AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF PAGES
	1	3

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0002	31 AUG 98		

6. ISSUED BY CODE

Department of the Army
Corps of Engineers
Fort Worth District

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

CODE FACILITY CODE

(√) X

9A. AMENDMENT OF SOLICITATION NO.
DACA63-98-B-0041

9B. DATED *(SEE ITEM 11)*
31 JULY 1998

10A. MODIFICATION OF CONTRACTS/ORDER NO.

10B. DATED *(SEE ITEM 13)*

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

The Solicitation for AMMO SUPPLY POINT IMPROVEMENTS AT McGREGOR RANGE, FORT BLISS, TEXAS, is amended as follows:

See Continuation Sheet.

NOTE: Bid Opening date remains "9 September 1998, 2 pm, local time, as previously announced.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY *(Signature of Contracting Officer)*	16C. DATE SIGNED

Item 14. Continued.

a. Specifications.

(1) The following listed section shall be voided and the accompanying new section of the same title and number, bearing the notation "**[AMEND 0002]**" shall be substituted therefor:

SECTION 13977 - BLAST RESISTANT PERSONNEL DOORS

(2) The following listed accompanying new section, bearing the notation "**[AMEND 0002]**" shall be added to the specifications and add to the Table of Contents:

SECTION 11302 - OIL/WATER SEPARATOR

b. Drawings.

The drawings listed below shall be voided and the attached new drawings of the same number, each bearing the notation "AM #0002", shall be substituted therefor:

Seq 3 C1 Project Location Map
Seq 4 C2 Project Vicinity Map
Seq 5 C3 Master Layout Plan
Seq 7 C5 Phasing Plan
Seq 12 C10 Layout Plan
Seq 13 C11 Layout Plan
Seq 16 C14 Utility Plan Water/Sewer/Gas
Seq 21 C19 Paving Details
Seq 23 C21 Fence Details
Seq 26 C24 Miscellaneous Detail
Seq 29 A2 Ops. Building Addition Floor, Roof and Ceiling Plans & Details
Seq 31 A4 Inert Storage Warehouse Floor Plan
Seq 56 A29 Ammunition Surveillance Room Finish Schedule
Seq 60 S1 General Structural Notes & Typical Details
Seq 61 S2 Operations Bldg. Addition, Guardhouse & Salvage Yard Office Foundati
Seq 62 S3 Inert Sto. Warehouse Foundation Plan
Seq 64 S5 Operations Bldg. Addition, Guardhouse, Salvage Yard Off. & Inert Sto
Seq 66 S7 Operations Bldg. Addition, Guardhouse, Salvage Yard Off. Masonry & M
Seq 68 S9 Ammunition Surveillance Facility Foundation Plan
Seq 69 S10 Ammunition Surveillance Facility Roof Framing
Seq 75 S16 Ammunition Surveillance Facility Blast Door Test Cubical
Seq 79 S20 Ammunition Surveillance Facility Building Sections & Details
Seq 83 S24 Magazine Plan & Sections
Seq 97 M9 Operations Building Addition HVAC Floor Plan
Seq 107 E5 Ammunition Surveillance Facility One Line Diagram & Panel Schedules
Seq 108 E6 Ammunition Surveillance Facility - Lighting & Power Plan Schedules
Seq 109 E7 Ammunition Surveillance Facility Grounding and HVAC Power Plan
Seq 110 E8 Ammunition Surveillance Facility Fire Detection and Security Plan

Seq 115 E13 Electrical Supply One Line Diagram, Panel Schedules
Seq 116 E14 Electrical Site Plan I
Seq 121 E19 Site Power Plan
Seq 124 E22 Security Lighting Plan III
Seq 125 E23 Security Lighting Plan IV
Seq 126 E24 Security Lighting Plan V

SECTION 11302 **[AMEND 0002]**

OIL/WATER SEPARATOR

PART I GENERAL

1.1 REFERENCES

	AMERICAN PETROLEUM INSTITUTE
Publication 421	Monographs on Refinery Environment Control - Management of Water Discharges, Design and Operation of Oil/Water Separators
	NATIONAL FIRE PROTECTION ASSOCIATION
NFPA 30	Flammable and Combustible Liquids Code
	STEEL TANK INSTITUTE
STI-P3	Specification and Manual for External Corrosion Protection of Underground Steel Storage tanks
	UNDERWRITERS LABORATORIES
UL-58	Standard for Safety, Steel Underground Tanks for Flammable and Combustible Liquids

1.2 SYSTEM DESCRIPTION

The oil/water separator shall be a double wall, underground, inclined parallel corrugated plate, gravity displacement-type separator with oil level alarm and leak detection systems designed for separation of free oils (hydrocarbons and other petroleum products) along with some settable solids from wastewater. The source of the influent to the separator shall be gravity flow from stormwater runoff, hydrocarbon spills and/or cleaning/maintenance operations.

1.3 PERFORMANCE REQUIREMENTS

1.3.1 Influent Characteristics

Provide oil/water separator designed for intermittent and variable flows of water, oil, or any combination of non-emulsified oil/water mixtures ranging from zero to the value indicated as the maximum flow rate as scheduled on the drawings. Operating temperatures of the influent in water mixture shall range from 40' to 180'F. The specific gravity of the oils at operating temperatures shall range from 0.68 to 0.95 and the petroleum hydrocarbon concentration less than or equal to 200,000 mg/l (20%). The specific gravity of the fresh water at operating temperatures shall range from 1.00 to 1.03.

1.3.2 Effluent Characteristics

The free oil and grease concentration in the effluent from the oil/water separator shall not exceed 10 mg/l (10 ppm). To achieve this goal, it will be necessary to remove all free oil droplets equal to and greater than 20 microns.

