SECTION 32 31 00 / 02825

 EXPANDED METAL SECURITY FENCING

\*\* NOTE TO SPECIFIER \*\*
 This section is based on the products of Niles Fence and Security Products, LLC, which is located at:
 310 N. Pleasant Ave., PO Box 191.
 Niles, OH 44446.
 Toll Free Te1: 800-321-7464.
 Tel: 330-652-0743.
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 Email: info@nilesfence.com .
 Web: [www.nilesfence.com.](http://www.nilesfence.com.)
 Niles Fence & Security, LLC manufactures and distributes the SECUREX line of expanded metal mesh fence systems. Our comprehensive list of expanded metal fence systems for industry have a range of applications from the highest level of security to perimeter demarcation. SECUREX fence systems were designed for strength, durability and aesthetic appeal featuring clean lines and easy installation. Niles Fence and Security offers a series of fence systems available for site security including SECUREX fence framework and fittings, expanded metal mesh, security gates, and machine guard safety railing. All SECUREX products can be customized for use on rail lines, power plants, schools, corporate faciilities, manufacturing plants, airports and prisons.

1. GENERAL
	1. SCOPE OF WORK

 The contractor shall provide all labor, materials and appurtenances necessary for installation of the Securex expanded metal security fence system outlined herein.

* 1. SYSTEM DESCRIPTION

As manufactured by Niles Fence and Security, the system will include high security expanded metal mesh panels and fittings of the Securex design. The system will be: (specify fence style – Diamond, Super C, Securex, Securex Retro-Fit)

* 1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Minimum of 10 years experience in the manufacture of expanded metal fencing.
		2. Contractor Qualifications: Contractor shall provide installers experienced with the installation of expanded metal security fencing.
	2. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. \_\_\_\_ \_\_\_\_\_ - Earthwork
		2. \_\_\_\_\_ \_\_\_\_\_ - Concrete.
	1. REFERENCES
		1. ASTM A 121 – Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.
		2. ASTM A 123 - Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
		3. ASTM A 307- Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
		4. ASTM F 626 - 96a - Standard Specification for Fence Fittings.
		5. ASTM F 900 - Specification for Industrial and Commercial Swing Gates.
		6. ASTM F 1043-06 – Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Framework.
		7. ASTM F 1083-06 – Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
		8. ASTM F 1184 – Standard Specification for Industrial and Commercial Horizontal Slide Gates.
		9. ASTM F 1267 – Standard Specification for Metal, Expanded Steel.
		10. ASTM F1910-98(2003) – Standard Specification for Long Barbed Tape Obstacles.
		11. ASTM F1911-05 – Standard Practice for Installation of Barbed Tape.
		12. ASTM F 2548-06 - Standard Specification for Expanded Metal Fence Systems for Security Purposes.
		13. ASTM F2780 - Standard Specification Guide for Design and Construction of Expanded Metal Security Fences and Barriers.

* 1. SUBMITTALS
		1. Product Data: Manufacturer's product data sheets on each product to be used, including details and drawings.

\*\* NOTE TO SPECIFIER \*\* Delete any LEED information that does not apply.

* + 1. LEED Requirements:

 1. MR Credits 2.1 and 2.2 – Construction Waste Management

 2. MR Credits 4.1 and 4.2 – Recycled Content

3. MR Credits 5.1 and 5.2 – Regional Materials

* + 1. Shop Drawings: Provide plan, post spacing and sizing, location of gates and material finish as necessary to depict actual products specified, proper design considerations, and installation procedures. Coordinate fencing locations with the Contract Drawings.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.
1. PRODUCTS
	1. MANUFACTURERS
		1. The high security expanded metal fence system shall conform to the Securex Fence system as manufactured by: Niles Fence and Security Products, LLC, 310 N. Pleasant Ave; Niles, OH 44446; Toll Free Tel: 800-321-7464; Facsimile 330-299-0329; or info@nilesfence.com; web: [www.nilesfence.com](http://www.nilesfence.com)
	2. SECUREX EXPANDED METAL SECURITY MESH

\*\* NOTE TO SPECIFIER \*\* Select Expanded Metal fabric mesh from the following options Delete the remaining options.

