NFPA No.

75

PROTECTION OF

ELECTRONIC COMPUTER/DATA PROCESSING EQUIPMENT 1968

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Official NFPA Definitions

Adopted Jan. 23, 1964. Where variances to these definitions are found, efforts to eliminate such conflicts are in process.

SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations or that which is advised but not required.

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*Among the laboratories nationally recognized by the authorities having jurisdiction in the United States and Canada are the Underwriters' Laboratories, Inc., the Factory Mutual Engineering Corporation, the American Gas Association Laboratories, the Underwriters' Laboratories of Canada, the Canadian Standards Association Testing Laboratories, and the Canadian Gas Association Approvals Division, and Yacht Safety Bureau.

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AUTHORITY HAVING JURISDICTION: The organization, office or individual responsible for "approving" equipment, an installation, or a procedure.

Units of Measurements

Units of measurements used here are U. S. standard. 1 U. S. gallon = 0.83 Imperial gallons = 3.785 liters. One foot = 0.3048 meters. One inch = 25.40 millimeters. One pound per square inch = 0.06805 atmospheres = 2.307 feet of water. One pound = 453.6 grams.

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1968 Edition of NFPA No. 75 -1968

The Association wishes to call attention to an oversight in the production of the 1968 Edition of the *Standard for the Protection of Electronic Computer/Data Processing Equipment* (NFPA No. 75), which was recently distributed. The oversight concerns Appendix *B*, which is an extract of Article 645 from the 1968 *National Electrical Code*.

At the 1968 Annual Meeting action was taken to revise three paragraphs in Article 645 of the 1968 *National Electrical Code* on the floor of the Meeting. Those changes were as follows:

Section 645-2(c): Revise Subparagraph (1) to read: "The raised floor is of suitable construction. See NFPA No. 75."

Revise Subparagraph (2) to read: "The supply conductors to receptacles are in rigid conduit, electrical metallic tubing, flexible metal conduit, Type MI mineral-insulated metal sheathed cable, or Type ALS aluminum sheathed cable."

Revise Subparagraph (3) to read: "Ventilation in the underfloor area is used for the data processing equipment and the data processing area only."

These changes were, of course, caught in the 1968 printing of the *National Electrical Code*, but Appendix *B* of NFPA No. 75 was printed before we had opportunity to make the changes.

The Association is now preparing a correction sheet for copies of the Standard still to be distributed, and all reprints will be corrected. We are also taking action to correct this detail in the printing of NFPA No. 75 in Volume 5 of the 1968-69 *National Fire Codes*.

Standard for the Protection of Electronic Computer/Data Processing Equipment

NFPA No. 75 — 1968

1968 Edition of No. 75

The 1968 edition of this Standard incorporates changes in the 1964 text which were prepared by the Committee on Electronic Computer Systems and adopted by the National Fire Protection Association at its May, 1968, Annual Meeting in Atlanta, Georgia. It supersedes the 1964 edition; Changes from the 1964 edition are shown on page 75-2.

Origin and Development of No. 75

The Committee on Electronic Computer Systems was formed by the action of the NFPA Board of Directors in January, 1960, following a request for standardization of fire protection recommendations by the computer industry.

The Committee first submitted the Standard for the Protection of Electronic Computer Systems to the 1961 NFPA Annual Meeting in Detroit, where it was tentatively adopted. At the 1962 Annual Meeting in Philadelphia, it was officially adopted as an NFPA Standard. Revisions were proposed and adopted in 1963, 1964 and again for this edition. A record of all changes and adoption discussion can be found in the NFPA "Technical Committee Reports" and "Proceedings" for the years indicated.

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SCOPE: To prepare standards for the protection of electronic computer equipment, components and associated records.

†Non-voting member.

Standard for the Protection of

Electronic Computer/Data Processing Equipment

NFPA No. 75 — 1968

CONTENTS

Changes in the 1968 Edition

Changes in the 1968 edition include: (1) change in the title; (2) addition of a new Par. 2303; (3) addition of word "noncombustible" to 2505; (4) addition of a second sentence to 6501 (b) (1); (5) revision of 6701; (6) revision of heading of 7100; (7) revision of 7301; (8) addition of new section 7400; (9) change of heading of Section 800; (10) insertion of new 8101 (b) and renumbering as necessary; (11) revision of 8102 (a) and (e); (12) addition of a new Appendix B duplicating new Article 645 from the 1968 National Electrical Code. In addition references have been updated and some editorial changes made consistent with the changes listed above.

