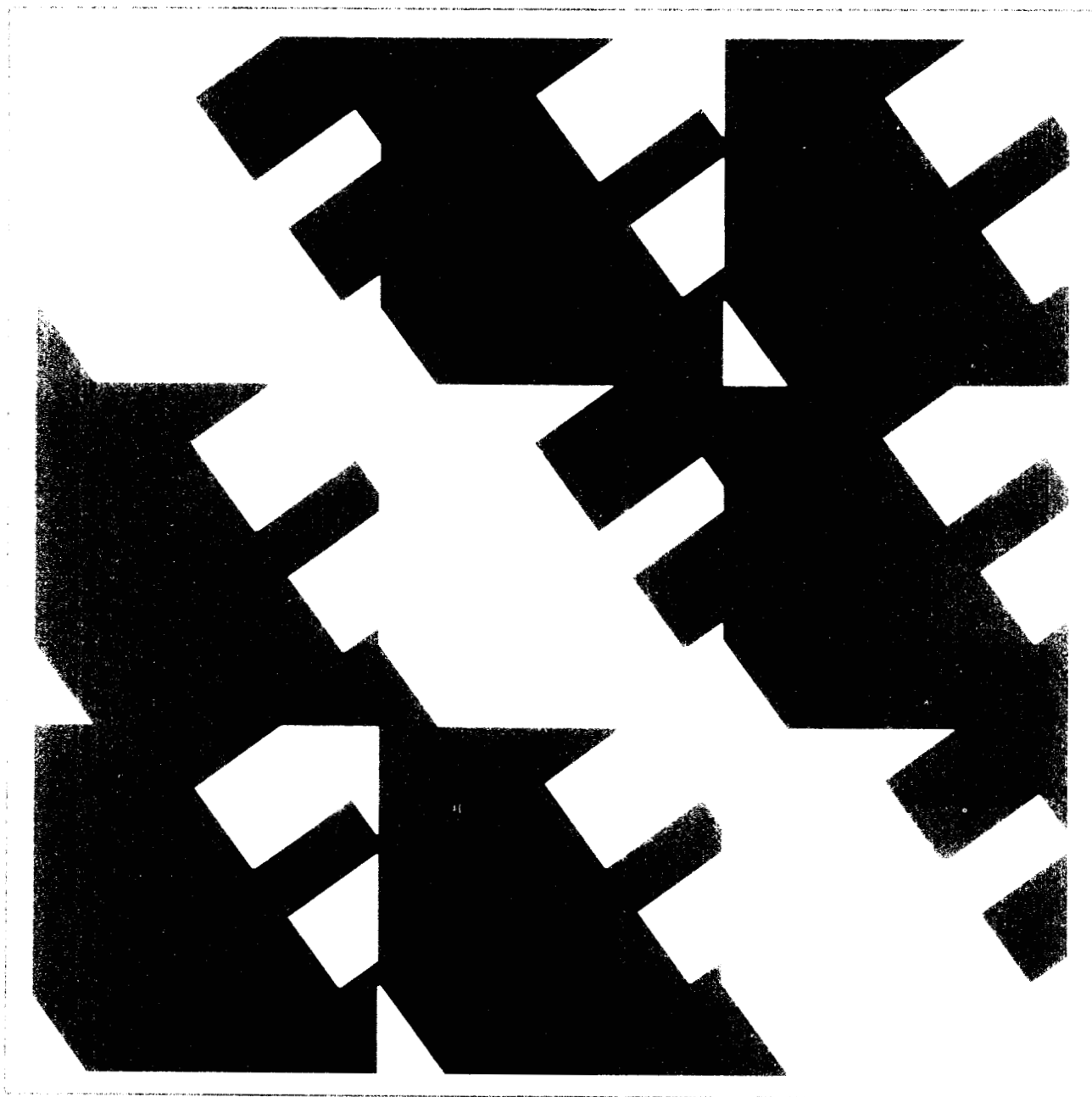


IEEE Recommended Practices to Improve Electrical Maintenance and Safety in the Cement Industry



IEEE Std 625-1979



Published by The Institute of Electrical and Electronics Engineers, Inc. 345 East 47th Street, New York, New York 10017
August 3, 1979

SH07401

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Sponsor
Cement Industry Committee
of the
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Foreword

(This Foreword is not a part of IEEE Std 625-1979, Recommended Practices to Improve Electrical Maintenance and Safety in the Cement Industry.)