* + 1. Mesh Panels: Expanded Steel.
			1. Type: 1/2 inch #13R.
				1. Strand Width: 0.096 inches (2.4mm).
				2. Strand Thickness: 0.090 inches (2.3mm).
				3. SWD: 0.50 inches (12.7mm).
				4. LWD: 1.2 inches (30.5mm).
				5. Percent Open Area: 57.
				6. Galvanized weight per sq. foot: 1.74 lbs (0.79 Kg).
			2. Type: 3/4 inch #9R.
				1. Strand Width: 0.150 inches (3.8mm).
				2. Strand Thickness: 0.134 inches (3.4mm).
				3. SWD: 0.923 inches (23.4mm).
				4. LWD: 2.0 inches (51mm).
				5. Percent open area: 68.
				6. Galvanized weight per sq. foot: 1.98 lbs (0.9 Kg).
			3. Type: 1 1/2 inch #9R.
				1. Strand Width: 0.144 inches (3.7mm).
				2. Strand Thickness: 0.134 inches (3.4mm).
				3. SWD: 1.3 inches (33mm).
				4. LWD: 3 inches (76mm).
				5. Percent Open Area: 76.
				6. Galvanized weight per sq. foot: 1.31 lbs (0.54 Kg).
			4. Type: 2 inch #9R.
				1. Strand Width: 0.149 inches (3.8mm).
				2. Strand Thickness: 0.134 inches (3.4mm).
				3. SWD: 1.85 inches (47mm).
				4. LWD: 4 inches (102mm).
				5. Percent Open Area: 84.
				6. Galvanized weight per sq. foot: 0.99 lbs (0.45 Kg).
	1. EXPANDED METAL DIAMOND FENCING

1. Frame: 6 Foot (1829mm) Securex Diamond Fence Framework:

* + - 1. Line Post Type: 2.375 inch (60mm) O.D. WT/SS 40 pipe.
			2. End Post Type: 2.375 inch (60mm) O.D. WT/SS 40 pipe.

 3. Maximum Span: 117 inches (2972mm).

 4. Panel Size: 60 inches wide by 72 inches tall (1524mm x 1829mm).

 5. Horizontal Rails: (2) 1-5/8 (41mm) x 13/16 (21mm) x 14ga c-channel rails.

2.4 FENCE ATTACHMENT FITTINGS AND HARDWARE:

 Securex expanded metal fence panels shall be installed using hot dip galvanized steel fittings as manufactured by Niles Fence and Security and sized to framework specific to the project. Use Securex Fittings to install expanded metal fence fabric.

 1. Expanded Metal Mesh Fittings:

###  Diamond C-Clamps shall be sized to match outside diameter of line posts and are used with clamp bars to attach mesh to fence framework.

###  Diamond Latch Clamps lock into expanded metal mesh and through Diamond line rails. Typical placement of latch clamps is every 12-15 inches on line rails.

###  Diamond Clamp bars shall be used in pairs to join mesh vertically between rails.

* 1. Diamond End Tensioners shall be sized to match outside diameter of corner and end posts and are used to secure expanded metal mesh to the posts.
	2. Diamond U-Washers shall be used with the latch clamp assembly on the non-attack side of the fence to lock the bolt and expanded metal mesh into place.
	3. Nuts and Bolts shall be stainless steel carriage bolts with breakaway nuts to maximize security. Bolt size is contingent on mesh and fittings.

 A. 3/4” - #9 Standard Diamond - 5/16-18 inch x 2 inch bolts.

 2. Fence Framework Fittings:

### 1. Securex Diamond Band Clamps shall be sized to match outside diameter of corner, end and terminal posts and are used to attach rails to posts. Use one 1-5/8”square washer per band.

2. Securex Diamond Post Band Sets are interlocking bands and shall be used on all line posts to connect rails.

2.5 SECURITY APPURTENANCES:

\*\* NOTE TO SPECIFIER \*\* Select additional security appurtenances if required. Delete the remaining options.

 1. Barbed Wire:

### 1. Steel barbed wire of 80 rods each, Coating type Z, Coating Class 3 to ASTM Specification A121.

### 2. Barbed wire shall meet the material requirements and installation per A121-99(2004) Standard Specification for Metallic-Coated Carbon Steel Barbed Wire.

### 3. Barbed wire shall be installed using manufacturers’ approved method of attachment.

 2. Barbed Tape:

###  Barbed Tape shall be 18-in single coil helical with stainless steel barb and Class III galvanized steel.

###  Barbed Tape shall meet ASTM F 1911 Standard Practice for Installation of Barbed Tape and will have 33 coil loops per 50 linear foot coil.

###  Barbed Tape shall be installed using manufacturers’ approved method of attachment.

 3. Security Ground Guard Panels shall be attached to the bottom rail of the fence and buried in a trench in line with the fence above grade.

\*\* NOTE TO SPECIFIER \*\* Select Expanded Metal fabric mesh from the following options Delete the remaining option.

