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NFPA 75 Protection of Electronic Computer/Data Processing Equipment 1989 Edition

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NFPA 75

Standard for the Protection of

Electronic Computer/Data Processing Equipment

1989 Edition

This edition of NFPA 75, *Standard for the Protection of Electronic Computer/Data Processing Equipment*, was prepared by the Technical Committee on Electronic Computer Systems and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 15-18, 1989 in Washington, DC. It was issued by the Standards Council on July 14, 1989, with an effective date of August 7, 1989, and supersedes all previous editions.

The 1989 edition of this document has been approved by the American National Standards Institute.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Origin and Development of NFPA 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 and it was tentatively adopted. At the 1962 Annual Meeting it was officially adopted as an NFPA standard. Revisions were adopted in 1963, 1964, 1968, 1972, 1976, 1981, and 1987.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 9 and Appendix D.

Chapter 1 Introduction

1-1 Scope.

1-1.1 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.

1-1.2 This standard does not cover installations of electronic computer/data processing equipment that can be made without this special construction or protection. It may, however, be used as a management guide for the installation of electrically powered mechanical data processing equipment, small table-top or desk-type units, and electronic computer/data processing equipment that do not require special construction or protection.

1-1.3* 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 that the one-of-a-kind system is partially or totally impaired by a fire, is remote.

Special attention is directed to 5-3.1, 5-3.2, 5-5.1, and Chapter 6. Chapter 6 is particularly important as the value of the records to the continuity of operations may far outweigh the importance of the equipment.

1-2 Purpose. 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, i.e., smoke, corrosion, heat, water.

1-3* Risk Considerations. The following factors shall be considered when determining the need for protecting the environment, equipment, function, programming, records, and supplies:

(a) Life safety aspects of the function (i.e., process controls, air traffic controls);

(b) Fire threat of the installation to occupants or exposed property;

(c) Economic loss from loss of function or loss of records; and

(d) Economic loss from value of equipment.

1-4 Telecommunications. In assessing and evaluating the damage and interruption potential of the loss of computer room operations, attention shall be given to the impact of the loss of data and communications lines. The complexity and scope of on-line computer operations make it necessary to link the computer to access terminals and other computers to perform a wide variety of functions.

If this is vital to the operation, rooms housing the services shall be constructed in accordance with Chapter 2 and protected in accordance with Chapter 5. These rooms shall be secured, locked, and free of extraneous combustibles.

1-5 Definitions. Unless expressly stated elsewhere, the following terms shall, for the purpose of this standard, have the meanings indicated below.

Approved. Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Business Interruption. The effect on business operations from the time that equipment was initially lost or damaged until it has been restored to the former level of operation.

Console. A unit containing main operative controls of the system.

Easily Accessible. When the covers, panels, doors, or other enclosures for the electronic components within the equipment or the flooring can be removed or opened by quick, simple operations to expose any area that might be involved in fire and permit the application of an extinguishing medium.

Electronic Computer System. Any electronic digital or analog computer, along with all peripheral, support, memory, programming, or other directly associated equipment, records, storage, and activities.

Electronically Interconnected. Units that must be connected by a signal wire to complete a system or perform an operation.

Fire-Resistant Construction. That type of construction in which the structural members, including walls, partitions, columns, floors, and roof construction, have fire resistance ratings of time duration not less than that specified in this standard.

Heat Detector. A device that detects abnormally high temperature or rate-of-temperature rise.

Interconnecting Cables. Signal and power cables for operation and control of system (usually supplied by computer manufacturer).

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Master Record. A record of information on a medium that can be referred to whenever there is a need to rebuild a data base.

Noncombustible. A material which, in the form in which it is used and under the conditions anticipated, will not aid combustion or add appreciable heat to an ambient fire. Materials, when tested in accordance with ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C*, and conforming to the criteria contained in Section 6 of the referenced standard shall be considered as noncombustible.

Program. Instructions to direct system operation.

Raised Floor. A platform with removable panels on which machines are installed, with the intervening space between it and the mainbuilding floor used to house the interconnecting cables and at times as a means for supplying conditioned air to the data processing machines and the room. (Sometimes referred to as a false floor or secondary floor.)

Separate Fire Division. A portion of a building cut off from all other portions of the building by fire walls, fire doors, and other approved means adequate to prevent any fire that may occur in one fire division from extending to another fire division.

Shall. Indicates a mandatory requirement.

Should. Indicates recommendations or that which is advised but not required.

Smoke Detector. A device that detects the visible or invisible particles of combustion.

Supervision. Continuous surveillance of a system or operation by special supervisory equipment or personnel to alert those responsible that failure has occurred or that a hazardous condition is being approached.

Water Sensor. A device or means that will detect the presence of water.

Chapter 2 Construction Requirements

2-1* Primary Building Construction.

2-1.1 The computer area shall be housed in a fire-resistant, noncombustible, or sprinklered building, or fire division.

2-1.2 Where exposure to the building housing the computer is unfavorable, appropriate exposure protection shall be provided.

NOTE: NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, is one method.

2-1.3* The computer room shall be separated from other occupancies within the building (including atria or other open space construction) by fire-resistant rated walls, floor, and ceiling constructed of noncombustible or limited combustible materials. The fire resistance rating shall be commensurate with the exposure, but not less than one hour. (*See Appendix C.*)

2-1.4 The fire-rated enclosures of the computer room and/or storage rooms shall extend from the structural floor to the structural floor above, or the roof.

