

## EXEMPTIONS FOR ELECTRICAL

### D2.1 – 7.1 Introduction:

The exemptions mentioned in both ASCE 7-98/02 and ASCE 7-05 are actually implied exemptions that are stated as requirements. This section is an attempt to more fully define these provisions for the design professional responsible for the design of the electrical components and distribution systems, and also for the installing contractor who is responsible for bidding and installing the restraints.

### D2.1 – 7.2 “Implied” Blanket Exemption Based on Component Importance Factor $I_p$ (Section 9.6.3.14) [Sections 13.6.4 and 13.6.5]<sup>1</sup>:

Section 9.6.3.14 of ASCE 7-98/02 states that;

“Attachments and supports for electrical equipment shall meet the force and displacement provisions of Sections 9.6.1.3 and 9.6.1.4 and the additional provisions of this Section. In addition to their attachments and supports, electrical equipment designated as having  $I_p = 1.5$ , itself, shall be designed to meet the force and displacement provisions of Sections 9.6.1.3 and 9.6.1.4 and the additional provisions of this Section.”

In this statement, there really are no implied exemptions for electrical equipment, except that if the supports for the equipment have been designed by the manufacturer to meet the seismic load requirements with the specified mounting hardware, no further analysis and restraint will be required.

In Section 13.6.4 of ASCE 7-05, the text reads as follows.

<sup>1</sup> References in brackets (Section 9.6.3.14) [Sections 13.6.4 and 13.6.5] apply to sections, tables, and/or equations in ASCE 7-98/02 and ASCE 7-05 respectively which forms the basis for the seismic provisions in 2000/2003 IBC and 2006 IBC respectively.

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RELEASED ON: 05/06/2008



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“Electrical components with  $I_p$  greater than 1.0 shall be designed for the seismic forces and relative displacements defined in Sections 13.3.1 and 13.3.2 ....”

ASCE 7-05 Section 13.6.5 states the following;

“Mechanical and electrical component supports (including those with  $I_p = 1.0$ ) and the means by which they are attached to the component shall be designed for the forces and displacements determined in Sections 13.3.1 and 13.3.2. Such supports including structural members, braces, frames, skirts, legs, saddles, pedestals, cables, guys, stays, snubbers, and tethers, as well as elements forged or cast as part of the mechanical or electrical component.”

ASCE 7-05 Section 13.6.4 implies that electrical components that have been assigned a Component Importance Factor equal to 1.0, regardless of the Seismic Design Category to which they have been assigned, will not require seismic restraints beyond the attachment provisions normally included with the component, provided that a qualified component is selected. This means that if the component has four mounting feet with holes for  $\Phi 3/8$ " mounting hardware, then the component should be attached to the structure with four  $\Phi 3/8$ " bolts, or anchors. Beyond that nothing further is required.

However, ASCE 7-05 Section 13.6.5 insists that the supports must be designed to withstand the code mounted forces and displacements. So, as with ASCE 7-98/02 this is not a general blanket exemption. The manufacturer of the component must be able to certify that the supports designed as part of the component will withstand the seismic requirements for the project using hardware of the appropriate size and strength.

So, while additional analysis and restraint may not be required for electrical components with  $I_p = 1.0$ , the supports for this equipment must be designed by the manufacturer with sufficient strength to meet the code mandated requirements. After this the design professional of record for a project and the contractor may provide attachment hardware of the appropriate type, size, and

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strength, as recommended by the manufacturer of the equipment, without doing any further analysis, or providing any further restraint.

While this sounds rather “wishy-washy”, it’s really not. If the manufacturer of the equipment and its supports certifies that it was design to handle accelerations in excess of the design acceleration for the project, then it may be exempted from the need for further seismic restraint or analysis.

## **D2.1 – 7.3 Conduit Size Exemption [13.6.5.5-6a]:**

There are no specific size exemptions for electrical conduit in 2000/2003 IBC, ASCE 7-98/02. However, 2006 IBC, ASCE 7-05 does have exemptions for electrical conduit. They seem to follow the exemptions, in terms size, that are used for piping. Therefore, it is reasonable to use the exemptions in 2006 IBC for 2000/2003 IBC since it is the most recent version, and takes into account any new testing or analysis.

For 2006 IBC, ASCE 7-05, seismic restraints are not required for conduit that has been assigned a Component Importance Factor equal to 1.5, and whose trade size is 2.5 in. (64mm) or less. When sizing and selecting restraints for electrical conduit, that the weight per linear foot of conduit varies greatly depending on the exact type of conduit being used. Also, when computing the total weight per foot of the conduit plus the cabling, it standard practice to assume that there will be ~40% copper fill for the cabling.

## **D2.1 – 7.4 Trapeze Supported Electrical Distribution Systems [13.6.5.5-6b]:**

As with conduit, no specific exemptions for trapeze supported electrical distribution systems exist in 2000/2003 IBC, ASCE 7-98/02. However, an exemption is allowed under 2006 IBC, ASCE 7-05. It makes sense to argue for the use of this exemption in 2000/2003 IBC as well. The exemption matches the weight limits proposed for trapeze supported pipe in Section 5.6 of this guide.

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No restraints are required for conduit, bus ducts, or cable trays that are supported on trapeze bars, that have been assigned a Component Importance Factor equal to 1.5, and that have a total weight that is 10 lb/ft (146 N/m) or less. This total weight includes not only the conduit, bus duct, or cable trays, but also includes the trapeze bars as well.

## D2.1 – 7.5 Summary:

All of the implied exemptions above are made without regard for the Seismic Design Category to which the building has been assigned. Further, a complete reading of the project specification is in order to ensure that these exemptions have not been negated by the wishes of the building owner.

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