

SECTION 14653

MAST TYPE 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 mast type 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. [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

******* Mast type jib cranes can be either manually operated or motorized. *******

- A. Section includes: [Manually operated] [Motorized], floor supported, top stabilized, mast type jib crane.
- B. Related sections:

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

******* Mast type jib cranes are economical, capable of 360 degrees rotation allowing full utilization of working area, and exert smaller forces on supporting structure than any other type of jib crane. However, mast type jib cranes do require foundation support and top stabilization. *******

1. Section 03300 - Cast-in-Place Concrete: Concrete slab or foundation supporting crane mast bearing assembly.
2. Section [_____] - [_____] : Structural [beam] [roof slab] [auxiliary framing] [_____] designed to stabilize top of crane mast and absorb outward force.

******* Typically fixed or trolley hoists are provided separately from mast type jib cranes and specified in another section. As an option, Gorbel, Inc. can provide hoists as a crane component. Contact Gorbel, Inc. for assistance in specifying hoists. *******

3. Section 14620 - Hoists: [Electric] [Air-powered] [Manual] [fixed] [trolley] hoist to be installed on crane boom.
4. Section 16100 - Wiring Methods: Electrical supply, conduit, wiring, and other electrical components for powering crane.

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 floor-supported, top-stabilized steel beam mast connected to rotating steel beam boom covering circular work area.

1. Maximum rotation: 360 degrees.

2. Crane shall be designed for [minimum effort manual rotation.] [motorized 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: [1/4] [1/2] [1] [2] [3] [5] ton[s].

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, [motor operator,] and accessories. Describe capacities, performance, operation, and applied forces to supporting structure.
2. Shop drawings showing crane configuration, dimensions, [electrical wiring diagrams,] 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 MAST TYPE JIB CRANE

******* Refer to Gorbel® pre-engineered crane tables in product literature for complete model number based on crane configuration, capacity, mast depth, boom depth, and mast pivot pin diameter. Cranes with other capacities, spans, and dimensions are available using programs at www.gorbel.com or contacting Gorbel, Inc. There are two mast type crane configurations, each with a model number:**

Model MT400 - Full cantilever.

Model MT450 - Drop cantilever.

Edit the following and complete model number to indicate specific mast type jib crane and accessories to be specified. *****

- A. Type: [Manually operated,] [Motorized,] floor-supported, top-stabilized, [full cantilever,] [drop cantilever,] steel mast type jib crane with rotating boom attached to steel mast, top and bottom bearing assemblies, [rotation stops] [tagline festoon system,] [electrical entry collector,] and other accessories; Model No. [__capacity in tons__] Ton [MT400] [MT450] - [__mast depth__] - [__boom depth__] - [__mast pivot pin diameter__] as manufactured by Gorbel, Inc.
- B. Boom span: [8] [10] [12] [14] [16] [18] [20] feet.
- C. Overall height from bottom mounting plate to top mounting plate: [10] [12] [14] [16] [18] [20] feet.

******* For Model MT400 boom is attached to top of mast providing maximum hoist lift. For Model MT450 boom can be placed at any level on mast allowing for overhead obstructions such as lighting fixtures, ductwork and piping. Height under boom will vary with crane configuration, project conditions, and user requirements. *******

D. Height under boom: [_____] feet.

E. Construction: Fabricate from ASTM A36 steel sections with finished ends and surfaces.

1. Boom: Horizontal, wide flange steel beam designed for hoist trolley travelling on bottom flange.

a. Reinforce with cap channel as required for lateral stability.

******* Include the following paragraph for full cantilever configuration, Model MT400. *******

b. Provide plate welded to inside end of boom to be bolted to outside flange of mast.

******* Include the following paragraph for drop cantilever configuration, Model MT450. *******

c. Provide plate and gusset welded to top inside end of boom to be bolted to outside flange of mast at specified height.

******* Include the following paragraph if trolley type hoist is used. *******

[d. Equip boom with stops to limit movement of trolley.]