2-2* Prerequisites for Location of Computer Area Within the Primary Building.

2-2.1* The electronic computer area shall be located to minimize exposure to fire, water, corrosive fumes, heat, and smoke from adjoining areas and activities.

2-2.2* 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.

2-3 Computer Area Interior Construction.

2-3.1* All materials used in construction within cutoff areas, including walls, floors, partitions, finish, acoustical treatment, raised floors, suspended ceilings, and other construction involved in the computer room, shall have a flame spread rating of 25 or less. (*See NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.*)

Exception: Resilient tiles or high-pressure plastic laminates may be used as the wearing surface on any exposed floors. Carpeting shall meet the requirement of 0.45 watts/cm² (0.51 BTU/sec ft) as per NFPA 253, and shall not restrict the lifting of panels for access to underfloor space.

2-3.1.1 Exposed cellular plastics shall not be used in computer room construction.

NOTE: Plastics interior to a fire-rated assembly are permitted.

2-3.2* A structural floor on which a computer system is located, or which supports a raised floor installation, shall incorporate provisions for drainage of the floor surface to minimize damage to the system and associated wiring due to domestic water leakage, sprinkler operation, coolant leakage, or fire fighting operations.

2-4* Raised Floors.

2-4.1 Structural supporting members for raised floors shall be of concrete, steel, aluminum, or other noncombustible material.

2-4.2 Decking for raised floors shall be one of the following:

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

(b) Pressure impregnated, fire-retardant treated lumber having a flame spread rating of 25 or less (*see NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials*), or

(c) Wood or similar core material that 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 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.*)

2-4.3 Existing combustible raised floors shall be replaced with construction meeting the requirements of 2-4.1 and 2-4.2, or

(a) An automatic detection and extinguishing system shall be installed in the space below the raised floor. This additional automatic detection system shall meet the requirements of Section 5-2 and shall sound an audible and visual alarm; and

(b) Air space below the raised floor shall be subdivided into areas not exceeding 10,000 sq ft (929 sq m) by tight noncombustible bulkheads.

2-4.4 Access sections or panels shall be provided in raised floors so that all the space beneath is easily accessible. Tools needed to provide access to the underfloor space shall be located in the raised floor area and well marked.

2-4.5 Electric cable openings in floors shall be made smooth or shall be otherwise protected to preclude the possibility of damage to the cables.

2-4.6 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.

NOTE: This may be accomplished by noncombustible covers, grilles, screens, or by locating equipment directly over the openings.

2-5 Cable Openings and Other Penetrations.

2-5.1 Cable openings or other penetrations into the computer area shall be firestopped with material that has an F-Rating equal to the fire resistance rating of the penetrated fire barrier when tested with a positive furnace pressure of 0.04 ± 0.01 inches (1.01 ± 0.25 mm) of water under ASTM E814-83, *Standard Method of Fire Tests of Through Penetration Fire Stops.*

2-5.2 Where openings (e.g., pass-throughs or windows) are installed in the fire-rated wall of a computer room, they shall be equipped with an automatic rated fire shutter. The shutter shall be operated automatically by the presence of either smoke or fire on either side of the wall.

2-6 Plenums. When the air space below a raised floor or above a suspended ceiling is used as a supply or return for air conditioning, the construction shall be noncombustible. All wiring shall conform to NFPA 70, Article 645, of the National Electrical Code.® (*See Appendix B.*)

Chapter 3 General Computer Room Requirements

3-1 Materials and Equipment Permitted in the Computer Room.

3-1.1 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 that which must be located in close proximity to the electronic computer equipment, shall be permitted within the computer room itself.

Exception No. 1: Small supervisory offices and similar Light Hazard Occupancies directly related to the electronic equipment operations may be located within the computer room if adequate facilities are provided for containing the necessary combustible material.

Exception No. 2: Records may be kept in the computer room to the extent allowed in Chapter 6.

3-1.2 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.

3-1.3 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 combustibles such as paper, corrugated boxes, cards, inks, or equivalent printing materials, in excess of that needed for efficient operation.

(c) Service and repair shops and operations, except for those service and repair operations performed directly on machines for which removal from the computer room is impractical.

(d) Bulk storage of records. (*See Chapter 6.*)

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

3-2 General Storage.

3-2.1 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, or if provided for in individual machine design, shall be limited to the quantity prescribed and located in the area designated by the equipment manufacturer.

NOTE: 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.

3-2.2 Reserve stocks of paper, unused recording media, and other combustibles shall be stored in one or more rooms outside of the computer room.

3-2.3 The space beneath the raised floor shall not be used for storage purposes. Cables not planned for use in the near future shall be removed.

Chapter 4 Construction of Computer Equipment

4-1 Computer Equipment.

4-1.1* Each individual unit shall be constructed so that by limiting combustible materials, or by use of enclosures, fire is not likely to spread beyond the unit in which the source of ignition is located. Enclosures of floor standing equipment having external surfaces of combustible materials of such size that might contribute to the spread of an external fire shall have a flame spread rating of 50 or less. (*See NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.*) Automatic protection shall be provided for all units not so constructed. (*See Chapter 5.*)

4-1.2 Listed equipment shall be considered as meeting the requirements of 4-1.1.

4-1.3 Equipment and replacement parts meeting the requirements of UL 478, *Electronic Data Processing Units and Systems*, shall be considered as meeting the requirements of 4-1.1 and 4-2.