The continuing efforts to improve safety and working conditions in the cement industry have made safety increasingly important to the management of every cement plant. Proliferating federal, state, and local laws have placed even greater stress on the need for a good maintenance and safety program. The Cement Industry Committee has analyzed many areas to which safety requirements pertain, and through the working groups, recommended practices have evolved for the industry.

Several years ago the Safety Committee Working Group published its safety recommendations for the cement industry. At that time no attempt was made to cover recommended maintenance practices in cement plants; the present document, however, combines both maintenance and safety practices. This approach was agreed on by the working group and is based on the belief that sound maintenance practices go, of necessity, hand-in-hand with safety. As in the previous documents, the recommendations contained in this document are advisory and should be considered in that light. These recommendations have been agreed on by the working group, but they will certainly be altered to suit specific plant conditions. In general, however, it is hoped that these practices will provide sound, basic guidelines for the industry.

For these recommendations to be of maximum use to the cement industry, the users' comments are required. Comments should be concerned with areas not covered in this document, as well as with those requiring greater coverage in subsequent reports.

The working group wishes to acknowledge the guidance obtained from ANSI/NFPA No 70-1978; American National Standard National Electrical Code; Westinghouse Electric Corporation's "Maintenance Hints"; and the IEEE Cement Industry Committee Standards, IEEE Std 277-1975, Recommended Practice for Cement Plant Power Distribution, and IEEE Std 499-1974, Recommended Practices for Cement Plant Electric Drives and Related Electrical Equipment.

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Contents

SECTION	PAGE
1. General	5
1.1 Purpose	5
1.2 Scope	5
1.3 Objectives	5
2. Plant Equipment Numbers	5
3. Equipment Manufacturer's Data	6
4. Spare-Parts Inventory	6
5. Maintenance Department	6
5.1 Maintenance Department Objectives	6
5.2 Maintenance Schedules	7
5.3 Maintenance Work Orders	7
5.4 Maintenance Inspection and Repair Records	7
5.5 Repair and Maintenance Cost Records	8
6. Equipment Maintenance	8
6.1 Oil Circuit Breakers	8
6.2 Power Transformers	10
6.3 Medium-Voltage Switchgear	10
6.4 Storage Batteries	11
6.5 Secondary-Unit Substations	12
6.6 Medium-Voltage Motor Controllers	13
6.7 Controller Mechanism	13
6.8 SCR Controllers	13
6.9 Motor Control Centers	13
6.10 Motors and Generators	14
6.11 Control Devices	15
6.12 Instruments	15
6.13 Grounding System	20
6.14 Lighting System	20
6.15 Special Systems	21
7. Safety Precautions and Procedures	22
7.1 Safety Equipment	22
7.2 Safety Precautions	22
7.3 Working Procedures on Equipment	23
8. Bibliography	24

FIGURES

Fig 1 Sample Spare-Parts List	6
Fig 2 Sample Work Order	8
Fig 3 Sample Maintenance Inspection and Repair Record Card	9

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1. General

1.1 Purpose. The purpose of this recommended practice is to define and recommend practices for improving electrical maintenance and safety in the cement industry in order to promote:

- (1) Safety to personnel and equipment.
- (2) Maximum reliability with minimum loss of production
- (3) Reduced maintenance and increased equipment life
- (4) Clarification of needs and conditions to reduce special engineering and chance of error in specification
- (5) Overall economy

1.2 Scope. These recommendations apply to all electrical equipment such as substations, power transformers, motor controls, generators, distribution systems, instruments, and storage batteries commonly used in cement plants. They are intended as a guide and may be supplemented where special needs exist.

