SECTION 32 31 13

CHAIN LINK FENCES AND GATES
11/16

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 within the text by the basic designation only.

JAPANESE STANDARDS ASSOCIATION (JSA)

JIS A 5308	(2014) Ready-Mixed Concrete
JIS A 5540	(2008) Turnbuckle for Building
JIS B 1180	(2014) Hexagon Head Bolts and Hexagon Screws
JIS B 1181	(2014) Hexagon Nuts and Hexagon Thin Nuts
JIS B 1256	(2008) Plain Washers
JIS G 3101	(2020) Rolled Steels for General Structure
JIS G 3444	(2021) Carbon Steel Tubes for General Structure
JIS G 3532	(2011) Low Carbon Steel Wires
JIS G 3533	(2008) Barbed Wires
JIS G 3552	(2011) Chain Link Wire Netting
JIS H 8641	(2021) Hot Dip Galvanized Coatings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fence Assembly; G

Location of Gate, Corner, End, and Pull Posts; G

Gate Assembly; G

Gate Hardware and Accessories; G

Erection/Installation Drawings; G

SD-03 Product Data

Fence Assembly; G

Gate Assembly; G

Gate Hardware and Accessories; G

Zinc Coating; G

PVC Coating; G

Fabric; G

Stretcher Bars; G

Barbed Wire; G

Precast Concrete Posts; G

Padlocks; G

Turnbuckles; G

Truss Rod; G

Tension Wires; G

Wire Ties; G

Concrete; G

SD-07 Certificates

Certificates of Compliance

SD-08 Manufacturer's Instructions

Fence Assembly

Gate Assembly

Hardware Assembly

Accessories

SD-11 Closeout Submittals

Recycled Material Content

1.3 QUALITY CONTROL

1.3.1 Certificates of Compliance

Submit certificates of compliance in accordance with the applicable reference standards and descriptions of this section for the following:

a. Zinc coating

b. PVC coating

c. Fabric

d. Stretcher bars

e. Gate hardware and accessories

f. Concrete

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide fencing and gate materials, as specified.
Submit reports of listing chain-link fencing and accessories regarding weight in grams for zinc coating, thickness of PVC coating.

Submit manufacturer's catalog data for complete fence assembly, gate assembly, hardware assembly and accessories. Provide chain link fence on concrete posts for Okinawa Area and chain link fence on pipe posts for all other regions in Japan.

2.2 COMPONENTS FOR CHAIN LINK FENCE AND GATE

2.2.1 Fabric

Fabric for fence and gates shall be galvanized steel chain link wire netting conforming to JIS G 3552 No. 8, 50 mm standard wire mesh.

2.2.2 Posts , Rails and Braces

2.2.2.1 Fence Posts for Okinawa Area

Shall be the commercial precast concrete posts of the type and size as indicated.

2.2.2.2 Fence Posts for Other Regions in Japan

Shall be carbon steel pipe conforming to JIS G 3444, size and thickness as indicated, and galvanized.

2.2.2.3 Fence Rails and Braces, and Pipe Connectors

Shall be carbon steel pipe conforming to JIS G 3444, size and thickness as indicated, and galvanized.

2.2.3 Structural Steel Bars, Plates and Shapes

Shall be JIS G 3101, SS 400, galvanized.

2.2.4 Barbed Wire

Shall be JIS G 3533, #12-gage, two-wire strand, a pitch of 102 mm, 4-pointed barbs and 2 to 7 twists.

2.2.5 Fastening Accessories

Shall be galvanized steel and shall be manufacturer's standard product.

2.2.6 Stretcher Bars

Provide bars that have one-piece lengths equal to the full height of the fabric with a minimum cross section of 5 by 20 millimeter or of size as recommended by the fence manufacturer and conforming to JIS G 3101.

2.2.7 Stretcher Bar Bands

Provide bar bands for securing stretcher bars to posts that are steel, wrought iron, or malleable iron spaced not over 381 millimeter on center or of size as recommended by the fence manufacturer. Bands may also be used in conjunction with special fittings for securing rails to posts. Provide bands with projecting edges chamfered or eased.

