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STANDARDS PUBLICATION/NO. IB 7-1980

nema

testing arrestor vents used on lead-acid industrial storage batteries for stationary service

NEMA

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION ■ 2101 L STREET, N.W., WASHINGTON, D.C. 20037

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Foreword

User input has been considered throughout the development of this standards publication.

These standards have been developed by the Industrial Battery and Charger Section of NEMA which periodically reviews them for any revisions necessary to keep them up to date with advancing technology. Comments or proposed revisions are welcome and should be submitted to:

Manager, Engineering Department
National Electrical Manufacturers Association
2101 L Street, N.W.
Washington, D.C. 20037

Purpose

The purpose of these standards is to determine the ability of a flame arrestor to vent gases from a lead-acid cell and to prevent the gases inside the cell from igniting.

Scope

This standards publication covers test procedures for determining the flame arresting ability of vents used on lead-acid industrial storage batteries for stationary service when installed as standby power for switchgear, control, communication, uninterrupted power, and emergency lighting systems.

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TESTING ARRESTOR VENTS USED ON LEAD-ACID INDUSTRIAL STORAGE BATTERIES FOR STATIONARY SERVICE

DEFINITIONS

IB 7-1.01 DEFINITIONS

The terms used in this publication shall be defined in accordance with the NEMA Standards Publication for *Definitions for Lead-acid Industrial Storage Batteries*, IB 1-1971 (R 1976), if applicable.

NEMA Standard 7-8-1980.

TESTING

IB 7-1.02 TEST PROCEDURE

A. Back Pressure Test

Air shall be vented through a new flame arrestor until a back pressure of 15 millimeters of water is reached. The test shall be started at a cubic-centimeter-per-minute flow rate equivalent to 40 cubic centimeters per minute per square inch of external vent surface. Increase at 10 percent intervals, holding for 15 seconds at each rate, until 15 millimeters of water is reached. See Fig. 1.

B. Sparking Test

THIS PARTICULAR TEST IS VERY DANGEROUS AND PROPER PRECAUTIONS MUST BE TAKEN TO SAFEGUARD PERSONNEL AND EQUIPMENT FROM EXPLOSION HAZARDS AND BURNS. Two parts hydrogen and one part oxygen gases shall be piped from a gas generator source into a water trap and from a water trap into the flame arrestor. The exterior of the flame arrestor shall be exposed, at a distance of 6.5 millimeters from the surface, to a flame or spark. The source of flame or spark must be positioned at intervals of not less than 60 degrees around the circumference.

The gas flow shall be started at a cubic-centimeter-per-minute rate equivalent to 40 cubic centimeters per minute per square inch of external vent surface. The vent shall be exposed to a flame or spark for 5 seconds. The gas flow rate shall be increased at 10-percent increments and the flame or spark exposure shall be repeated until a flame ignites on the surface of the vent (as determined by a thermocouple) or an explosion occurs. See Fig. 2.

C. Simulated Aging Test

The flame arrestor shall be placed on a cell and charged for 60 days at a rate that would produce the same ampere hours as when floated at the voltage recommended by the manufacturer for the duration of one maintenance period of the vent. The flame arrestor shall then be subjected to the back pressure test (IB 7-1.02A) and sparking test (IB 7-1.02B).

NEMA Standard 7-8-1980.

RATINGS

IB 7-1.03 DETERMINATION OF MAXIMUM AMPERE RATING

A. Back Pressure Test—Rating

The cubic centimeters per minute of air required to produce 15 millimeters of water back pressure shall be divided by 11.50 to determine the ampere rating for the new vent on the back pressure test. The value 11.50 represents the cubic centimeters per minute of gas produced by 1 ampere of charge current.

B. Sparking Test—Rating

The cubic centimeters per minute of gas required to cause flame ignition or explosion shall be divided by 11.50 to determine the ampere rating for the new vent on the sparking test.

C. Simulated Aging Test—Rating

Tests IB 7-1.03A and IB 7-1.03B shall be repeated on the back pressure test results and sparking test results, respectively, of the aged vent to determine the ampere rating of each test.

D. Maximum Ampere Rating

The maximum ampere rating of the vent is the *lowest* value in amperes as determined by pars. IB 7-1.03A, B, and C.

