PREFACE

This publication has been prepared as a guide for Architectural and Engineering (A&E) firms in the preparation of documents for the design and construction of new structures and the remodeling of existing structure for Indiana University. Items pertinent to requirements of Indiana University are contained herein.

The specification section numbers referenced by these standards are to help the A&E firms identify where IU Engineering standards are to be applied. These specification section numbers are based upon CSI standards and may not correspond to a particular A&E firm’s standard specification section numbering scheme.

Compliance with codes and OSHA regulations are minimum requirements. When requirements of Federal and/or State Codes are at variance with the contents of this publication, the most demanding requirements shall be observed.

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IT IS NOT INTENDED THAT THESE STANDARDS BE COPIED AND USED AS A SPECIFICATION!

MATERIAL CONTAINED HEREIN SHALL NOT BE COPIED VERBATIM IN SPECIFICATIONS OR IN NOTES ON THE DRAWINGS EXCEPT WHEN INSTRUCTIONS ARE GIVEN TO COPY CERTAIN ARTICLES OR PARAGRAPHS.

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Changing technology and changes in State or University policies will require continuing revisions of these standards. Revisions will be maintained online at www.indiana.edu/~uao. Architects and Engineers doing work for the University are expected to ensure that they are working with the latest revision of the standards.

Throughout these standards, cross-references have been made frequently to emphasize the importance of coordination of all parts of the contract documents for a project. Because of the requirement for complete coordination, the holder of this document is cautioned to furnish complete standards to consultants or to ascertain that consultants have copies of the referenced sections and paragraphs affecting the consultant’s work.

If questions arise concerning instructions contained herein, please request clarification from Indiana University, Department of Engineering Services, (812) 856 - 7055.
Also Included:

26 36 23 - Automatic Transfer Switches

A. Standby Engine/Generator Systems


2. Design Features
   a. Engine/Generator (E/G) Sizing and Selection
      1) Loads to be connected to the emergency power distribution system shall include the following:
         a) Fire pump where directed by Engineering Services or CFS
         b) Fire detection and alarm system
         c) Smoke removal system
         d) Egress lighting
         e) Energy management system control panel(s)
         f) Control air compressors
         g) Lighting and receptacles in the locations listed below:
            (1) Transformer vault / Substation
            (2) Mechanical / Electrical room/closet
            (3) Telephone / Data communication room/closet
            (4) E/G room / Enclosure
         h) HVAC equipment serving E/G room / Enclosure
         i) Special equipment or where directed
      2) Standby E/G systems installed to provide emergency power to non-linear loads, such as uninterruptable power supplies or variable frequency drives, shall be sized in accordance with E/G manufacturers recommendations and actual equipment to be installed. Increased loading of the E/G system due to equipment efficiencies, UPS battery recharging, harmonic distortion, etc. shall be thoroughly investigated.
      3) New installations of standby E/G systems shall provide a minimum of 20 percent growth capacity. Contact Engineering Services or CFS to determine if this is adequate.
      4) The E/G system shall be a standard production model in commercial use for the past five years and capable of satisfactory performance on a commercial grade of distilled petroleum such as DF-2.
5) The University performs monthly testing of generators. In order to facilitate testing, provide a permanently installed load bank sized at 50% of generator capacity. Generator control system shall switch from load bank to automatic transfer switch in the event of a power outage during testing. Where space doesn’t allow, or as directed by Engineering, provide required switches, etc. to allow a portable load bank to be easily connected to the generator.

b. Fuel Tanks and Piping
1) In general, underground fuel tanks are not acceptable. In extremely rare circumstances, and only with Engineering Services or CFS approval will underground fuel storage tanks even be considered.
2) Above ground fuel tanks shall be double wall welded steel construction and sized to provide the E/G system with fuel for a minimum of 24 hours operating at continuous full-load power output. Above ground fuel tanks may be sub-base mounted or remote located as appropriate for the application and shall be provided with a rupture basin. Interstitial monitoring and “fuel in basin” alarms shall be provided.
3) Day tanks shall be installed where applicable or required. Construction shall be same as fuel tank.
4) Fuel piping shall be double wall construction.
5) Provide fuel fill location outside of building. Provide fuel tank level gauge and overfill alarm at this location. Overfill alarm shall be set at 90% of fuel tank capacity.

