

Section 08315 Blast Resistant Doors

DIVISION 08 - OPENINGS

Section 08315

BLAST RESISTANT DOORS  
04/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)	
AISC 303	(2000) Code of Standard Practice for Steel Buildings and Bridges
AISC 335	(1989) Structural Steel Buildings Allowable Stress Design and Plastic Design
AISC 350	(1999) Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings
AMERICAN WELDING SOCIETY (AWS)	
AWS D1.1/D1.1M	(2004) Structural Welding Code - Steel
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)	
ASTM A 36	(1992) Structural Steel
ASTM A 36/A 36M	(1997; Rev. A) Carbon Structural Steel
ASTM INTERNATIONAL (ASTM)	
ASTM A 123/A 123M	(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2004) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	(2004) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(2004b) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 36/A 36M	(2004) Carbon Structural Steel
ASTM A 563	(2004a) Carbon and Alloy Steel Nuts
ASTM A 780	(2001) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM F 436	(2004) Hardened Steel Washers
ASTM F 844	(2004) Washers, Steel, Plain (Flat),

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Unhardened for General Use

FEDERAL SPECIFICATIONS

CC-M-1807 Motors, Alternating Current, Fractional  
and Integral Horsepower  
TT-C-490B Cleaning Method and Pretreatment of  
Ferrous Surfaces and Organic Coatings  
TT-P-645A Primer, Paint, Zinc-Chromate, Alkyd Type

MILITARY SPECIFICATIONS

MIL-R-6855C Rubber, Synthetic Sheets, Stripes, Molded  
or Extruded Shapes

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2 Industrial Control and Systems  
Controllers, Contractors, and Overload  
Relays

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 National Electrical Code

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP6 Commercial Blast Cleaning

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Blast Resistant Doors; G  
Submit shop drawings for structural steel type and location of door operator, supports, locking device, controls, wiring for approval prior to fabrication of door, frame, and operator assemblies.  
Trolley Track; G  
Trolleys; G

SD-03 Product Data

Submit in one complete coordinated package including all the components of the door unit. Data shall include operating instructions, maintenance and operational manuals, and replacement parts lists.  
Trolleys; G

SD-05 Design Data

Manual Operator; G  
Submit calculations showing that manual operator has achieved by mechanical advantage, a required downward force to open doors of not more than 18 lbs.

SD-10 Operation and Maintenance Data

Blast Resistant Doors; G

1.2.1 MANUFACTURER'S DATA

Submit in one complete coordinated package including all the components of the door unit. Data shall include operating instructions, maintenance and operational manuals, and replacement parts lists.

1.2.2 CERTIFICATION FROM THE DOOR MANUFACTURER

Field Supervisor will provide the service specified herein and that all doors will be installed in accordance with provided instructions and will function properly.

1.3 QUALIFICATIONS

Welding shall be performed by certified welders qualified in accordance with DWS1.1 using procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protection from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the respective specifications specified herein. Materials not otherwise specified herein shall conform to the AISC "Manual of Steel Construction."

2.1.1 Structural Steel

ASTM A 36/A 36M

2.1.2 Bolts, Nuts, and Washers

2.1.2.1 Bolts

The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

- a. Anchor Bolts: ASTM A 307, Grade A.
- b. High Strength Bolts: ASTM A 325, Type 1 or 2.

2.1.2.2 Nuts

ASTM A 563, Grade A, heavy hex style, except nuts under 1.5 inches may be provided in hex style.

2.1.2.3 Washers

ASTM F 844 washers for ASTM A 307 bolts, and ASTM F 436 washers for ASTM A 325 bolts.

2.1.3 Welding Electrodes and Rods

Welding electrodes and rods shall conform to AWS D1.1/D1.1M. Welding wire shall conform to E71T-1. Process equal to FCAW-G.

2.1.4 Anchor Bolts

Anchor bolts shall be embedded in concrete as specified.

2.1.5 Weather-stripping

Weather-stripping shall be sheet 1/8" - 2 ply cloth inserted neoprene or EPDM.

2.2 TROLLEYS

Shall consist of cast steel or forged steel components and be designed to operate from the track beam section furnished under this contract. Trolley wheels shall be made from high alloy forged steel. Wheel treads shall be unpainted. Wheel axles shall be precision machined from high alloy, heat treated steel. Minimum Rated Load Capacity of the trolley shall be 3000 lbs.

2.3 MANUAL OPERATOR

Provide a cast steel or forged steel, galvanized, pull door travel chain operating over a sprocket. Extend chain loop to within 3 feet of the floor. Provide chain cleat and pin for securing pull door travel chain. Provide mechanical advantage by means of roller chain and sprocket drive and/or gearing. The downward force required to operate the door shall not exceed 18 pounds.

2.4 TROLLEY TRACK

Provide as indicated on drawings.

2.5 FABRICATION

2.5.1 Blast Resistant Doors

Fabricate doors in accordance with the applicable provisions of AISC 335 or AISC 350. Workmanship shall be equal to standard commercial practice in modern metal shops. Fabricate and assemble in the shop to the greatest extent possible.