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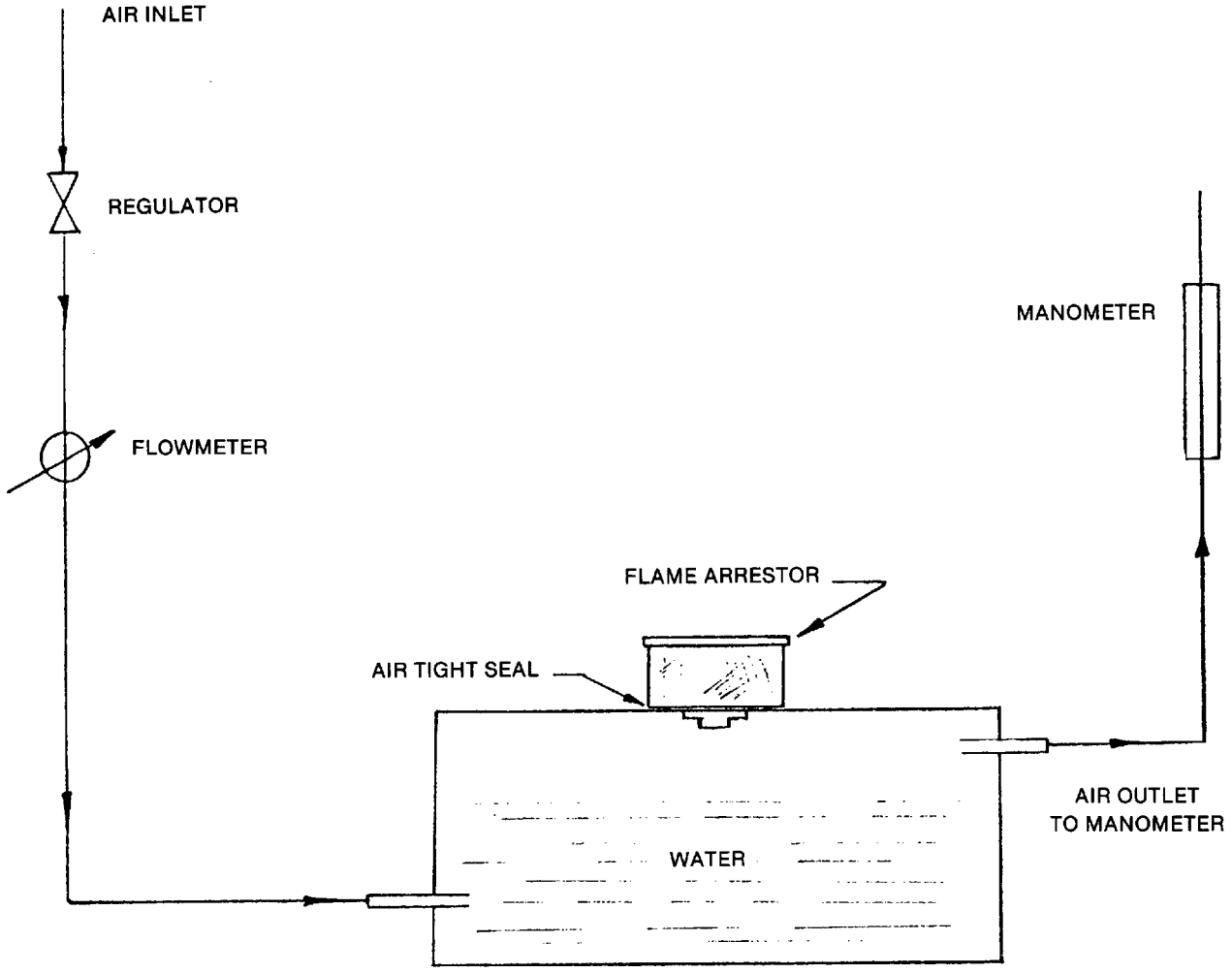


