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Report on Standard
for
VALVE and EXPULSION TYPE
LIGHTNING ARRESTERS

(Published for comment and criticism
as a proposed revision of
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Report on Standard

of the

American Institute of Electrical Engineers

VALVE and EXPULSION TYPE LIGHTNING ARRESTERS

SCOPE

28-1.—This standard applies to lightning protective devices designed for repeated operations to limit voltage surges on 60 cycle power circuits¹ and to interrupt repeatedly power follow current. It applies specifically to lightning arresters of the valve and expulsion types² as defined in this standard. Arresters claimed to be in accordance with this standard must meet the tests specified herein.

DEFINITIONS

28-10.—A **lightning arrester** is a protective device for limiting surge voltages on equipment by discharging surge current; it prevents continued flow of follow current, and is capable of repeating these functions as specified. (Hereafter the term "arrester" as used in this standard shall be understood to mean "lightning arrester.")

(20.30.015*3)

Note: In general, arresters consist of series gaps and characteristic elements arranged within or upon suitable insulating members. Arresters are variously classified by the manufacturers as station-, line-, distribution-, and secondary-type arresters.

28-11.—A **valve type arrester** is an arrester having a characteristic element consisting of a resistor with a non-linear volt-ampere characteristic which limits the follow current to a value the series gap can interrupt. If the arrester has no series gap the characteristic element limits the follow current to a magnitude that does not interfere with the operation of the system.

28-12.—An **expulsion type arrester** is an arrester having a characteristic element in which an arc is confined and brought in contact with gas evolving or other arc extinguishing material in a manner which enables it to interrupt power follow current.

Note: The term "expulsion arrester", includes any external series gap or current-limiting resistor if either or both are used as a part of the complete device as installed for service.

28-13.—The **characteristic element** of an arrester is the element which determines both the discharge voltage and the follow current.

28-14.—The **series gap** (or gaps) of an arrester is a gap between spaced electrodes which is in series with the characteristic element. In expulsion arresters and some types of valve arresters, the series gap substantially isolates the character-

istic element from the line or ground under normal conditions, determines or influences the arrester impulse sparkover voltage, and in some types interrupts the follow current.

28-15.—The **current-limiting resistor** of an arrester is a resistor which is in series with the characteristic element for the purpose of limiting the follow current.

28-16.—A **shield** (or grading ring) is a metallic element used to modify voltage distribution electrostatically and thereby control the sparkover voltage of a gap or the flashover voltage of insulation.

28-17.—A **vent** of an arrester is an opening through which gases may discharge to the outside.

28-18.—A **deflector** of an expulsion arrester is a vent fitting for diverting the flow of the gas discharging from the arrester.

28-19.—The **line terminal** of an arrester is the conducting part which is designed to be connected to the circuit conductor.

Note: When a line terminal is not supplied as an integral part of the arrester, but the series gap is obtained by providing a specified air clearance between the line end of the arrester and a conductor, or arcing electrode, etc., the words "line terminal" used in the standard refer to the conducting part which is at line potential and which is used as the line electrode of the series gap.

28-20.—The **ground terminal** of an arrester is the conducting part which is designed to be connected to ground.

28-21.—The **arrester ground** is an intentional electric connection of the arrester ground terminal to the earth.

28-22.—**Lightning** is an electric discharge which occurs in the atmosphere between clouds or between clouds and ground. (20.30.005*)

28-23.—A **lightning surge** is a transient electric disturbance in an electric circuit caused by lightning. (20.30.010)

¹ In this standard a frequency of 60 cycles per second is assumed as a basic value for tests and as the system frequency. The required tests, when properly interpreted, are useful in making lightning arrester applications to 25 and 60 cycle systems.

² Expulsion type arresters supplied integrally with transformers and represented as coordinated with the complete transformer insulation do not necessarily conform to these standards. Devices formerly called transmission line protector tubes are covered under the general heading of expulsion arresters.

³ Numbers refer to American Standard Definitions of Electrical Terms, ASA C42-1941. Where an asterisk (*) is added to a number it indicates a change in wording from the C42 definition.