4-2 Construction Features.

4-2.1 Cables. Interconnecting cables and wiring between units, power cords, plugs, and connectors shall be of a listed type. They shall be considered as part of the computer system and suitable for installation on the floor or under a raised floor as described in Section 2-4.

4-2.2 Cords. Approved flexible cord and plug assemblies used for connecting computer equipment to the branch circuit to facilitate interchange shall not exceed 15 ft (4.57 m) in length.

4-2.3 Filters. Air filters for use in the cooling systems of individual units shall be of such material or so arranged that they do not increase the potential of fire damage to the unit or the potential of fire propagation from the unit. They shall be so arranged that they can be readily removed, inspected, cleaned, or replaced when necessary.

4-2.4 Liquids. If the design of the unit is such that oil or equivalent liquid is required for lubrication, cooling, or hydraulic purposes, it shall have a closed-cup flash point of 300 °F (149 °C) or higher, and the container shall be of a sealed construction, incorporating automatic pressure relief devices.

4-2.5 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.

Chapter 5 Fire Protection Equipment

5-1 General. Fire detection and extinguishing systems shall be selected after a complete evaluation of the exposures. The amount of protection provided shall be related to the building construction and contents, equipment construction, business interruption, and security need.

NOTE: For amplification of the important need of fire protection, see Sections 1-3 and 1-4.

5-1.1 The alarms and trouble signals of automatic detection or suppression systems shall be arranged to annunciate at a constantly attended location.

5-2 Automatic Detection Systems. Automatic detection equipment shall be installed to provide early warning of fire. The equipment used shall be a listed smoke detection type. Each installation shall be engineered for the specific area to be protected, giving due consideration to air currents and patterns within the space and shall be installed and maintained in accordance with NFPA 72E, *Standard on Automatic Fire Detectors.*

NOTE: If electric power service (not furnished to the fire alarm control panel or its own backup emergency power package) is uti-

lized to affect interlock and shutdown sequences, the availability of the electric power supply should be supervised by the fire alarm control panel.

5-3 Portable Extinguishers and Hose Lines.

5-3.1* Listed portable carbon dioxide, Halon 1301, or Halon 1211 extinguishers shall be provided and maintained for use on electrical fires (*see NFPA 10, Standard for Portable Fire Extinguishers*).

5-3.2 Listed extinguishers of plain water type or halogenated agent with a minimum rating of Class 2A shall be provided and maintained for use on fires in ordinary combustible materials, such as paper and plastics. (*See NFPA 10, Standard for Portable Fire Extinguishers.*)

5-3.3 A sign shall be located adjacent to each portable extinguisher and shall plainly indicate the type of fire for which it is intended.

5-3.4 In installations where conditions may require the provision of inside hose, it shall be 1½-in. (3.81-cm) rubber-lined hose with shutoff and combination solid-stream and water-spray nozzles. They shall be installed and maintained in accordance with NFPA 14, *Standard for the Installation of Standpipe and Hose Systems.*

5-3.5 In installations where conditions may require the provision of carbon dioxide hand hose lines, the lines shall be installed and maintained in accordance with NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems.*

5-4 Automatic Sprinkler Systems.

5-4.1 An automatic sprinkler system shall be provided to protect the computer room when:

(a) The computer room construction contains any combustible materials other than permitted in 2-3.1, or

(b) The enclosure of a unit in a computer system, or the unit structure, is built all or in part of a significant quantity of combustible materials, or

(c) The operation of the computer room involves a significant quantity of combustible materials.

5-4.2* Automatic sprinkler systems protecting computer rooms or computer areas shall be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

NOTE: To minimize damage in electronic computer equipment located in sprinkler protected areas, it is important that power be off prior to the application of water on the fire.

5-5 Halon 1301 Total Flooding Systems.

5-5.1* Where there is a critical need to protect data in process, reduce equipment damage, and facilitate return to service, consideration shall be given to the use of Halon 1301 total flooding systems in sprinklered or nonsprinklered computer rooms.

5-5.2 In installations where Halon 1301 total flooding systems are used, they shall be installed and maintained in accordance with the requirements of NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems.*

5-5.3 Halon 1301 systems shall be automatically actuated by an approved method of detection, meeting the requirements of NFPA 72E, *Standard on Automatic Fire Detectors*; and a listed releasing device compatible with the Halon 1301 system.

NOTE: The Halon 1301 system may be actuated by the automatic fire detection system required in Section 5-2 when designed to do so.

5-5.4 Where operation of the air handling system would exhaust the agent supply, the Halon 1301 system shall be interlocked to shut down the air handling system when the Halon 1301 system is actuated. This requires that all environmental design criteria (e.g., damper closure, fan shutdown, sealed openings, etc.) be carefully maintained to insure that needed concentration for extinguishment will be achieved.

NOTE: It is preferable but not essential to deenergize computer equipment prior to discharge if computer shutdown does not cause major service interruptions.

5-5.5 Alarms shall be provided to give positive warning of a discharge or pending discharge.

5-6 Training. Designated computer room personnel shall be continually and thoroughly trained in the functioning of all detector equipment, desired response to alarm conditions, location of all emergency equipment and tools, and the use of all available extinguishing equipment. This training shall encompass both the capabilities and limitations of each available type of extinguisher, and proper operating procedures of the extinguishing systems.

