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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | November 16, 2009 | Modified ‘Related Sections’ and approved suppliers |
| 3 | November 20, 2014 | First draft review (AV) |
| **4** | **March 2, 2015** | **Updated, Finalized Specification – Legal Reference eDOCS #5793237 v5 (AV)** |
| 5 | November 11, 2016 | Updated NEMA MG-1 reference to 2016 new version and NFPA 70 to 2017 Edition (AV) |

NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GEneral

## Work of this Section

### The work of this Section includes providing the monorail, hoist and miscellaneous lifting systems and appurtenant work for a complete functional system.

### Unit Responsibility: The work requires that the monorail, hoist and miscellaneous lifting systems, complete with all accessories and appurtenances, be the end product of one responsible system manufacturer or responsible system supplier. Unless otherwise indicated, the Contractor shall obtain each system from the responsible supplier of the equipment, which supplier shall furnish all components and accessories of the system to enhance compatibility, ease of operation and maintenance, and as necessary to place the equipment in operation in conformance with the specified performance, features and functions without altering or modifying the Contractor’s responsibilities under the Contract Documents. The Contractor is responsible to the Region for providing the equipment system as specified herein.

## Related Sections

### [Under "Related Sections", identify other Sections that are related to, and/or dependent on, the work results or information specified elsewhere. The list should be limited to Sections with specific information that the reader might expect to find in this Section, but is specified elsewhere. For example, if hardware for aluminum entrances is specified in the aluminum entrance Section, a cross-reference would be appropriate in the finish hardware Section. The purpose of this cross-referencing is for information only, to aid in finding those other requirements—not to define the scope of the Section.

### Cross-referencing here may also be used to coordinate assemblies or systems whose components may span multiple Sections and which must meet certain performance requirements as an assembly or system.

### Consultant to ensure all aspects of the Ontario Building Code (OBC) pertaining to cranes and hoists are adequately addressed in other specifications so that compliance with OBC is not required in these specifications.

### The Contractor is responsible for coordination of the Work.

### All work and equipment shall be in accordance with CSA C22.1-12 and CSA C22.2 No. 0-10 for the applicable sections.

### Consultant to amend specifications to incorporate relevant sections of CSA C22.1 and CSA C22.2. Consultant to note 2015 update to CSA C22 standards in 2015.

### This Section is to be completed/updated during the design development by the Consultant. If it is not applicable to the section for the specific project it may be deleted.]

### [List Sections specifying installation of products supplied but not installed under this Section and indicate specific items.]

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Execution requirements for ...[item]... specified under this Section.

### [List Sections specifying products installed but not supplied under this Section and indicate specific items.]

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: Product requirements for ...[item]... for installation under this Section.

### [List Sections specifying related requirements.]

### Section [\_\_\_\_\_\_ – \_\_\_\_\_\_\_\_\_\_\_\_]: [Optional short phrase indicating relationship].

### Section 01300 – Submittals

### Section 01425 - Computerized Maintenance Management System Data Requirements

### Section 01430 - Operation and Maintenance Data

### Section 01640 - Manufacturer's Services

### Section 01810 – Equipment Testing and Facility Commissioning

### Section 09900 – Painting and Protective Coating

### Section 16010 – Electrical General Requirements

### Section 21 – Development and Maintenance of Asset Inventory and Tagging

## References

*[Delete .1 if Section 01060 – Regulatory Requirements is included in Contract Documents.]*

### Comply with the latest edition of the following statutes, codes, standards, and all amendments thereto:

#### American National Standards Institute (ANSI) and American Society of Mechanical Engineers (ASME):

##### ASME B30.10-2014, Hooks.

##### ASME B30.11-2010, Monorails and Underhung Cranes – Safety Standard for Cableways, Cranes, Derricks, Hoists, Jacks, and Slings.