1.4 DESIGN REQUIREMENTS

1.4.1 Design shall be in accordance with Stokes Law and the American Petroleum Institute Publication 421.

1.4.2 Capacities, dimensions, construction, and thickness shall be in strict accordance with Underwriters Laboratories, Subject LJL-58, Double-wall Type I Construction with 360' Steel Secondary Containment Wall. Tank construction using thin-walled primary tank with external fiberglass jacket will not be allowed. Separator shall have a double-wall steel shell with a space between the layers. The inner primary containment tank (including pipe connections, manholes, etc.) shall be constructed in strict accordance with UL-58. Construction of the outer secondary containment tank shall be separate from the inner primary containment tank, and may be in direct contact with the primary tank, wherein the inner tank is completely contained within the outer steel tank, (the outer tank covers 360' or 100% of the tank volume). Any potential leak that may occur shall be captured in this sealed space, preventing a release to the environment. A warning shall be provided by the tank's leak monitoring system.

1.4.3 The oil/water separator shall be fabricated, inspected, and tested for leakage before shipment from the factory by manufacturer as a completely assembled vessel ready for installation. Inspection and test reports shall be supplied on manufacturer's letterhead.

1.4.4 The oil/water separator shall be cylindrical, horizontal, atmospheric-type steel vessel with flat-flanged heads, intended for the separation and storage of flammable and combustible

1.5 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 01330
SUBMITTAL PROCEDURES:

SD-0 1 Data

Design Calculations; FIO

API design calculations signed by a registered professional engineer to verify required effective surface area and design compliance in accordance with American Petroleum Institute 421.

Anchorage and Buoyancy Calculations; FIO.

Anchorage and buoyancy calculations signed by a registered professional engineer to verify burial depth, buoyancy and anchorage. Calculations to be based on site-specific information as funished by contract specifications.

SD-04 Drawings

Dimensions and Locations; GA
Shop drawings for oil/water separators shall show principal dimensions and location of all fittings.

SD-05 Design Data

Monograph; FIO

API Publication 421, "Monographs on Refinery Environmental Control - Management of Water Discharges, Design and Operation of Oil/Water Separators."

SD-09 Reports

Test Data; FIO

Manufacturer shall submit factory DIN 1999 test data and representative independent certified field-test reports to verify performance.

SD- 1 9 Operation and Maintenance Manuals

Instructions; FIO

Instructions for installation, operation, and maintenance. Manufacturer shall supply three (3) sets with the separator.

1.6 QUALITY ASSURANCE

1.6.1 Qualifications

Contractor: Manufacturer shall have at least (5) year's experience in manufacturing similar units for identical applications.

1.6.2 Regulatory Requirements

Comply with NFPA 30.

1.7 QUALIFICATIONS

1.7.1 Corrosion control system shall be in strict accordance with STI-P3 specifications as applied by a licensee of the Steel Tank Institute. Manufacturer shall be a licensee of Steel Tank Institute. No assigning or subcontracting of STI-P3 licensing will be permitted.

1.7.2 The oil water separator shall be the standard patented product of a steel tank manufacturer regularly engaged in the production of such equipment. No subcontracting of tank fabrication shall be permitted.

1.8 DELIVERY, STORAGE, HANDLING

1.8.1 All parts shall be preassembled to the largest extent possible, compatible with transportation limitations and equipment protection considerations. Field assembly, if any, shall require merely bolting together of match-marked components. Equipment shall be crated and delivered to protect against damage during shipping. Flange faces shall be protected from damage. All openings shall be covered to prevent entrance of @ water and debris. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the unit is ready for operation. Steel surfaces shall be properly protected to prevent rust and corrosion.

1.9 WARRANTY

1.9.1 The manufacturer shall wan-ant its products to be free from defects in material and workmanship for a period of one year from the date of shipment. The warranty shall be limited to repair or replacement of the defective part(s).

1.9.1.1 Provide thirty (30) year Limited Warranty as outlined in STI-P3.

PART 2 PRODUCTS

2.1 Manufactured Unit

The oil/water separator shall be cylindrical, horizontal, atmospheric-type steel vessel with flat-flanged heads, intended for the separation and storage of flammable and combustible liquids. The separator shall have the structural strength to withstand static and dynastic hydraulic loading while empty and during operating conditions.

2.1.1 The oil/water separator shall have an oil storage capacity equal to about 43% of the total vessel volume and an emergency oil spill capacity equal to 80% of the total vessel volume.

2.1.2 Each oil/water separator shall consist of inlet and outlet connections, non-clogging flow distributor and energy dissipation device, stationary under flow baffle, presettling chamber for solids, sludge baffle, oil coalescing chamber with a parallel corrugated steel plate coalescer (with removable plates) and sectionalized removable polypropylene impingement coalescers to optimize separation of free oil from water, effluent downcomer positioned to prevent

discharge of free oil that has been separated from water, access for each chamber, fittings for vent, oil pump-out, sampling, gauging, leak detection, and lifting lugs.

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2.1.4 Flow through the plate coalescer shall be cross-flow, perpendicular to plate corrugations. The corrugated plates shall be of protected steel construction. The minimum plate gap spacing shall be 3/4 inches. Plastic plate or vertical tube type coalescers are not permissible. NOTE: Plate spacing and orientation may vary depending on site conditions.

2.2 CONTONENTS

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2.2.1 Separator shall be a pre-packaged, pre-engineered, ready to install unit consisting of the following:

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2.2.1.1 An influent connection 8 inch flanged.

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2.2.1.2 An internal influent nozzle at the inlet end of the separator located at the furthest diagonal point from the effluent discharge opening.