5-7 Expansion or Renovations. Whenever significant changes are made to the computer room (i.e., size, installation of new partitions, modification of the air handling systems, or revised computer equipment layout) the potential impact on existing fire detection and extinguishing systems shall be evaluated, and appropriate changes shall be made.

Chapter 6 Protection of Records

6-1* General.

6-1.1* Record Media.

6-1.2 Classification of Records.

6-1.2.1 The evaluation of records shall be a joint effort of all parties concerned with the safeguarding of computer operations. The amount of protection provided for any record shall be directly related to its importance in terms of the mission of the computer system and the reestablishment of operations after a fire.

NOTE: It is assumed that computer equipment capable of properly using the records will be available. (*See Chapter 8.*)

6-1.2.2 Records Classes. The following records classes are based on recommendations of NFPA 232, *Standard for the Protection of Records*:

(a) *Vital Records.* Vital records are those that are irreplaceable, such as: records of which a reproduction does not have the same value as an original; records needed to sustain the business promptly or to recover monies with which to replace buildings, equipment, and raw materials,

finished goods, and work in process; and records needed to avoid delay in restoration of production, sales, and service.

(b) *Important Records.* Important records are those of which a reproduction could be obtained only at considerable expense and labor or only after considerable delay.

(c) *Useful Records.* Records whose loss might occasion much inconvenience but that could readily be replaced and that would not be an insurmountable obstacle to prompt restoration of operations. Programs and procedures retained as examples of special problems are typical of records in this category.

6-2 Duplication of Records. All vital and important records shall be duplicated or protected in accordance with NFPA 232, *Standard for the Protection of Records*. Duplicate records shall be stored in an area that is not subject to a fire, or its associated effects, which may involve the originals.

6-3 Protection Required.

6-3.1 Records Kept Within the Computer Room.

6-3.1.1 The amount of records kept within the computer room shall be kept to the absolute minimum required for efficient operation. Only records that are essential to the computer operations may be kept in the computer room.

Exception: Records may be kept within the computer room if they are stored inside or mounted on approved computer equipment, the primary function of which is to retrieve and mount the records onto an electronic computer system.

6-3.1.2 Any records regularly kept or stored in the computer room shall be provided with the following protection:

(a) Vital or important records that have not been duplicated shall be stored in approved Class 150 one-hour or better record protection equipment.

(b) All other records shall be stored in closed metal files or cabinets.

6-3.2 Records Stored Outside of the Computer Room.

6-3.2.1 Record Storage Rooms.

(a) Vital and important records that have not been duplicated 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 Section 6-2.*)

NOTE: Useful 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.

(b) Unless the records are contained in closed metal files, cabinets, or other noncombustible containers, records storage rooms shall also be provided with an automatic sprinkler system or automatic 1301 total flooding Halon system in accordance with Sections 5-4 and 5-5.

(c) The records storage room shall be used only for the storage of records. All other operations including splicing, repairing, erasing, reproducing, cataloging, etc., shall be prohibited in this room.

Exception: Spare tapes may be stored in this room if they are unpacked and stored in the same manner as the tapes containing records.

6-3.2.2 The limitations on the size of the record storage rooms shall be based upon the type of records and level of protection, as follows:

(a) Rooms containing plastic-based records in combustible containers shall not exceed 10,000 cu ft (283.2 m^3).

(b) Rooms containing plastic based records in noncombustible containers shall not exceed 20,000 cu ft (566.4 m^3).

(c) Rooms containing only paper records shall not exceed 50,000 cu ft (1416 m^3).

NOTE: Storage rooms with an automatic sprinkler system or automatic total flooding Halon 1301 system protection in (a), (b), and (c) may be doubled in size.

6-3.2.3 Portable extinguishing equipment and hose lines for record storage rooms or areas shall be installed in accordance with 5-3.1, 5-3.2, 5-3.3, 5-3.4, and 5-3.5.

6-3.3 When records are kept in supply cabinets, or other containers, protection shall be that required for the highest class of damageable media in the total assembly of records and containers.

Chapter 7 Utilities

7-1 Air Conditioning and Coolant Systems.

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

7-1.1 Unless a separate air conditioning system is provided for the computer area, air conditioning equipment shall conform to the requirements of NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*, and to the additional requirements in 7-1.2 through 7-1.5.

7-1.2 If the air conditioning system for the computer room also serves other areas, dampers to protect against both smoke and fire shall be provided in the ductwork at all penetrations through the computer room fire division.

7-1.3 Air ducts serving other areas either shall not pass through the electronic equipment area, or suitable fire dampers shall be provided in the ducts.

7-1.4 All duct insulation and linings shall be noncombustible, including vapor barriers and coatings.

7-1.5* Air filters for use in air conditioning systems shall be listed types that will not burn freely or emit a large volume of smoke or other objectionable products of combustion when attacked by flames. They shall be so arranged that they can be readily inspected and cleaned or replaced when necessary.

7-2 Electrical Service. (*See Appendix B.*)

NOTE: 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 Chapter 4.

7-2.1 Service equipment supplying the main power requirements of the computer area shall be of a type arranged for remote control or located to fulfill the requirements of Section 7-3.

7-2.2 All wiring shall conform to NFPA 70, *National Electrical Code®*.

7-2.3 If a premise transformer must be installed in the computer 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 NFPA 70, *National Electrical Code.*

NOTE: Service entrance transformers should not be permitted in the electronic computer area.

