

BOARD OF REGENTS OF THE UNIVERSITY SYSTEM OF GEORGIA
270 Washington Street, S.W.
Atlanta, Georgia 30334-1450

DIRECTOR OF ENVIRONMENTAL AFFAIRS
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October 29, 1998

(404) 656-2247
FAX 657-1479

MEMORANDUM

TO: Directors of Facilities, Plant Operations and EHS Coordinators

FROM: Mark Demyanek, Director of Environmental Affairs *Mark*

SUBJECT: Fire Marshal Ruling on Emergency Generators

As you are aware, it is our policy to require that back-up emergency generators used for University System facilities be fueled by natural gas. We believe that utility-provided natural gas offers a more environmentally responsible and safer alternative than diesel or other fuel stored in on-site tanks.

It was recently pointed out to me that NFPA 70 and NEC 700-12(b)(2) state that emergency generators used to operate fire and life safety systems in buildings must be powered by a fuel source "stored" on the premises. Based on this, it is conceivable that the Fire Marshal could interpret that we would be required to install extra diesel, propane or other fuel tanks on our emergency generators in addition to the normal utility-provided natural gas supply as a kind of "double back-up" fuel source. In our opinion, natural gas supplies on University System campuses should be sufficiently reliable and redundant; and there should be no need for additional on-site fuel storage which could create more serious environmental and/or safety liabilities.

In an effort to clarify this, I requested a written ruling from the State Fire Marshal's Office for facilities of the University System of Georgia. We are very pleased with their favorable ruling. For your use and future reference, I am attaching a copy of our correspondence. Thanks and please let me know if you wish to discuss anything regarding this issue.

cc: Mr. William K. Chatham, Vice Chancellor for Facilities
Mr. Gerald Donaldson, RTK Coordinator



OFFICE OF INSURANCE AND SAFETY FIRE COMMISSIONER

JOHN W. OXENDINE
COMMISSIONER OF INSURANCE
SAFETY FIRE COMMISSIONER
INDUSTRIAL LOAN COMMISSIONER
COMPTROLLER GENERAL

October 15, 1998

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2 MARTIN LUTHER KING, JR., DRIVE
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Mark L. Demyanek, CIH, CPS
Director of Environmental Affairs
Board of Regents of the University System of Georgia
270 Washington Street, S.W.
Atlanta, Georgia 30334-1450

RE: Fuel Sources for Emergency Generators

Dear Mr. Demyanek:

This letter is written as a follow-up to your written correspondence on September 23, 1998, regarding emergency generators back-up fuel source. Article 700-12 (b)(3) of the *National Electrical Code* (NEC) has an exception which states the following. "Exception: Where acceptable to the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and the power from the outside electrical utility company." Based upon my research, Article 700-12 (b)(2) and Article 700-12 (b)(3) of the *National Electrical Code* (NEC) are written and explained as an extension of each other rather than separate requirements. Based upon this exception and based upon the "track record" of the natural gas pipelines in Georgia and their supply sources, it has been and still is the policy of this office to accept natural gas as an alternative fuel source to run an emergency generator in lieu of requiring an on-site fuel supply on-premise.

If this office can be of further assistance to you, please contact us at (404) 656-7087.

Sincerely,

M. Dwayne Garriss
President

MDG/mdg

cc: All Engineering/Inspection Personnel

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OFFICE OF FACILITIES

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BOARD OF REGENTS OF THE UNIVERSITY SYSTEM OF GEORGIA
270 Washington Street, S.W.
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DIRECTOR OF ENVIRONMENTAL AFFAIRS
E-mail: mdemyano@mail.regents.peachnet.edu

September 23, 1998

(404) 656-2247
FAX 657-1479

Mr. M. Dwayne Garriss, Assistant State Fire Marshall
Safety Fire Division - Insurance Commissioner's Office
Suite 620, West Tower, Floyd Building
No. 2 Martin Luther King, Jr. Drive
Atlanta, GA 30334

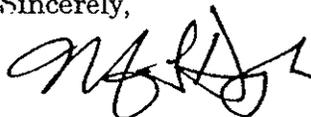
Dear Dwayne:

As a follow-up to our phone conversation yesterday, I am writing to request a clarification of current state requirements for fuel sources on emergency generators which are used for fire and life safety system back-up power.

