

BLAST RESISTANCE OF PRECAST CONCRETE STRUCTURES

Most United States government and military structures are required to consider blast demands and structural integrity in the design process. Blast design can be quite different from standard structural design as the structure must be analyzed using dynamic response. Engineers unfamiliar with blast design often incorrectly assume they can use an equivalent static load. Just designing for dynamic blast pressures as static loads could result in unrealistic and uneconomical designs. Structural-integrity design ensures that the failure of one component does not result in a total collapse of the entire structure. To ensure the proper implementation of this unique design criteria, an engineering consultant with blast design experience is often brought in early in the project to assist the design team.

Precast concrete structures provide excellent Anti-Terrorism Force Protection (ATFP) and blast resistance along with many other high-performance attributes and benefits. Precast is frequently used in many military, government and other structures to provide blast protection and resiliency. Insulated precast concrete sandwich wall panels provide a cost-effective energy-efficient means of cladding building structures. Non-load bearing insulated precast panels are

especially resilient against blast loads. Panels may be designed to be fully composite or treated as non-composite. Blast testing of precast concrete insulated sandwich wall panels by the Air Force Research Laboratory in Panama City, Florida show that precast concrete meets or exceeds the requirements as defined by US Army Corp PDC-TR 06-08 Single Degree of Freedom Structural Response Limits for Anti-Terrorism Design.

Additional information on blast design considerations for precast concrete building components guidance can be found in the PCI “Blast Design Manual” (MNL-141) that is available for purchase on the PCI Online Bookstore. Precast, prestressed concrete components provide exceptional ductility, durability and resiliency to resist blast loads and offer greater blast resistance compared with conventional construction.

