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| --- | --- | --- |
| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | September 22,2009 | Review/update of the document “Related Sections” |
| 3 | February 18, 2010 | Approved manufacturers inserted in text |
| 4 | April 10, 2013 | First Draft – Consolidated Comments Spec Update Project |
| 5 | June 17, 2013 | Finalized for Legal Review. Incorporation of new Commissioning and Computerized Maintenance Management System Data Requirements Specification cross references. |
| 6 | June 2, 2014 | Incorporation of Legal Comments (AV) |
| 7 | July 15, 2014 | Amended to reflect changes related to commissioning specification and name change (AV) |
| 8 | September 24, 2014 | Updated, Finalized Specification – Reference eDOCS #1029444-v6 (AV) |
| 9 | February 11, 2015 | Updated 3 standards to current versions & corrections (AV) |
| 10 | March 2, 2015 | Updated, Finalized Specification – Legal Reference eDOCS #5043357 v12 (AV) |
| **11** | **March 18, 2016** | **Updated AWWA Specifications** |
| 12 | November 11, 2016 | Updated NEMA MG-1 reference to 2016 new version (AV) |
| 13 | February 15, 2017 | Updated standards references. Updated Acceptable Manufacturers to be consistent with other specifications (CDP PMO) (AV) |
| 14 | March 1, 2017 | Updated for reference to NSF 372. (AV) |
| 15 | December 7, 2017 | Updated references to Design Guidelines 30 and 35 (AAM) |
| 16 | November 18, 2020 | Revisions throughout to align with AWWA 561 (BM) |
| 17 | June 13, 2022 | 2.5.6 Revisions to tagging requirements (BM) |

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

## 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 refer to Section 11010 sub-section 1.2 Related Sections to provide detailed equipment information requirements.]

### 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 01060 – Regulatory Requirements

### Section 01080 – Process Equipment Location Tagging

### Section 01250 – Substitutions

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

### Section 01600 – Material and Equipment

### Section 01640 – Manufacturers’ Services

### Section 01810 – Equipment Testing and Facility Commissioning

### Section 01820 – Demonstration and Training

### Section 05500 – Metal Fabrications General

### Section 09900 – Painting and Protective Coatings

### Section 11010 – Equipment General Requirements

### Section 11280 – Fabricated Sluice Gates

### Section 16220 – AC Induction Motors

### Section 16260 – Low Voltage Adjustable Frequency Drive Systems

### Division 13 SCADA and Instrumentation – [Insert applicable specifications]

## References

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

#### American Society for Testing and Materials (ASTM):

##### ASTM A193/A193M-16 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High temperature or High Pressure Service and Other Special Purpose Applications.

##### ASTM A240/A240M-16a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

##### ASTM A276/A276M-16a, Standard Specification for Stainless Steel Bars and Shapes.

##### ASTM B209-14, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate.

##### ASTM B308/B308M-10, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles

##### Other ASTM Standards as applicable and cited in AWWA C561-14 Fabricated Stainless Steel Slide Gates.

#### American Water Works Association (AWWA):

##### AWWA C561-14 Fabricated Stainless Steel Slide Gates

#### American National Standards Institute (ANSI)

##### ANSI/NSF Standard 61: Drinking Water System Components – Health Effects

##### ANSI/NSF 372-2011: Drinking Water System Components – Lead Content

#### National Electrical Manufacturers Association (NEMA):

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

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

## Definitions

### Submersible: The ability to exclude water when submerged under a 6 metre head of fresh water for 24 hours and still maintain electrical integrity.

### Slenderness Ratio: The ratio of the maximum unsupported stem [and cylinder rod] length to the stem [or rod] cross section radius of gyration.

### Self-Contained: The arrangement of the gate operator, supported by the gate frame, such that operating thrust loads are not applied external to the assembly.