As we discussed, it is currently our policy to require emergency generators in our facilities to be powered by natural gas as opposed to diesel fuel (or other on-site fuel) due to environmental and safety concerns. However, NFPA-70 and NEC 700-12(b)(2) state that emergency generators used for fire and life safety system back-up power must be powered by a fuel source "stored" on the premises. It is conceivable that this could be interpreted as requiring us to install extra diesel, propane or other fuel tanks on our emergency generators as more or less a "double back-up" fuel supply. As I mentioned to you, it is our belief that the natural gas utility supply service provided to our University System facilities is sufficiently redundant and reliable enough to preclude the need for additional on-site fuel sources. During our conversation, you indicated that the State Fire Marshal's Office has generally concurred that utility-provided natural gas service alone may be sufficient for powering emergency generators. We would appreciate your written ruling on this issue as it applies to University System of Georgia facilities.

Thank you very much for your assistance.

Sincerely,



Mark L. Demyanek, CIH, CSP
Director of Environmental Affairs

cc: Mr. William K. Chatham, Vice Chancellor for Facilities
Ms. Linda M. Daniels, Asst. Vice Chancellor for Facilities
BOR Program Managers

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required for the application but not to exceed 10 seconds. The supply system for emergency purposes, in addition to the normal services to the building and meeting the general requirements of this section, shall be permitted to comprise one or more of the types of systems described in (a) through (d) below. Unit equipment in accordance with Section 700-12(e) shall satisfy the applicable requirements of this article.

In selecting an emergency source of power, consideration shall be given to the occupancy and the type of service to be rendered, whether of minimum duration, as for evacuation of a theater, or longer duration, as for supplying emergency power and lighting due to an indefinite period of current failure from trouble either inside or outside the building.

Equipment shall be designed and located to minimize the hazards that might cause complete failure due to flooding, fires, icing, and vandalism.

Equipment for sources of power as described in Sections 700-12(a) through (d) where located within assembly occupancies greater than 1000 persons or in buildings above 75 ft (23 m) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile, shall be installed either in spaces fully protected by approved automatic fire suppression systems (sprinklers, carbon dioxide systems, etc.), or in spaces with a 1-hour fire rating.

(FPN No. 1) For definition of occupancy class, see Section 4-1 of *Life Safety Code*, NFPA 101, 1994.

(FPN No. 2) Assignment of degree of reliability of the recognized emergency supply system depends on the careful evaluation of the variables at each particular installation.

(a) **Storage Battery.** Storage batteries used as source of power for emergency systems shall be of suitable rating and capacity to supply and maintain the total load for a period of 1½ hours minimum, without the voltage applied to the load falling below 87½ percent of normal.

Batteries, whether of the acid or alkali type, shall be designed and constructed to meet the requirements of emergency service and shall be compatible with the charger for that particular installation.

For a sealed battery, the container shall not be required to be transparent. However, for the lead acid battery that requires water additions, transparent or translucent jars shall be furnished. Automotive-type batteries shall not be used.

An automatic battery charging means shall be provided.

(b) Generator Set.

(1) A generator set driven by a prime mover acceptable to the authority having jurisdiction and sized in accordance with Section 700-5. Means shall be provided for automatically starting the prime mover on failure of the normal service and for automatic transfer and operation of all required electrical circuits. A time-delay feature permitting a 15-minute setting

shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.

(2) Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided with an on-premise fuel supply sufficient for not less than 2 hours of demand operation of the system.

(3) Prime movers shall not be solely dependent upon a public utility gas system for their fuel supply or municipal water supply for their cooling systems. Means shall be provided for automatically transferring from one fuel supply to another where dual fuel supplies are used.

Exception: Where acceptable to the authority having jurisdiction, the use of other than on-site fuels shall be permitted where there is a low probability of a simultaneous failure of both the off-site fuel delivery system and power from the outside electrical utility company.

(4) Where a storage battery is used for control or signal power, or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set.

(5) Generator sets that require more than 10 seconds to develop power shall be acceptable, provided an auxiliary power supply will energize the emergency system until the generator can pick up the load.

See Figure 700-1

(c) **Uninterruptible Power Supplies.** Uninterruptible power supplies used to provide power for emergency systems shall comply with the applicable provisions of Sections 700-12(a) and (b).

(d) **Separate Service.** Where acceptable to the authority having jurisdiction as suitable for use as an emergency source, a second service shall be permitted. This service shall be in accordance with Article 230, with separate service drop or lateral, widely separated electrically and physically from the normal service, to minimize the possibility of simultaneous interruption of supply.

(e) **Unit Equipment.** Individual unit equipment for emergency illumination shall consist of (1) a rechargeable battery; (2) a battery charging means; (3) provisions for one or more lamps mounted on the equipment, or shall be permitted to have terminals for remote lamps, or both, and (4) a relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment. The batteries shall be of suitable rating and capacity to supply and maintain at not less than 87½ percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 1½ hours, or the unit equipment shall supply and maintain not less than 60 percent of the initial emergency illumination for a period of at least 1½ hours. Storage batteries, whether of the acid or alkali type, shall be designed and constructed to meet the requirements of emergency service.