* + 1. Type: 1 1/2 inch #6R.
			- 1. Strand Width: 0.203 inches (5.2mm).
				2. Strand Thickness: 0.194 inches (4.9mm).
				3. SWD: 1.3 inches (33mm).
				4. LWD: 3 inches (76mm).
				5. Percent Open Area: 69.
				6. Galvanized weight per sq. foot: 2.75 lbs (1.25 Kg).
			1. Type: 1/2 inch #13R.
				1. Strand Width: 0.096 inches (2.4mm).
				2. Strand Thickness: 0.090 inches (2.3mm).
				3. SWD: 0.50 inches (12.7mm).
				4. LWD: 1.2 inches (30.5mm).
				5. Percent Open Area: 57.
				6. Galvanized weigh per sq. foot: 1.74 lbs (0.79 Kg).

 4. Security U-Edging shall be used to minimize, where necessary, sharp edges and secure expanded metal for safety railing applications.

 a. 18 gauge x 7/8 inch (22mm) x \_\_\_\_\_.

2.6 GATES AND GATE HARDWARE

 \*\* NOTE TO SPECIFIER \*\* Select gates if required. Delete the remaining options.

 1. Single Swing Pedestrian Gate:

1. Single Swing Gates shall be of a welded construction and designed to operate under the added weight of the Securex expanded metal security mesh panels and the affects of additional wind loading.
2. Swing gates shall be designed per ASTM F900 Specification for Industrial and Commercial Swing Gates.
3. Swing gates shall be covered with Securex mesh fabric and shall fit flush on all sides of the gate frame allowing no open spaces between the fabric and the gate frame.
4. Securex Bands shall secure the mesh to the gate frame. Use 1 less band than the height of the vertical gate member and one less than the width of the gate leaf per horizontal gate member.
5. Use Securex C-Clamps for bracing. Securex Clamps shall be spaced no more than 16 inches apart on gate braces. Any required mesh to mesh joints shall be secured using Securex Clamps evenly spaced over the joint.
6. Securex mesh panels shall overlap a minimum of one diamond. Typically, use 2 less clamps than the height of the gate leaf.
7. Gate hinges shall be structurally capable of supporting the gate leaf and allow t he gate to open and close without binding. The installed gate latch shall be capable of retaining the gate in a closed position.
8. Alternatively, Securex expanded metal mesh can be welded directly to the gate frame

\*\* NOTE TO SPECIFIER \*\* Select Gate Frame. Delete one of the next two paragraphs.

 A. Gate Frame: Round.

 1. 1.90 inch (48mm) round pipe fully welded.

 2. Mesh to attach to outside of frame with Securex fittings.

 3. Standard industrial hinges to match hinge post size.

 4. Standard industrial fork latch to match latch post size.

 5. Fittings and accessories: Truss rod and tighteners, post caps, and brackets will be malleable iron or steel hot dipped galvanized in accordance with ASTM F 626.

 B. Gate Frame: Square.

1. 2 inch by 2 inch (51mm x 51mm) 14ga square tubing, fully welded.
2. Expanded Metal Mesh in-fill welded to frame center.
3. Standard industrial hinges to match hinge post size.
4. Standard industrial fork latch to match latch post size.
5. \*\* NOTE TO SPECIFIER \*\* Select Horizontal Support Rail Count. Delete one of the next two paragraphs.
6. Horizontal Support Rails: 1.
7. Horizontal Support Rails: 2.

\*\* NOTE TO SPECIFIER \*\* Select Gate End Post Type based on height of fence and wind load. Delete one of the next two paragraphs.

 C. Post Types

 1. Post Type: 2.875 inch (73mm) Schedule 40 /SS40 pipe.

 2. Post Type: 4 inch (102mm) Schedule 40/SS40 pipe.

2. Double Drive Swing Pedestrian Gate:

1. Double Drive Swing Gates shall be of a welded construction and designed to operate under the added weight of the Securex expanded metal security mesh panels and the affects of additional wind loading.
2. Swing gates shall be designed per ASTM F900 Specification for Industrial and Commercial Swing Gates.
3. Swing gates shall be covered with Securex mesh fabric and shall fit flush on all sides of the gate frame allowing no open spaces between the fabric and the gate frame.
4. Securex Bands shall secure the mesh to the gate frame. Use 1 less band than the height of the vertical gate member and one less than the width of the gate leaf per horizontal gate member.
5. Use Securex C-Clamps for bracing. Securex Clamps shall be spaced no more than 16 inches apart on gate braces. Any required mesh to mesh joints shall be secured using Securex Clamps evenly spaced over the joint.
6. Securex mesh panels shall overlap a minimum of one diamond. Typically, use 2 less clamps than the height of the gate leaf.
7. Gate hinges shall be structurally capable of supporting the gate leaf and allow t he gate to open and close without binding. The installed gate latch shall be capable of retaining the gate in a closed position.
8. Alternatively, Securex expanded metal mesh can be welded directly to the gate frame

\*\* NOTE TO SPECIFIER \*\* Select Gate Frame. Delete one of the next two paragraphs.

