

PART 1 – GENERAL

1.01 DESCRIPTION

A. SCOPE

1. This section specifies bridge cranes and hoisting equipment.
2. Runway beams and rail are OPTIONAL, and are not included in this section.

B. CRANE SUMMARY

This section is used to list cranes, capacities, spans, configurations [TR, UR, etc], hoist speeds, trolley speeds, bridge speeds, control options [2 speed, VFD, etc.], and any special features specific to one or more of the cranes.

Crane #1

location _____
Span: _____mm (___ Ft. ___ Inches)
Capacity: _____tonne (___ Tons)
Crane type: (top running, under running, single girder, double girder)

Classification: Crane shall be designed and constructed to CMAA Specification # 70 or #74, as applicable, for Class "C" service requirements and operation in a non-hazardous environment.

Crane speed:

___ mpm (___FPM), infinitely variable
Crane drive: Dual motor drive
Trolley speed: ___ mpm (___FPM), infinitely variable
Trolley drive: Motorized
Hoist speeds: ___ and ___ mpm (___and___FPM), two speed
Hoist type: Electric wire rope
Hoist lift required: ___ m (___Ft.)
Control: Pendant from independent track on bridge
Any other specifics that may apply to this crane

Repeat for additional cranes.

C. WORK INCLUDES THE FOLLOWING:

1. Detailed design of completed crane system, including bridge, end trucks, trolley, hoists, cabling, controls, and all appurtenances specified hereinafter.
2. Shop drawings.
3. Fabrication of a complete crane.
4. Inspection and shop testing.
5. Documentation and schedules.

1.02 REFERENCES

Equipment furnished under this section shall comply in all respects with the requirements of the following standards:

OSHA - Occupational Safety and Health Administration

- Part 1926.554 - Overhead Hoists
- Part 1910.179 – Overhead and Gantry Cranes

CMAA - Crane Manufacturer's Association of America

- Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes - No. 70 (2004)
- Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist - No. 74 (2004)



ANSI / ASME - American National Standards Institute / American Society of Mechanical Engineers

ANSI / ASME HST-4 - 1999 Performance Standard for Overhead Electric Wire Rope Hoists

ANSI / ASME B30.16 – 2003 Overhead Hoists (Under hung)

ANSI / ASME B30.2 - 2001 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)

ANSI / ASME B30.11 – 2004 Monorails and Under hung Cranes

ANSI / ASME B30.17 – 2003 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Under hung Hoist)

CSA - CSA Standard C22.2 No. 33 M1984, Electric Cranes and Hoists.

Electric Component Enclosures – EEMAC-4 (NEMA).

NEC - National Electric Code – 1999

Article 100, Article 240-1, Article 430-31, Article 430-51, Article 610-1, Article 610-3

All electrical control equipment and all wiring to comply with local Hydro requirements.

The crane, accessories, to conform to current Ontario Ministry of Labor requirements.

1.03 SUBMITTALS

A. SHOP DRAWINGS AND EQUIPMENT DATA

1. Manufacturer's catalog data for hoist.
2. Dimensional drawings and details for bridge crane system.
3. Wiring schematics. – ship with crane

B. OPERATIONS AND MAINTENANCE MANUALS (one set of Owner's manuals in paper and on CD rom)

1. Equipment function, normal operating characteristics, and limiting conditions.
2. Assembly, installation, alignment, and maintenance instructions.
3. Lubrication and maintenance instructions.
4. Guide to "troubleshooting".
5. Parts list.
6. As-built drawing.
7. Test results.

1.04 APPLICABLE STANDARDS

- A. Contractor shall adhere to OSHA, state, and local safety guidelines, laws, rules, and regulations.
- B. Contractor shall conform to all applicable ANSI, CMAA, and HMI specifications and/or standards.
- C. Comply with CMAA specification 74 or 70, as applicable.
- D. Long lead items [hoist, end trucks, drives and controls] will be ordered by contractor upon receipt of purchase order and credit approval. Steel will not be ordered until shop drawings and submittals have been approved by the customer.
- E. All electric equipment shall be UL, CSA c/us or ETL labeled.

Quality Assurance

1. Bridge cranes to be manufactured by a crane manufacturer which is accepted by the engineer in accordance with the requirements of ISO 9001 and capable of supplying specified type of crane meeting design and performance criteria.
2. Installation shall be by manufacturer or forces licensed and approved by manufacturer.
3. All electrical equipment shall be approved by CSA and other authorities having jurisdiction.
4. Perform steel welding in conformance with CSA W59, executed by a fabricator fully approved by the Canadian Welding Bureau under requirements of CSA W47.1.

General arrangement drawing shall be stamped by a professional Engineer, registered in the Province of Ontario.

1.05 WARRANTIES

- A. Provide one-year equipment warranty.



PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

Bridge crane package systems shall be provided by: **STEELWAY MATERIAL HANDLING**
Hoist shall be **R&M Spacemaster® SX** electric wire rope type.

