

SECTION 14652WALL CANTILEVER 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 wall cantilever jib cranes into a competitively bid construction project.

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

<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.

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PART 1 - GENERAL

## 1.1 SUMMARY

\*\*\*\*\* Wall cantilever jib cranes can be either manually operated or motorized. \*\*\*\*\*

A. Section includes: [Manually operated] [Motorized] jib crane cantilevered from vertical support structure.

B. Related sections:

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

**\*\*\*\*\* Wall cantilever jib cranes are very cost effective and allow maximum hoist lift. However, they require a structurally adequate wall, column, or other vertical member for support. \*\*\*\*\***

1. Section [\_\_\_\_\_] - [\_\_\_\_]: Structural [wall] [column] [\_\_\_\_] designed to support crane and live loads.

**\*\*\*\*\* Typically fixed or trolley hoists are provided separately from wall cantilever 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. \*\*\*\*\***

2. Section 14620 - Hoists: [Electric] [Air-powered] [Manual] [fixed] [trolley] hoist to be installed on wall cantilever jib crane boom.
3. 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 wall bracket mounted horizontal boom attached to vertical mast which rotates covering a semi-circular area.
  - 1. Maximum rotation: 200 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 [wall] [column] [\_\_\_\_\_].
  2. Shop drawings showing crane configuration, dimensions, [electrical wiring diagrams,] 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 WALL CANTILEVER JIB CRANE

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

- A. Type: [Manually operated,] [Motorized,] steel jib crane cantilevered from vertical support structure with rotating boom attached to steel mast, mounting brackets, [rotation stops] [tagline festoon system,] and other accessories; Model No. WC200-B[\_capacity in tons \_]-[\_span \_]-[\_boom depth \_] as manufactured by Gorbel, Inc.
- B. Span: [8] [10] [12] [14] [16] [18] [20] feet.
- C. Construction: Fabricate from ASTM A36 steel sections with finished ends and surfaces.

**\*\*\*\*\* Depending on crane size, boom is either factory welded to mast or field bolted. Welding is used when mounting bracket center to center spacing is 72 inches or less. Cranes with greater spacing are shipped disassembled to be field bolted. \*\*\*\*\***

1. Boom: Horizontal, wide flange steel beam designed for hoist trolley travelling on bottom flange. Reinforce with cap channel as required for lateral stability and stiffeners at critical stress points. Boom [factory welded] [field bolted] to mast. [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 corner web gusset for mast boom joint.

**\*\*\*\*\* Motorized wall cantilever jib cranes require extra rigidity to withstand forces of motorized rotation. This is accomplished by boxing in mast with steel plate. An extended plate and gusset welded to mast bottom is also required to receive motor operator rotation**

**arm. Include the following two paragraphs for if motorized crane is being specified.**

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

- c. Box-in mast by welding steel plate to mast flanges to provide rigidity for withstanding motor operator induced forces.
  - d. Weld steel plate and gusset to mast bottom to receive motor operation rotation arm.
3. Two mounting brackets: Designed to anchor mast to support structure, allow boom rotation, resist drift. Load-carrying parts will be double shear and no bolt stress will exceed 10,000 PSI. Brackets with tension welds are not acceptable. Bracket consists of:
- a. Formed channel to be bolted to support structure and equipped with pivot pin and thrust washer.
  - b. Fabricated I bracket to be welded to mast and joined to formed channel with pivot pin. Provide with oil-impregnated bronze bushings and field lubricated grease fitting.

## **2.3 MOTORIZED OPERATION**

**\*\*\*\*\* Include this article if wall cantilever jib crane is motorized. \*\*\*\*\***

- A. Provide motor operator and lever arm to rotate crane boom. Operator to be bolted to steel plate mounted on support structure at base of mast.
- B. Type: Variable frequency, rotation lever arm 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 wall cantilever 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. \*\*\*\*\***

**\*\*\*\*\* 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. \*\*\*\*\***

- A. 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. \*\*\*\*\***

- B. Rotation stops: Provide steel plate stops for welding to formed channels of top and bottom brackets in order to limit boom rotation.

## **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, steel or other type of supporting wall, column, or other vertical structure must be designed by architect/engineer to absorb outward, downward, and inward applied forces from crane; detailed on drawings; and specified in other sections. Bracket connections to supporting structure must also be designed by architect/engineer. \*\*\*\*\***

1. Design and construction of [reinforced concrete] [steel] [\_\_\_\_\_] [wall] [column] [\_\_\_\_\_] supporting wall cantilever 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 [wall] [column] [\_\_\_\_\_] is ready to receive wall cantilever 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. Top bracket: Determine position, drill bolt holes, and bolt bracket to support structure.
- F. Bottom bracket: Determine position and temporary clamp to support structure. Align top and bottom brackets with plumb bob through pivot holes. Shim as required to ensure vertical alignment is plumb. Bolt bracket to support structure.

**\*\*\*\*\* Include the following paragraph if crane is provided with bolted mast to boom connection. \*\*\*\*\***

- G. Bolt to mast to boom using all manufacturer hardware.
- H. Position mast/boom assembly in formed channels of brackets and attach with pivot bolt, thrust washer, lockwasher, and nut. Tighten nuts to full compression of lockwasher.

**\*\*\*\*\* 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 if rotation stops are required to limit rotation. \*\*\*\*\***

- J. Rotation stops: Swing boom to farthest position of use on one side. Weld rotation stop to formed channel with its edge against pivot assembly. Similarly weld upper stop. Repeat procedure for rotation stops on other side of crane.

**\*\*\*\*\* Include the following paragraph if wall cantilever jib crane is motorized. \*\*\*\*\***

- K. Motor operator: Install at base of mast. Bolt operator to steel plate mounted to support structure. Attach rotation lever arm to steel plate and gusset welded on mast bottom. Connect to power source.

**\*\*\*\*\* 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 wall cantilever jib crane.

**END OF SECTION**