

SECTION 14651FREE STANDING JIB CRANE

***** Gorbel, Inc. manufactures a broad range of material handling cranes including monorail, bridge, gantry, and jib cranes. Numerous work station and industrial models are provided.

This guide can be used to prepare a specification for incorporating free standing jib cranes into a competitively bid construction project.

The specification section is organized by placing information in three standard parts:

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| <u>PART 1 - GENERAL</u> | Describes administrative and procedural requirements. |
| <u>PART 2 - PRODUCTS</u> | Describes materials, products, and accessories to be incorporated into the construction project. |
| <u>PART 3 - EXECUTION</u> | Describes how the products will be installed at the construction site. |

Throughout this product guide specification, references are made to other specification sections that might be contained in the project manual. These references are presented as examples and coordination reminders. For each project, these references will need to be revised to reflect actual sections being used.

The specifier will need to edit this product specification for a specific project to reflect the options and applications being used. The guide section has been written so that most editing can be accomplished by deleting unnecessary requirements and options.

[Depending on project requirements, some additional information will need to be added by the specifier.] Options are indicated by []. Notes to assist the specifier in selecting options and editing the specification guide are printed in bold and indicated with *****. For final editing, all brackets and notes will need to be deleted from the guide.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Free standing, manually operated, jib crane with rotating boom assembly.
- B. Related sections:

***** List other specification sections related to work of this section such as the following. *****

1. Section 03300 - Cast-in-Place Concrete: Concrete foundation to receive free standing jib crane.

******* Typically fixed lifting devices are provided separately from free standing jib cranes and specified in another section. As an option, Gorbel, Inc. can provide lifting device as a crane component. Contact Gorbel, Inc. for assistance in specifying lifting devices. *******

2. Section 14620 - Hoists: [Electric] [Air-powered] [Manual] lifting device attached to crane arm.
3. Section 16100 - Wiring Methods: Electrical supply, conduit, wiring, and other electrical components for powering lifting device.

1.2 REFERENCES

******* List by number and full title reference standards referred to in remainder of the specification section. Delete non-applicable references. *******

- A. American Institute of Steel Construction (AISC): Manual of Steel Construction, Part 5, Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.
- B. American National Standards Institute (ANSI):
 1. ANSI B30.11 - Monorails and Underhung Cranes.
- C. American Society for Testing and Materials (ASTM) Publications:
 1. ASTM A36 - Carbon Structural Steel.
 2. ASTM A325 - Structural Bolts, Steel, Heat Treated, 120/150 ksi Minimum Tensile Strength.
 3. ASTM A490 - Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- D. American Welding Society (AWS):
 1. AWS D1.1 - Structural Welding Code.
- E. Occupational Safety and Health Administration (OSHA): OSHA Specification 1910.179 - Overhead and Gantry Cranes.

1.3 PERFORMANCE REQUIREMENTS

A. Crane shall consist of free standing mast requiring only foundation support and a rotating boom.

1. Rotation:

a. Primary boom: 360 degrees.

2. Crane shall be designed for minimum effort manual rotation.

3. Boom shall not drift when at rest.

4. Maximum deflection at boom end: 1/150 span based on capacity plus 15 percent for hoist and trolley weight.

******* Edit the following to reflect project structural design requirements. *******

B. Crane shall be designed to withstand:

1. Crane and hoist dead load.

2. Live load capacity equal to net rated hook load: [150] [250] [500] pounds.

3. Inertia forces from crane and load movement.

******* Typically cranes are designed for normal interior operation and design does not include thermal, wind, seismic, and snow loads. Contact Gorbel, Inc. for assistance in specifying cranes requiring these additional loads or cranes operating in high humidity or corrosive environments. Include applicable additional loads. *******

4. Wind load: [_____] MPH.

5. Thermal load: [_____] degrees F temperature range.

6. Snow live load: [_____] PSF.

7. Seismic load for [_____] seismic zone.

1.4 SUBMITTALS

A. Provide in accordance with Section 01330 - Submittal Procedures:

1. Product data for crane and accessories. Describe capacities, performance, operation, and applied forces to foundation.