##### ASME HST 1-2012, Performance Standard for Electric Chain Hoists

##### ASME HST 2-2014, Performance Standard for Hand Chain Manually Operated Chain Hoists.

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

##### ANSI MH27.1-2009, Specifications for Patented Track Underhung Cranes and Monorail Systems.

#### National Electrical Manufacturer’s Association (NEMA):

##### ANSI/NEMA MG 1-2016, Motors and Generators.

##### NEMA 250-2014, Enclosures for Electrical Equipment (1,000 V Maximum).

#### Occupational Health and Safety Act (Ontario)

##### R.R.O. 1990, Regulation 851/90, Industrial Establishments as amended by Ontario Reg. 98/11

#### Canadian Standards Association (CSA):

##### C22.1-12, Canadian Electrical Code, Part I (22nd edition), Safety Standard for Electrical Installations.

##### C22.2 No. 0-10, General Requirements – Canadian Electrical Code Part II.

#### National Fire Protection Association (NFPA): 70, National Electrical Code (NEC) 2017 Edition:

##### Chapter 2, Article 250, Grounding and Bonding.

##### Chapter 6, Article 610, Cranes and Hoists.

## Measurement and Payment

*[Choose one of the following payment language provisions that best suits the individual project.*

*If this Section is not specifically referenced by an item in the Bid Form, please use the following language:*

.1 The work of this Section will not be measured separately for payment. All costs associated with the work of this Section shall be included in the Contract Price.

*OR If this Section is specifically referenced in the Bid Form, use the following language and identify the relevant item in the Bid Form:*

.1 All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

*If the work of this Section is to be measured and paid for by several different methods, please amend the standard wording given above to reflect the different methods of measurement and payment.*]

## Submittals

### Action Submittals, in accordance with Section 01300 - Submittals:

#### Shop Drawings:

##### Make, model, weight, and kW (horsepower) of each equipment assembly.

##### Complete catalogue information, descriptive literature, materials of construction, and specifications on hoist, wheels, gears and bearing, trolley drive system, hoist motor and assemblies, hook, brakes, starting system, variable speed drive system, conductors (bus bar, festoon, cable reel), controls, remote control system, and accessories.

##### Structural design calculations for monorail track and support system and calculations of deflection and loads on building steel certified correct by a professional engineer licensed to practice in the Province of Ontario.

##### Detailed shop drawings of monorail track, brackets, hangers, and their attachments to building structural steel.

##### Power and control wiring diagrams, including terminals and numbers.

##### Motor nameplate data in accordance with NEMA MG 1-2016, and include any motor modifications.

##### Factory finish system.

##### Certified test results of load tests for overhead hoists, monorail and lifting davit systems (as applicable).

##### Equipment information in accordance with Section 01425 - Computerized Maintenance Management System Data Requirements.

### Informational Submittals, in accordance with Section 01300 - Submittals:

#### Manufacturer’s Certification of Compliance that the factory finish system is identical to the requirements specified in this Section.

#### Special shipping, storage and protection, and handling instructions.

#### Manufacturer’s printed installation instructions.

#### Manufacturer’s Certificate of Proper Installation.

#### Suggested spare parts list to maintain the equipment in service for a period of one year. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.

#### List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.

#### Operation and Maintenance Data: As specified in Section 01430 - Operation and Maintenance Data.

# PRODUCTS

## General

### Ensure that the hoist, trolley and lifting davit system manufacturer coordinates equipment requirements with steel structures, drive motor, hoisting cable or chain, hook, rails, stops, and electrical equipment controls.

## Design Requirements

### Monorail System: Specifications for Underhung Cranes and Monorail Systems, ANSI MH27.1-2009 and ANSI/ASME B30.11-2010.

### Hoist: ANSI/ASME B30.11-2010, Hoist Manufacturers’ Institute.

### Trolley: ANSI MH27.1-2009.

### Wire Rope Hoist Service Class: ANSI/ASME HST-4-1999.

### Chain Hoist Service Class: ANSI HST 1M.

### Hook: ANSI/ASME 30.10-2014.

### Stress and Safety Factors: ANSI MH27.1-2009 and ANSI/ASME B30.11-2010. Properly select materials of construction for stresses to which subjected.

### Safety of Operation, Accessibility, Interchangeability, and Durability of Parts: ANSI/ASME B30.11-2010 and OHSA, O. Reg. 851/90, Industrial Establishments requirements. *[Consultant to amend specification with appropriate sections of 851/90]*

## Track

### Furnish monorail track in accordance with Section [      ] - Structural Steel.

### Rail:

#### Cross Section: Design for stresses not exceeding 60 percent of material’s yield strength and deflection not to exceed 1/800 of span.

