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 43 00 - Transient Voltage Suppression

26 45 00 - Arc Flash Analysis

A Lightning Protection Systems

1. Provide a lightning protection system (LPS) for the protection of University structures from direct lightning strikes.

2. This is an optional system that should be evaluated for inclusion in new construction projects. Evaluation shall be made in accordance with guidelines set forth in the latest edition of NFPA 780, Standard for the Installation of Lightning Protection systems, Appendix H, Risk Assessment Guide. Submit copies of the evaluation for review by Engineering Services or CFS.

3. The LPS shall be comprised of air terminals, down conductors, ground terminals, counterpoised ground conductor, interconnecting conductors, Arresters and other connectors or fittings required to complete the system. The lightning protection ground components shall be connected to the electrical service ground. System design shall be in accordance with the latest edition of the following.
   a. NFPA 70, National Electrical Code
   b. NFPA 780, Standard for the Installation of Lightning Protection Systems
   c. LPI-175, Lightning Protection Institute (LPI), Standard of Practice
   d. UL 96A, Underwriters Laboratories, Installation Requirements for Lightning Protection Systems

4. If an LPS is to be installed, it must be fully coordinated with any surge protective devices (SPDs) installed for equipment protection. Both the LPS and SPDs must be properly installed in accordance with the above referenced standards. The use of an experienced electrical designer who is well versed in such systems is strongly encouraged.

5. Installation of the LPS and/or SPDs must be by an installer that is listed with Underwriters Laboratories (UL) and capable of furnishing a UL Master Label. The installer must use LPI certified journeymen who are directly supervised by LPI certified Master Installers for the installation.

6. During design of the LPS, contact Engineering Services or CFS for the actual level of certification required, e.g. installer verified code compliant LPS, UL Letter of Finding, or UL Master Label Certified LPS.
7. The LPS shall be tested and certified in accordance with the latest LPI standards. Submit testing data, certified report, and LPI certification to Engineering Services or CFS.

B. Surge Suppression Systems (Section 26 43 00)

1. Integrate surge protective devices (SPDs) into the electrical distribution equipment for the protection of AC electrical circuits and equipment from the effects of lightning induced currents, substation switching transients, and internally generated transients resulting from inductive and/or capacitive load switching and other electronic equipment. Selection of SPDs shall be based upon the latest edition of ANSI/UL 1449, Standard for Safety for Surge Protective Devices.

2. The surge suppression system shall be comprised of Types 1, 2, & 3 SPDs that are listed and labeled for their intended installation. System design shall be in accordance with the latest edition of the following:
   a. NFPA 70, National Electrical Code
   b. ANSI/UL 1449, Standard for Safety for Surge Protective Devices
   d. ANSI/IEEE C62.41.2, Recommended Practice on Characterization of Surges in Low Voltage AC Power Circuits
   e. ANSI/IEEE C62.45, Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits
   g. IEEE C62.72, Guide for the Application of Surge-Protective Devices for Low-Voltage AC Power Circuits

3. Type 4 SPD assemblies are allowed provided they have been investigated by UL for Type 1, 2, or 3 locations and are approved as suitable for use within the specified electrical panel or gear. SPDs shall not require additional UL testing or field investigation to maintain equipment’s UL listing.

4. The SPDs used in the design of a surge suppression system shall be installed at all levels of the distribution system (cascaded) to optimize the level of suppression throughout the system.

5. Use only SPDs with the following characteristics.
   a. Nominal Discharge Current Rating (In)
      1) Type 1 & 2 devices - 20 kA
      2) Type 3 devices - 3 kA
   b. Short Circuit-Current Rating (SCCR) shall be no less than 200 kA.
   c. Maximum Continuous Operating Voltage (MCOV) shall be identified and shall be the actual tested value. It is expected that the MCOV shall be no less than 15% and no more than 25% of normal system operating voltage.
d. Voltage Protection Rating (VPR)
   1) 120/208 volt system - minimum ratings shall be 700 Volts L-N, and 1200 Volts L-L
   2) 277/480 volt system - minimum ratings shall be 1200 Volts L-N, and 2000 Volts L-L

C. Arc Flash Analysis (Section 26 45 00)

1. An arc flash analysis shall be performed on all projects that include the design of a new electrical power distribution system and any project that adds or deletes any electrical distribution equipment from an existing facility.

2. The arc flash analysis shall be performed and certified under the direct supervision of a Professional Engineer (PE) with a minimum of 5 years of experience in Arc Flash Analysis. Said Electrical PE shall be a full time employee of the Engineering/Consulting firm.

3. The arc flash analysis shall be performed using Easy Power software. SKM Systems Analysis, Inc. software shall be used for IUPUI projects. An electronic copy of the software model and database shall be provided to Engineering Services or CFS for incorporation into the campus master model.

4. In order to properly perform the arc flash analysis, the following studies/calculations shall also be performed.
   a. Short circuit study to verify equipment duties in the system. The short circuit study shall verify the system electrical equipment is properly rated to withstand and interrupt the expected bolted and arcing faults in the system. Short circuit calculations shall comply with ANSI C37.010, C37.13, C37.5, IEEE 141 adm IEEE 399.
   b. Protective device coordination study to determine if the system protection characteristics are sufficient to provide reliable power to the facility.

5. A comprehensive written report shall be provided to Engineering Services or CFS which includes, but is not limited to the following:
   a. Equipment duty study and recommendation
   b. Coordination study and recommendations
   c. Arc flash analysis and recommendations to mitigate to a Category 2 or below
   d. A complete updated one line diagram in AutoCAD 2011

6. All work shall comply with the latest published codes and standards including but not limited to the following:
   a. IEEE 399 - Recommended Practice for Industrial and Commercial Power Systems Analysis,
   b. IEEE 242 - Recommended Practice for Coordination of Industrial and Commercial Power Systems
   c. IEEE 1584 - Guide for Performing Arc-Flash Hazard Calculations
d. NFPA 70E - Standard for Electrical Safety in the Workplace

e. NFPA 70 - National Electrical Code (NEC)

7. Contact Engineering Services or CFS for access to existing fault current and arch flash hazard studies. Field data may need to be collected to augment and/or confirm existing information.

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