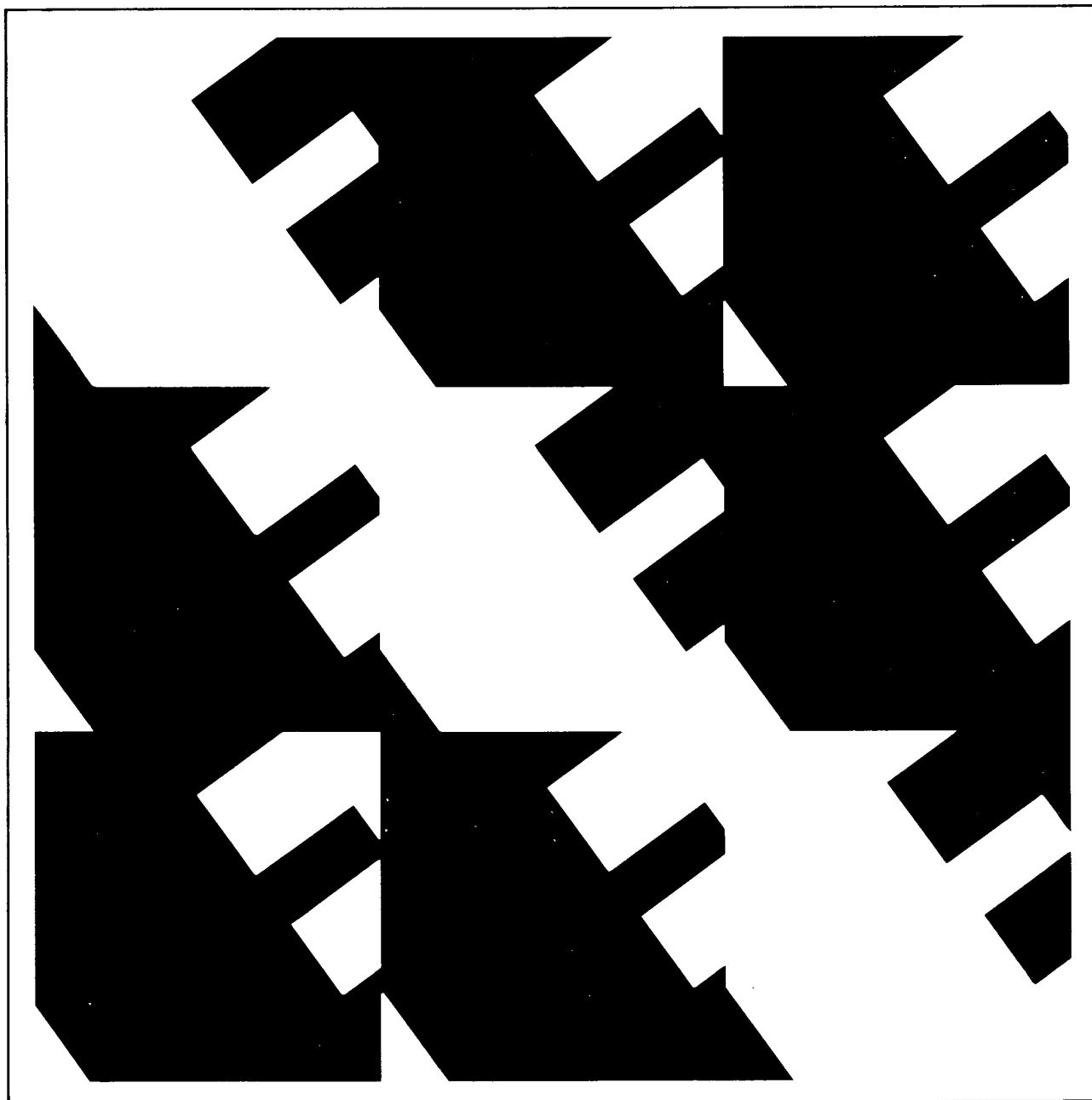


IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations



ANSI/IEEE Std 308-1980



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Class 1E Power Systems for
Nuclear Power Generating Stations**

Sponsor

**Nuclear Power Engineering Committee of the
IEEE Power Engineering Society**

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Foreword

(This Foreword is not a part of IEEE Std 308-1980, IEEE Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations.)

This standard presents criteria and requirements for the electrical systems of nuclear power generating stations specifically related to providing protection to the health and safety of the public.

The Institute of Electrical and Electronics Engineers has developed these criteria to provide guidance in the determination of the design features and the surveillance requirements and testing related to the electric power systems of a nuclear power generating station. Each applicant for a construction permit or an operating license for a nuclear power generating station in the United States is required to develop these items to comply with the Title 10, Code of Federal Regulations, Part 50.

Adherence to these criteria may not suffice for assuring the public health and safety because it is the integrated performance of the structures, the fluid systems, the instrumentation and the electric systems of the station that establishes the consequences of accidents. Failure to meet these requirements may be an indication of system inadequacy. Each applicant has the responsibility to assure himself and others that this integrated performance is adequate.