Fig. 1
FLAME ARRESTOR BACK PRESSURE TEST

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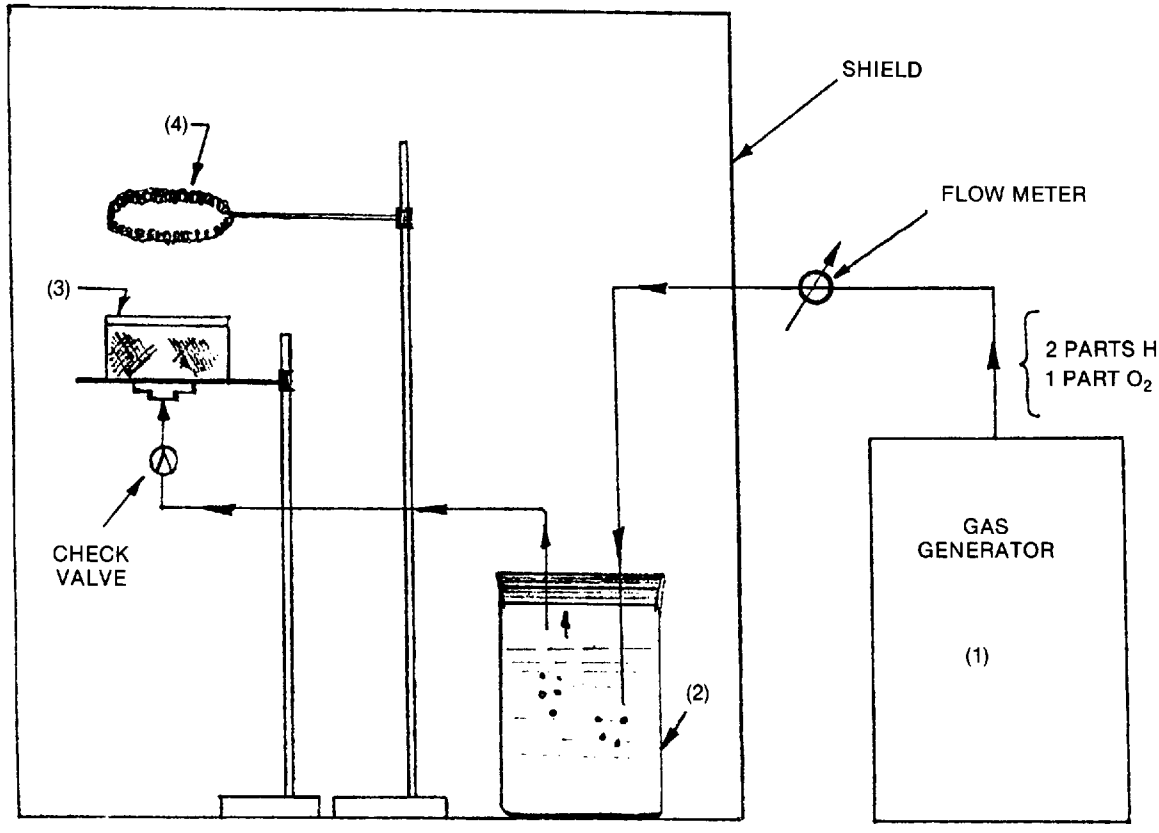


Fig. 2
TYPICAL SPARKING TEST APPARATUS

DESCRIPTION: HYDROGEN (H_2) AND OXYGEN (O_2) GENERATED AT (1) ARE PIPED INTO PLASTIC BOTTLE BUBBLETRAP (2) EQUIPPED WITH A STOPPER. GASES DISCHARGE BELOW WATER LEVEL AND ARE COLLECTED ABOVE WATER LEVEL* AND PIPED TO THE FLAME ARRESTOR (3). THE SPARK OR FLAME GENERATOR (4) IS THEN LOWERED TO FIT AROUND THE CIRCUMFERENCE OF THE VENT AND IGNITED.

*The gas volume above the water level shall be held at a minimum.

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(Bylaw—Art. V, Sec. 1)

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A standard of the National Electrical Manufacturers Association defines a product, process or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, rating, testing, and the service for which they are designed.

(Bylaw—Art. V, Sec. 2, Subsection A)

Dimensions

Where dimensions are given for interchangeability purposes, alternate dimensions satisfying the other provisions of the standards publication may be capable of otherwise equivalent performance.

(NEMA Policy Memorandum 84-2, dated June 7, 1984)

Classes of Standards

National Electrical Manufacturers Association Standards are of two classes:

1. NEMA Standard, which relates to a product commercially standardized and subject to repetitive manufacture, which standard has been approved by at least 90 percent of the members of the Subdivision eligible to vote thereon;
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(Bylaw—Art. V, Sec. 2, Subsection B)

Authorized Engineering Information

Authorized Engineering Information consists of explanatory data and other engineering information of an informative character not falling within the classification of NEMA Standard or Suggested Standard for Future Design.

(Bylaw—Art. V, Sec. 6, 1st Sentence)

Official Standards Proposal

An Official Standards Proposal is an official draft of a proposed standard which is formally recommended to an outside organization(s) for consideration, comment and/or approval.

(Bylaw—Art. V, Sec. 4, Subsection A)

Identification of Status

Standards in NEMA Standards Publications are identified in the foreword or following each standard as "NEMA Standard" or "Suggested Standard for Future Design." These indicate the status of the standard. These words are followed by a date which indicates when the standard was adopted in its present form by the Association.

The material identified as "Authorized Engineering Information" and "Official Standards Proposal" is designated similarly.

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