2.2.8 Post Tops

Provide tops that are steel, wrought iron, or malleable iron designed as a weathertight closure cap. Provide one cap for each post, unless equal protection is provided by a combination post-cap and wire supporting arm. Provide caps with an opening to permit through passage of the top rail.

2.2.9 Gate Posts

Shall be carbon steel pipe conforming to JIS G 3444, size and thickness as indicated, and galvanized.

2.2.10 Gates

2.2.10.1 Gate Assembly

Shape and size of the gate frame shall be as indicated. Framing and bracing members shall be of steel pipe specified herein.

2.2.10.2 Gate Leaves

For gate leaves, more than 2.44 m wide, provide intermediate members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 2.44 m wide shall have truss rods or intermediate braces. Provide intermediate braces on all gate frames with an electro-mechanical lock. Attach fabric to the gate frame by method standard with the manufacturer except that welding will not be permitted.

2.2.10.3 Gate Hardware And Accessories

Submit manufacturer's catalog data. Furnish and install latches, hinges, stops, keepers, rollers, and other hardware items as required for the operation of the gate and shall be zinc-coated steel having weight of zinc-coating not less than HDZ 40B, JIS H 8641. Gate latches shall be fork or plunger bar type. Arrange latches for padlocking so that the padlock

will be accessible from both sides of the gate. Provide stops for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

2.2.10.4 Turnbuckles for Gates

JIS A 5540, galvanized, size as indicated.

2.2.10.5 Truss Rod

Shall be JIS G 3101, 10 mm diameter, welded to fence post where indicated.

2.2.10.6 Tension Wires

Provide galvanized, coiled spring wire conforming to JIS G 3532 SWM-G3. Provide Zinc coating that weighs not less than 370 gram per square meter.

2.2.11 Wire Ties

Provide 2.3 millimeter galvanized steel wire conforming to JIS G 3532 for tying fabric to line posts,spaced 300 millimeter on center. For tying fabric to rails and braces, space wire ties 600 millimeter on center. For tying fabric to tension wire, space 2.7 millimeter hog rings 600 millimeter on center.

Manufacturer's standard procedure will be accepted if of equal strength and durability.

Provide wire ties constructed of the same material as the fencing fabric. Provide accessories with polyvinyl (PVC) coatings when PVC-coated fence fabric is required.

2.2.12 Bolts, Nuts and Washers

Steel conforming to JIS B 1180, JIS B 1181, JIS B 1256 respectively.

2.2.13 Padlocks

Provide padlocks with keys and chain in conformance with the appropriate specification of the installation agency having jurisdiction.

2.3 OTHER MATERIALS

2.3.1 Zinc Coating

Hot dip galvanization shall be in conformance with JIS H 8641.

2.3.2 Cast-in-Place Concrete for Fence and Gate Posts

Shall be of size as indicated. Concrete in conformance with JIS A 5308 and shall be a minimum compressive strength of 18 MPa at 28 days.

2.3.3 Grout

Provide grout of proportions one part portland cement to three parts clean, well-graded sand and a minimum amount of water to produce a workable mix.

2.4 GROUNDING

Ground the chain link fence and gates as indicated on drawings.

PART 3 EXECUTION

Submit manufacturer's erection/installation drawings and instructions that detail proper assembly and materials in the design for fence, gate, hardware and accessories.

3.1 PREPARATION

Ensure final grading and established elevations are complete prior to commencing fence installation.

3.1.1 Clearing and Grading

Clear fence line of trees, brush, and other obstacles to install fencing . Establish a graded, compacted fence line prior to fencing installation.

3.2 INSTALLATION

3.2.1 Security

Install new chain link fencing, remove existing fencing, and perform related work to provide continuous security for facility. Schedule and fully coordinate work with Contracting Officer and cognizant Security Officer.

3.2.2 Fence Installation

Install fence on prepared surfaces to line and grade indicated. Install fence in accordance with fence manufacturer's written installation instructions except as modified herein.