Standard for the Protection of

Electronic Computer/Data Processing Equipment

NFPA No. 75 — 1968

FOREWORD

Electronic computer/data processing equipment has become a vital and commonplace tool for business, industry, government, and research groups in recent years. The use of such equipment is a direct result of the technological breakthroughs which have made the equipment available and the increased complexity of modern business, industrial, governmental, and research needs. Particularly pertinent are the increasing number of variables which must be taken into consideration in everyday decisions — overlooking any one item may spell the difference between profit and loss, success or failure, life or death. To keep track of all these variables, electronic computer/data processing equipment offers practical answers.

This equipment is being used on an ever increasing basis to process large amounts of statistical, problematical, or experimental information, and to print out answers or information in very short periods of time. More and more reliance is being placed on the equipment to perform the repetitive, the experimental, and in some cases, even the whole programming operation for business, industry, government, and research groups.

Much has been written on the procedural steps required for study before installing electronic computer/data processing equipment. These requirements embrace selection of proper equipment, checking and planning for areas to receive the equipment, utility requirements, orientation and training of personnel to operate the equipment, as well as consideration for expansion of the initial facility. One other factor should be included in this vital study — namely, fire protection.

Oftentimes, the strategic importance placed upon electronic computer/data processing equipment by the user is vitally tied to uninterrupted operation of the system. Consequently, by the partial or entire loss of this equipment, an entire operation of vital nature could be temporarily paralyzed.

Not to be overlooked are the "one-of-a-kind" electronic computer/data processing systems. These are the "custom-made" models that are designed to perform specific tasks. Replacement units for this type of equipment are not available and the probability of the existence of duplicate facilities, which could be used to perform vital operations in the event the "one-of-a-kind" system is partially or totally impaired by a fire, is remote.

Present information indicates that sustained temperatures in excess of about 140° F will cause malfunctioning of component parts within electronic computer/data processing equipment and temperatures of between 300° F to 500°F will cause extensive damage to particular units and will usually require their replacement. Smoke and particles which may be generated by fire also can adversely affect electronic computer/data processing system operations.

Planning for fire protection is vital due to an organization's dependence upon the electronic computer/data processing equipment. Once management commits itself to a program of dependence on any such equipment, simple economics dictates doing away with former methods and procedures. The personnel, equipment, and facilities are no longer available to pick up the load assumed by the data processing equipment if it is put out of operation by fire or other unforeseen occurrences. Often, the major cost involved to management by disruption of the computer operation is from business interruption rather than from the actual monetary loss represented by the equipment itself, although the latter may run into millions of dollars.

There are three major areas where judgment will be required in the application of this standard. They are:

1. Is this equipment important?
This is a judicious evaluation based on both what the equipment is and what it does. If it controls air traffic safety it can be vital to human life; if it controls corporate information it can be vital to business "life", but if its loss would be simply inconvenient, then, perhaps, it is not important even though expensive.

2. Does this equipment need special construction?
When special construction is needed in an important computer installation, it is essential that this construction of itself provide a safe environment for the equipment.

3. What is the exposure to the equipment? Exposure to destruction can come from within a computer cabinet, from within the equipment room, from the immediate area around the data processing room, from the floors above and below the computer, and from outside of the building in which the equipment is located. This exposure can be evaluated and then controlled as needed.

The application of this standard to the protection of an individual system will depend upon the answers to these three questions.

While this standard cannot cover all contingencies with hard and fast rules, it does give an indication of the major areas of consideration and will provide a basis for an intelligent evaluation of fire protection requirements. There is no substitute for informed consideration of common sense principles.

SECTION 100. PURPOSE AND SCOPE

1100. Purpose

1101. The purpose of this standard is to set forth the minimum requirements for the protection of electronic computer/data processing equipment from damage by fire or its associated effects.

1200. Scope

1201. This standard covers the requirements for installations of electronic computer/data processing equipment where either:

(a) Special building construction, rooms, areas, or operating environment are required, or

(b) Fire protection for the equipment is required.

1202. This standard presently does not cover installations of electronic computer/data processing equipment which can be made without this special construction or protection.

1203. This standard, however, may be used as a management guide for the installation of electromechanical data processing equipment, small table top or desk type units and electronic computer/data processing equipment that do not require special construction or protection.

SECTION 200. BUILDING CONSTRUCTION REQUIREMENTS

2100. Building Construction

2101. The computer area shall be housed in a fire-resistive, noncombustible or sprinklered building, except as noted in Paragraph 2102.

2102. When the portion of a nonfire-resistive structure housing a computer area is a separate fire division, only that portion of the structure housing the computer area is required to comply with Paragraph 2101.