 A. Gate Frame: Round.

 1. 1.90 inch (48mm) round pipe fully welded.

 2. Mesh to attach to outside of frame with Securex fittings.

 3. Standard industrial hinges to match hinge post size.

 4. Standard industrial fork latch to match latch post size.

 5. Fittings and accessories: Truss rod and tighteners, post caps, and brackets will be malleable iron or steel hot dipped galvanized in accordance with ASTM F 626.

 B. Gate Frame: Square.

1. 2 inch by 2 inch (51mm x 51mm) 14ga square tubing, fully welded.
2. Expanded Metal Mesh in-fill welded to frame center.
3. Standard industrial hinges to match hinge post size.
4. Standard industrial fork latch to match latch post size.
5. \*\* NOTE TO SPECIFIER \*\* Select Horizontal Support Rail Count. Delete one of the next two paragraphs.
6. Horizontal Support Rails: 1.
7. Horizontal Support Rails: 2.

\*\* NOTE TO SPECIFIER \*\* Select Gate End Post Type based on height of fence and wind load. Delete one of the next two paragraphs.

 C. Post Types

 1. Post Type: 2.875 inch (73mm) Schedule 40 /SS40 pipe.

 2. Post Type: 4 inch (102mm) Schedule 40/SS40 pipe.

 3. Horizontal and Cantilever Swing Gates:

1. Horizontal and Cantilever Slide Gates shall be of a welded construction and designed to operate under the added weight of the Securex expanded metal security mesh panels and the affects of additional wind loading.
2. Slide gates shall be designed per ASTM F1184 Specification for Industrial and Commercial Horizontal Slide Gates.
3. Slide gates shall be covered with Securex mesh fabric and shall fit flush on all sides of the gate frame allowing no open spaces between the fabric and the gate frame.
4. Securex Bands shall secure the mesh to the gate frame. Use 1 less band than the height of the vertical gate member and one less than the width of the gate leaf per horizontal gate member.
5. Use Securex C-Clamps for bracing. Securex Clamps shall be spaced no more than 16 inches apart on gate braces. Any required mesh to mesh joints shall be secured using Securex Clamps evenly spaced over the joint.
6. Securex mesh panels shall overlap a minimum of one diamond. Typically, use 2 less clamps than the height of the gate leaf.
7. Alternatively, Securex expanded metal mesh can be welded directly to the gate frame

\*\* NOTE TO SPECIFIER \*\* Select Gate Frame. Delete one of the next two paragraphs.

 A. Gate Frame: Round.

 1. 1.90 inch (48mm) round pipe fully welded.

 2. Mesh to attach to outside of frame with Securex fittings.

 3. Standard industrial hinges to match hinge post size.

 4. Standard industrial fork latch to match latch post size.

 5. Fittings and accessories: Truss rod and tighteners, post caps, and brackets will be malleable iron or steel hot dipped galvanized in accordance with ASTM F 626.

 B. Gate Frame: Square.

1. 2 inch by 2 inch (51mm x 51mm) 14ga square tubing, fully welded.
2. Expanded Metal Mesh in-fill welded to frame center.
3. Standard industrial hinges to match hinge post size.
4. Standard industrial fork latch to match latch post size.
5. \*\* NOTE TO SPECIFIER \*\* Select Horizontal Support Rail Count. Delete one of the next two paragraphs.
6. Horizontal Support Rails: 1.
7. Horizontal Support Rails: 2.
8. \*\* NOTE TO SPECIFIER \*\* Select Gate End Post Type based on height of fence and wind load. Delete one of the next two paragraphs.

 C. Post Types

 1. Post Type: 2.875 inch (73mm) Schedule 40 /SS40 pipe.

 2. Post Type: 4 inch (102mm) Schedule 40/SS40 pipe.

 D. Types of Slide Gates:

\*\* NOTE TO SPECIFIER \*\* Select Type of Slide Gate.

\*\* NOTE TO SPECIFIER \*\* Select Top Track and Rail. Delete one of the next two paragraphs.