2.2.1.3 A velocity head diffusion baffle at the inlet which shall reduce horizontal velocity and flow turbulence; distribute the flow equally over the separators cross sectional area; direct the flow in a serpentine path in order to enhance hydraulic characteristics and fully utilize all separator volume; completely isolate all inlet turbulence from the separation chamber.

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2.2.1.4 A sediment chamber to disperse flows and collects oily solids and sediments.

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2.2.1.5 Sludge baffle to retain settable solids and sediment and prevent them from entering the separation chamber.

2.2.1.6 An oil/water separation chamber containing an inched parallel corrugated plate coalescer, with removable corrugated plates, sloped downward toward the sediment chamber to shorten the vertical distance than an oil globule has to rise for effective removal; to enhance coalescence by generating a slight sinusoidal (wave like) flow pattern thereby causing smaller, slow rising, oil globules to coalesce together on the undersides of the plates forming larger, rapidly rising sheets of oil; to direct the paths of the separated oil to the surface of the separator.

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2.2.1.7 An oil/water separation chamber containing a sectionalized removable polypropylene coalescer designed to intercept oil globules equal to or greater than 20 microns in diameter to produce an effluent quality no greater than IO ppm free oil and grease. Heavy, one-piece impingement coalescers are not permissible.

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2.2.1.8 An internal effluent downcomer at the outlet end of the separator, to allow for discharge from the bottom of the separation chamber only.

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2.2.1.9 An effluent connection 8 inch, flanged.

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2.2. 1.10 Fittings for vent, interface/level sensor, leak detection, oil pump-out, sampling, and gauge.
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2.2.1.10 Two 24" diameter manholes (18" on 550 gal.), U.L. approved, complete with manway extensions, covers, gaskets, and bolts. Direct grade level access to all chambers is required. One manway shall be placed between the inlet and the parallel corrugated plate coalescer to facilitate access into sediment chamber for solids removal from above. One manway shall be placed between the parallel corrugated plate coalescer and outlet to facilitate access into the oil water separation chamber for coalescer removal from above.

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2.2.1.11 Lifting lugs at balancing points for handling and installation.

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2.2.1.12 Identification plates affixed in prominent locations, durable and legible throughout equipment life.
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2.2.1.14 STI-P3 Corrosion Protection System consisting of Isolation Spool Pieces; Dielectric Isolation Gaskets and Bushings; External surfaces commercial grit-blast, coated with either minimum 15 mils, DFT Polyurethane or 100 mils DFT "High-Life" FRP (Fiberglass Reinforced Polyester); Cathodic Protection System using Zinc Sacrificial Anodes; PPII Protection Prover.

2.2.1.15 Internal surfaces commercial grit-blast, coated 15 mils DFT coffosion-resistant Polyurethane.

2.3 ACCESSORIES

2.3.1 Separator shall be funished with an audible and visual alarm system which indicates hi oil (visual only) and hi-hi oil level (audible and visual) of oil storage in the oil/water separator. An audible and visual leak detection alarm system, which indicates hydrocarbon and/or water in the interstice, shall be provided. A silence control shall be provided for the audible alarm. Level sensors to be intrinsically safe. Level sensors to be made of stainless steel. Control panel shall be in NEMA 4. Power to the control panel shall be [120] volt, [3] phase.

2.3.2 Separator shall be furnished with steel hold-down straps with dielectric liners and tumbuckles.

2.3.3 Grout: Grout shall be non-metallic, noranetallic, non-shrink, fluid precision grout of a hydraulic cementitious system with graded and processed silica aggregate, portland cement shrinkage compensating agents, plasticizing and water reducing agents; fr6e of aluminum

powder agents, oxidizing agents and inorganic accelerators, including chlorides; proportioned, pre-mixed and packaged at factory with only the addition of water required at the project site.

2.4 TESTS, INSPECTION

2.3.1 The oil/water separator shall be fabricated, inspected and tested for leakage before shipment from the factory by manufacturer as a completely assembled vessel ready for installation. Inspection and test reports shall be supplied to customer on manufacturer's letterhead.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Installation: Install equipment and components accurately in position, true to line, level and plumb. Follow manufacturer's recommended practices for equipment installation. Provide required clearances between equipment components. Equipment, apparatus, and accessories requiring normal servicing or maintenance to be easily accessible.

3.1.2 Anchoring: Anchor all equipment in place. Check alignment of anchor bolts before installing equipment and clean out associated sleeves. Do not cut bolts because of misalignment. Notify Contracting Officer of errors and obtain Contracting Officer's acceptance before proceeding with corrections. Cut anchor bolts of excess length to the appropriate length without damage to threads. Where anchor bolts or like devices have not been installed, provide appropriate type anchors indicated for construction condition. For self drilling anchor bolts, use Hilti Fastening Systems, HHS self drilling anchor or ITT Phillips Drill Division, Red Head self drilling anchor. For drop in expansion anchors, use Hilti Fastening Systems, K@ Bolt or ITT Phillips Drill Division, Red Head Wedge Anchors. Devices of lead, plastic, or wood are not acceptable.

3.1.3 Grouting: Before setting all equipment which is anchored to a pad to be grouted in place, and before placing grout, clean surfaces to be in contact with grout, including fasteners and sleeves. Remove standing water, debris, oil, rust, coatings and other materials that impair bond. Clean metal surfaces or mill scale and rust by hand or power tool methods, or other acceptable methods. Provide necessary form work for placing and retaining grout. Perform all grouting in accordance with equipment manufacturer's published specifications and recommendations.