2.5.2 Door Support System

Provide track clamps, threaded suspension rods and support brackets as shown on the drawings, capable of supporting 150% of the design door loads. Trolley, trolley track, and blast door shall be designed together as a system to operate properly within the vertical and horizontal space provided. This system shall be designed to provide a minimum 1/4 inch vertical and horizontal adjustment in either direction to meet the tolerances required for proper door operation.

2.5.3 Miscellaneous Accessories

2.5.3.1 Weather-stripping

Weather-stripping seals shall be 2 inch wide cloth inserted EPDM at head and jambs of doorway. The material shall have a minimum thickness of 1/8 inch and shall be attached to structure with a continuous 1 inch steel channel strip and 3/16" x 3/4" metal screws at 8" o/c.

2.5.3.2 Locking Bars, Restraining Bracket, Chain Guide Holder and Handle.

Provide as indicated on drawings.

2.6 FABRICATION FINISHES

2.6.2 Painting

2.6.2.1 Preparation, Priming and Painting

In accordance with Section 09900 PAINTS AND COATINGS.

PART 3 EXECUTION

3.1.1 Procedure

Erect in accordance with the AISC 335 or AISC 350. Use erecting equipment suitable for the work and in first class condition. Where parts cannot be assembled or fitted properly as a result of errors in fabrication or of deformation due to handling or transportation, report such condition immediately to the Contracting Officer and obtain approval of the method of correction; make the correction in his presence. The straightening of plates and angles or other shapes shall be done by the methods approved by the Contracting Officer. If heating of metal is approved for straightening, it shall not be to a higher temperature than that producing a dark "cherry red" color. After heating, the metal shall be cooled as slowly as possible. There shall be no evidence of fracture on the surface of the metal after straightening. Drain steelwork properly; fill pockets exposed to the weather with an approved waterproof material.

3.1.2 Connections

Provide anchor bolts and other connections between the steel and concrete and properly locate and build into connecting work. Design connections for which details are not indicated in accordance with AISC 335 or AISC 350.

3.1.3 High-Strength Bolting

Specification for structural joints using ASTM A 325 bolts, approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation shall govern the furnishing and installation of high-strength bolting, with the following modifications. Alternate fasteners, specified in paragraph 2(d) will not be permitted.

3.1.4 Erection Tolerances

In accordance with the AISC 303.

3.1.5 Temporary Welds and Backing Strips

Temporary Welds and Backing Strips shall be removed.

3.1.6 Doors and Frames

Doors and frames shall be constructed, assembled, and equipped with all required hardware and accessories to complete the installation in the shop of a competent fabricator. Materials and fabrication of the doors shall be in accordance with the applicable requirements of this section as indicated. Special care shall be exercised during welding to prevent warping of the metal. The surfaces shall be flat, parallel, and plumb after erection. Frame angles shall be nearly mitered and welded at the corners, with all exposed welds ground smooth. The Contractor shall be responsible for proper installation of the door assemble

and frame so that operating clearances and bearing surfaces of the erected door conform to the drawing requirements.

3.1.7 Track

Shall be carbon grade steel, A36. Track shall be one continuous and true rolled beam sized as indicated. Bottom flange surface under the trolley wheels shall be ground with machine or hand grinders to provide a smooth and true running surface.

3.1.8 Door Trolley

Trolleys shall have a capacity of 1200 lbs each for the 16 foot of door and shall have a minimum of four wheels. Trolleys shall be such that when the electric operator has been disconnected from the chain drive, a horizontal force not exceeding 100 lbs. shall move the door. Trolleys shall have drop forged steel, heat treated, wheel with chilled treads with a minimum tread hardness of 425 Brinnell. Provide concentric bore wheels with tread for double row combination radial and thrust antifriction bearings. Bearings shall provide the specified capacity and provide an average bearing life of 5,000 hours at a speed of travel between 10 to 15 feet per minute.

3.1.9 Electric Drive Unit

Shall be factory-assembled and attached directly to the roller drive chain. The electric drive shall consist of an enclosed high starting torque motor, equipped with an integral disc brake of adequate size, and a gear drive. Provide a releasing mechanics which will permit manual operation of the door by means of a hand chain. Arrange the releasing mechanism so that it may be put in and out of operation from the floor. Drive unit shall move the door in either direction from any position and produce a door travel stop of between 10 to 15 feet per minute. The electric drive unit shall be a weatherproof unit mounted on a common steel base. The motor shall be removable without disturbing or affecting the manual operation of the unit.

3.1.9.1 Motor

Shall be a standard NEMA size sufficient for the duty to be performed and shall not exceed the full-load rating when the driven equipment is operating at specified capacity under the most sever conditions likely to be encountered. Motor shall be totally enclosed, fan cooled, horizontal solid shaft, reversible, designed for full voltage starting and shall conform to applicable requirements of Federal Specification CC-M-1807 except as hereinafter specified. Motor base shall have easy access to bearing covers and starters. Motor bearings shall be suitable for the load alternating current, continuous duty based on a 40 degrees C (104 degrees F) ambient temperature. Motor shall have NEMA Class "B" insulation. The horsepower rating indicated is the minimum equipment size. When the electrically driven equipment provided differs from the design, the Contractor shall make the necessary adjustments to the wiring, conduit, disconnect devices, branch circuit protection motor starter, etc., to accommodate the equipment provided. Service factor shall be 1.15. Materials and equipment shall be in accordance with NFPA 70.