2. Shop drawings showing crane configuration, dimensions, and construction and installation details.

3. Copy of warranty required by Paragraph 1.5 for review by Architect.
4. Manufacturer's installation instructions.
5. Manufacturer's operation and maintenance manual.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in designing and manufacturing cranes with 25 years successful experience.
- B. Installer: Company experienced in assembly and installation of cranes with 5 years successful experience and acceptable to crane manufacturer.
- C. Crane shall be designed, fabricated, and installed in accordance with ANSI B30.11 and OSHA 1910-179.

******* Standard impact factor for crane design is 25 percent. Contact Gorbel, Inc. if increased factor is required for high impact applications. *******

- D. Base crane structural design on live load capacity plus 15 percent for hoist and trolley weight and 25 [_____] percent for impact.
- E. Perform welding by certified operators in accordance with AWS D14.1.
- F. Bolted connections shall be in accordance with torque tightening procedures specified in AISC Manual, Part 5.
- G. Clearly label crane with rated load capacity. Place label at height and location easily read from floor level and loading position.

1.6 WARRANTY

- A. Provide under provisions of Section 01780 - Closeout Submittals: 5 years warranty for crane to cover defects in materials and workmanship.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Gorbel, Inc., P.O. Box 593, Fishers, New York 14453-0593; 800-828-0086; www.gorbel.com.
- B. Requests to use equivalent products of other manufacturers shall be submitted in accordance with Section 01630 - Product Substitution Procedures.

2.2 FREE STANDING JIB CRANE

******* Refer to Gorbel® pre-engineered crane tables in product literature for complete model number based on capacity, span, under boom height, and mounting method. Cranes with other spans and heights are available using programs at www.gorbel.com or contacting Gorbel, Inc. Edit the following and complete model number to indicate specific free standing jib crane and accessories to be specified. *******

- A. Type: Free standing, [base plate] [insert] [sleeve] mounted, [manually operated,] [motorized,] steel jib crane with rotating boom, [electrical entry collector,] [compressed air swivel,] [tagline festoon system,] and other accessories; Model No. FS[300] [350] [350S]-[__ mast diameter in inches __]-[__ boom depth in inches __] as manufactured by Gorbel, Inc.
- B. Span: [8] [10] [12] [14] [16] [18] [20] feet.
- C. Under boom height: [8] [10] [12] [14] [16] [18] [20] feet.
- D. Construction: Fabricate from ASTM A36 steel sections with finished ends and surfaces.
 - 1. Mast: Stationary steel pipe, perpendicular to boom. Equip mast top with plate and pivot pin to receive head assembly.

- 2. Boom: Horizontal, wide flange steel beam bolted to head assembly and designed for hoist trolley traveling on bottom flange. Reinforce with cap channel as required for lateral stability. [Equip boom with stops to limit movement of trolley.]

- 3. Head assembly: Welded steel plate and channel fabrication fitted over mast, bolted to boom, and designed to transfer boom load to mast and to rotate. Assembly shall allow for installation of head prior to boom attachment and provide maximum hoist lift.
 - a. Top pivot bearing assembly: Designed to connect head assembly to mast and transfer load from boom. Weight bearing channel connecting sides of head assembly shall contain tapered roller bearings allowing easy rotation.

 - b. Retaining pin: Inserted through mast pivot pin above weight bearing channel to prevent accidentally dislodging head assembly. Cranes without retaining pin are not acceptable.

 - c. Trunnion roller assembly: Designed to rotate around mast and transmit moment force from boom to mast. Provide trunnion rollers with tapered bearings held in steel channel with 1 inch diameter bolts. Masts less than 18 inches diameter shall have 2 rollers and larger masts shall have 4 rollers. Assembly shall rotate around mast with full roller face contact. Roller surface shall be sufficiently large to prevent cutting into mast. Cranes with small rollers or cams requiring wear band on mast are not acceptable.

******* Select mounting method form the following three options. Include the following to specify Model FS300, base plate mounted crane. *******

- E. Base plate mounting: Provide hexagonal steel base plate welded to mast for anchoring crane to concrete foundation cast flush with floor slab.
 - 1. Gussets: Weld triangular, full-web gusset plates to mast and base plate for stability and reinforcement. Cranes with open gussets or base plates made from rings and subject to warping are not acceptable.

 - 2. Base plate to be installed on foundation with anchor bolts of number, size, and pattern as indicated on shop drawings.