When designing emergency systems, whether for lighting, power, or both, consideration must be given to the type of service to be rendered.

Supply systems for emergency systems can be designed in one or more of the following:

1. One storage battery or a group of storage batteries provided with an automatic battery-charging means. See also Article 480 and paragraph (a) of this section.

2. A generator set driven by a prime mover, acceptable to the authority having jurisdiction, and with adequate capacity to carry the maximum load connected. Prime movers may be internal-combustion engines, steam or gas turbines, or other approved types. A storage battery used to start the prime mover is required to be provided with an automatic battery-charging means. An on-site fuel supply sufficient to operate internal-combustion engines at full load for 2 hours is required to be available.

Off-site fuel supplies may be used where experience has demonstrated their reliability. Off-site fuel supplies may also be used where they will provide greater reliability than gasoline or diesel engines or in isolated areas where maintenance or refueling could be a problem.

Some types of drivers, particularly large ones, may take longer than 10 seconds to accelerate and develop generator voltage. Gas and steam turbines and large internal-combustion engines may have prolonged starting times. Depending on the specific loads, short-time supply could be provided by an uninterruptible power supply; a generator shared with other loads; or a generator with limited emergency supply, such as an expander, steam turbine, or waste heat system.

3. Two services, overhead or underground, widely separated electrically and physically, and preferred by some authorities to be completely independent of each other; that is, separate service locations and separate transformers and supplied from separate utility substations where practical.

4. Uninterruptible power supplies (UPS), which generally include a rectifier, storage battery, and inverter to act. These may be very complex systems with redundant components and high-speed solid-state switching. It is common practice to include an automatic bypass for UPS malfunction to permit maintenance.

5. The use of a separate service requires a judgment by the authority having jurisdiction. Such judgment should be based on the nature of the emergency loads and the expected reliability of the other available sources.

Unit equipment shall be permanently fixed in place (i.e., not portable) and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in Chapter 3. Flexible cord and plug connection shall be permitted,

provided that the cord does not exceed 3 ft (914 mm) in length. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. The branch circuit feeding unit equipment shall be clearly identified at the distribution panel. Emergency illumination fixtures that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment as required by Section 700-9 and by one of the wiring methods of Chapter 3.

Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is provided with a lock-on feature.

Unit equipment may be wired with a flexible cord (not exceeding 3 ft in length) and attachment plug cap. This equipment must be permanently fixed in place, usually by mounting screws accessible only from within the unit. One or more lamps may be mounted on or remote from the unit. The unit should be located where it can be readily checked or tested for proper performance.

Unit equipment is intended to provide illumination for the area where it is installed. For instance, if a unit is located in a corridor, it is required to be connected to the branch circuit supplying the normal corridor lights (on the line side of any switching arrangements). In the event of loss of normal power, the unit would automatically energize the unit lamps, restoring illumination to the corridor. A separate circuit is not permitted for unit equipment (except as noted in the exception) because, if applied to the above example, failure of the normal corridor circuit would not affect the unit equipment, and the corridor would remain in darkness. The branch circuit feeding the unit must be identified at the panelboard.

Notes on General Requirements for Emergency Lighting Systems

At least two sources of power are required to be provided — one normal supply and one or more emergency systems described in Section 700-12. The sources may be (1) two services, one normal supply and one emergency supply (preferably from separate utility stations), (2) one normal service and a storage battery (or unit equipment) system, or (3) one normal service and a generator set. See Figures 700-3 and 700-4.

A transfer means (or throw-over switch) is required to be provided to energize the emergency equipment from the alternate supply when the normal source of supply is interrupted.

Where two services are used, both may operate normally, but equipment for emergency lighting and power is required to be arranged to be energized from either service.

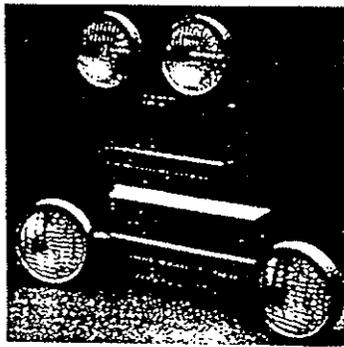


Figure 700-2. Self-contained, fully automatic unit equipment for operating emergency lighting located on the unit or for remotely located exit signs or lighting heads. (Dual-Lite Inc.)