3.2.2.1 Post Spacing

Provide line posts spaced equidistantly apart, not exceeding 3.048 m on center. Provide gate posts spaced as necessary for size of gate openings. Do not exceed 152.4 m on straight runs between braced posts. Provide corner or pull posts, with bracing in both directions, for changes in direction of 0.26 rad or more, or for abrupt changes in grade. Submit drawings showing location of gate, corner, end, and pull posts.

3.2.2.2 Top and Bottom Tension Wire

Install top and bottom tension wires before installing chain-link fabric, and pull wires taut. Place top and bottom tension wires within 203 mm of respective fabric line.

3.2.3 Excavation

Provide excavations for post footings which are drilled holes in virgin or compacted soil, of minimum sizes as indicated.

Space footings for line posts 3048 millimeter on center maximum and at closer intervals when indicated, with bottoms of the holes approximately

75 millimeter below the bottoms of the posts. Set bottom of each post not less than 915 millimeter below finished grade when in firm, undisturbed soil. Set posts deeper, as required, in soft and problem soils and for heavy, lateral loads.

Remove excavated soil from Government property.

When solid rock is encountered near the surface, drill into the rock at least 305 millimeter for line posts and at least 457 millimeter for end, pull, corner, and gate posts. Drill holes at least 25.4 millimeter greater in diameter than the largest dimension of the placed post.

If solid rock is below the soil overburden, drill to the full depth required except that penetration into rock need not exceed the minimum depths specified above.

3.2.4 Setting Posts

Remove loose and foreign materials from holes and moisten the soil prior to placing concrete.

Provide tops of footings that are trowel finished and sloped or domed to shed water away from posts. Set hold-open devices, sleeves, and other accessories in concrete.

Keep exposed concrete moist for at least 7 calendar days after placement or cured with a membrane curing material, as approved.

Grout all posts set into sleeved holes in concrete with an approved grouting material.

Maintain vertical alignment of posts in concrete construction until concrete has set.

3.2.4.1 Earth and Bedrock

Provide concrete bases of dimensions indicated on the manufactures installation drawings, except in bedrock. Compact concrete to eliminate voids, and finish to a dome shape. In bedrock, set posts with a minimum of 25.4 mm of grout around each post. Work grout into hole to eliminate voids, and finish to a dome shape.

3.2.4.2 Concrete Slabs and Walls

Set posts into zinc-coated sleeves, set in concrete slab or wall, to a minimum depth of 305 mm. Fill sleeve joint with lead, nonshrink grout, or other approved material. Set posts for support of removable fence sections into sleeves that provide a tight sliding joint and hold posts aligned and plumb without use of lead or setting material.

3.2.4.3 Bracing

Brace gate, corner, end, and pull posts to nearest post with a horizontal brace used as a compression member, placed at least 305 mm below top of fence, and two diagonal tension rods.

a. Tolerances

Provide posts that are straight and plumb within a vertical tolerance of

6.35 millimeter after the fabric has been stretched. Provide fencing and gates that are true to line with no more than 12.7 millimeter deviation from the established centerline between line posts. Repair defects as directed.

3.2.5 Concrete Strength

Provide concrete that has attained at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than 7 calendar days after placement, before rails, tension wire, or fabric are installed. Do not stretch fabric and wires or hang gates until the concrete has attained its full design strength.

Take samples and test concrete to determine strength as specified.

3.2.6 Supporting Arms (only for Security Chain Link Fence and Gates)

It is the Contractor's option to choose the following type of supporting arms; type (1) or type (2). Type (1): Supporting arm shall be top part of fence and gate post, which shall be one length, seamless pipe through post to arm. Type (2): If the selected manufacturer's standard product uses the sectional type supporting arms, that shall be designed to accomodate the top rail. Install supporting arms as recommended by the manufacturer. In addition to manufacturer's standard connections, securely anchor supporting arms to posts to prevent easy removal with hand tools.

3.2.7 Top Rails

Provide top rails that run continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by the fencing manufacturer.

3.2.8 Brace Assembly

Provide bracing assemblies at end and gate posts and at both sides of corner and pull posts, with the horizontal brace located at midheight of the fabric.

Install brace assemblies so posts are plumb when the diagonal rod is under proper tension.