2200. Location of Computer Area

2201. The electronic computer area shall be located to minimize fire, water, and smoke exposure from adjoining areas and activities.

2202. The computer room shall not be located above, below or adjacent to areas or other structures where hazardous processes are located unless adequate protective features are provided.

2300. Computer Room Construction

2301. The computer system shall be housed in a room of noncombustible construction or as permitted in Paragraph 5101. All materials including walls, floors, partitions, finish, acoustical treatment, raised floors, raised floor supports, suspended ceilings, and other construction involved in the computer room, shall have a flame-spread rating of 25 or less (see NFPA Standard Method of Test of Surface Burning Characteristics of Building Materials, No. 255, 1966).

(a) Floor covering materials, such as asphalt, rubber or vinyl floor tiles, linoleum, high pressure plastic laminates, or carpeting may be used to cover any exposed floors.

2302. In multistoried buildings, the floor above the computer room should be made reasonably watertight to avoid water damage to equipment. Any openings including those for beams and pipes should be sealed to watertightness.

2303. A structural floor on which a computer system is located, or which supports a raised floor installation shall incorporate provisions for automatic, positive drainage

of the floor surface to minimize damage to the system and associated wiring due to flooding, sprinkler operation, coolant leakage, or the like.

2400. Computer Room Fire Cutoffs

2401. Where exposure to the building housing the computer is unfavorable, good protection against exposure shall be provided. This protection should consist of blank masonry walls, or other suitable exposure protection, depending upon local conditions (see NFPA Suggested Practice for Protection Against Fire Exposure of Openings in Fire Resistive Walls, No. 80A-1925).

2402. The computer room shall be cut off from other occupancies within the building by noncombustible, fire-resistance-rated walls, floor and ceiling. The fire-resistance rating shall be commensurate with the exposure, but not less than one hour.

2403. The fire-resistant walls or partitions enclosing the computer room shall extend from the structural floor to the structural floor above, or the roof.

2500. Raised Floors (Where Required)

2501. Structural supporting members for raised floors shall be of concrete, steel, aluminum, or other noncombustible material.

2502. Decking for raised floors shall be one of the following:

(a) Concrete, steel, aluminum, or other noncombustible material.

(b) Pressure impregnated, fire-retardant treated lumber having a flame spread rating of 25 or less. (See NFPA Method of Test of Surface Burning Characteristics of Building Materials, No. 255-1966).

(c) Wood or similar core material which is encased on the top and bottom with sheet, cast or extruded metal, with all openings or cut edges covered with metal or plastic clips or grommets so that none of the core is exposed, and has an assembly flame spread rating of 25 or less. (See NFPA Method of Test of Surface Burning Characteristics of Building Materials, No. 255-1966).

2503. Existing combustible, structural floors shall be covered with an insulating noncombustible material before installing a raised floor.

2504. Access sections or panels shall be provided in raised floors so that all the space beneath is easily accessible.

2505. Openings in raised floors for electric cables or other uses shall be protected to minimize the entrance of debris or other combustibles beneath the floor. This may be accomplished by noncombustible covers, grilles, screens, or by locating equipment directly over the openings.

2600. Cable Openings

2601. Electric cable openings in floors shall be made smooth or shall be otherwise protected to preclude the possibility of damage to the cables.

SECTION 300. GENERAL COMPUTER ROOM REQUIREMENTS

3100. Materials and Equipment Permitted in the Computer Room

3101. Except as noted below, only the actual electronic computer equipment and such input-output or other auxiliary electronic equipment electronically interconnected with the computer, or which must be located in close proximity to the electronic computer equipment, shall be permitted within the computer room itself.

3102. All office furniture in the computer room shall be of metal construction or of other materials that do not contribute significantly to the combustible contents.

3103. Small supervisory offices and similar light hazard occupancies directly related to the electronic equipment operations may be located within the computer room if all furnishings are noncombustible and if adequate facilities are provided for containing the necessary combustible material. Supplies of paper or other combustible material shall be strictly limited to the minimum needed for safe efficient operations.

3104. Records may be kept in the computer room to the extent allowed in Section 600.

3105. The following shall not be permitted within the computer room:

(a) Any activity or occupancy not directly associated with the electronic computer system(s) involved.

(b) Supplies of paper or other combustible material in excess of that necessary for efficient operation.

(c) Service and repair shops and operations except for that servicing and repairing performed directly on machines which are impractical to remove from the computer room.

(d) Bulk storage of records (see Section 600).

(e) Any other combustible material, equipment or operation which constitutes a hazard and which can be removed.