3.1.4 Leveling and Aligning: Level and align all equipment in accordance with respective manufacturer's published data. Do not use anchor bolt jack nuts or wedges to support, level or align equipment. Install only flat shims for leveling equipment. Place shims to fully support equipment. Wedging will not be permitted. Shims shall be fabricated flat carbon steel units of surface configuration and area not less than equipment bearing surface. Shims shall provide for full equipment support. Shims shall have smooth surfaces and edges, free from burrs and slivers. Flame or electrode cut edges will not be acceptable.

3.1.5 Provide coupling alignment records indicating parallel and angular dial indicator readings as well as coupling manufacturer's tolerances. Alignment for pumps, couplings and drivers

requiring "cold" and "hof' settings shall be checked in both conditions and so indicated on the alignment record.

3.2 EQUIP@NT TEST AND CHECKOUT

3.2.1 Before equipment installations will be accepted the equipment shall be tested and demonstrated to be correctly connected and installed.

3.2.2 All testing and checkout procedures of the manufacturer shall be carried out completely.

3.2.3 Any operating difficulty or defective item as a result of the installation shall be repaired or replaced and put into proper operation immediately.

3.3 INSTALLATION OF OIL/WATER SEPARATOR

3.3.1 Installing contractor shall be certified in accordance with local, state and federal underground storage tank regulations.

3.3.2 Separator shipping, delivery, storage, rigging and replacement shall conform to the written requirements of the separator manufacturer. Separator shall be installed on a concrete hold-down slab and backfilled with clean sand according to manufacturer's recommendations.

3.3.3 Cover the concrete hold-down slab with a minimum of 6 inches of clean sand, evenly graded and thoroughly compacted, prior to tank placement.

3.3.4 Separator shall be unloaded and placed on the sand bed using crane and the rigging procedures provided by the manufacturer. Use the separator lifting lugs for lifting into place. The use of slings around the separator will not be permitted, nor will the use of chock blocks of any sort. During handling, carefully inspect the separator for coating damage and repair before proceeding.

3.3.5 After placement, check separator to insure proper, uniform slope. Confirm the elevation.

3.3.6 Separator shall be tested before backfill. A primary (internal) tank test and secondary (external) tank test shall be conducted by applying 5-psig air pressure in accordance with manufacturer's instructions. Leaks shall be repaired in accordance with the manufacturer's instructions under the personal supervision of a representative of the manufacturer. After backfill, separator shall be retested.

3.3.7 Before proceeding with backfill, install the hold-down straps and tighten the tumbuckles securely and evenly throughout the length of the separator. Hold-down straps shall be separated from the shell by inert pads made of insulating dielectric material at least 2 inches wider than the straps. The bottom and sides of the seaprator shall be fully and evenly supported by hand shoveling and tamping. Use clean sand to backfill up to 12 inches above the top of the separator. Hand guided power equipment may be used to place fill in 6 inch layers, compacted to a minimum of 95 percent maximum dry density, after the bottom quadrant is filled. A minimum of four density tests shall be performed. Clean, non-corrosive, well-tamped gravel shall be used for backfill from a point 12 inches above the separator to subgrade for concrete slab.

3.3.8 Do not fill the separator, even partially, before the bottom quadrant is backfilled. The level of product shall not exceed the level of compacted backfill at any time.

3.3.9 Conduct continuity test of Cathodic Protection System.

3.3.10 Conduct test of structure to soil voltage and record results on installation checklist.

3.3.11 Complete an installation checklist. Checklist shall include tank deflection measurement. Checklist shall be signed by contractor and submitted as part of the Operation and Maintenance Manuals.

3.4 START-UP, MOTORS AND DRIVES

3.4.1 Check all motors and drives careftilly for correct rotation and alignment before placing equipment into operation.

3.4.2 Disconnect and realign couplings before placing into service or testing.

3.5 PIT ASSEMBLIES

3.5.1 Although the pit assemblies have been specified as assemblies, certain components may be shipped loose. Account for all loose components and ensure that they are properly assembled.

--End of Section--

BLAST RESISTANT PERSONNEL DOORS
07/98

PART 1 GENERAL

1.1 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 BEARING MANUFACTURERS ASSOCIATION (ABEMA)

ABEMA 9	(1990) Load Ratings and Fatigue Life for Ball Bearings
ABEMA 11	(1990) Load Ratings and Fatigue Life for Roller Bearings

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318/318R	(1989; Rev 1992; Errata) Building Code Requirements for Reinforced Concrete

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC-01	(1993) Load & Resistance Factor Design Manual Vol 1 - Structural Members, Specifications and Codes
AISC-02	(1993) Load & Resistance Factor Design Manual Vol II - Connections
AISC-03	(1989) Manual of Steel Construction Allowable Stress Design
AISC-04	(1989) Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG-671	(1986; Addenda 1989; Errata Nov, 1990) Specification for the Design of Cold-Formed Steel Structural Members (Part I of the Cold-Formed Steel Design Manual)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36	(1994) Carbon Structural Steel
ASTM A 123	(1989a) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153	(1982; R 1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 242	(1993a) High-Strength Low-Alloy Structural Steel
ASTM A 307	(1994) Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 325	(1994) Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A 354	(1994) Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM A 366	(1991; R 1993) Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
ASTM A 446	(1993) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A 449	(1993) Quenched and Tempered Steel Bolts and Studs
ASTM A 490	(1993) Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength
ASTM A 500	(1993) Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A 501	(1993) Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 514	(1994a) High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding
ASTM A 526	(1990) Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
ASTM A 529	(1994) High-Strength Carbon-Manganese Steel of Structural Quality
ASTM A 534	(1994) Carburizing Steels for Anti-Friction Bearings
ASTM A 563	(1994) Carbon and Alloy Steel Nuts
ASTM A 570	(1992; R 1993) Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 572	(1994b) High-Strength Low-Alloy