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******* Include the following to specify Model FS350, insert mounted crane. *******

F. Insert mounting: Provide square steel base plate welded to mast for anchoring mast to concrete foundation cast below floor slab. Base plate is then embedded with concrete. There shall be no exposed base plate or gussets.

1. Base plate size: 3 inches larger on all sides than mast diameter.
2. Base plate to be installed on foundation with anchor bolts of number, size, and pattern as indicated on shop drawings.

******* Include the following to specify Model FS350S, sleeve mounted crane. *******

G. Sleeve mounting: Provide steel pipe sleeve with steel base plate and centering pin of size indicated on shop drawings. Pipe sleeve shall be bolted to concrete foundation cast below floor slab and then embedded with reinforced concrete. Sleeve, base plate, and bolts shall not be exposed. Mast equipped with steel plate end with centering hole shall be inserted in sleeve and permanently secured to prevent rotation.

1. Sleeve base plate to be installed with anchor bolts of number, size, and pattern as indicated on shop drawings.
2. Provide steel wedges for plumbing mast and to be welded to prevent mast movement.

2.3 MOTORIZED OPERATION

******* Include this article if free standing jib crane is motorized. *******

- A. Provide motor operator to rotate crane boom. Operator to be bolted to back side of head assembly.
- B. Type: Variable frequency, direct drive allowing single or multiple speed applications, with torque limiter and worm gear reducer in oil bath.
- C. Motor: 1 HP, 1800 RPM, 3 phase, Class B, 40 degrees C ambient continuous, C faced, 30 minutes rated. Motor shall be enclosed and fan cooled.
- D. Controls: Pre-wired controls in NEMA 12 enclosure with magnetic reversing starter, thermal overload protection, voltage transformer, and fuse block. Power supply to be 460 volt, 3 phase, 60 cycle.

2.4 ACCESSORIES

******* Several accessories are provided as options for free standing jib cranes. Select required options from the following. Contact Gorbel, Inc. or refer to product literature if hoist or other types of accessories are required. *******

******* Electrical power can be provided for motorized cranes and hoists with either bottom entry collector or top entry collector. Include the following to specify bottom entry electrical power supply. *******

- A. Electrical bottom entry collector: Provide electrical collector installed in weight bearing channel of head assembly to conduct electrical power from inside mast through mast pivot pin to [motor operator on head assembly] [and] [electrically operated hoist on boom]. Collector shall allow continuous 360 degrees crane rotation.

******* Include the following to specify top entry electrical power supply. *******

- B. Electrical top entry collector: Provide electrical collector installed on top flange of boom to conduct electrical power from overhead electrical source to [motor operator on head assembly] [and] [electrically operated hoist on boom]. Collector shall be fitted with pivot arm connected to source conduit and allow continuous 360 degrees crane rotation.

******* Compressed air for air-powered hoists can be supplied with either bottom entry air swivel or top entry air swivel. Include the following to specify bottom entry compressed air supply. *******

- C. Bottom entry compressed air swivel: Provide air swivel installed in weight bearing channel of head assembly to convey compressed air supply inside mast through mast pivot pin to air powered hoist on boom. Swivel shall allow continuous 360 degrees crane rotation.

******* Include the following to specify top entry compressed air swivel. *******

- D. Top entry compressed air swivel: Provide air swivel installed on top flange of boom to convey compressed air from overhead source to air-powered hoist on boom. Swivel shall be fitted with pivot arm connected to source hose and allow continuous 360 degrees crane rotation.

******* Include the following to specify tagline festoon system attached to boom for supporting either electrical cable or compressed air hose supplying trolley hoist. Either S-hooks or wire rope trolleys can be used. *******

- E. Tagline festoon system: Provide system of wire rope tagline, [S-hooks] [wire rope trolleys], and brackets and eyebolts for attachment to boom. System shall support [electrical cable] [air hose] supplying trolley hoist moving along boom.

2.5 SHOP FINISHING

- A. Steam wash steel crane components with iron phosphate solution and apply yellow baked enamel finish.
- B. Provide spray can of matching color, air-drying paint for field touch-up.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate provision of crane with:

******* Reinforced concrete foundations supporting crane must be designed, detailed on drawings, and specified by architect/engineer to accommodate crane type, capacity, span, height under boom, soil bearing pressure, and other project specific conditions. *******

1. Design and construction of reinforced concrete footings as detailed on Drawings and specified in other sections. Ensure that accurate crane applied forces and anchor bolt patterns are provided for foundation design.