3200. Combination of Systems

3201. Separate electronic computer systems should not be combined in a single computer room unless the systems are interconnected electronically, use the same input-output equipment or must be located in the same room for other operational reasons. Computers may be located in adjacent rooms with properly protected communicating openings in separating walls (see Section 200).

3300. General Storage

3301. The operation of an electronic computer system frequently requires considerable quantities of stationery supplies and other combustible support materials. This material can present a serious fire exposure within the computer room capable of causing serious damage to vital equipment or records.

3302. Paper stock, unused recording media, and other combustibles within the computer room shall be restricted to the absolute minimum necessary for efficient operation. Any such materials in the computer room shall be kept in totally enclosed metal file cases or cabinets.

3303. One or more storage rooms outside of the computer room should be provided for reserve stocks of paper, unused recording media and other combustibles (see sketch, Appendix A).

SECTION 400. CONSTRUCTION OF COMPUTER EQUIPMENT

4100. Types of Computer Equipment

4101. TYPE I. — So constructed, that if ignition is caused by a source within the unit, the fire may be expected to be localized, and resulting damage limited to the extent that the affected parts can be readily replaced.

4102. TYPE II. — So constructed that when de-energized fire is not likely to spread beyond the external housing of the unit in which the source of ignition is located.

4103. TYPE III. — Includes all equipment not defined in Types I and II above.

4104. Classification of all equipment into the three Types described above is being developed by the testing laboratories. Until this information is available, Underwriters' Laboratories listed equipment may be considered as meeting at least the Type II rating.

4200. Use of Approved or Listed Equipment

4201. Wherever possible, each installed electronic computer system or individual computer unit shall be a recognized Type I or Type II construction (as defined in Paragraphs 4101 and 4102).

4202. "Recognized" equipment is that equipment which has been accepted by the authority having jurisdiction as meeting the requirements for Type I and Type II. Approval or listing as Type I and Type II by Underwriters' Laboratories, Inc., Factory Mutual Engineering Corporation or other nationally recognized independent fire testing laboratories shall be considered as proof that equipment has met such standards.

4203. Any equipment not of a recognized construction shall be considered to be of a Type III construction in determining the applicable installation requirements pertaining to that particular equipment.

4300. Construction Features

4301. GENERAL. All non-electrical parts, such as housings, frames, supporting members, and the like, shall constitute no additional fire hazard to the equipment.

4302. CORDS. Approved flexible cord and plug assemblies, not to exceed 15 feet in length, may be used for con-

necting the computer to building wiring to facilitate interchange.

4303. CABLES. Interconnecting cables and wiring between units should be of a type approved for the purpose by a nationally recognized testing laboratory. Such cables shall be considered as a part of the computer system and suitable for installation on the floor or under a raised floor as described in Section 2500. If cables or other interconnecting wiring is of any other type, the equipment shall be so designed that the cables or wiring can be installed in accordance with the National Electrical Code (NFPA No. 70-1968, USAS C1-1968). See Appendix B.

4304. ENCLOSURES. Individual units of a system should be housed in metal or enclosures of other materials that will minimize the likelihood of fire propagation from the enclosure with suitable subdivisions to minimize the likelihood of fire spreading from one section to another within a single unit structure. Enclosures shall be designed to permit easy access to all interior sections in the event of an emergency.

4305. FILTERS. Air filters for use in individual units of a computer system shall be of approved types that will not burn freely or emit a large volume of smoke or other objectionable products of combustion when attacked by flames, so arranged that they can be readily removed, inspected, cleaned or replaced when necessary.

4306. POWER-OFF CONTROL. Each electronic computer system shall be so designed that, in the event of an emergency, the system can be de-energized by the operation of a suitably marked control at at least one location (see Section 700).

4307. FLUIDS. Except as noted below, oil shall not be used as a component of a unit of an electronic computer system. If the design of the unit is such that oil or equivalent fluid is required for cooling or other purposes, it shall have a flash point of 300° F or higher, and the container shall be of a sealed construction, incorporating automatic pressure relief devices.

4308. ACOUSTICAL MATERIALS. All sound deadening material used inside of computer equipment shall be of such material or so arranged that it does not increase the potential of fire damage to the unit or the potential of fire propagation from the unit.

SECTION 500. PROTECTION OF COMPUTER ROOMS AND EQUIPMENT

5100. Protection of Computer Rooms

5101. If the construction of the computer room contains any combustible material other than that permitted in Paragraph 2301, or if the computer housing or structure is built all or in part of combustible material, then the computer room shall be protected by an automatic sprinkler system.