1.3 Objectives. It is urged that users and manufacturers cooperate with the working group to help formulate final recommendations that will ensure the use of proven equipment and methods. The ultimate objective is to establish recommendations that will assist in improving electrical maintenance and safety.

2. Plant Equipment Numbers

In order to facilitate the maintenance procedures, spare-parts inventory, and the filing system of the manufacturer's information, it is important that each machine and piece of equipment be assigned an identification number. There are many numbering systems that

can be used. Consider a computer-compatible system to aid inventory and cost control. A simple system is suggested here. The equipment numbers consist of a department letter or number as a prefix and a three-digit number assigned according to the material flow. The motors and controllers for the same item usually carry the same basic number. The auxiliary equipment for the item, an oil pump, for example, can carry a suffix such as point one (.1), or can have a separate identification number. For example:

K-325 or Kiln No 3 Coal Mill
25-325 (suitable for computer entry)

K-325.1 or Kiln No 3 Coal Mill Feeder
25-325.1 (suitable for computer entry)

The numbers for the auxiliary devices, for example, limit switches or pressures switches, could be the equipment numbers with a suffix such as LS or PS. For example:

K-326 LSO or Bucket gate open limit switch
25-326 LSO

Electrical equipment servicing more than one item in the same department, for example, control centers, secondary-unit substations, or operator's panels, can be identified with an abbreviated description and the department letter. For example:

CC "KIA" Kiln No 1 "A" Control Center

LC "KI" Kiln No 1 Secondary Unit Substation

OP "KI" Kiln No 1 Operator's Panel

Electrical equipment that is common to all departments, for example, power transformers or main switchgear, can be identified with abbreviated descriptions such as 10 MVA transformer or main 5 kV switchgear.

3. Equipment Manufacturer's Data

It is necessary to acquire from each manufacturer a complete data file of the specific equipment used in the plant. This will include a list of recommended spare parts, a set of drawings, operating instructions, part numbers for reordering replacement parts, trouble-shooting instructions, and suggested maintenance procedures. Practically all equipment manufacturers have this information available. This information is a definite prerequisite for a maintenance program. The manufacturer's data should include the following:

- (1) Drawings
 - (a) Schematic and wiring diagrams
 - (b) Operating description
 - (c) Outline and installation drawings
 - (d) Bill of material
- (2) Instructions
 - (a) Handling and storage instructions
 - (b) Installation instructions
 - (c) Operating instructions
 - (d) Trouble-shooting instructions
 - (e) Maintenance procedures
- (3) Spare Parts
 - (a) Part numbers
 - (b) Recommended spare parts
 - (c) Ordering instructions

This file will be set up for all electrical equipment, with every piece of information marked with the equipment identification numbers. This rule, in regard to setting up maintenance programs, shall be followed even more strictly if the equipment is old or not in good condition, or was hastily and improperly installed.

The equipment manufacturer's data files should be indexed, both according to the identification numbers and general category for easy access. It is also recommended that the original documents be kept in the file room and copies made for outside use, as required.

4. Spare-Parts Inventory

Spare parts are an important part of any maintenance department. Good maintenance records will help to determine what and how many parts are needed.

An accurate spare-parts inventory should be kept and made available for maintenance repairmen at all times. The spare-parts quantities should be maintained, with minimum quantities set depending on the availability of each item.

A sample of a good spare-parts list is shown in Fig 1.

5. Maintenance Department

5.1 Maintenance Department Objectives. The basic objective of any maintenance department is to avoid unexpected production outages due to equipment breakdowns. The usual cause of breakdowns is neglect or prolonged periods of operation without maintenance. The department interest should be focused on good preventive maintenance and the need for maximum utilization of time during normal shutdown.

Fig 1
Sample Spare-Parts List

Spare-Parts List			
Part in use	Description	Quantity Recommended	
		Max	Min
64	Scam panalarm division model 50-A1 plug-in relay, 120 V, 60 Hz	4	2
6	Scam panalarm division model 50-F1 flasher, 120 V, 60 Hz	2	2