

COMPONENT IMPORTANCE FACTOR

D2.1 – 3.1 Introduction:

MEP components and systems are categorized in ASCE 7-98/02 and ASCE 7-05 as non-structural components. There are just two values for the Component Importance Factors for MEP components, 1.0 and 1.5, which are not directly linked to the importance factor for the building structure. The Component Importance Factor is designated as I_p in the body of the code. All MEP components must be assigned a component importance factor. The design professional that has responsibility for the MEP system in question is also responsible for assigning the Component Importance Factor to that system.

D2.1 – 3.2 Criteria for Assigning a Component Importance Factor (Sections 9.6.1 and 9.6.1.5) [Section 13.1.3]¹:

For MEP systems, the Component Importance Factor (I_p) assigned to the components within the system shall be determined as follows.

1. If the MEP system is required to remain in place and function for life-safety purposes following an earthquake the importance factor assigned to the MEP system and its components shall be 1.5. Some examples of this type of system would be;
 - a. Fire sprinkler piping and fire suppression systems.
 - b. Smoke removal and fresh air ventilation systems.
 - c. Systems required for maintaining the proper air pressure in patient hospital rooms to prevent the transmission of infectious diseases.
 - d. Systems that maintain proper air pressure, temperature, and humidity in surgical suites, bio-hazard labs, and clean rooms.

¹ References in brackets (Sections 9.6.1 and 9.6.1.5) and [Section 13.1.3] 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..

PIPE AND DUCT COMPONENT IMPORTANCE FACTOR

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- e. Medical gas lines.
 - f. Steam lines or high pressure hot water lines.
2. If the MEP system contains or is used to transport hazardous materials, or materials that are toxic if released in quantities that exceed the exempted limits a Component Importance Factor of 1.5 shall be assigned to that MEP system and its components. Examples are as follows.
- a. Systems using natural gas.
 - b. Systems requiring fuel oil.
 - c. Systems used to exhaust laboratory fume hoods.
 - d. Boilers, furnaces and flue systems.
 - e. Systems that are used to ventilate bio-hazard areas and infectious patient rooms.
 - f. Chemical or by-product systems which are required for industrial processes.
3. If the MEP system is in or attached to a building that has been assigned to Occupancy Category IV (Seismic Use Group III), i.e. essential or critical facilities, and is required for the continued operation of that facility following an earthquake, then a Component Importance Factor of 1.5 shall be assigned to that system and its components. Hospitals, emergency response centers, police stations, fire stations, and etc. fall in Occupancy Category IV. The failure of any system could cause the portion of the building it serves to be evacuated and unusable would cause that system and its components to be assigned a Component Importance Factor of 1.5. Even the failure of domestic water lines can flood a building and render it uninhabitable. So, all of the items listed above under items 1 and 2 would apply to facilities in Occupancy Category IV.
4. If the MEP system that is located in or attached to an Occupancy Category IV facility and its failure would impair the operation of that facility, then a Component Importance Factor of 1.5 shall be assigned to that MEP system and its components. This implies that any MEP system or component that could be assigned a Component Importance Factor of 1.0 that is located above an MEP system or component that has been assigned a Component Importance Factor of 1.5 must be reassigned to a Component Importance Factor of 1.5.

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5. All other MEP systems that are not covered under items 1, 2, 3, or 4 may be assigned a Component Importance Factor of 1.0.

D2.1 – 3.3 Summary:

The Component Importance Factor is very important to the designer responsible for selecting and certifying the seismic restraints for an MEP system or component. This factor is a direct multiplier for the horizontal seismic design force, which shall be discussed in a later section. The Component Importance Factor will also be a key indicator as to whether a particular component will qualify for an exemption or not. If a Component Importance Factor has not been assigned to an MEP system, the designer responsible for selecting the seismic restraints must assume that the Component Importance Factor is equal to 1.5. If the MEP system actually could be assigned a Component Importance Factor of 1.0, this could result in a large increase in the size and number of restraints required along with a corresponding increase in the cost for the system.

It is in the best interest of the design professionals responsible for an MEP system to properly assign the Component Importance Factor to that MEP system. The Component Importance Factor for each MEP system and component should be clearly indicated on the drawings that are distributed to other design professionals, contractors, suppliers, and building officials.

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