2. Mast: Vertical, wide flange steel section perpendicular to boom and parallel to crane rotation axis.

a. Reinforce with stiffeners at critical stress points.

b. Provide steel plate with pivot pin for top and bottom ends of mast.

******* Include the following paragraph for full cantilever configuration, Model MT400. *******

c. Provide plate welded to top of mast to be bolted to top flange of boom.

******* Motorized mast type jib cranes require extra rigidity to withstand forces of motorized rotation. This is accomplished by boxing in mast with steel plate. Include the following paragraph for motorized mast type jib crane. *******

- d. Box-in mast by welding steel plate to mast flanges to provide rigidity for withstanding motor operator induced forces.
3. Top and bottom bearing assemblies: Consist of 3/4 inch thick steel mounting plate with self-aligning, radial ball bearing in machined housing welded to mounting plate and field lubricated grease fitting. Provide bottom bearing assembly with bronze thrust washer.

2.3 MOTORIZED OPERATION

******* Include this article if mast type jib crane is motorized. *******

- A. Provide motor operator to rotate crane boom and mast. Operator to be bolted to back side of mast.
- 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 mast type 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 mast type jib cranes and electric hoists with either bottom entry collector or top entry collector. Include the following to specify electrical entry collector. *******

- A. Electrical [bottom] [top] entry collector: Provide electrical collector installed on mast in conjunction with [bottom] [top] bearing assembly to conduct electrical power from power source through mast pivot pin to [motor operator mounted on mast] [and] [electrically operated hoist on boom]. Collector shall 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. *****

- B. 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.

******* Include the following paragraph if rotation stops are required to limit boom rotation. *******

- C. Rotation stops: Provide solid steel blocks to limit rotation of crane. Weld rotating stop block to underside of mast bottom plate. Weld stationary stop blocks to mounting plate of bottom bearing assembly.

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:

******* Foundation support and top stabilization components for mast type jib cranes must be designed by architect/engineer to absorb outward, downward, and inward applied forces from crane; detailed on drawings; and specified in other sections. *******

1. Design and construction of reinforced concrete foundation support and top stabilization structure for mast type jib crane as detailed on Drawings and specified in other sections. Ensure that accurate crane applied forces and bolt patterns are provided for structural support 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 supporting foundation and top stabilizing structure is ready to receive mast type jib crane.
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 boom and rotating mast:
 1. 3 inches minimum vertical clearance from any overhead obstruction.
 2. 2 inches minimum horizontal clearance from any lateral obstruction.
- D. Tighten mounting bolts to manufacturer recommended torque ratings.
- E. Bearing assemblies: Locate top and bottom assemblies. Use plumb bob to position with line passing through pivot pin holes. Ensure pivot holes are accurately aligned and plumb. Mark and drill bolt holes.

******* If rotation stop blocks are required, include the following paragraph. *******

- F. Rotation stop blocks: Determine required positions of stop blocks to limit boom rotation. Weld blocks to bottom mounting plate and plate on bottom of mast.
- G. Place top and bottom pivot bearing assemblies onto top and bottom mast pivot pins. Place bronze thrust washer between mast and bottom bearing assembly. Raise mast and assemblies into position. Bolt top assembly to stabilizing structure. Bolt bottom assembly to concrete. Ensure assemblies are anchored in pre-determined locations.
- H. Boom: Bolt to mast using manufacturer provided hardware. Level boom using shims as required. Torque nuts to manufacturer recommended ratings.

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

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

******* Include the following paragraph if mast type jib crane is motorized. *******

- J. Motor operator: Install on top portion of mast.

******* If electrical entry collector is used, include the following paragraph. *******

- K. Electrical entry collector: Connect electrical source wires through pivot pin to collector wires. Place connector over pivot pin and lock in place with set screws. Extend wiring and make connection to [motor operator] [and] [electric hoist].

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

- L. 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 and boom is level.
- C. 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 mast type jib crane.

END OF SECTION