2.02 MATERIALS

Components	Material
Bridge beams	Steel, ASTM A36 or A992
End trucks	Steel, ASTM A36 (or equal)
Trolley	Steel, ASTM A36 (or equal)
Wheels	Cast iron or steel
Hooks	Forged steel

2.03 EQUIPMENT

A. HOIST AND TROLLEY

1. Top-running and under-running single girder cranes shall utilize the Spacemaster® SX low headroom or standard headroom electric wire rope hoists as manufactured by R&M Materials Handling Inc., Springfield, OH.
2. Top-running double girder cranes shall utilize the **Spacemaster® SX** double girder trolley electric wire rope hoists as manufactured by R&M Materials Handling Inc., Springfield, OH.
3. The hoist shall be equipped with an electro-mechanical load-limiting device that shall prevent lifting more than 110% of the rated load.
4. Hoist and trolley motors shall be per 1.01B above, as applicable.
5. Hoisting motor(s) shall be two-speed/two winding squirrel cage type with a speed ratio of 6:1.
6. Hoisting motor(s) shall be totally enclosed with IP55 protection, minimum class F insulation, Klixon type bimetal switch for thermal protection and shall have a 60% ED rating.
7. Trolley shall be furnished with an adjustable frequency inverter drive and two-step or infinitely variable speed control for smooth acceleration and deceleration.
8. Trolley motors shall be inverter duty motors with minimum class "F" insulation and motor enclosures shall be TENV [totally enclosed non-ventilated].
9. Rotary cam type limit switch equipped with 4 micro-switches shall be provided. Limit switch shall provide upper and lower limit of hoist travel, hoist slow down prior to reaching upper limit and phase sequence supervision at upper limit.
10. Hoist motor brake shall be DC disc type with adequate torque to stop and hold over 125% of the hoist rated load.
11. Large diameter rope drum with a minimum of 36:1 drum to wire rope diameter ratio. Groove depth shall be at least 35% of rope diameter. The rope drum shall be equipped with a rope guide to help keep the rope aligned in the grooves of the drum.
12. Wire rope shall be constructed from galvanized steel having a minimum safety factor of 5.
13. Hoist reeving shall be single reeved. Lateral hook drift shall not exceed 10 mm per m. (1/8 inch per foot) of vertical travel on single reeved models.
14. The hoist nameplate is to carry a CSA c/us rating. The actual hoist control enclosure rating shall be at least equivalent to IP55 / NEMA 4 type.
15. Hooks shall be made of forged alloy steel (34CrMo4QT or 34CrNiMo6QT) and shall be fitted with a spring-loaded flipper-type safety latch.



A. HOIST AND TROLLEY (continued)

16. Hoist shall have a duty rating suitable for the load class and load cycles of the application (reference appendix A).
17. AGMA quality class 12 machine cut, hardened and precision ground hoist gearing. The gears inside the hoist gearboxes on models up to 5 ton capacity are lubricated by semi-fluid grease. On models over 5 ton capacity the gears inside the hoist gearbox are lubricated with semi-fluid grease or oil.
18. AGMA quality class 10, hardened and precision ground trolley drive gearing, lubricated by semi-fluid grease.
19. Trolleys shall have safety drop lugs and energy absorbing bumpers.

B. BRIDGE GIRDER

1. Bridge girder shall be per 1.01B above, as applicable.
2. Bridge girders shall be constructed from welded box girders or Structural beams, Steel, ASTM A36 or A992, as required.

C. END TRUCKS AND BRIDGE DRIVE

1. End trucks shall be designed in accordance with CMAA specifications as applicable (reference appendix B).
2. End trucks shall be bolted to bridge girder.
3. Bridge drive shall be dual-motor (A-4 arrangement per CMAA).
4. Bridge drive shall be designed to stop the bridge within CMAA specifications.
5. End trucks shall be equipped with rail sweeps and energy-absorbing rubber bumpers.
6. Travel limit switches to be provided as necessary for safe operation.
7. Bridge shall be furnished with an adjustable frequency inverter drive and two-step or infinitely variable speed control for smooth acceleration and deceleration.
8. Bridge motors shall be inverter duty motors with minimum class "F" insulation and motor enclosures shall be TENV [totally enclosed non-ventilated].
9. AGMA quality class 10, hardened and precision ground bridge drive gearing, lubricated by semi-fluid grease.