	Columbium-Vanadium Structural Steel
ASTM A 574	(1992a) Alloy Steel Socket-Head Cap Screws
ASTM A 588	(1994) High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 in. (100 mm) Thick
ASTM A 606	(1991a; R 1993) Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A 607	(1992a) Steel, Sheet and Strip, High-Strength, Low-Alloy, Columbium or Vanadium, or Both, Hot-Rolled and Cold-Rolled
ASTM A 611	(1994) Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
ASTM A 615	(1994) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 618	(1993) Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A 687	(1993) High-Strength Nonheaded Steel Bolts and Studs
ASTM A 706	(1993a) Low-Alloy Steel Deformed Bars for Concrete Reinforcement
ASTM A 715	(1992a; R 1993) Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled, and Steel Sheet, Cold-Rolled, High-Strength, Low-Alloy, with Improved Formability
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A 792	(1993a) Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process, General Requirements
ASTM E 90	(1990) Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
ASTM E 152	(1981a) Fire Tests of Door Assemblies
ASTM E 283	(1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM F 436	(1993) Hardened Steel Washers

ASTM F 568	(1993a) Carbon and Alloy Steel Externally Threaded Metric Fasteners
ASTM F 835	(1993) Alloy Steel Socket Button and Flat Countersunk Head Cap Screws
ASTM F 883	(1990) Padlocks

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	(1993) Standard Symbols for Welding, Brazing and Nondestructive Examination
AWS A5.4	(1992) Stainless Steel Electrodes for Shielded Metal Arc Welding
AWS D1.1	(1994) Structural Welding Code - Steel
AWS D1.3	(1989) Structural Welding Code - Sheet Steel
AWS D1.4	(1992) Structural Welding Code - Reinforcing Steel

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A 156.3	(1994) Exit Devices
BHMA A 156.4	(1992) Door Controls - Closers
BHMA A 156.8	(1994) Door Controls - Overhead Holders
BHMA A 156.13	(1987) Mortise Locks & Latches
BHMA A 156.20	(1989) Strap and Tee Hinges and Hasps

MILITARY SPECIFICATIONS (MS)

MS MIL-H-29181	(Rev A) Hasp, High Security, Shrouded, for High and Medium Security Padlock
MS MIL-H-43905	(Rev C) Hasps, High Security Padlocks
MS MIL-P-43607	(Rev G; Am 4) Padlock, Key Operated, High Security, Shrouded Shackle

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(1992) Fire Doors and Fire Windows
NFPA 80A	(1993) Protection of Buildings from Exterior Fire Exposures
NFPA 101	(1994) Safety to Life from Fire in Buildings and Structures

1.2 DESCRIPTION

Hollow metal doors shall be flush mounted in frames and shall be of unitized grid construction with two face sheets. Doors shall be the manually operated, side hinged, swinging type. Each door assembly shall include the door, frame, anchors, hardware, and accessories and shall be provided by a single manufacturer. Frames and anchors shall be capable of transferring blast and rebound reactions to the adjacent supporting structure. Resistance to blast shall be demonstrated either by design calculations or tests on prototype door assemblies. This specification applier only to doors 10, 34, 35, and 36 on the surveillance workshop building. All other indicated blast doors shall be fabricated in accordance with the details on the drawings and in accordance with the associated material specifications.

1.2.1 Design Requirements

1.2.1.1 Static Material Strength

The static values for minimum yield strength (or yield point) and (ultimate) tensile strength for steel shall be obtained from the applicable material specification. For tensile strength specified in terms of a tensile strength range, the lowest tensile strength specified shall be selected for design. Structural steel having a minimum static yield strength (or yield point) less than 50 ksiand Grade 60 reinforcing bars shall be designed using an average yield strength computed as 1.1 times the minimum static yield strength or yield point. When the minimum static yield for structural steel exceeds 50 ksi, the average yield strength shall be taken as equal to the minimum static yield strength or yield point without increase. The in-place compressive strength of concrete shall be computed by adding 0.5 ksi to the specified compressive strength to reach the average compressive strength and then multiplying by 1.1 to account for age effects. The average yield stress for steel sheet and strip shall be computed as 1.21 times the static yield point.

1.2.1.2 Dynamic Material Strength

The dynamic material strength shall be computed by applying a dynamic increase factor that accounts for the increase in material strength due to strain rate effects. The dynamic increase factor for steel sheet and strip used in flexure shall be 1.1 applied to the average yield stress.

1.2.1.3 Structural Member Design

Hollow metal doors shall be designed in accordance with AISI SG-671 except that for blast design, the dynamic yield strength shall be substituted for the static yield point.

1.2.1.4 Dynamic Analysis and Deformation

The door shall be designed using an equivalent single degree of freedom or other approved dynamic analysis method. The maximum door deformation shall be selected by the door manufacturer except that the maximum deformation in flexure shall not exceed the deformation limits specified or indicated. The deformation of structural steel members having a minimum yield strength or yield point greater than 65 ksi shall not exceed the elastic deflection. The ductility ratio for flexural members in hollow metal doors shall not exceed 1.0.

1.2.1.5 Rebound Resistance

Rebound resistance shall be the specified or indicated percentage of the door resistance at initial peak response.

1.2.2 Blast Effects

1.2.2.1 Overpressure

The spatial distribution of overpressure shall be uniform unless otherwise specified or indicated. For overpressure specified or indicated without duration, the overpressure waveform shall have a zero rise time and infinite duration.

1.2.2.2 Overpressure Direction

For overpressure identified as seating and for overpressure directions not otherwise specified or indicated, the positive phase overpressure shall be in the direction that causes the door to seat toward the frame.