#### Span: Not to exceed [     ] m with one load per span used in computing total capacity of rail. Ratio of span to top flange width shall not exceed [     ] to [     ] for spans over [     ] m. Lower load carrying flange minimum of [     ] mm width and have raised running or wear tread.

#### Couplings: Web type at rail joints with maximum gap at rail ends of load carrying flange of [     ] mm and [     ] mm at turntable, switch, or free ends.

#### Stops: Furnish stops and impact absorbing bumpers at open rail ends.

### Rail Suspension:

#### Furnish clamps, hanger rods, and fittings to support live and dead load of hoist, trolley, controls, motors, and track.

#### Hanger Rods: High carbon, cold rolled alloy steel with unified national fine, Class 2 screw thread ends.

#### Vertical Adjustment: 25mm adjustable.

#### Lubricant: Permanent factory pre-lubricated joints.

## Trolley

### Frame: Welded steel, cast steel, or ductile iron construction, or a combination thereof. Construct to control deflection of trolley assembly while transmitting the carrying load to running surface.

### Drive shall consist of trolley drive shaft, driven by an electric motor through a gear reduction unit or chain sprocket mounted on shaft. Furnish chain length to within 1.5m of operating floor level. Drive shaft shall drive the trolley wheels through a gear and pinion or spur gear arrangement.

### Furnish roller assembly stabilizers on single girder trolley units to prevent tipping during load pickup.

### Wheels: Rolled or forged steel, accurately machined and ground to receive inner bearing races. Furnish alloy steel axles. Rotating axles with wheels mounted press fit and keys, or with keys alone. Minimum tread hardness 210 Brinell.

### Drive Gears: Helical, spur or herringbone type, rolled or cast steel, with machine cut teeth.

### Bearings: Combination radial and thrust type, double row, angular contact ball bearings or single row tapered roller bearings. Bearings pre-lubricated and sealed, or fitted for pressure lubrication. Locate pressure lubrication fittings for accessibility during maintenance.

### Brakes: Suitable for service class and rated torque capacities as specified in ANSI B30.11-2010.

## Hoist

### Electric Hoists:

#### Hoisting machinery shall consist of rope drum driven through gear reductions, load blocks, hook, hoisting rope, sheaves, and hoist braking. Drum size and length sufficient for a minimum of two turns of cable remaining on drum when the hook is at the lowest position.

#### Rope drum and surrounding members shall be constructed to minimize abrasion, crushing or jamming of hoist rope. Load blocks enclosed type. Hoisting rope extra flexible, improved plow steel wire rope, made especially for hoist service.

#### Hook: Construct with sufficient ductility to open noticeably before hook failure, equipped with safety latch, free to rotate 360 degrees with rated load and positively held in place with locknuts, collars or other devices.

#### Brakes: Mechanical and electric load brake and controls, designed in accordance with ASME/ANSI HST-4-1999, and adjustable to compensate for wear

### Approved Suppliers:

#### Kito Canada Inc. (Subsidiary of Kito Corporation).

#### Lift-Tech International, A Division of Columbus McKinnon Corporation (Yale Shaw-Box brand).

#### Richards-Wilcox Inc.

#### Demag Cranes & Components Corp.

#### Approved Equivalent.

## Davit Crane

### Davit crane machinery shall consist of a crane, hand winch, crane base, wire rope, and accessories.

### Crane Configuration: Portable davit crane, adjustable boom, 360 degree rotation, double reduction spur gear hand winch with positive load control for lifting and lowering operations, corrosion resistant finish.

### Capacity: [     ] kg.

### Crane Base: Wall mount base, galvanized.

### Wire Rope: Galvanized aircraft cable with swivel hook and swagged ball fitting, [     ] mm diameter rope, for load rating specified, lift below base level of [     ] mm, two part line (total length of [     ] m).