Background. IEEE Std 308-1970, the original issue, was prepared by Subcommittee 4, Auxiliary Power Systems of the Joint Committee on Nuclear Power Standards (JCNPS) of the IEEE Nuclear Science Group and the IEEE Power Engineering Society (PES). IEEE Std 308-1971 incorporated the experience of the first edition and added multi-unit considerations. IEEE Std 308-1974, the second revision, was completed by Working Group 4.1 of Subcommittee 4 of JCNPS, which became the Nuclear Power Engineering Committee (NPEC) of the PES in 1973. The third revision, IEEE Std 308-1978, clarified the interface between the functional requirements of the Class 1E Auxiliary Power System and the Safety Systems for elements of the Protective Action System that are within the Class 1E Power System.

Current Revision. IEEE Std 308-1980 was revised to implement the recommendations of the IEEE 308/603 Ad Hoc Committee appointed by the Nuclear Power Engineering Committee. The charter of the Ad Hoc Committee was to:

- (1) Develop a written interpretation of the IEEE Std 308/IEEE Std 603 scope diagram and determine its adequacy.
- (2) Give direction to Subcommittee 4 and Subcommittee 6 for revision of the diagram and of IEEE Std 603 if appropriate.
- (3) Determine where specific equipment and components of the Class 1E Power System fit the scope.
- (4) Determine what sections of IEEE Std 603 apply to the Class 1E Power System and define those supplementary requirements needed in IEEE Std 308.

The Ad Hoc Committee recommended revision of the 308/603 scope diagram and provided definitions and text changes to agree with a new safety system scope diagram (Figs 4, 5, and 6). Specific Class 1E equipment and components were fitted to the new scope diagram, Fig 5, to aid its understanding. Applicability of the Safety System requirements to the Class 1E Power System were reviewed, and revisions to IEEE Std 603 were recommended to make it consistent with the new scope diagram. Additionally, supplementary requirements and modifications to IEEE Std 308 were identified to make it consistent with IEEE Std 603. These recommendations were incorporated in this revision.

Safety Function Concept. The Ad Hoc Committee concluded that a safety system, by definition, must encompass all of the elements required to achieve a protective or safety function. Figures 2 and 3 illustrate the systems and equipment needed to perform a typical safety function, such as Post Accident Heat Removal. As part of the safety system the role of the Class 1E Power System is clearly that of an auxiliary supporting feature, providing electric power to other safety systems, for example, recirculation spray system, containment spray system, etc. In this capacity, those portions

of the Class 1E Power System that contribute to performing a safety function must comply with the requirements of IEEE Std 603. However, those components, equipment, and systems within the Class 1E Power System which perform no direct safety function, such as overload devices, protective relaying, etc, must meet those requirements in IEEE Std 603 which assure that those components, equipment, and systems do not degrade the Class 1E Power System below an acceptable level.

Major Role of Class 1E Power System. The major role of the Class 1E Power System is to provide electric power to the reactor trip system, engineered safety features, and auxiliary supporting features; and, therefore, the Class 1E Power System is an auxiliary supporting feature.

The Class 1E Power System is unique in that it extends throughout the plant having far more complex interfaces than other auxiliary supporting features. Most other auxiliary supporting features are limited to one area or a single process in the plant and are basically mechanical systems. Characteristic of the complex interfaces of the Class 1E Power System is the fact that it is an auxiliary supporting feature; other auxiliary features are auxiliary supporting features for it, and the Class 1E Power System may provide support for nonsafety system equipment as well as providing the means for the execution of the safety system protective actions.

The sense and command features include equipment which produces signals (current transformer, PT, etc), measures electric system parameters (voltage, current, watts, etc), or functions to limit degradation effects (protective relaying, thermal overloads, undervoltage relays, etc). Those sense and command features of the Class 1E Power System that directly perform a safety function must comply with the requirements of IEEE Std 603; those sense and command features of the Class 1E Power System that do not have a direct safety function must be analyzed to show that their failure will have no unacceptable effects on the Class 1E Power System.

In its role in the execute features, some Class 1E Power System equipment, switchgear, circuit breakers, power cabling and loads (primarily motors) are not only part of the Class 1E Power System, but are integral parts of the engineered safety features as well.

Future Tasks. The committee recognizes that certain areas of the standard need more extensive treatment. These include criteria for interfacing the Class 1E Power System with the *Preferred Power Supply for Nuclear Power Generating Stations* (P765), *Protection of Class 1E Power Systems* (P741), and *Raceway Systems for Class 1E Circuits* (P628). These projects are being actively pursued by their working groups and will be issued in the near future. In addition, work is underway to revise ANSI/IEEE Std 387-1977, *Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations*, to address light or no load operation, factory production tests, preventative maintenance, and protection. While this standard was under revision, NPEC approved an Ad Hoc Committee Report on Shared Safety Systems. It is anticipated that this latest position on sharing will be addressed in the next revision.

IEEE will maintain this standard current with the state of technology. Comments are invited on this standard as well as suggestions for additional material that should be included. These comments and suggestions should be addressed to:

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