7-2.4* Protection against lightning surges shall be provided where needed in accordance with the requirements of NFPA 70, *National Electrical Code.*

7-2.5 The number of junction boxes in underfloor areas shall be kept to a minimum. Where 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. No splices or connections shall be made in the underfloor area except within junction boxes or approved type receptacles or connectors.

7-3 Emergency Power Controls. A disconnecting means shall be provided to disconnect the power to all electronic equipment in the computer room. This disconnecting means shall be controlled from locations readily accessible to the operator at the principal exit doors. There shall also be a similar disconnecting means to disconnect the air conditioning system serving this area.

NOTE: Provision should be made for emergency lighting.

7-4 Coolant Systems. If a separate coolant system is required for operation of a computer installation, it shall be provided with a suitable alarm to indicate loss of fluid.

Chapter 8 Emergency Procedures

8-1* There shall be a management approved written, dated, and annually tested plan covering emergency procedures for continued operations.

8-2* There shall be a management approved written, dated, and annually tested emergency fire plan.

8-3* There shall be a management approved written, dated, and annually tested damage control plan.

Chapter 9 Referenced Publications

9-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

9-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 10-1988, *Standard for Portable Fire Extinguishers*

NFPA 12-1989, *Standard on Carbon Dioxide Extinguishing Systems*

NFPA 12A-1989, *Standard on Halon 1301 Fire Extinguishing Systems*

NFPA 13-1989, *Standard for the Installation of Sprinkler Systems*

NFPA 14-1986, *Standard for the Installation of Standpipe and Hose Systems*

NFPA 70-1990, *National Electrical Code*

NFPA 72E-1987, *Standard on Automatic Fire Detectors*

NFPA 90A-1989, *Standard for the Installation of Air Conditioning and Ventilating Systems*

NFPA 232-1986, *Standard for the Protection of Records*

NFPA 253-1984, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*

NFPA 255-1984, *Standard Method of Test of Surface Burning Characteristics of Building Materials.*

9-2 Other Publications.

9-2.1 ASTM Publications. American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19105.

ASTM E136-1982, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C*

ASTM E184-1983, *Standard Method of Fire Tests of Through Penetration Fire Stops.*

9-2.2 UL Publication. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

UL 478-80, 5th edition, *Electronic Data Processing Units and Systems.*

Appendix A

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-1-1.3 In assessing and evaluating the damage and business interruption potential of the loss of computer room operations, attention should be given to the impact of the loss of data-link and telephone communications lines. The complexity and scope of on-line computer operations makes it necessary to link the computer to access terminals and

other computers to perform a wide variety of functions. Where a computer system is dependent upon such data-link and telephone communication for a significant portion of its continuous on-line business transactions, enhanced protection for these assets should be considered.

Rooms housing these services should be constructed in accordance with Chapter 2, equipped with a detection system in accordance with Section 5-2, and protected with an automatic Halon 1301 total flooding system. The Halon total flooding system may be augmented by an automatic sprinkler system. These rooms should be secured, locked, and free of combustibles.

A-1-3 Risk Considerations. Electronic computer/data processing equipment is a vital and commonplace tool for business, industry, government, and research groups. The use of such equipment is a direct result of the increased complexity of modern business, industrial, governmental, and research needs. Particularly pertinent are the increasing number of variables that 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 has become the accepted tool to process large amounts of statistical, problematical, or experimental information, and to print out or display answers or information in very short periods of time. 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.

Risk considerations include the 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, protection against fires of either accidental or deliberate origin, i.e., sabotage and incendiary.

Computer equipment and materials for data recording and storage may incur damage when exposed to elevated sustained ambient temperatures. The degree of such damage will vary depending upon exposure, equipment design, and the composition of materials for data recording and storage.

Business Interruption. 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 decision will be required. They are:

(a) Is this equipment important?

This is an 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."

(b) Does this equipment need special construction and/or environment?

When the equipment or the activity it supports is governed by this standard, the areas considered should include fire detection, fire extinguishment, and building construction.

(c) What is the exposure to the equipment?

Exposure to damage or destruction to the equipment 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 should 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 it gives an indication of the major areas of consideration and provides a basis for an intelligent evaluation of fire protection requirements. There is no substitute for informed consideration of common sense principles.

Temperature Considerations. The following are guidelines concerning high sustained ambient temperatures:

(a) Damage to functioning computer equipment may begin at a sustained ambient temperature of 175 °F (79.4 °C), with the degree of damage increasing with further elevations of the ambient temperature and exposure time.

(b) Damage to magnetic tapes, flexible discs, and similar media may begin at sustained ambient temperatures above 100 °F (37.8 °C). However, damages occurring between 100 °F (37.8 °C) and 120 °F (48.9 °C) can generally be reconditioned successfully, where the chance of successful reconditioning lessens rapidly with elevations of sustained ambient temperatures above 120 °F (48.9 °C).

(c) Damage to disc media may begin at sustained ambient temperatures above 150 °F (65.6 °C) with the degree of damage increasing rapidly with further elevations of sustained ambient temperature.

(d) Damage to paper products (including punched cards) may begin at a sustained ambient temperature of 150 °F (65.6 °C). Paper products that have not become brittle will generally be salvageable.

(e) Damage to microfilm may begin at a sustained ambient temperature of 225 °F (107.2 °C) in the presence of steam or at 500 °F (260.0 °C) in the absence of steam.

A-2-1 The structural floor supporting the computer area should have sufficient floor loading capacity to sustain the expected floor load.