5102. If the operation in the computer room involves a significant quantity of combustible materials (exclusive of that contained within electronics equipment and protected in accordance with Paragraph 5400), the computer room shall be protected by an automatic sprinkler system (see Paragraph 3105).

5103. Automatic sprinkler systems protecting computer rooms or computer areas shall conform to NFPA Standard for the Installation of Sprinkler Systems (No. 13-1968). Sprinkler systems protecting computer rooms should preferably be valved separately from other sprinkler systems.

5104. To minimize water damage to the electronic computer equipment located in sprinkler protected areas, it is important that power be off prior to the application of water on the fire. In facilities which are under the supervision of an operator or other person familiar with the equipment (during all periods that equipment is energized), the normal delay between the initial outbreak of a fire and the operation of a sprinkler system will provide adequate time for operators to shut down the power by use of the emergency shutdown switches as prescribed in Paragraph 7301. In other instances where a fire may operate sprinkler heads before discovery by personnel, a method of automatic detection should be provided to automatically de-energize the electronic equipment as quickly as possible.

5105. EXISTING COMBUSTIBLE RAISED FLOORS. Existing combustible raised floors, not meeting the requirements of Paragraph 2501, should be replaced with noncombustible construction wherever possible. If these combustible raised floors are not replaced, then:

(a) Smoke or fire detectors shall be provided in the air space below to sound an audible and visual alarm, and to shut down all electrical power passing through the air space, and

(b) Air spaces below shall be subdivided by tight noncombustible bulkheads into areas not exceeding that required for one system, or, in any case, not more than 10,000 sq. ft.

5106. PLENUM PROTECTION. The air spaces below a raised floor or above a suspended ceiling may be used as a plenum chamber for air conditioning if construction is noncombustible or in accordance with Paragraph 2501, and all wiring is of an approved type.

5107. PLENUM WIRING. Interconnecting cables and wiring between units should be of a type approved for the purpose by a nationally recognized testing laboratory. Such cables shall be considered as a part of the computer system. If cables or other interconnecting wiring is of any other type, the equipment shall be so designed that the cables or wiring can be installed in accordance with the National Electrical Code (NFPA No. 70-1968 USAS C1-1968). See Appendix B.

5200. Portable Fire Extinguishers

5201. Approved portable carbon dioxide extinguishers shall be provided and maintained for electrical fires. See NFPA Standard for the Installation of Portable Fire Extinguishers (No. 10-1968, USAS Z112.1-1968) and the NFPA Recommended Good Practice for the Maintenance and Use of Portable Fire Extinguishers (No. 10A-1968).

5202. Approved Class A type extinguishers shall be provided and maintained for ordinary combustible materials such as paper.

5203. If it is desired to provide other types of extinguishers, advice should be obtained from the computer equipment manufacturer and the authority having jurisdiction as to their acceptability.

5204. In installations where conditions may require the provision of inside hose, it shall be 1½-inch rubber lined with shutoff combination solid stream, water-spray nozzles.

5300. Training

5301. Designated persons working in the computer area shall be thoroughly trained in how to use each of the available types of manually operated fire fighting equipment. This training should show the capabilities and the limitations of the extinguishing equipment.

5302. All hand-type extinguishing equipment shall be plainly marked to indicate the type of fire for which it is intended, and installed and maintained in accordance with Paragraph 5201.

5400. Protection Requirements for Equipment

5401. In addition to the protection required elsewhere in this standard, each unit of an electronic computer system shall be provided with the following special protection:

5402. TYPE I EQUIPMENT. Type I equipment requires no special protection.

5403. TYPE II EQUIPMENT. There shall be available to each unit of Type II equipment an adequate means of extinguishing the maximum fire which may occur as follows:

(a) Carbon dioxide fire extinguishers or carbon dioxide hand hose systems installed in accordance with NFPA Standard for Carbon Dioxide Extinguishing Systems (No. 12-1968 USAS A54.1-1968), shall be considered as providing adequate extinguishing protection provided all of the following conditions are met:

(1) The equipment, during all periods that it is energized, is under supervision of an operator or other person familiar with the equipment and trained in the operation of the types of extinguishers or hand hose systems involved.

(2) Adequate controls are readily accessible to shut down power and air conditioning to the involved equipment (see Section 700).

(3) All interior sections are readily accessible to manual application of the extinguishing agents.

(4) There is located within the computer room and not more than 50 feet from the equipment under consider-

ation either a carbon dioxide fire extinguisher or carbon dioxide hand hose system having a capacity of at least one pound of carbon dioxide for each cubic foot of volume of the unit under consideration if the equipment is on open racks; — one-half pound for each cubic foot of volume if the unit under consideration is enclosed in a cabinet.

