

ICC 500 Storm Shelters

Storm shelters provide life-safety protection from extreme wind events, such as hurricanes and tornados. Buildings that are in areas with wind speeds of 150 to 250 mph, per the ICC-500 Wind Zones map, are recommended by code to include storm shelters.

Storm shelters shall be constructed as either separate detached buildings or rooms or spaces within a building. These spaces may be in all building types such as: schools, gymnasiums, cafeterias, theaters, arenas, churches, senior living facilities, community centers, emergency operation centers – fire, police, ambulance and 911 call centers.

For FEMA grants and funding, storm shelters per ICC 500 must meet the requirements of FEMA P-361-2021.



The design criteria for storm shelters follows ICC 500 -2021. Fox Blocks compliance to meet this criterion has two main components:

1. The project structural engineer of record must design the walls and enclosure in accordance with the ICC 500 standard for the required wind speed.
2. The insulated concrete wall design must have passed a Missile Impact test of windborne debris in accordance with the ICC 500-2020 and FEMA P-361-2021.

Fox Blocks, as reinforced concrete walls are structurally designed following ACI 318. Concrete cores are available in 4, 6, 8, 10 and 12-inch thicknesses. Per the Missile Impact testing, a minimum concrete thickness is compatible.

ICC 500 Storm Shelters

FOX BLOCKS ICC 500 COMPLIANCE

Impact testing following ASTM E1886-19 and ASTM E1996-20 was successfully completed by a third-party agency. The impact test shoots 2x4s, as missiles, at a velocity of 100 mph (equivalent to 250 mph wind speed) impacting the Fox Blocks wall sample at two different locations. The wall sample, as specified below, passed the test with no damage to the concrete exterior or interior face, no spalling, no penetrations, or cracking.

Fox Blocks 8' x 8' test wall specifications:

- 4" concrete core Fox Blocks
- 3000 psi concrete, with $\frac{3}{8}$ " coarse aggregate, 28-day cure time with compressive test
- #4 rebar, Grade 60 ksi
- **Rebar horizontally spaced at 16" on center to fit Fox Block coursing**
- Rebar vertically spaced at a minimum of 16" on center

The testing was successful on the minimum 4" concrete core, which means all other concrete core and rebar sizes are compliant to this missile testing criteria and ICC 500 compliance.

CONCLUSION

Designs for storm shelters and/or safe rooms following the ICC 500-2021 and FEMA P36-2021 can utilize a Fox Blocks wall assembly with a minimum of 3000 psi concrete and a #4 rebar grid at 16" on center, per the Missile Impact testing results.

The construction advantages and life-safety protection provided by a FOX BLOCKS reinforce concrete wall assembly meets all the criteria following ICC 500-2021 and FEMA P-361-2021 for all building types.



Fox Blocks Intertek Missile Test Report

Fox Blocks also has successful missile testing on the Fox Buck assembly. Florida Building code FL-17775-R2

The Fox Blocks Code Compliance Research Report CCRR-1010 now includes the ICC 500 compliance per the Missile Impact Testing.