## Submittals

### Shop Drawings:

#### Provide the make, model, weight, [and kW, horsepower] of each equipment assembly and all other required information as detailed in the equipment information template in a format that is electronically suitable for upload to the Region’s CMMS (Maximo). All equipment information shall be primarily expressed in SI units with imperial units as a secondary unit cited. Provide the manufacturer’s catalog information, descriptive literature, specifications, and identification of materials of construction.

#### Detailed [structural,] [mechanical,] [and] [electrical] drawings showing the equipment fabrications and interface with other items. Include dimensions, size, and locations of connections to other work, and weights of associated equipment associated therewith.

#### Gate operator and stem calculations for each gate and service condition.

#### Gate opening and closing thrust forces that will be transmitted to the support structure with operator at extreme positions and load.

#### [External utility requirements such as air, water, power, drain, etc., for each component.]

#### [Functional description of internal and external instrumentation and controls to be supplied including list of parameters monitored, controlled, or alarmed.]

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

#### [Shop Performance Test Procedures.]

### Information Submittals:

#### Manufacturer’s Certificate of Compliance.

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

#### Manufacturer’s written/printed installation instructions.

#### Routine maintenance requirements prior to plant startup.

#### Manufacturer’s Certificate of Proper Installation in accordance with Section 01640 - Manufacturers’ Services.

#### Operation and maintenance manual.

#### [Service records for maintenance performed during construction.]

#### Test Procedures and field leakage test reports in accordance with AWWA C561-14.

#### Affidavit of Compliance in accordance with AWWA C561-14 for all applicable components.

#### All information (including data for lubricants) shall also be provided in an electronic format suitable for uploading to the Region’s CMMS (Maximo). Refer to Section 01425 - Computerized Maintenance Management System Data Requirements.

## System Description

### The Contractor shall coordinate and ensure that electric motor operators are fully assembled and tested, including the motor, at the factory.

## Extra Materials

### Furnish, tag, and box for shipment and storage the following spare parts and special tools. Provide a list of special tools required with details for use or cross-reference to O&M manuals in an electronic format that is up-loadable to the Region’s CMMS (Maximo).

|  |  |
| --- | --- |
| Item | Quantity |
| Stem collars for all gate stems | **[One] [     ]** of each different size |
| Bronze lift nuts | **[One] [     ]** of each different size |
| Indicator lights | **[One]** dozen |
| Special tools required to maintain or dismantle including adequately rated slings for the equipment | **[One] [     ]** complete set |

### Delivery: In accordance with Section 01600 – Material and Equipment.

## 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.*]

# PRODUCTS

## Supplements

### See the supplements to this Section for additional Product information.

## Materials

### Aluminum Plate and Shapes: ASTM B209-14 and B308/B308M-10, Alloy 6061 T6.

### Stainless Steel:

#### Plate, Sheet, and Strip: ASTM A240/A240M-16a, Type [316L.] [304L.]

#### Bars and Shapes: ASTM A276/A276M-16a, Type [316L.] [304L.]

## Performance Requirements

### Leakage shall not exceed the leakage rates cited in AWWA 561-14 of gate periphery under either seating or unseating head conditions.

## Slide Gates

### Rising stem type, with assembly styles designated as follows:

#### Style A: Upward acting type for wall surface mounting on the concrete structures.

#### Style B: Upward acting type for mounting in channels with concrete embedded frame and invert.

#### Style C: Downward acting weir gate type with [P-type or U-type] invert seal for wall surface mounting on the concrete structures.

#### Style D: Downward acting weir gate type with invert P-type or U-type seal for embedded side frame mounting in concrete structures.

### Guide Frames:

#### [Aluminum] [or] [stainless steel.]

#### Vertical Guides: Design for maximum rigidity, and extend in one continuous piece from the gate invert to form posts for the support of gate operators of self-contained gates. When guides extend above the operating floor, they shall be sufficiently strong so that no further reinforcements are required.

#### Provision of instructions and tools to clean Guide Frames from deposition and corrosion which would inhibit routine installation of Stop Logs after prolonged periods under water.