(b) Type II equipment not meeting the requirements of (a) above shall be protected by a fixed carbon dioxide extinguishing system conforming to the requirements of NFPA Standard for Carbon Dioxide Extinguishing Systems (No. 12-1968, USAS A54.1-1968).

5404. TYPE III EQUIPMENT. Because of the hazard presented by the possibility of communication of fire to other equipment outside of Type III units, hand applied extinguishing agents shall be considered inadequate except in the case of small (table top or desk size) units. Except for the previously mentioned small units, all Type III equipment shall be protected with a fixed carbon dioxide extinguishing system as described in Paragraph 5403 (b) above.

5405. CARBON DIOXIDE SYSTEM OPERATION. Fixed carbon dioxide extinguishing systems installed to meet the requirements of Paragraphs 5403 (b) or 5404 may be actuated solely by manual operation if, during all periods when the equipment is energized, it is under the supervision of an operator or other persons familiar with the equipment. In all other instances, the extinguishing system shall be provided with both manual and automatic actuation means.

5406. AUTOMATIC CARBON DIOXIDE SYSTEM ACTUATION. Automatic actuation of a carbon dioxide system should be by an approved method of detection meeting the requirements of NFPA Standard for Proprietary Protective Signaling Systems (No. 72D-1967). Particular attention shall be given in the choice of actuation means, to insure detection, considering the air flows usually involved in such systems, and the small heat release under fire conditions.

5407. CARBON DIOXIDE TRIGGERED ALARM AND SHUTDOWN. When called upon to operate, each fixed carbon dioxide extinguishing or carbon dioxide hand hose installation shall be arranged to automatically sound an alarm, and shut down power and air conditioning supplied to the equipment involved.

SECTION 600. PROTECTION OF RECORDS

6100. General

6101. The operation of most electronic computer systems involves obtaining, using, creating and storing large amounts of records. In many operations these records are as important to the continuity of the operation and its mission as the computer itself.

6200. Record Media

6201. Records may be the commonly encountered paper records, punch cards, plastic or metal base electronic tapes (on metal or plastic reels and in metal, plastic or cardboard containers), paper, control panels, magnetic discs, memory drums, memory cores or various other means of maintaining for future use information in plain or machine language, inside or outside of electronic equipment. Some of these records such as magnetic discs, memory drums and memory cores are usually found as an integral portion of electronic equipment and as such the protection of these records is covered in Section 500.

6202. It is extremely important to note that the degree of resistance of magnetic tape to fire exposure is not completely known. It is known, however, that fire exposures (heat and/or steam) that would not damage records on paper media may damage records on magnetic tape. The protection of records or magnetic tape by storage methods presently available must be considered limited.

6300. Types of Records

6301. Records involved in computer operations fall into five basic types which must be safeguarded according to their importance and the difficulty involved in their replacement as follows:

6302. INPUT DATA — Raw or partially refined information to be entered into the computer system, either as memory for later use or for immediate use in the solution of a problem, development of a statistic or production of some other product.

6303. MEMORY — Information previously converted to language or symbols immediately recognizable to the com-

puter equipment and held for future use. Memory may be on any media which can be directly read by the computer system.

6304. PROGRAM — Data, which may be on paper, punch cards, photographic, magnetic or electronic media, used to direct the computer as to which input or memory data to use, how to use it and the type of results to obtain. Also to be considered are any diagrams or other records which can be used to reproduce programs.

6305. OUTPUT DATA — The final product of the computer system. This may consist of printed material or electronic data.

6306. ENGINEERING RECORDS — Those plans, specifications, and other records which provide the engineering record of the construction, wiring, and arrangement of the computer system and its housing area. Of particular importance are records of modification made following the original installation.

6400. Value of Records

6401. The evaluation of records should be a joint effort of all parties concerned with the safeguarding of computer operations. The amount of protection provided for records shall be directly related to the importance of the records as measured by evaluation of what the loss of a particular record would mean in terms of the mission of the computer system and the re-establishment of operations after a fire. It is assumed that computer equipment capable of properly using the records will be available.

6402. The following classifications of records are based on the recommendations of NFPA Standard for the Protection of Records (No. 232-1967). All records shall be evaluated and assigned to one of these categories to ensure that adequate protection is provided where necessary and that unimportant records are not overprotected.

6403. CLASS I (VITAL) RECORDS — Records that are essential to the mission of the equipment, are irreplaceable, or would be needed immediately after the fire and could not be quickly reproduced. Examples might include key programs, master records, equipment wiring diagrams, and certain input-output and memory data.