1.2.2.3 Fragment Resistance

For doors specified or indicated to resist fragments, the door and the door and frame interface shall be designed to prevent fragment perforation and the latches and latching mechanism shall be shielded from fragment damage. The fragment impact point shall be anywhere on the door and frame face exposed to overpressure.

1.2.3 Blast Door Operation

The force required to set the door in motion shall be measured from the 90-degree open position, and the force required to engage and release the latches shall be measured at the latch handle with the door in the normal closed position.

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 SUBMITTAL PROCEDURES:

SD-01 Data

Blast Resistant Door; GA.

Data on standard blast doors consisting of catalog cuts, brochures, circulars, specifications, and product data that show complete dimensions and completely describe overpressure ratings, rebound ratings, doors, frames, anchors, hardware, and accessories.

Contractor Design Calculations; GA.

Detailed structural analysis and design calculations demonstrating resistance to blast when blast resistance is not demonstrated by prototype tests. Design calculations shall demonstrate adequacy under the blast effects specified or indicated. Design calculations shall include a sketch

of the overpressure waveform; dimensioned sketches of blast resisting elements such as door members, frame members, latches, and hinges; section properties for blast resisting members including built-up sections; the standard under which steel is produced; static and dynamic materiel strength properties; the resistance, stiffness, mass, elastic natural period, and elastic deflection for flexural members; and the peak deflection, peak support rotation, and time to peak deflection for door members in flexure. Design calculations shall cover initial response, rebound, and all secondary items such as shear, welds, local buckling, web crippling, hinges, and latches.

Test on Prototype Door; GA.

Certified test reports demonstrating blast resistance. Test reports shall include the name and location of the testing agency or laboratory, a description of the testing apparatus, the date of the tests, a description of the door specimen tested, descriptions of loadings, and the value of measured peak door deflection and peak permanent set. Test reports shall include analysis and interpretation of test results.

SD-04 Drawings

Contractor Design of Blast Resistant Doors; GA.

For special doors or standard doors with appreciable modifications, detailed fabrication and assembly drawings indicating the door location and showing dimensions, materials, fabrication methods, hardware, and accessories in sufficient detail to enable the Contracting Officer to check compliance with contract documents. Weld symbols used shall conform to AWS A2.4. These drawings need not be submitted for standard doors for which manufacturer's catalog data is submitted.

SD-06 Instructions

Blast Resistant Door; FIO.

Manufacturer's instructions for installation and field testing.

SD-08 Statements

Manufacturer's Field Service; FIO.

Information describing training to be provided, training aids to be used, and background data on the personnel conducting the training.

SD-09 Reports

Blast Door Shop and Field Operating Tests; GA.

Shop and field operating test reports that include values for opening and closing forces and times, forces required to operate latches, and a description of all operating tests performed.

Fire Rated Blast Door; GA.

In lieu of a UL listing for fire door assemblies, a letter shall be submitted by the testing laboratory which identifies the submitted product

by manufacturer and type or model and certifies that it has tested a sample assembly and issued a current listing.

SD-13 Certificates

Certificates of Compliance; GA.

Steel mill reports covering the number, chemical composition, and tension properties for structural quality steels. When blast resistance is demonstrated by calculations, a certificate stating that the door assembly provided was manufactured using the same materials, dimensions, and tolerances shown in the calculations. When blast resistance is demonstrated by prototype testing, a certificate stating that door and frame provided was manufactured using the same materials, dimensions, and tolerances as the tested prototype and listing the hardware and frame anchors required to achieve blast resistance. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturer and shall identify the door assembly and date of shipment or delivery to which the certificate applies.

Fire Rated Blast Door; GA.

Certificate of inspection conforming to NFPA 80, NFPA 80A, and NFPA 101 for fire doors exceeding the size for which label service is available.

Thermal Insulated Blast Door; GA.

Sound Rated Blast Door; GA.

Certification or test report for sound rated doors listing the type of hardware used to achieve the rating.

SD-19 Operation and Maintenance Manuals

Blast Resistant Door; FIO.

Information bound in manual form consisting of manufacturer's safety precautions, preventative maintenance and schedules, troubleshooting procedures, special tools, parts list, and spare parts data. All material shall be cross referenced to the door designations shown on the drawings.

1.4 QUALIFICATIONS

Welders, welding operators, and weld inspectors shall be qualified in accordance with AWS D1.1welders performing arc welding of steel sheet and strip shall be qualified in accordance with AWS D1.3

1.5 DELIVERY AND STORAGE

Door assemblies delivered and placed in storage shall be stored with protection from weather and dirt, dust, and contaminants.

1.6 WARRANTY

Manufacturer's written warranty covering the blast door assembly for 2 years after acceptance by the Government shall be furnished. This warranty shall provide for repair and replacement of the blast door assembly and

individual hardware and accessory items in the event of malfunction due to defects in design, materials, and workmanship except that the warranty need not cover finishes provided by others.

PART 2 PRODUCTS

2.1 MATERIALS

Only structural quality steel materials for which tension properties have been obtained shall be used to resist blast except that commercial quality steel sheet and strip shall be permitted for prototype tested hollow metal doors. Steel used in the door, door frame, and door frame anchors and nonstainless steel fasteners that resist blast shall be selected from the materials specified.

2.1.1 Concrete and Concrete Reinforcement

Concrete is specified in Section 03300 CONCRETE FOR BUILDING CONSTRUCTION. Concrete reinforcement shall conform to ASTM A 615 or ASTM A 706, Grade 60.

2.1.2 Structural Tubing

Structural tubing shall conform to ASTM A 500, ASTM A 501, or ASTM A 618.

