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Cranes and Hoist Division 14600 Specification highlighting R&M Materials Handling, Inc hoist and crane components.

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PART 1 – GENERAL

1.01 DESCRIPTION

A. SCOPE

1. This section specifies bridge cranes and hoisting equipment.
2. Runway beams and rail are part of the building steel package 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:	___ Ft., ___ Inches
Capacity:	___ 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:	___ FPM, infinitely variable
Crane drive:	Dual motor drive
Trolley speed:	___ FPM, infinitely variable
Trolley drive:	Motorized
Hoist speeds:	___ and ___ FPM, two speed
Hoist type:	Electric wire rope
Hoist lift required:	___ 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, except as otherwise noted, 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 (2015)
Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist - No. 74 (2015)

*ANSI / ASME
American National Standards Institute /
American Society of Mechanical Engineers
ANSI / ASME HST-4 - 2016 Performance Standard for Overhead Electric Wire Rope Hoists
ANSI / ASME B30.16 – 2017 Overhead Underhung and Stationary Hoists
ANSI / ASME B30.2 - 2016 Overhead and Gantry Cranes
(Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
ANSI / ASME B30.17 – 2015 Cranes and Monorails (with Underhung Trolley or Bridge)
ANSI / ASME B30.30 – 2019 Ropes

NEMA National Electric Manufacturer's Association

NEC National Electric Code – 2017
Article 100, Article 240-1, Article 430-31, Article 430-51, Article 610-1, Article 610-31

*Compliance to this standard is limited to the extent such standard is incorporated into and made mandatory by OSHA regulations.

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.

1.05 WARRANTIES

A. Provide one-year equipment warranty.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

A. Bridge crane package systems shall be provided by: _____.

B. 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. An additional block operated limit shall be included.

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 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.

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 4-bar safety type rigid conductors as manufactured by Insul-8, Duct-O-Wire Company or Wampfler. 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.

E. CONTROLS

The following controls shall be used as applicable:

1. Six-way operation, plug-in pushbutton pendant suspended from independent festoon track. Radio control may be quoted as an option.

2. 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.

3. Pushbutton shall be clearly marked with hoist, trolley and bridge travel directions.

4. 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.

5. Electrical control enclosures shall be IP55 or 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.

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 customer 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. All tests shall be carried out with the bridge crane equipment loaded at 125 percent of capacity. The bridge crane provider shall provide the test weight loads. Any defects shall be corrected by the bridge crane provider without any expense to the Owner.

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