A-2-1.3 Experience with fires affecting computer rooms has demonstrated that the fire often starts in areas other

than the computer area and that the fire and its related products including smoke, soot, and heat can enter the computer room if it is not adequately separated by sealed rated walls. Consideration should be given to raising the rating of perimeter walls to two hours where adjacent walls are already rated 2 hours or greater.

The prudent facilities manager would do well to limit the exposure fire hazard by locating a computer facility in a fully sprinklered building.

A-2-2 Security. Many computer and data processing installations have become prime targets for sabotage and arson. The location and construction should be designed to minimize the possibility of penetration by an explosive or incendiary device. It is essential that access be restricted to only those persons absolutely necessary to the operation of the equipment. A controlled-access system of admittance through positive identification should be maintained at all times.

A-2-2.1 Steam, water, or horizontal drain piping should not be in the space above the suspended ceiling and over computer equipment other than for sprinkler system use.

A-2-2.2 Basement areas should not be considered for the location of a computer area. If computers must be located in a basement, precautions should be taken to facilitate smoke venting and prevent flooding from interior and exterior sources that may occur, including a fire on an upper floor.

A-2-3.1 Fire protection authorities generally prefer that hard-surfaced materials be used on computer room floors, and object to most carpeting. Because of the need in some computer rooms for special floor coverings, a useful guide for selection is the Underwriters Laboratories Inc. *Standard Method of Test for Flame-Propagation Classification of Flooring and Floor Covering Materials* (Subj. 992).

A-2-3.2 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. Where drainage is installed in an area containing an underfloor extinguishing system, provisions should be made for maintaining the drain piping as a closed system unless water is present. This is required to assure the integrity of a gaseous extinguishing system and allow for maintenance of the necessary concentration level. As water will evaporate from the standard plumbing trap, mineral oil or another substitute should be considered.

Underfloor spaces should be provided with leak detection when any utility or computer auxiliary cooling fluids are piped into the computer room, or are capable of entering the room from adjoining areas.

A-2-4 The determination of the depth of the raised floor should take into consideration air movement, fire detection and extinguishing systems requirements (if installed), as well as building construction restrictions.

A-4-1.1 All non-electrical parts, such as housings, frames, supporting members, and the like, should not constitute additional fire hazard to the equipment.

A-5-3.1 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.

A-5-4.2 Automatic sprinkler systems protecting computer rooms or computer areas should be maintained in accordance with NFPA 13A, *Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems.* In facilities that 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 Section 7-3. In other instances when a fire may operate sprinkler heads before discovery by personnel, a method of automatic detection should be provided to automatically deenergize the electronic equipment as quickly as possible.

Sprinkler systems protecting computer rooms should be valved separately from other sprinkler systems.

A-5-5.1 If major concerns over potential fire loss to specific critical data or equipment or of serious interruption to operations cannot be resolved or alleviated by equipment redundancy, subdivision of the computer area, or the use of leased facilities, automatic Halon total flooding may be the only feasible approach to handling an incipient fire situation with an acceptable minimum amount of damage. At the same time, this sophisticated protection approach requires that all environmental design criteria (e.g., damper closure, fan shutdown, sealed openings, etc.) be carefully maintained to ensure that the needed concentration for extinguishment will be achieved.

A-6-1 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.

A-6-1.1 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 Chapter 6.

A-7-1.5 Electric reheat units can collect dust over a period of time. When heat is applied after several months of nonuse, a significant amount of dust and lint may accumulate on the heating elements and, when the elements are energized, may cause sufficient smoke particles to actuate a sensitive smoke detector in the smoke exhaust (air discharge) area. These reheat units should be set up with a weekly timer circuit to *burn off* the small amounts of dust that have collected, and maintain these reheat units in a *clean* condition.

A-7-2.4 In addition to surges, the building housing a computer area should be considered for effective lightning protection in accordance with NFPA 78, *Lightning Protection Code.*

A-8-1 Emergency Procedures for Continued Operation. Emergency procedures for the continued operation of an electronic computer system should include but not be limited to the following:

(a) A program to protect records in accordance with their importance as set forth by Chapter 6.

(b) An analysis of the work load and its effect upon continuity of operations.

(c) A written set of requirements for the backup site, including:

1. Backup files and equipment required.
2. Configuration of main frame computer and peripheral units.
3. Alternate locations for backup processing.
4. Availability of backup system.
5. Telecommunications required at backup site.
6. Files, input work, special forms, etc., needed.
7. Personnel staffing and transportation.
8. Agreements and procedures for the emergency use of computer equipment at a contingency site.

A-8-2 A written emergency fire plan should be prepared for and posted at each installation that assigns specific responsibilities to designated personnel. Personnel should receive continuing instructions in at least the following:

(a) The method of turning off all electrical power to (1) the computers under both normal and emergency conditions and (2) the air conditioning systems serving the area.

(b) Alerting the fire department or fire brigade.

(c) Evacuation of personnel and designated assembly area.

(d) The operations of all fire extinguishing and damage control equipment including automatic detection equipment.

(e) The use of extinguishers through actual operation on a practice fire.

A-8-3 Damage Control Plan. A damage control plan should provide a means for at least the following:

(a) Preventing or minimizing damage to electronic equipment.

(b) Preventing or minimizing damage to other operations and equipment.