 1. Type I – Overhead Slide – Any horizontal slide gate supported from above.

1. Top track and Rail: Enclosed combination one piece aluminum extrusion.
2. Top track and Rail: Dual track (2) enclosed combination one piece aluminum extrusions welded together.
3. Bottom rail: 2 inch by 4 inch (51mm x 102mm) rectangular aluminum (1.71 lb/lf) in accordance with ASTM B221 alloy and temper 6061-T6.
4. Vertical members: interior vertical members shall be the same material as gate frame with corresponding alloy and temper 6061-T6
5. Truck Assembly - Zinc die cast swivel type with sealed lubricant ball bearing rollers to ensure proper truck alignment in track.
6. Bottom guide wheels: Each assembly shall consist of two 3 inch (76mm) diameter rubber wheels straddling bottom horizontal gate rail.

 2. Type II – Cantilever Slide – Any horizontal slide gate spanning an opening and lacking a top or bottom support within that opening. Type II gates shall be supplied in one of two classes:

\*\* NOTE TO SPECIFIER \*\* Select Class based on cantilever requirements.

1. Class 1 – Steel frame gates and aluminum frame gates using external rollers.
2. Class 2 – Steel frame gates and aluminum frame gates using internal rollers.

2.7 FENCE SYSTEM FINISHES

* + 1. Galvanized Finish:
			1. Hot dip galvanized expanded metal mesh, fittings and framework meeting ASTM A123.
		2. Color Coated Finish:
			1. All color coated expanded metal mesh material shall be coated using Securex Plus 8-12 mil finish as manufactured by Niles Fence and Security. Materials will be electro deposition E-coat, color coated and top coated with a TGIC polyester powder.
			2. Securex Fence Framework shall be powder coated black to meet ASTM 1043.
			3. All nuts and bolts shall be painted after installation.

2.8 RELATED PRODUCTS

\*\* NOTE TO SPECIFIER \*\* Select ready mixed or site mixed concrete. Delete one of the next two paragraphs.

* + 1. Concrete: Ready mixed concrete in accordance with Section 03300; site delivered and placed in accordance with requirements found in Part 3 of this section.
		2. Concrete: Site mixed concrete in accordance with ASTM C 387 and Section 03300; placed in accordance with requirements found in Part 3 of this section.

PART 3 EXECUTION

3.1 EXAMINATION

* + 1. Do not begin installation until site has been properly prepared to finish grading requirements.
		2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

* + 1. All new installation shall be laid out by contractor in accordance with construction plans.
		2. Prepare all work areas and components. Clean all debris from work area prior to installation.

3.3 EXCAVATION

* + 1. Excavate for fence posts to a depth as required by local building code. At no time may the post depth be less than the following:
			1. 6 foot (1829mm) Fences: minimum of 24 inches (610mm).
		2. Post Spacing:

\*\* NOTE TO SPECIFIER \*\* Select Post Spacing. Where smaller spacing is necessary due to wind load or other design considerations, insert spacing as required. Delete two of the next three paragraphs.

* + - 1. On flat and gradual gradient, locate posts every 117 inches (2972mm) on center.
			2. On flat and gradual gradient, locate posts every \_\_\_\_ inches (\_\_\_\_\_mm) on center.

\*\* NOTE TO SPECIFIER \*\* Retain the next paragraph only if slopes in excess of 1 in 10 are to receive fencing.

* + - 1. On steep gradient, decrease post centers to 48 inches (1219mm) on center.

3.4 INSTALLATION – GENERAL CONDITIONS

* + 1. Installation and layout out of the job shall be approved by the owner or general contractor prior to installation.
		2. Install posts plumb and set on center per manufacturer’s drawings.
		3. Install all line rails level. The bottom rail shall be installed 3 to 6 inches above the bottom of the expanded metal panel. Top rail shall be installed 3-6 inches from the top of the expanded metal panel.
		4. Expanded metal panels shall be installed flush to grade.
		5. Expanded metal panels shall overlap three diamonds or 3 inches with diamonds orientated in the same direction.
		6. Expanded metal mesh panels shall fit flush to all corner posts, end posts, gate posts and gate frames.
		7. Clamp mesh to line posts and rails using clamps spaced per manufacturer’s drawings.

3.5 PROTECTION

* + 1. Protect installed products until completion of project.
		2. Tighten all nuts and if not using breakaway bolts peen, scarf or weld the threads of the carriage bolts.
		3. Touch-up, repair or replace damaged products before substantial completion.

END OF SECTION