### Accessories: Gear cover, quick disconnect anchor for wire rope.

### Location:

#### [     ]

#### [     ]

### Approved Suppliers:

#### Kito Canada Inc. (Subsidiary of Kito Corporation).

#### Lift-Tech International A Division of Columbus McKinnon Corporation (Yale Shaw-Box brand).

#### Richards-Wilcox Inc.

#### Demag Cranes & Components Corp.

#### Approved Equivalent.

## Electrical

### Electrical work shall in in accordance with Section 16010 – Electrical General Requirements.

### Furnish electrical equipment including motors, motor starters, pendant control, control systems, wire, and conduit.

### Electrical: In accordance with NFPA 70, 2017 Edition, National Electrical Code, Chapter 6, Article 610 and CSA C22.1

### Monorail conductor voltage drops from monorail track supply taps shall permit the hoist and trolley motors to operate within voltage tolerances of plus or minus 10 percent, when building supply voltage is at plus or minus 5 percent of design voltage.

### Enclosed Bus Bar Conductors: Stainless steel clad hard copper enclosed in insulation. Collector sliding non-copper bearing, carbon shoe type, with adjustable spring tension arms for contact between bus bar and controls. Collector mechanism components shall be made of aluminum, stainless steel, plastic, or other non-corrosive materials.

## Controls

### Hoist and Trolley: Pendant control having momentary contact pushbuttons with a device which will disconnect motors from line on failure of power. Device shall not permit any motor to be restarted until controller handle is brought to the OFF position, or a reset switch or button is operated. Furnish with under-voltage protection as a function of each motor controller, or by a magnetic main line contactor.

### Trolley Drives: Soft start controls, [600/240] volt ac series device, installed between drive motor and motor starter with torque and acceleration rate adjustable, suitable for trolley drive service, and work in conjunction with crane control and pendant system.

### Pendant Pushbutton Control Stations: Heavy duty, oil-tight, suspended from trolley, with control transformers to supply 120 volt ac power to pushbutton control station. Pushbutton enclosure shall be supported with chain or wire rope. Control wire cable shall be attached to support chain or wire rope at a maximum of [     ] m intervals. Furnish control station buttons for control of hoist and trolley ON/OFF main line contactor power switch which removes all power from the control station.

## Accessories

### Equipment Identification Plate: 16 gauge stainless steel with 6mm die stamped equipment tag number securely mounted in a readily visible location.

### Lifting Lugs: Equipment weighing over [     ] kg.

## Shop Fabrication

### Shop/Factory Painting: Prepare and prime coat in accordance with the manufacturer’s standard.

## Source Quality Control

### Factory Inspections: Inspect equipment for required construction, electrical connection, and intended function.

# EXECUTION

## Installation

### Install in accordance with the manufacturer’s printed instructions.

### Provide lubrication and lubrication fittings.

## Painting

### Perform field painting of equipment as specified in Section 09900 – Painting and Protective Coating.

## Field Quality Control

### Immediately upon completion of installation, perform complete tests on the crane elements with the manufacturer's technical representative.

### Apply test loads of 125 percent of indicated operating loads in the presence of the Consultant.

### Test the crane and adjust to operate in accordance with the manufacturer’s specifications to full rated capacity in the room for all directions of designed travel and hoisting locations.

### Comply with the requirements of Section 55 of the Occupational Health and Safety Act, and O.Reg. 851/91 - Industrial Establishments.

### Provide weights and suitable means for connecting the test weight to the hoist hooks.

### Submit certified in-place load test results for hoists.

### Functional Tests: Conduct on each hoist and monorail system.

#### Alignment: Test complete assemblies for proper alignment and connection, and quiet operation.

### Performance Test:

#### Conduct on each hoist and monorail system.

#### Load tests in compliance with OHSA (O. Reg. 851/90), ANSI/ASME B30.112010, and ANSI MH27.1-2009.

## Manufacturer’s Services

### See Section 01640 - Manufacturers’ Services and Section 01810 - Equipment Testing and Facility Commissioning.

## Supplements

### The supplements listed below, attached following “End of Section,” form part of this Section:

#### Data Sheets:

##### 14620-01 Hoist/Monorail Data Sheet

1. Hoist/Monorail Data Sheet

2. Hoist/Monorail Dimension Sheet

**END OF SECTION**