2.1.3 Structural Steel

Structural steel bars, plates, and shapes shall conform to ASTM A 36, ASTM A 242, ASTM A 529, ASTM A 572, or ASTM A 588. Quenched and tempered steel plate shall conform to ASTM A 514.

2.1.4 Steel Sheet and Strip

Steel sheet and strip shall conform to ASTM A 366; ASTM A 446, Grades A, B, C, D, and F; ASTM A 526; ASTM A 570; ASTM A 606; ASTM A 607; ASTM A 611, Grades A, B, C, and D; ASTM A 715, Grades 50 and 60; or ASTM A 792, Grades 33, 37, 40, and 50.

2.1.5 Fasteners

Steel studs and bolts shall conform to ASTM A 307, ASTM A 325, ASTM A 354, ASTM A 449, ASTM A 490, or ASTM A 687 as applicable. Steel nuts shall conform to ASTM A 563. Hardened circular, beveled, and clipped washers shall conform to ASTM F 436. Steel hex cap screws shall conform to ASTM F 568. Steel socket-headed cap screws shall conform to ASTM A 574. Steel button and flat-headed countersunk cap screws shall conform to ASTM F 835.

2.2 HARDWARE

2.2.1 Hinges

2.2.1.1 General Requirements

Hinges shall be specially manufactured to support the door and to resist any blast induced loading. The number of hinges shall be determined by the blast door manufacturer. Welds used in hinges shall be continuous. Hinges shall be attached to the door and frame using mechanical fasteners except that full surface hinges for doors with locks shall be attached to the door

and frame by welding or approved tamper-resistant mechanical fasteners and hinges for doors with locks shall have approved nonremovable pins. Load ratings and fatigue life for ball and roller bearings shall be determined in accordance with ABEMA 9 and ABEMA 11 as applicable and, unless otherwise approved, the bearing steel shall conform to ASTM A 534. Hinges shall be capable of operating for the minimum number of cycles specified without failure or excessive wear under the door service loads where one cycle consists of swinging the door back and forth between the normal closed position and the 90-degree open position, where failure or excessive wear means that the latches do not seat properly or the door does not swing smoothly due to hinge failure or wear, and where door service loads consist of the door weight plus any loads produced by hardware. Rolling bearings shall be factory grease lubricated and either sealed or provided with easily accessible lubrication fittings.

2.2.1.2 Hinge Description

Hinge Type 1 shall be capable of smooth operation for a minimum of 250,000 cycles. This type of hinge shall be provided with structural quality steel pins and leafs and either rolling bearings in both the thrust and radial directions or hardened steel washer (disc) thrust bearings and rolling radial bearings except that rolling thrust bearings and metallic journal radial bearings shall be permitted for hollow metal doors when the specified overpressure is less than 3 psi.

2.2.2 Latching System

2.2.2.1 Latching Points

The number of latching points shall be determined by the door manufacturer. For multiple latching points, latching points can be provided at the head, sill, and jambs.

2.2.2.2 Latching System Operation

Latching systems shall be capable of operating for the same number of cycles specified for the door hinges where one latch operating cycle consists of engaging and releasing using the handle. Latches shall remain engaged until manually released and shall not release under blast loads or rebound. Manually operated latches shall remain in the released position until manually engaged. Self-latching latches shall provide self-activating engagement when the door is swung to the normal closed position. Handles shall release latches under a clockwise motion.

2.2.2.3 Latching Mechanism

Latching mechanisms for hollow metal doors shall be mounted on the seating face of the door and safety covered. Latch handle axles shall be manufactured of hardened steel or stainless steel, and axles requiring lubrication shall be provided with easily accessible lubrication fittings.

2.2.2.4 Safety Cover

Safety covers shall consist of steel housings that enclose the latching mechanism such that only the operating rods are exposed.

2.2.2.5 Cover Plate

Cover plates for structural steel doors shall be manufactured of minimum 1/4 inch thick plate and shall enclose the entire latching mechanism.

2.2.2.6 Latches

Latches (latch bolts) shall be manufactured of structural quality steel and the latch bolt throw shall not be less than 3/4 inch. Latch bolts shall be the sliding type in which the latch bolt slides into a matching strike in the door frame. Manually operated latches shall draw the door toward the frame during latching.

2.2.2.7 Handle

Handles for doors without locks shall be manufactured of steel castings, forgings, pipe, round tubing, bar, or plate and shall be one piece or have welded joints except that wheel handles can be manufactured of aluminum castings. Latch handles shall be firmly fastened to axles. Lever handles shall be perpendicular to the door edge when latches are engaged. Single lever handles shall be located at the stile opposite the hinges.

2.2.3 Keying

Keying shall conform to Section 08700 BUILDERS' HARDWARE. Change keys for locks shall be stamped with change number and the inscription "U.S. Property - Do Not Duplicate." Unless otherwise specified, two change keys shall be provided for each lock.

2.2.4 Door Stop

Door stops shall be designed to resist the impact of the door. The stop shall not scratch or scar the door finish when the door is opened against the stop.

2.2.5 Door Silencer

Rubber door silencers shall cushion the impact of the door against the frame so that steel-to-steel contact is not made during closing.

2.3 ACCESSORIES

2.3.1 Subframe

At the Contractor's option, a subframe can be provided and built into the structure prior to installation of the frame. The subframe and subframe anchors shall be capable of transferring blast and rebound reactions to the adjacent structure, and the frame shall be capable of transferring these reactions to the subframe. The subframe shall be fabricated in the same manner specified for the frame.

2.3.2 Nameplate

Each door assembly shall have a permanently affixed nameplate that displays the manufacturer's name, place and year of manufacture, and the applicable peak overpressure, impulse, and rebound rating.