Provide two complete brace assemblies at corner and pull posts where required for stiffness and as indicated.

3.2.9 Tension Wire Installation

Install tension wire by weaving them through the fabric and tying them to each post with not less than 3.9 millimeter galvanized wire or by securing the wire to the fabric with 3.5 millimeter ties or clips spaced 610 millimeter on center.

3.2.10 Fabric Installation

Provide fabric in single lengths between stretch bars with bottom barbs placed approximately 38 millimeter above the ground line. Pull fabric taut and tied to posts, rails, and tension wire with wire ties and bands.

Install fabric on the security side of fence, unless otherwise directed.

Ensure fabric remains under tension after the pulling force is released.

3.2.11 Stretcher Bar Installation

Thread stretcher bars through or clamped to fabric 102 millimeter on center and secured to posts with metal bands spaced 381 millimeter on center.

3.2.12 Barbed Wire (only for Security Chain Link Fence and Gate)

Install barbed wire on supporting arms above fence posts. Extend each end member of gate frames sufficiently above top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Pull each strand taut and securely fasten each strand to each supporting arm and extend member. The method of securing wires shall be as follows: twist tie barbed wire to arm using wire which has been looped through a hole in the supporting arm. Other methods of securing barbed wire are acceptable provided they are equally secure, and are approved in advance by the Contracting Officer.

3.2.13 Gate Installation

Install gates plumb, level, and secure, with full opening without interference. Install ground set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricated where necessary.

3.2.14 Tie Wires

Provide tie wires that are U-shaped to the pipe diameters to which attached. Twist ends of tie wires not less than two full turns and bent so as not to present a hazard.

3.2.15 Fasteners

Install nuts for tension bands and hardware on the side of the fence opposite the fabric side. Peen ends of bolts to prevent removal of nuts.

3.2.16 Zinc-Coating Repair

Clean and repair galvanized surfaces damaged by welding or abrasion, and cut ends of fabric, or other cut sections with specified galvanizing repair material applied in strict conformance with the manufacturer's printed instructions.

3.2.17 Accessories Installation

3.2.17.1 Post Caps

Install post caps as recommended by the manufacturer.

3.2.17.2 Padlocks

Provide padlocks for gate openings and provide chains that are securely attached to gate or gate posts. Provide padlocks keyed alike, and provide two keys for each padlock.

3.2.18 Grounding

Ground all fences crossed by overhead power lines in excess of 600 volts, and all electrical equipment attached to the fence. Ground fences on each side of all gates, at each corner, at the closest approach to each building located within 15 m of the fence, and where the fence alignment changes more than 15 degrees. Grounding locations can not exceed 198 m. Bond each gate panel with a flexible bond strap to its gate post. Ground fences crossed by power lines of 600 volts or more at or near the point of crossing and at distances not exceeding 45 m on each side of crossing. Provide ground conductor consisting of No. 6 AWG solid copper wire. Provide copper-clad steel rod grounding electrodes 19 mm by 3.05 m long. Drive electrodes into the earth so that the top of the electrode is at least 152 mm below the grade. Where driving is impracticable, bury electrodes a minimum of 305 mm deep and radially from the fence, with top of the electrode not less than 610 mm or more than 2.4 m from the fence. Clamp ground conductor to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. Total resistance of the fence to ground cannot exceed 25 ohms.

3.3 CLOSEOUT ACTIVITIES

Remove waste fencing materials and other debris from the work site.

Submit manufacturer's data indicating percentage of recycled material content in protective fence materials, including chain link fence, fabric, and gates to verify affirmative procurement compliance.

3.4 RESTORATION

The Contractor shall restore all damaged and disturbed areas caused by this project work to match existing condition as directed.

3.4.1 Surface Course Restoration

Concrete and/or asphalt concrete surface course which has been damaged and disturbed to accomplish this project shall be restored to match existing condition with new concrete and/or new asphalt concrete, including crushed stone base course.

3.4.2 Turf Restoration

Sodded area which has been damaged and disturbed to accomplish this project shall be restored to match existing condition by reusing existing sod or new sod. Water thoroughly immediately after replanting.

-- End of Section --