D. POWER SUPPLY

1. Power supply for the hoist shall be ____ volt, 3 ph., 60 Hz. All power required for the operation of the hoist, trolley, and end trucks shall be developed from this source.
2. Runway electrification shall be insulated V-bar safety type rigid conductors with ground bar as manufactured by Duct-O-Wire or CAN-D. System to be complete with bolt on clamp type support brackets, hanger clamps, joint covers, and power feeds. Supply expansion sections as recommended by bar manufacturer, and at building joints. Limit voltage drop to 3% on long systems. Select conductors based on total horsepower of equipment, supply voltage, duty class, ambient temperature, and environmental conditions. Conductor collectors shall be double shoe type designed to be guided by the conductor bar, and not by the insulated cover. **Provide junction box with terminal strip for ease of collector replacement.** Wall mounted disconnect switch and power to runway conductors provided by Electrical Contractor.
3. Cross bridge electrification shall be flat cable style festoon system with terminal box, multi-conductor cord, plug connectors (when available) and accessories. Cables are to be hardwired when plug connectors are not available. Support the flat cable on four wheel cable carriers which have lifetime lubricated anti-friction bearings for effortless operation.



E. CONTROLS

The following controls shall be used as applicable:

All hoist, trolley and bridge motions will be controlled from a plug-in type pendant push button station running in a box track along the full length of the crane bridge allowing the operator independent movement from the trolley. **Radio control may be quoted as an option.**

Pendant shall include Start (momentary) button and Emergency Stop (push to maintain, turn to release) that controls a mainline contactor in the bridge control panel. Pushbutton shall be clearly marked with hoist, trolley and bridge travel directions. **INCLUDE A WARNING HORN OPERATED FROM THE PUSH BUTTON STATION ON ALL CRANES**

1. Hoist shall be 2 speed magnetic reversing type (standard) or variable frequency inverter control (optional) and the trolley and bridge controls shall be variable frequency inverter control (standard), as required per section 1.01.B.
2. Electrical control enclosures shall be IP55 or EEMAC (NEMA) 4 type. Pushbutton enclosure shall have a rating of IP65, NEMA 4X, 4 or 5.

F. LABELING

1. Hoist and bridge beam shall be labeled with load rating. **The bridge shall be labeled in both metric (kg and imperial (lbs) in easy to read lettering on both sides of the Crane.**
2. A corrosion-resistant nameplate shall be fixed to the bridge with the following information:
 - A. Name of manufacturer
 - B. Mfg.'s model number and serial number
 - C. Capacity
 - D. Date of manufacture (month and year)

G. PAINTING

1. Hoist and trolley shall be factory painted (2-part epoxy) per manufacturer's standards.
2. Bridge shall be shop cleaned, primed, and painted per manufacturer's standards.
3. The following items shall not be painted:
 - A. Rail surfaces in contact with wheels
 - B. Wheel running surfaces
 - C. Hoist wire rope
 - D. Conductor bar, festoon cables and supports

PART 3 – EXECUTION (if applicable to crane manufacturer)

3.01 INSTALLATION AND INSPECTION

A. Inspect structure and crane rail erection for conformance with reviewed shop drawings and contract documents prior to installation of equipment. Bring nonconforming work to the attention of the Engineer prior to proceeding with crane installation. Non-conforming runway structure or installation must be corrected prior to load testing of crane system. Costs of delays or additional work due to nonconforming runway structure will be reimbursed by the Owner.

B. Bridge crane shall be installed in conformance with manufacturer's instructions and inspected by a manufacturer's representative. Provide all necessary accessories to make bridge crane complete, usable, and capable of meeting the operating requirements specified in the Operating Requirements. Test, adjust and clean equipment for acceptance by Owner.



3.02 TESTING

A. All crane equipment shall be operated through a complete lift and lowering cycle and through a complete travel of the bridge and trolley to determine that the equipment shall perform smoothly and safely and that pendant cable length is sufficient to permit operation from desired floor levels.

B. Test weight loads shall be provided by the owner.

Running Test:

After erection has been completed, and before being placed into service, the machinery shall be operated by power and tests carried out to prove the following:

1. All clearances and alignments are in order; gearing is sufficiently quiet and lubrication is adequate.
2. Operation of each controller switch, contactor relay and other control devices is satisfactory; all limit switches operate correctly under the most unfavorable conditions.
3. All circuits, inter-locks and sequence of operation are correct.
4. All protective devices operate satisfactorily.
5. Each motion of the crane operates satisfactorily.

Load Test:

Test each motion with the hook carrying 25% Overload: During this test the specified speeds need not be attained, but the system shall show itself capable of dealing with the overload without difficulty.

1. Rated Load: During these tests the specified speeds are to be attained, provided that the current supply to the crane is correctly maintained.

Brake Test:

All brakes shall be tested under full load conditions, from maximum speed to rest, three times in quick succession without overheating.

Any work not meeting the requirements of this Specification shall be rectified to the satisfaction of the Engineer and all costs for such work shall be at this Section's expense.

3.03 USE BY CONTRACTOR

A. If crane is used by the Contractor, it shall be repaired, repainted, and otherwise refurbished to like new condition prior to its acceptance. The Contractor assumes all responsibility for operation and maintenance until the crane has been accepted by Owner.

3.04 CLEANUP

A. Upon completion of work, area shall be cleaned and restored to original condition, acceptable to the Owner.

END OF SECTION