2.3.3 Removable Threshold

The sill shall be flush with the adjacent floor when the threshold is removed. The removable threshold shall be attached using approved countersunk mechanical fasteners.

2.4 FABRICATION

2.4.1 Shop Assembly

Welding shall be in accordance with AWS D1.1 except that arc welding of steel sheet and strip shall be in accordance with AWS D1.3 and welding of concrete reinforcing bars shall be in accordance with AWS D1.4. Stainless steel shall be welded using electrodes conforming to AWS A5.4 In order to reduce distortion and residual stresses, a welding sequence shall be used. All welds shall be stress relieved, and welded doors and frames shall be post-weld straightened. Fabricated steel shall be well-formed to shape and size, with sharp lines and angles. Intermediate and corner joints shall be coped or mitered. Exposed welds shall be dressed smooth. Hollow metal door frames shall be pressed steel or structural steel with welded joints. Steel frames or subframes installed in masonry walls shall be provided with adjustable anchors. Hollow metal doors shall be of unitized grid construction with welded grid junctions and shall have flat, one-piece face sheets spot welded to the grid system. The edges of hollow metal doors shall be closed with seams continuously welded. Hollow metal doors shall be neat in appearance, free from warpage and buckle, and suitable reinforcing shall be provided for hardware.]

2.4.2 Mullion

Mullions for double doors shall be fabricated in the same manner specified for frames.

2.4.3 Shop Finishing

Shop priming of steel surfaces shall conform to Section 09900PAINTING, GENERAL except that surfaces that will be embedded in concrete need not be primed and hollow metal doors shall be either dipped in primer after welding is completed, or exposed surfaces shall be primed and interior surfaces coated with an approved rust inhibitor. Galvanizing of doors and frames shall conform to ASTM A 123 or other approved methods. Surfaces that will be embedded in concrete need not be galvanized and the interior of hollow metal doors may be treated with an approved rust inhibitor in lieu of galvanizing. Galvanizing of exposed portions of concrete anchors, nonstainless steel fasteners, and hardware other than factory finished hardware shall conform to ASTM A 153 or other approved methods.

2.4.4 Clearance

The clearance between the seated steel surfaces of structural steel doors and frames shall not exceed 1/16 inch. The
lateral clearance between hollow metal doors and frames shall not exceed 1/8 inch at the head and jambs and the clearance between the meeting edges of pairs of doors shall not exceed 1/4 inch. The clearance between the door bottom and threshold shall not exceed 3/4 inch.

2.5 BLAST DOOR ASSEMBLIES

2.5.1 Type

Type shall be hollow metal and fire-rated.

2.5.2 External Design Loading

Ballast Predure: 16.0 psi
Blast Oration: 9.0 Milliseconds
Blast Impluse: 72 psi .

2.5.3 Rebound

Rebound resistance shall be 50

2.5.4 Hardware

Mortise hinges shall be Type 1
Jamb latch points and a single lever handle operated from the seating face and opposite the seating faceself-latching engagement and either sliding or lever latch bolts shall be provided. Mortise lock and latch set with function FO4 shall be provided. A hasp and door silencer shall be provided.]

2.5.5 Operating Forces

Operating forces shall conform to NFPA 101. Maximum force shall be 20 pounds to engage and release latches.

2.5.6 Accessories

A removable threshold or shall be provided.

2.6 TESTS, INSPECTIONS, AND VERIFICATIONS

2.6.1 Prototype Static Test

Static tests on prototype door assemblies shall demonstrate that the door will resist the blast overpressure. Static tests will be accepted only if the door and frame proposed are manufactured using the same materials, dimensions, and tolerances as those in the prototype static test and the static overpressure used in the test is at least two times the blast overpressure. Static test reports shall be supplemented with calculations that demonstrate rebound resistance when rebound is not tested.

2.6.2 Shop Operating Test

Prior to shipment, each door assembly shall be fully erected in a supporting structure and tested for proper operation. Such testing shall include opening, closing, and operating all moving parts to ensure smooth operation and proper clearance, fit, and seating. The operating forces and opening and closing times shall be determined. A test report shall be prepared and three copies furnished within 7 calendar days after testing.

PART 3 EXECUTION

3.1 INSTALLATION

Doors and frames shall be installed in accordance with the manufacturer's written instructions. Pressed steel frames for hollow metal doors shall be fully grouted. Exposed surfaces shall be finish painted in accordance with

Section 09900 PAINTING, GENERAL. Galvanized surfaces damaged prior to final acceptance shall be repaired in accordance with ASTM A 780 to the same thickness as the original galvanizing.

3.2 TESTS

After installation is completed, each door shall be field tested for operation, clearance, fit, and seating by operating the door and hardware through at least 10 operating cycles. Door and hardware operation shall be tested using the forces specified. Personnel and equipment required to perform field testing shall be provided by the Contractor. Unless waived, all field tests shall be performed in the presence of the Contracting Officer. After testing is completed, test reports shall be prepared and three copies furnished.

3.3 MANUFACTURER'S FIELD SERVICE

Installation and testing of door assemblies shall be under the supervision of the door manufacturer's erection engineer. Upon completion of the work, and at a time designated by the Contracting Officer, the services of one engineer and other technical personnel as required shall be provided for a period of not less than 4 hours to instruct Government personnel in the operation and maintenance of the blast doors and all other items furnished under this specification section. The instructions shall also include use of the operation and maintenance manual. The instructions shall include videotapes. An instruction outline and procedure shall be submitted and approved prior to scheduling the instruction. One copy of all instruction material shall be provided at the time of instruction.

-- End of Section --