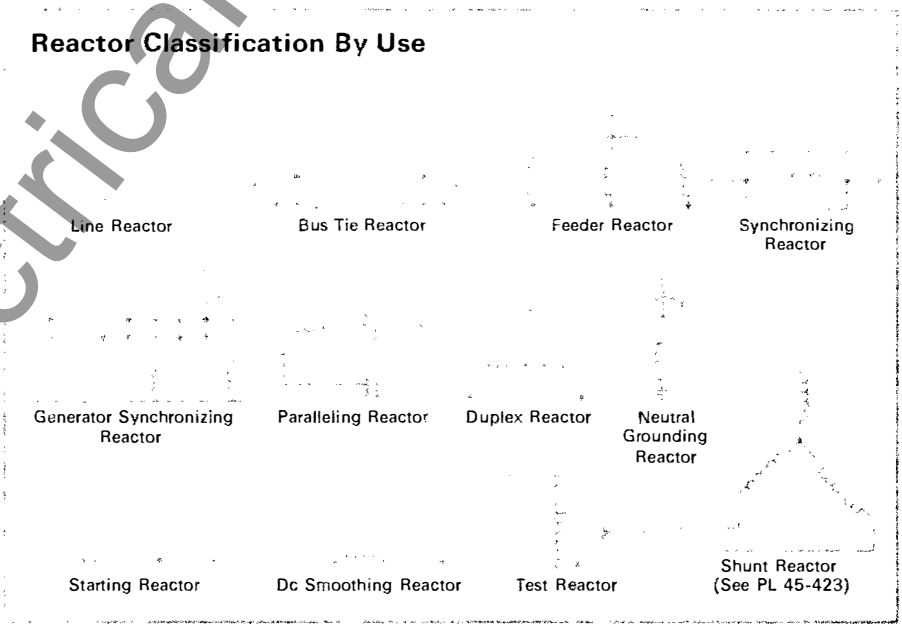
If the reactor impedance is less than 3%, the reactor is normally designed to withstand mechanically and thermally a short circuit current of 33⅓ times normal for three seconds. If the reactor impedance is 3% or more, then the reactor is designed to withstand mechanically and thermally the current that will flow when rated line to neutral voltage is applied across the coil for three seconds. The asymmetrical instantaneous short circuit current conforms with USA Standards.

Horizontal Reactors



For indoor applications where headroom is a minimum, a special horizontal reactor is available 15 Kv and below. Individual single phases or horizontally stacked three phase units may be specified. Typical installations are balcony mounting near ceiling of building or on top of switchgear assemblies.

Reactor Classification By Use



Further Information:

Description: Oil Immersed—Descriptive Bulletin 45-451, MSP—Descriptive Bulletin 45-455

Prices: Dry Type—Price List 45-420, Oil Immersed—Price List 45-421, MSP—Price List 45-425, Shunt (Dry Type) Price List 45-423

Application: Technical Data 45-460 and SA 10006

USASI Standards—C57-16 and C57-99

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Printed in U.S.A.