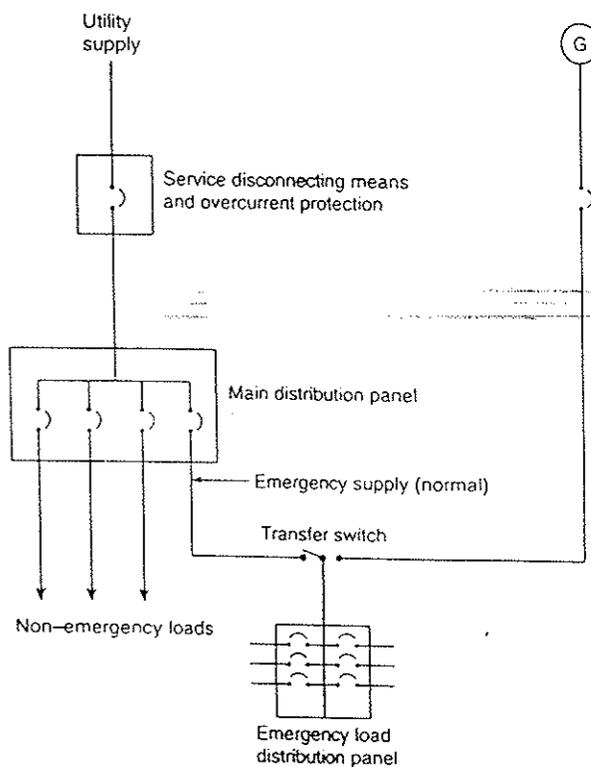


Figure 700-3. Emergency load arranged to be supplied from a generator, as permitted by Section 700-12(b).

Where the alternate or emergency source of supply is a storage battery or generator set, the single emergency system is usually operated on the normal service, and the battery (or batteries) or generator operates only if the normal service fails. However, a generator may be used for peak load shaving, etc., in accordance with Section 700-5(b).

Two or more separate and complete systems may be used to provide current for emergency lighting, but means are required to be provided for energizing one system upon the failure of the other.

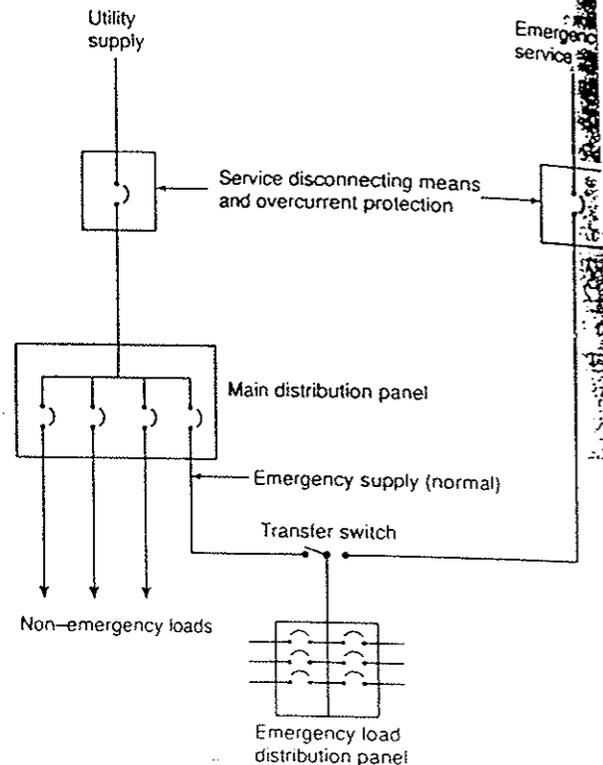


Figure 700-4. Emergency load arranged to be supplied from two widely separated services, as permitted by Section 700-12(d). Upon failure of one service, the emergency load will be transferred to the other service.

It should be noted that provisions for disconnecting means and overcurrent protection (see Figures 700-3 and 700-4) are to be provided for emergency systems as required by Article 230. See also Section 230-83.

D. Emergency System Circuits for Lighting and Power

700-15. Loads on Emergency Branch Circuits. No appliances and no lamps, other than those specified as required for emergency use, shall be supplied by emergency lighting circuits.

700-16. Emergency Illumination. Emergency illumination shall include all required means of egress lighting, illuminated exit signs, and all other lights specified as necessary to provide required illumination.

Emergency lighting systems shall be so designed and installed that the failure of any individual lighting element, such as the burning out of a light bulb, cannot leave in total darkness any space that requires emergency illumination.

Where high-intensity discharge lighting such as high- and low-pressure sodium, mercury vapor, and metal halide is used as the sole source of normal illumination, the emergency lighting system shall be required to operate until normal illumination has been restored.