

**SECTION 14655**

**FREE STANDING ARTICULATING JIB CRANE**

**\*\*\*\*\* Gorbel, Inc. manufacturers 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 articulating jib cranes into a competitively bid construction project.**

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

- PART 1 - GENERAL**                      **Describes administrative and procedural requirements.**
- PART 2 - PRODUCTS**                      **Describes materials, products, and accessories to be incorporated into the construction project.**
- PART 3 - EXECUTION**                      **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. 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.**

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**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes: Free standing, manually operated, jib crane with articulating boom and arm 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 articulating jib crane.

**\*\*\*\*\* Typically lifting devices are provided separately from free standing articulating 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] [Vacuum-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 articulating assembly consisting of pivoting boom with rotating arm allowing loads to be rotated close to mast and positioned around an obstruction, through a door opening, and close to mast.

1. Rotation:

- a. Primary boom: 360 degrees.
- b. Secondary arm: 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 1.6 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 ARTICULATING JIB CRANE

**\*\*\*\*\* Refer to Gorbel® pre-engineered crane tables in product literature for complete model number based on capacity, height under boom, and span. 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 crane and accessories to be specified. \*\*\*\*\***

- A. Type: Free standing, base plate mounted, manually operated, steel jib crane with articulating boom/arm assembly, [electrical entry collectors,] [compressed air swivels,] [rotation stops,] and other accessories; Model No. AJ360-F-[\_\_capacity in pounds\_\_]-[\_\_height under boom\_\_]-[\_\_span\_\_] as manufactured by Gorbel, Inc.
- B. Arm span: [36] [48] [60] [72] [84] inches.
- C. Total boom plus arm span: [8] [10] [12] [14] [16] feet.
- D. Height under boom: [8] [10] [12] [14] feet.
- E. Construction: Fabricate from ASTM A36 steel sections with finished ends and surfaces.
  - 1. Mast: Stationary steel pipe, perpendicular to boom/arm assembly. Equip mast with:
    - a. Hexagonal steel base plate welded to mast for anchoring crane to concrete foundation. 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.
    - b. Circular steel top plate to receive boom/arm assembly.

2. Articulating boom/arm assembly: Fabricate boom and arm from rectangular steel tubes connected with pivot joint.
  - a. Equip inside boom end with steel pipe pivot assembly with circular steel plate for attachment to mast and reinforced with gussets.
  - b. Equip arm outside end with steel plate clevis with 1-1/2 inches diameter hole to receive lifting device.
  - c. Provide pivot joints with friction brake bolts for adjusting boom and arm rotation.

### **2.3 ACCESSORIES**

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

**\*\*\*\*\* Electrical power can be provided for lifting devices with boom bottom entry collector and arm electrical collector. Include the following to specify electrical entry collectors to power lifting device. \*\*\*\*\***

- A. Electrical entry collectors: Provide pair of electrical collectors to supply electric power to lifting device at arm end. Collectors shall allow continuous 360 degrees rotation.
  1. Boom electrical collector: Bottom entry type to conduct electrical power from inside mast through pivot joint to top side of boom.
  2. Arm electrical collector: Install at boom/arm pivot joint to conduct electrical power from boom, through pivot, and along bottom side of arm to lifting device.
  3. Provide brackets, shafts, housings, cable, cord clamps and grips, boxes, fasteners, and other components required for complete, functional installation.

**\*\*\*\*\* Compressed air for air-powered lifting devices can be supplied with either bottom or top entry air swivel to boom and boom to arm swivel. Include the following to specify entry air swivels for air-powdered lifting devices. \*\*\*\*\***

- B. Entry air swivels: Provide pair of air swivels to convey compressed air to boom and from boom to arm to supply air-powered lifting device at arm end. Swivels shall allow continuous 360 degrees rotation.

**\*\*\*\*\* Boom air swivel can be either bottom entry from inside mast or top entry from overhead air supply. \*\*\*\*\***

1. Boom air swivel: [Bottom entry type conveying air from inside mast through

pivot joint to top side of boom.] [Top entry type mounted on boom top side and connected to overhead air supply.]

2. Arm air swivel: Install at boom/arm pivot joint to conduct compressed air from boom, through pivot, and along bottom side of arm to lifting device.
3. Provide brackets, shafts, swivels, couplings, hoses, nipples, hose clamps, fasteners, and other components required for complete, functional installation.

**\*\*\*\*\* Stops limiting boom and arm rotation are required on articulating jib cranes with electric or compressed air lifting devices unless electrical entry collectors or air swivels are provided. Cranes with vacuum lifting devices must have stops to limit boom and arm rotation to less than 360 degrees. Project conditions can also dictate the need for rotation stops. Include the following two paragraphs if rotation stops are required, \*\*\*\*\***

- C. Boom rotation stops: Provide steel tube rotation stop to be welded to bottom side of boom and steel rotation stop blocks to be welded on boom head mounting assembly to limit boom rotation to less than 360 degrees.
- D. Arm rotation stops: Provide steel tube with two rubber bumpers to be welded to top side of arm and engage boom tube to limit arm rotation to less than 360 degrees.

## **2.4 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 slabs or 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 lifting device is being used. \*\*\*\*\***

2. Provision of electrical supply, conduit, wiring, and other electrical components

for powering electrically operated lifting device.

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 from 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.

D. Mast: Cover base plate foundation area with 1 inch grout. Set mast into place and completely seat base plate in grout. Use level to plumb mast. Set level on top plate capturing opposing bolts. Check alignment for all bolt holes. When mast is plumb and grout cured, tighten anchor bolts to full compression of lockwasher.

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

E. Boom/arm assembly: Install assembly on mast [in conjunction with [electrical bottom entry collector] [bottom entry compressed air swivel]].

1. Bolt assembly to mast top plate. Do not torque bolts until boom/arm assembly is leveled.

\*\*\*\*\* **Include the following paragraph if bottom electrical collector or bottom air swivel is required.** \*\*\*\*\*

2. Make [electrical] [compressed air] connections from inside mast.

F. Use level and steel shims to level boom/arm assembly. When level, torque bolts.



- G. Set boom and arm rotation speed by adjusting friction brake bolts. Do not overtighten friction bolts and cause higher pull forces.

**\*\*\*\*\* Include the following paragraph if boom and arm rotation stops are required.**

**\*\*\*\*\***

H. Rotation stops:

1. Boom: Weld rotation stop tube to boom bottom side with 1/2 inch clearance from head mounting assembly. Swing boom to farthest position of use on one side. Place stop block against stop tube and weld to head assembly. Repeat procedure for other side.
2. Arm: Rotate arm to desired stopping position. Place rotation stop so rubber bumper engages boom tube. Orient stop on arm centerline at 45 degrees and weld in place.

**\*\*\*\*\* Include the following paragraph if electrical entry collectors are required. \*\*\*\*\***

- I. Electrical entry collectors: Install arm electrical collector and connect to boom electrical connector and lifting device on arm.

**\*\*\*\*\* Edit and include the following paragraph if entry air swivels are required. \*\*\*\*\***

- J. Compressed air swivels: Install [top entry air swivel on boom and] air swivel at boom/arm pivot joint. Connect to air-powdered lifting device on arm.

### **3.3 FIELD QUALITY CONTROL**

- A. Move boom and arm through entire travel to ensure boom/arm assembly is clear of obstructions, rotates freely, and does not drift.
- 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 crane 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 articulating jib crane.

**END OF SECTION**