c. Monitoring and Alarms
1) Standby E/G systems shall be self-monitoring. A local annunciator shall display the status, "normal", "trouble" and "alarm", of E/G system components. The following signals shall also be monitored and displayed by the local annunciator.
   a) Generator running
   b) Generator system alarm or trouble
   c) Leak detection system alarm
   d) Fuel tank level
   e) Fuel overfill alarm
   f) E/G main circuit breaker position
2) The E/G system status and signals listed above shall also be monitored by the energy management system. The energy management system will forward any E/G system "trouble" or "alarm" signals to the campus control Operations Center.
3) The E/G system shall be provided with a remote annunciator that displays the status and signals listed above.

d. Standby E/G systems shall be provided with jacket water heaters. The jacket water heater shall be connected to the emergency power distribution system.
e. Enclosures

1) Indoors: E/G systems installed inside a building shall be located in a room, preferably along an outside wall, that is dedicated to only the E/G and ancillary equipment. E/G system designers shall pay particular attention to the following requirements:
   a) Provide adequate access into the generator room from outdoors for maintenance, replacement or removal of any and all equipment housed in the room.
   b) Provide adequate means of cooling and ventilating the E/G room. HVAC equipment and any other "space" equipment shall be connected to the emergency power distribution system.
   c) Provide adequate insulation so that E/G running noise levels are not obtrusive to building occupants.
   d) Coolant lines to extension heat exchangers shall be protected from freezing and mechanical damage.

2) Outdoors: E/G systems installed outdoors shall be housed in a steel, heated, free standing, weather tight enclosure. The enclosure shall be constructed upon a skid base that shall have sufficient stiffness to allow transportation and handling of the entire package with all equipment mounted and ready for operation. Wall framing, dampers, shutters and bird screens shall be aluminum. Provide lockable, access doors on both sides of enclosure. Where E/G controls are too high to be readily accessible from ground level, provide a catwalk around enclosure to facilitate maintenance and testing.

f. Provide an engineered exhaust system for engine exhaust. Insulate all piping. Mufflers shall be installed on E/G exhaust systems. They shall be "critical" sound rated to provide maximum noise attenuation. Install muffler and exhaust wrap systems where applicable or required to augment exhaust system sound attenuation. Locate engine exhaust so it does not infiltrate building.

g. E/G systems shall be completely factory tested prior to installation. In addition, E/G systems shall be completely field tested by manufacturers representative using load banks, INETA Acceptance Testing Specifications, and, if applicable, NFPA 110 to ensure proper installation and operation.

h. Installing contractor shall provide fuel for field testing and top off fuel tank at substantial completion of project.

3. Submit design calculations for E/G system, whether a new system or an existing system being modified.
4. Preferred Manufacturers
   a. Caterpillar
   b. Cummins
   c. Kohler
   d. Tognum America (MTU Detroit Diesel)
   e. Generac (< 200 Kw)

B. Automatic Transfer Switch (ATS) (Section 26 36 23)

1. Automatic transfer switches shall conform to the requirements of ANSI/NFPA 70 - National Electrical Code, NEMA Standard ICS 2-447 and UL 1008. ATS shall be UL listed and labeled for intended purpose.

2. The ATS shall be supplied by the engine/generator supplier and tested in accordance with NETA Acceptance Testing Specifications (NFPA 110 as applicable) to ensure a completely coordinated system.

3. Design Features
   a. The ATS shall consist of a power transfer module and a microprocessor control module interconnected to provide complete automatic operation. The power transfer module shall be mechanically held and electrically operated by a single solenoid mechanism momentarily energized from the source to which the load is to be transferred. The control module shall have solid-state sensing and control logic. Interfacing relays shall be industrial control grade. The ATS shall include a microprocessor based metering device that provides real time measurements of single and three phase power system. The following shall be measured: current per phase, real, reactive and apparent power, and bi-directional energy.
   
   b. The ATS shall be inherently double throw and mechanically interlocked to ensure only two positions; normal or emergency.
   
   c. The ATS shall be rated for continuous duty and braced to withstand the rms symmetrical short circuit current available at the ATS terminals.
   
   d. Utilize by-pass isolation type ATS for any ATS rated 600 amperes or larger, for critical building systems, and where directed.
   
   e. ATS shall be closed transition type.
   
   f. ATS for elevator shall have delayed transition feature to deenergize elevator controller when switching from emergency to normal source. Function of the building elevator controller with ATS functionality shall be verified with the controller manufacturer.

4. Preferred Manufacturers
   a. Automatic Switch Company - Model 7000 with Power Manager Data Monitor and By-pass Isolation feature where specified

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