******* Include the following paragraph if motorized crane or hoist is being used. *******

2. Provision of electrical supply, conduit, wiring, disconnect switch, and other electrical components for powering [motorized crane] [electrically operated hoist].

- B. Prior to installation:

1. Verify reinforced concrete foundations have cured 7 days minimum. Ensure that foundations have cured 28 days minimum prior to using crane to full capacity.
2. Verify type and location of power supply.
3. Inventory parts. Verify all required components are available and undamaged.

3.2 INSTALLATION

- A. Install crane and accessories in accordance with manufacturer's instructions and shop drawings.
- B. Do not modify crane components in any manner without advance, written approval by crane manufacturer.
- C. Clearances for moving crane components:
 - 1. 3 inches minimum vertical clearance from any overhead obstruction.
 - 2. 2 inches minimum horizontal clearance from any lateral obstruction.

******* Include the following for Model FS300, base plate mounted crane mast. *******

- D. Mast: Cover base plate foundation area with 1 inch grout. Set mast into place and completely seat base plate in grout. Use plumb bob with 60 inches minimum line to plumb mast. Check alignment at 60 degree points. When mast is plumb and grout cured, tighten anchor bolts to full compression of lockwasher.

******* Include the following for Model FS350, insert mounted crane mast. *******

- E. Mast: Cover base plate foundation area with 1 inch grout. Set mast into place and completely seat base plate in grout. Use plumb bob with 60 inches minimum line to plumb mast. Check alignment at 60 degree points. When mast is plumb and grout cured, tighten anchor bolts to full compression of lockwasher. Cast second reinforced concrete foundation around mast and flush with adjacent floor slab.

******* Include the following for Model FS350S, sleeve mounted crane. *******

- F. Mast: Set mast sleeve with centering pin on foundation. Grout to ensure sleeve is plumb and tighten anchor bolts to full compression of lockwasher. Cast second reinforced concrete foundation around sleeve and flush with adjacent floor slab. When concrete is cured, set mast into sleeve. Ensure centering pin is fully inserted in mast center hole. Insert steel wedges between sleeve and mast. Space at [45] [60] degrees. Use plumb bob with 60 inches minimum line to plumb mast. Check alignment at 60 degree points. When mast is plumb weld wedges to mast and sleeve.

******* Edit the following to reflect if motor operator, bottom electrical collector, or bottom air swivel are required. *******

G. Head assembly: Install head assembly [with [electrical bottom entry collector] [with bottom entry compressed air swivel] on mast. [Bolt motor operator to back side of head assembly.] [Make [electrical] [compressed air] connections.] Adjust rollers for smooth, full contact rotation.

H. Boom: Set boom on head assembly attach with bolts and other manufacturer provided hardware. Level boom with shims or adjusting hexnuts.

******* Include the following paragraph if either electrical top entry collector or top entry compressed air swivel is required. *******

I. [Electrical top entry collector:] [Top entry compressed air swivel:] Attach with mounting plate and bolts to top flange of boom.

******* Include the following paragraph if trolley hoist requiring end stops is being used. *******

J. End stops: In conjunction with hoist trolley installation, bolt end stops to boom ends.

******* Include the following if tagline festoon system is used. *******

K. Install tagline to boom with brackets and tension wire rope with eyebolts. Run festoon [cable] [air hose] through [S-hooks] [wire rope trolleys] for connection to hoist.

3.3 FIELD QUALITY CONTROL

A. Move boom through entire travel to ensure boom is clear of obstructions, rotates freely, and does not drift. [Verify motorized operation, controls, and limit switches function properly.]

B. Inspect installed crane. Verify all bolts are tight and lockwashers fully compressed. Verify mast is plumb and boom is level.

C. Field test crane and accessories for operating functions. Ensure crane movement is smooth and proper. Adjust as required and correct deficiencies.

D. Clean surfaces. If necessary, touch-up paint damage, scratches, and blemishes with manufacturer provided matching paint.

E. Protect cranes from other construction operations.

3.4 DEMONSTRATING AND TRAINING

- A. In accordance with Section 01755 - Starting, Adjusting, and Demonstrating, provide demonstration and training session for Owner's representative covering operation and maintenance of free standing jib crane.

END OF SECTION