For example, whenever electronic equipment or any type of record is wet, smoke damaged, or otherwise affected by the results of a fire or other emergency, it is vital that immediate action be taken to clean and dry the electronic equipment. If the water, smoke, or other contaminations are permitted to remain in the equipment longer than absolutely necessary, the damage may be grossly increased.

In addition, a means should be provided for preventing water damage to electronic equipment. The proper method of doing this will vary according to the individual equipment design. Consideration should be given to the provision of waterproof covers, which should be stored in easily accessible locations.

Appendix B

Extract of Article 645 — Electronic Computer/Data Processing Equipment from the 1990 *National Electrical Code* (NFPA 70-1990)

This portion of the Appendix is considered part of the requirements of the document.

ARTICLE 645 — ELECTRONIC COMPUTER/DATA PROCESSING EQUIPMENT

645-1. Scope. This article covers equipment, power-supply wiring, equipment interconnecting wiring, and grounding of electronic computer/data processing equipment and systems, including terminal units, in an electronic computer/data processing room.

(FPN): For further information, see Protection of Electronic Computer/Data Processing Equipment, NFPA 75-1989 (ANSI).

645-2. Special Requirements for Electronic Computer/Data Processing Equipment Room. This article applies provided all the following conditions are met:

(1) Disconnecting means complying with Section 645-10 are provided.

(2) A separate heating/ventilating/air conditioning (HVAC) system is provided that is dedicated for electronic computer/data processing equipment use and is separated from other areas of occupancy. Any HVAC system that serves other occupancies may also serve the electronic computer/data processing equipment room if fire/smoke dampers are provided at the point of penetration of the room boundary. Such dampers shall operate on activation of smoke detectors and also by operation of the disconnecting means required by Section 645-10.

(FPN): For further information, see Protection of Electronic Computer/Data Processing Equipment, NFPA 75-1989 (ANSI).

(3) Listed electronic computer/data processing equipment is installed.

(FPN): For further information, see Protection of Electronic Computer/Data Processing Equipment, NFPA 75-1989 (ANSI), Section 4-1.3.

(4) Occupied only by those personnel needed for the maintenance and functional operation of the installed electronic computer/data processing equipment.

(FPN): The computer room is not to be used for the storage of combustibles beyond that necessary for the day-to-day operation of the equipment. For further information, see Protection of Electronic Computer/Data Processing Equipment, NFPA 75-1989 (ANSI).

(5) The room is separated from other occupancies by fire-resistant-rated walls, floors, and ceilings with protected openings.

(6) The building construction, rooms, or areas and occupancy comply with the applicable building code.

645-5. Supply Circuits and Interconnecting Cables.

(a) Branch Circuit Conductors. The branch circuit conductors supplying one or more units of a data processing system shall have an ampacity not less than 125 percent of the total connected load.

(b) Connecting Cables. The data processing system shall be permitted to be connected to a branch circuit by any of the following means listed for the purpose:

(1) Computer/data processing cable and attachment plug cap.

(2) Flexible cord and an attachment plug cap.

(3) Cord-set assembly. When run on the surface of the floor, they shall be protected against physical damage.

(c) Interconnecting Cables. Separate data processing units shall be permitted to be interconnected by means of cables and cable assemblies listed for the purpose. Where run on the surface of the floor, they shall be protected against physical damage.

(d) Under Raised Floors. Power cables, communications cables, connecting cables, interconnecting cables, and receptacles associated with the data processing equipment shall be permitted under a raised floor provided:

(1) The raised floor is of suitable construction and the area under the floor is accessible.

(FPN): See Protection of Electronic Computer/Data Processing Equipment, NFPA 75-1989 (ANSI).

(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, metal wireway, surface metal raceway with metal cover, flexible metal conduit, liquidtight flexible metal or nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of Section 300-11.

(3) Ventilation in the underfloor area is used for the data processing equipment and data processing area only.

(4) Openings in raised floors for cables protect cables against abrasions and minimize the entrance of debris beneath the floor.

(e) Securing in Place. Power cables, communications cables, connecting cables, interconnecting cables, and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, electronic computer/data processing equipment shall not be required to be secured in place.

645-6. Cables not in Computer Room. Cables extending beyond the computer room shall be subject to the applicable requirements of this Code.

(FPN): For signaling circuits, refer to Article 725; for fiber optic circuits, refer to Article 770; and for communication circuits, refer to Article 800. For fire protective signaling systems, refer to Article 760.

645-7. Penetrations. Penetrations of the fire resistant room boundary shall be in accordance with Section 300-21.

645-10. Disconnecting Means. A means shall be provided to disconnect power to all electronic equipment in the electronic computer/data processing equipment room. There shall also be a similar means to disconnect the power to all dedicated HVAC systems serving the room and cause all required fire/smoke dampers to close. These disconnecting means shall be grouped and identified and shall be controlled from locations readily accessible at the principal exit doors. A single means to control both the electronic equipment and HVAC systems shall be permitted.

Exception: Installations qualifying under the provisions of Article 685.

645.11. Uninterruptible Power Supplies (UPS). UPS systems installed within the electronic computer/data processing room, and their supply and output circuits, shall comply with Section 645-10. The disconnecting means shall also disconnect the battery from its load.

Exception: Installations qualifying under the provisions of Article 685.

645-15. Grounding. Electronic computer/data processing equipment shall be grounded in accordance with Article 250 or double insulated. Power systems derived within listed electronic computer/data processing equipment that supply electronic computer/data processing systems through receptacles or cable assemblies supplied as part of this equipment shall not be considered separately derived for the purpose of applying Section 250-5(d). All exposed noncurrent-carrying metal parts of an electronic computer/data processing system shall be grounded.