6404. CLASS II (IMPORTANT) RECORDS — Records that are essential or important but which, with difficulty or extra expense, could be reproduced without a critical delay of any essential missions. Some programs, wiring diagrams, memory and input-output data have this level of importance.

6405. CLASS III (USEFUL) RECORDS — Records whose loss might occasion much inconvenience but which could readily be replaced and which would not be an insurmountable obstacle to prompt restoration of operations. Programs and procedures saved as examples of special problems are typical of records in this category.

6406. CLASS IV (NONESSENTIAL) RECORDS — Those records which on examination are found to be no longer necessary.

6500. Protection Required

6501. RECORDS KEPT WITHIN THE COMPUTER ROOM.

(a) The amount of records kept within the computer room shall be kept to the absolute minimum required for efficient operation. Nonessential records shall not be kept in the computer room.

(b) Any records regularly kept or stored in the computer room shall be provided with the following protection:

(1) Class I (Vital) or Class II (Important) records shall be stored in Class C or better records protection equipment. Approved Class 150 one-hour or better record protection equipment may be used in lieu of the Class C or better record protection equipment referred to above.

(2) Class III (Useful) records on paper based or plastic materials shall be stored in metal files or cabinets.

(3) Class III (Useful) records on metal based material require no special protection.

6502. RECORDS STORED OUTSIDE OF THE COMPUTER ROOM.

(a) To the maximum extent consistent with efficient operation, all record storage shall be outside of the computer room.

(b) Record storage room.

(1) Class I (Vital) and Class II (Important) records shall be stored in fire-resistive rooms. The degree of

fire resistance shall be commensurate with the fire exposure to the records, but not less than two hours (see Paragraph 6601).

(2) Unless the records are contained in metal files, cabinets or other noncombustible containers, records storage rooms shall also be provided with an automatic sprinkler system.

(3) Class III (Useful) and Class IV (Nonessential) records do not require any special fire protection unless these records are stored with vital or important records. In such case the requirements for the most valuable records apply to all records.

(4) The records storage room shall be used only for the storage of records. Spare tapes, however, may be stored in this room if they are unpacked and stored in the same manner as the tapes containing records. All other operations including splicing, repairing, reproducing, etc. shall be prohibited in this room.

(c) Portable extinguishing equipment for record storage rooms or areas should be installed in accordance with the Standard for the Installation of Portable Fire Extinguishers (NFPA No. 10-1968, USAS Z112.1-1968), and Protection of Records (NFPA No. 232-1967).

6503. When records are kept in cases, boxes or other containers, protection shall be that required for the highest level of damageable media in the total assembly of records and containers.

6504. It is recommended that the following be considered as limitations in the design of record storage rooms:

(a) Rooms containing only paper records shall not exceed 50,000 cubic feet.

(b) Rooms containing plastic based records in noncombustible containers shall not exceed 10,000 cubic feet.

(c) Rooms containing plastic based records in combustible containers shall not exceed 5,000 cubic feet.

6600. Duplication of Records

6601. The best protection for records consists of storing duplicate records in separate areas not subject to the

same fire. In some electronic computer operations the duplication of records on the same or different media is a common practice. The keeping of duplicate records is particularly important when records on magnetic tape are involved.

(a) All Class I (Vital) records shall be duplicated on the same or different media and the duplicates stored in an area which is not subject to a fire that may involve the originals, preferably in a separate building.

(b) Whenever practical, Class II (Important) records shall be similarly duplicated and stored.

(c) Class I (Vital) records not duplicated shall be protected in accordance with NFPA Standard on the Protection of Records (No. 232-1967).

6700. Protection Against Building Collapse

6701. Insofar as is possible, records storage equipment used for magnetic tapes should be located in an area not subject to building collapse due to the possibility of damage to the tapes if the records storage equipment is subject to impact.

SECTION 700. UTILITIES

7100. Air Conditioning and Coolant Systems

7101. Air conditioning equipment shall conform to the requirements of NFPA Standard for the Installation of Air Conditioning and Ventilating Systems (No. 90A-1968), and to the additional requirements set forth below.

7102. A separate air conditioning system should be provided for the computer area.

7103. Air ducts serving other areas should not pass through the electronic equipment area. When it is impractical to reroute such ducts, they shall be encased in a fire-resistive duct, equivalent to the fire resistance of the enclosure for the electronic equipment area, or provided with suitable fire dampers as outlined in NFPA Standard No. 90A.

