

CHAPTER 16 STRUCTURAL DESIGN

SECTION 1604.5 2012 Edition IBC INTERPRETATION 113-12 Issued 1-25-2013 BU_12_113_12

1604.5 Risk category. Each building and structure shall be assigned a *risk category* in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the *risk category* shall not be taken as lower than the occupancy category specified therein.

**TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES**

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: <ul style="list-style-type: none"> • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: <ul style="list-style-type: none"> • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250. • Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000 ^a. • Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: <ul style="list-style-type: none"> Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the <i>International Fire Code</i>; and Are sufficient to pose a threat to the public if released ^b.
IV	Buildings and other structures designated as essential facilities, including but not limited to: <ul style="list-style-type: none"> • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: <ul style="list-style-type: none"> Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the <i>International Fire Code</i>; and Are sufficient to pose a threat to the public if released ^b. • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.2 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

1604.5.1 Multiple occupancies. Where a building or structure is occupied by two or more occupancies not included in the same *risk category*, it shall be assigned the classification of the highest *risk category* corresponding to the various occupancies. Where

buildings or structures have two or more portions that are structurally separated, each portion shall be separately classified. Where a separated portion of a building or structure provides required access to, required egress from or shares life safety components with another portion having a higher *risk category*, both portions shall be assigned to the higher *risk category*.

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Q: A storm shelter meeting the requirements of ICC Standard ICC 500-08 is installed within a host building. The occupancy of the host building is in Risk Category III. Is the entire structure required to be constructed as required for Risk Category IV based upon the provisions of Section 1604.5.1?

A: No. Risk categories are assigned to buildings to account for consequences and risks to human life (building occupants) in the event of a building failure. The intent is to assign higher risk categories, and hence higher design criteria, to buildings or structures that, if they experience a failure, would have grave consequences to either building occupants or the population around the building or structure that is reliant upon it (such as a power station).

Currently, neither Section 1604.5.1 nor Table 1604.5 incorporates storm shelters as defined by the ICC-500 Standard for the Design and Construction of Storm Shelters (ICC 500). The “earthquake, hurricane or other emergency shelters” are not defined, while an ICC 500 compliant storm shelter is defined by the ICC 500 Standard. This standard confirms that the area(s) of a building that have been constructed to this criteria have been specifically designed and constructed to provide life-safety protection from people seeking refuge from a high wind event.

ICC 500 compliant storm shelters are designed and constructed to account for extreme wind loads, have specific requirements for structural stability, vertical and horizontal load transfer, and egress that meet or exceed the basic requirements of the building code for property protection. Even if the storm shelter is not structurally separated from the host building, the ICC 500 details the strength requirements for the members of the host building that connect to the storm shelter. Issues related to protection of occupants due to building collapse or failure has been considered by the ICC 500 and do not need to be addressed for the other portions of the facility.

This is why Section **104.1 Rooms or spaces within other uses** of ICC 500 states: *Where storm shelters are designated areas normally occupied for other purposes, the requirements of the applicable construction codes for the occupancy of the building shall apply unless otherwise stated in this standard.*

Further, the storm shelter is a self-contained and defined space within the building that does not rely upon other portions of the building to provide life-safety protection from high winds, floods, or structural collapse. Hardening the other portions of the building that are outside the storm shelter or increasing the risk category for portions of the building that may be used to egress the space is not necessitated. The statements in Section 1604.5.1 regarding egress are to be applied when a building or portion thereof is being used to provide long-term, post-disaster response capabilities that would have considerable consequences to the community outside the occupied building and does not apply to ICC 500 compliant storm shelters.

The intent of the storm shelter is to provide short term, life safety in the event of a severe storm when the host building cannot. This protection provided by ICC 500 compliant storm shelters allows a building owner to provide a storm shelter in one portion of the structure as opposed to requiring the structure to meet the Risk Category IV provisions.