3.1.9.2 Gear Drive

Shall consist of a carefully machine cut carburized worm gear. Provide antifriction ball bearings on the motor shaft and tapered roller bearings on all slow speed shafts. Operate all gears and bearings in a bath of oil. Prevent leakage of oil by the 4 double-type oil seals around motor shaft and counter shafts. The disc-type brake shall be built onto the rear end of the motor. All sprockets shall be made from ASTM A 36 steel. All pins, bearings, gears, sprockets, shafts, and sheaves shall be designed for a door life of 50,000 cycles of operation.

3.1.10 Roller Drive Chain

Shall be of size and type necessary to operate the door as recommended by the door operator manufacturer. Furnish drive chain complete with protected sag pulleys along the chain and bracketed idler sprockets. Sag pulleys shall be provided as required to prevent the drive chain from sagging. A safety friction disc clutch on the gear motor's counter shaft will drive the chain. This safety device shall protect equipment if the door comes in contact with an obstruction. Arrange the drive sprocket by the use of idlers for a minimum of a 200-degree arc, to prevent the chain from jumping the drive sprocket and to reduce shock loading of the chain when the door is operated. Design the chain assembly to minimize the possibility of the chain jumping off of the drive and idler sprockets.

3.1.11 Controls

Each motor shall have an enclosed reversing across-the-line type magnetic starter having thermal-overload protection and limit switches. The control equipment shall conform to NEMA ICS 2. Center control switches shall be located in the security hasp assembly. The two end control switches shall be explosion proof and located inside the bunker, mounted to the bunker wall. Control switches shall consist of pushbutton stations of the three-button type with a key-operated on/off switch. Mark buttons "OPEN", "CLOSE" and "STOP". The "CLOSE" button shall be of the momentary contact type that require pressure to be maintained on the switch "button" to maintain door movement. When the pressure is released from the switch "button", door movement shall stop. Limit switches shall be of a mechanical actuated type to stop the travel of the door automatically at their fully open and fully closed positions. Switches shall be adjusted so that when magazine doors are closed by the electrical operator, locking device can easily be operated and the doors are 1/4" inch from contact with the bumpers.

3.1.12 Canopy and Frame Over Blast Doors

Provide door canopy and frame over the door, as specified in drawings.

3.1.13 Door Bumpers

Shall be sized and styled as indicated and fabricated from materials normally used for rubber-type truck loading dock bumpers conforming to Military Specification MIL-R-6855.

3.1.14 Roller Guides

Shall be a pair of 3 inch diameter stay rollers. Wheels shall be fabricated of gray iron and the frame of steel.

3.1.15 Weather-stripping

Door shall be weather-stripped with 1/8 inch thick, cloth inserted, neoprene or EPDM as indicated. Weather-stripping shall be installed with a continuous plate and in such a manner to ensure a complete weather-tight closure.

3.2 FABRICATION FINISHES

3.2.1 Painting

The blast resistant door assembly shall be shop painted in accordance with Section 09900 PAINTS AND COATINGS.

3.3 SECURITY HASP

Shall be furnished by the OWNER for installation by the contractor.

3.4 FIELD INSPECTION AND TESTS

3.4.1 Inspection

The manufacturer of the doors shall provide a field inspection engineer to perform the following:

- a. Check installation of embedded items before pouring of concrete (after forms or shoring are in place) to insure that the dimensional tolerances recommended by door manufacturer have been complied with.
- b. Re-check embedded items to verify the accuracy of dimensions after shoring and forms are removed from concrete.
- c. Supervise any necessary corrective action.
- d. Supervise the job site assembly and installation of the doors and operators.
- e. Inspect final assembly of doors and operators after corrections and adjustments have been made to doors.
- f. Demonstrate to the Contracting Officer that operation of the door assembly is as specified.

3.4.2 Visual Inspection of Welding

Visually inspect welding while the operators are making the welds and again after the work is completed. After the welding is completed, hand or power wire brush welds and thoroughly clean them before the inspector makes the check inspection. Inspect welds with magnifiers under strong, adequate light for surface cracking, porosity, and slab inclusions; excessive roughness, unfilled craters, gas pockets, undercuts, overlaps, size and insufficient throat and concavity. Inspect the preparation of groove welds for adequate throat opening and for snug position of back-up-bars.

3.4.3 Nondestructive Testing

AWS D1.1/D1.1M. Test locations shall be as indicated. If more than 20 percent of welds made by a welder contain defects identified by testing, then all welds made by that welder shall be repaired and approved by the contracting officer and door manufacturer's quality control.

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3.4.4 OPERATION TEST

Doors shall be given a complete operational test, in the presence of the Contracting Officer, and shall fully demonstrate that the door and operating equipment are performing properly and that the complete system meets all requirements specified and indicated. Any required adjustments shall be made at this time.

--End of Section--