7104. Air ducts serving other areas shall not pass through any computer records storage room.

7105. All duct insulation and linings shall be noncombustible, including vapor barriers and coatings.

7106. Air filters for use in air conditioning systems shall be of approved types that will not burn freely or emit a large volume of smoke or other objectionable products of combustion when attacked by flames and shall be so arranged that they can be readily inspected, cleaned and/or replaced when necessary.

7107. If the computer area is within an area which is air conditioned and additional air conditioning capacity is not required, the ducts serving the computer area should have suitable fire dampers, as outlined in NFPA Standard No. 90A.

7200. Electrical Service (See Appendix B)

7201. The requirements in this section apply to all power and service wiring supplying the electronic computer equipment. They do not apply to wiring and components within the actual equipment or to wiring connecting various units

of equipment. The equipment and interconnected wiring requirements are set forth in Section 400.

7202. Service equipment supplying the main power requirements of the computer room area should be of a type arranged for remote control or located to fulfill the requirements of Paragraph 7301.

7203. All wiring shall conform to the National Electrical Code (NFPA No. 70-1968, USAS C1-1968).

7204. Service transformers should not be permitted in the electronic computer area. However, if such a transformer must be installed in this area, it shall be of the dry type or the type filled with a nonflammable dielectric medium. Such transformers shall be installed in accordance with the requirements of the National Electrical Code.

7205. Protection against lightning surges shall be provided where needed in accordance with the requirements of the National Electrical Code.

7206. The number of junction boxes in underfloor areas should be kept to a minimum. If they must be used, they shall be metal, completely enclosed, easily accessible, properly grounded and in compliance with the National Electrical Code, requirements as to construction. They shall be securely fastened to the floor. No splices or connections shall be made in the underfloor area except within junction boxes or approved type receptacles or connectors.

7300. Emergency Power Controls

7301. In addition to any integral individual disconnect switches for components or other units of the data processing system, a disconnecting means shall be provided as a part of the main service wiring which shall be controlled from locations readily accessible to the operator's control panel, and to the principal exit doors and which, when actuated, shall disconnect the power to all electronic equipment in the electronic computer area and to the air conditioning system serving that area.

7302. Provision should be made for emergency lighting.

7400. Coolant Systems

7401. If a separate coolant system is required for operation of a computer installation, it shall be provided with a suitable alarm to indicate inadvertent loss of fluid.

SECTION 800. EMERGENCY PROCEDURES

8100. Preplanning for Continued Operation in an Emergency

8101. The continued operation of an electronic computer system is dependent on information stored on cards, tape, discs, drums, etc. Therefore, the preplanning for continued operation should include:

(a) A program to protect records in accordance with their importance as set forth by Section 600.

(b) An analysis of the work load and the effect upon continuity of operations should be prepared for each computer facility.

(c) Arrangements for emergency use of other installed computer equipment to cover:

(1) Plans for transportation of personnel, data and supplies to emergency computer locations.

(2) Agreements and procedures for the emergency use of the computer equipment.

(d) Programs designed with adequate number of checkpoints and restarts to ensure rapid recovery to normal operations.

8102. Personnel should receive continuing instructions in:

(a) Method required for turning off all electrical power to the computer both under normal and emergency conditions.

(b) Turning off the air conditioning to the area.

(c) Alerting the Fire Department or company fire brigade.

(d) Evacuation of personnel.

(e) The location of and proper operation and application of all available fire extinguishing and damage control equipment including automatic detection and extinguishing equipment. Because of the noise and of the need for skillful operation of carbon dioxide extinguishing equipment, computer room personnel should be fully trained in carbon dioxide usage through actual operating of the equipment on a practice fire.

(f) The importance of records and their storage requirements.

8200. Emergency Fire Procedure

8201. A written emergency fire plan should be prepared for and posted at each installation which assigns specific responsibilities to designated personnel. The following major items are suggested as minimum features of this plan.

8202. Remove all power to the computer system.

(a) MEANS
Main line circuit breaker or equivalent for turning off all power.

(b) LOCATION OF CONTROL FOR DISCONNECTING MEANS
Remote controls for operating the disconnect located convenient to the operator and next to each exit door.

8203. Shut down air conditioning system.

(a) IN CASES OF COMPLETELY SEPARATE SYSTEMS ONLY
Emergency means similar to that described in Paragraph 8202 provided to turn off the computer room air conditioning. They should also be located near the emergency power shut-off device.

(b) IN CASES OF REGULAR BUILDING SYSTEMS ONLY
Emergency means similar to that described in Paragraph 8202 provided to close off all duct dampers leading to and from the computer