

SECTION 05315

BLAST AND FRAGMENT RESISTANT WALLS

1 GENERAL

1.1 SUMMARY (NOT APPLICABLE)

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 446 (1987) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

ASTM A 548 (1982) Steel Wire, Carbon, Cold-Heading Quality, for Tapping or Sheet Metal Screws

ASTM A 615 (1989) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement Textile

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with SECTION 01300 SUBMITTALS:

SD-04, Drawings

BFR Wall Layout and Details; GA

Detail drawings shall include dimensions, required type, number, and length of all BFR steel panels, panel connection details, details at wall corners, and details for fabrication of all steel panels. Drawings shall include overall plan layouts and elevations of walls sufficient to show final panel arrangements. Drawings shall also include number, size, type, dimensions and locations of all additional reinforcing steel bars in the walls.

SD-13, Certificates

Steel Panels; FIO

Certificates of compliance stating that all steel facing panels, lacing panels, and miscellaneous steel components of the BFR walls conform to the requirements specified.

SD-20, Construction Methods and Procedures

BFR Wall System; FIO.

Technical description of the materials, equipment, methods, procedures, and construction sequence to be used in constructing the BRF walls, Procedures shall generally conform to those provided by the patent holder.

1.4 STORAGE

BFR steel panels shall be stored on wooden bearers out of contact with the ground with a slope of 1:100 along the sheet length to prevent accumulation of water. The steel panels shall be covered with a waterproof cover to prevent exposure to water but allow air circulation.

2 PRODUCTS

2.1 BLAST AND FRAGMENT RESISTANT (BFR) WALLS

The headwall, side and rear walls of this magazine shall be walls made from the Blast and Fragment Resistant (BFR) wall system. The BFR system is protected by United States Patent Number 4,433,522 and other patents. Walls shown on the drawings as 12 inches thick shall be made of the 300 millimeter thick BFR wall section. Walls shown on the drawings as 10 inches thick shall be made of the 250 millimeter thick BFR wall section.

2.2 STEEL PANELS

Steel facing panels, lacing panels, half panels, and other miscellaneous panels for the BFR walls shall conform to [ASTM A 446](#), Grade B, coating designation G90, non-oiled. Dimensions, gage, and corrugation pattern of these panels shall conform to the requirements of the BFR system as defined by the patent holder.

2.3 CONCRETE

Concrete for infill in the BFR walls shall conform to Section [03300](#), CONCRETE FOR BUILDING CONSTRUCTION.

2.4 REINFORCING STEEL

Reinforcing steel shall conform to [ASTM A 615](#), Grade 60.

2.5 STEEL SHEET METAL SCREWS

Steel sheet metal screws shall be the self-tapping type, galvanized conforming to [ASTM A 548](#).

3 EXECUTION

3.1 GENERAL

BFR walls shall be constructed according to the methods and procedures generally outlined by the manufacturer and provided in the submittals.

3.2 WORKMANSHIP

Workmanship and manufacturing tolerances of the BFR steel elements shall be such as to insure proper fit when assembled and interchangeability of elements of the same type and size. Panels shall be well formed to shape and size, with sharp lines and true curves. Panels with warped or buckled edges shall not be used in wall construction and shall be removed from the job site.

3.3 PREPARATION OF MATERIALS

Before erection, all BFR steel elements shall be inspected and cleaned of all loose scale, rust, and other deleterious material. Any damage to the galvanized coating shall be repaired using a zinc-rich paint.

3.4 ERECTION OF STEEL PANELS

Erection of steel BFR panels shall not begin until foundations have been completed. Steel panels shall be erected in accordance with the manufacturer's recommended procedure. Steel panels shall be erected plumb and true to lines indicated on the drawings and in conformance with the tolerances listed in Table 1. Joints between steel panels shall be connected with no fewer than two steel sheet metal screws at each end and shall be mortar tight.

3.5 TEMPORARY BRACING

Temporary bracing shall be provided to prevent misalignment and damage to the erected BFR steel panels during construction and bulging and separating of the steel panels during concrete placement. Care shall be taken to prevent the bracing from damaging the galvanized coating on the steel panels. Bracing shall remain in place until the walls are strong enough to carry their own weight and any other construction or natural loads, but not before 24 hours has elapsed since concrete placement. Construction of the roof slab shall not be started until the walls are sufficiently strong to support the roof. In no case shall bracing be removed before the concrete strength has reached 70 percent of design strength as determined by field cured cylinders or other methods.

3.6 PLACING CONCRETE

Concrete shall be placed successively in lifts not exceeding 24 inches, and each lift shall be allowed to partially set before pouring the next lift. Concrete may be placed using buckets or chutes or by pumping. If concrete pumping is used, the rate of pumping shall not exceed 7-1/2 cubic yards per hour. The work shall be visually inspected during the placement of each lift to ensure that all spaces between the steel panels are completely filled with concrete.

3.7 CONSOLIDATION

Immediately after placing, each layer of concrete shall be consolidated. Consolidation shall be by placing manual vibration bars on the outside of

walls or by tapping with a rubber mallet. Internal vibrators shall not be used for consolidation of concrete in BFR walls. The use of form vibrators must be specifically approved.

3.8 CONSTRUCTION JOINTS

Vertical construction joints shall be made using the manufacturer's recommended method. Vertical joints shall be located not less than 6 feet from wall corners. BFR steel facing panels shall be continuous across vertical construction joints. Horizontal construction joints shall not be permitted.

TOLERANCES FOR BFR WALLS

1. Variations from the plumb	In any 10 feet of length ---- 1/4 inch Maximum for entire length --- 1 inch
2. Variation from the level	In any 10 feet of length ---- 1/4 inch Maximum for entire length --- 3/4 inch
3. Variation of the linear building lines from established position in plan	In any 20 feet ----- 1/2 inch Maximum ----- 1 inch
4. Variation of distance between walls	1/4 inch per 10 feet of distance, but not more than 1 inch total variation
5. Variation in the sizes and locations of wall openings	Minus ----- 1/4 inch Plus ----- 1/2 inch
6. Variation in the thickness of walls	Minus ----- 1/2 inch Plus ----- 1/2 inch