(FPN): Where isolated grounding-type receptacles are used, see Section 250-74, Exception No. 4.

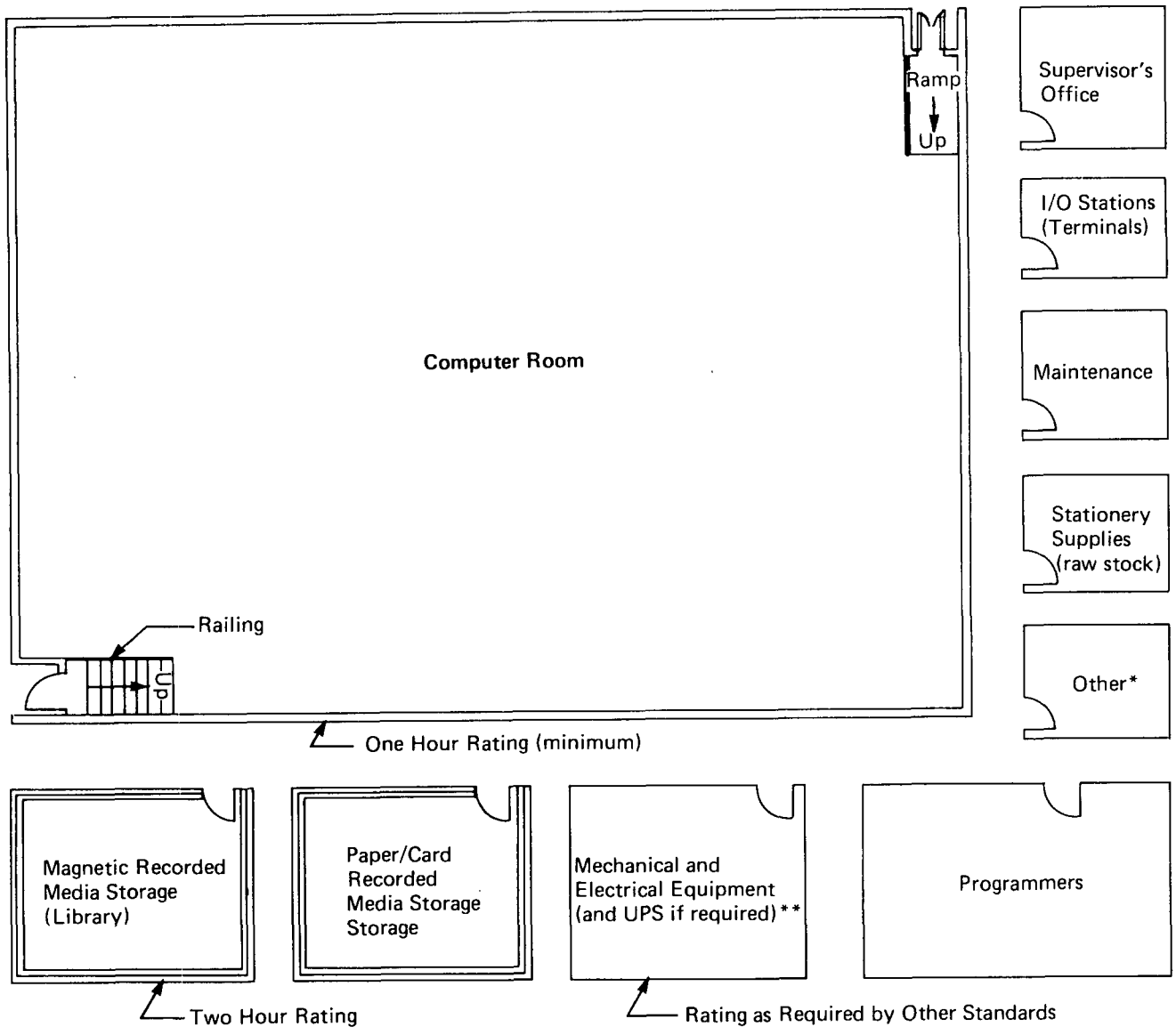
645-16. Marking. Each unit of an electronic computer/data processing system supplied by a branch-circuit shall be provided with a manufacturer's nameplate, which shall also include the input power requirements for voltage, frequency, and maximum rated load in amperes.

Appendix C Example of a Computer Area

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

The rooms shown are symbolic and do not denote size, shape, or location.

Supervisor and Maintenance Rooms normally are adjacent to and have direct access to the Computer Room. Computer Rooms normally have a raised floor.



*Other: Receptionist, Security Station, Communications

**UPS: Uninterruptable Power Supply (Motor/Generator or Solid State Systems)

Diagram of Computer Area

Appendix D Referenced Publications

D-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

D-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 13A-1987, *Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems*

NFPA 78-1989, *Lightning Protection Code*

NFPA 80A-1987, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures.*

D-1.2 DOE Publication. US Dept. of Energy, EH-34, Washington, DC 20545.

DOE/EP-0108-1986, *Standard for Fire Protection of DOE Electronic Computer/Data Processing Systems,* Appendix B, Reconditioning of Flooded and Smoke-Contaminated Equipment.

D-1.3 UL Publication. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

UL 992, *Standard Method of Test for Flame-Propagation Classification of Flooring and Floor Covering Materials, 3rd edition.*

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