##### Weight: Not less than [6 kilograms per metre] [for aluminum] [and] [13.4 kilograms per metre] [H: for stainless steel.]

##### Incorporate a replaceable Ultra High Molecular Weight (UHMW) polyethylene bearing strip mechanically fastened on the downstream side (unseating head side) of the gate.

#### Frame Invert: For flush bottom gate, furnish a neoprene insert to function as a seating surface for the gate disc.

##### Weight: A minimum of [3 kilograms per metre] [for aluminum] [and] [13.4 kilograms per metre] [for stainless steel - to be confirmed by Consultant.]

#### Join vertical guide frames and invert with factory welded corners.

#### Size guided slot to provide a minimum disc engagement of 25 mm on each side.

### Disc:

#### Disc Plate (Sliding Member): One piece [aluminum] [or] [stainless steel plate]. Reinforce as required so that the disc will not deflect more than 1/720th of the gate span, when the upstream liquid depth (seating head side) is as shown on the Slide Gate Schedule (attached as a supplement to this Section) and the downstream liquid depth is less than 13 mm. The Contractor shall provide written confirmation of deflection compliance with all calculations shown to the Consultant.

#### Reinforce gate disc with one piece [aluminum] [or] [stainless steel] angles or channels welded to the disc plate. Bolted reinforcements will not be permitted.

#### [Where required on the contract Drawings, furnish V notch or rectangular weir cutouts in the disc plate. Cut-out dimensions and location to match details shown on the Contract Drawings.]

### Operator Support Yoke:

#### For self-contained gate operators, attached to the vertical extensions of the guide frames.

#### Constructed from shapes suitable to provide required rigidity, and bolt in place to provide a rigid assembly.

#### Maximum Deflection: 6mm maximum or 1/720th of the span. The Contractor shall provide written confirmation of deflection compliance with all calculations shown to the Consultant.

### Stems:

#### 28 mm minimum diameter, ASTM A276/A276M-16a, Type [316] [304] stainless steel. Type of stainless steel shall be resistant to corrosive action of process stream fugitive emissions and must be approved by the Consultant.

#### Threads: Acme type with RMS surface roughness of 160 micron or less on the flanks for manually operated gates and 81 microns or less on the flanks for electrically operated gates. Extend the threaded portion of the stem [2] mm above the operator when the gate is in the CLOSED position.

#### Ratio of the unsupported stem length to the radius of gyration, both in inches, shall not exceed [200.]

#### Stems shall withstand in compression, without damage, the thrust equal to a minimum of [2.5] times the rated output of the hoisting mechanism, with an 18 kilogram effort applied to the hand-wheel or crank.

#### Design electric motor driven floor stands to withstand at least [1.25] times the output thrust of the motor in the stalled condition.

#### Equip operating stems with stainless steel, bushed stem guides, mounted on stainless steel brackets; adjustable in two directions and spaced so that the L/r ratio does not exceed [200.]

#### Adjustable stop collar for the CLOSED position.

#### Connect the stems to the disc plate with a yoke, bolted to the stem and welded to the disc.

#### Slide gates having a width greater than twice the height [O: or width greater than 2.1 metres] shall have dual stems. For downward opening weir type gates, locate the stems near the outside edges of the gate.

### Stem Covers:

#### Transparent plastic, vented pipe stem cover and cap.

#### Provide with OPEN/CLOSED designators [with 25 mm graduations] on clear mylar pressure sensitive, adhesive tape, suitable for outdoor application.

### Acceptable Manufacturers:

#### Dynamic Water Control Gates Inc.

#### Fontaine Industries Ltd.

#### Orbinox Canada.

#### Or Equivalent.

### Stop log fabrication is allowed from fabricators who can provide stamped shop drawings for stop logs that are designed for the application and system conditions.

## Gate Operators

### Dual Stem Gate Operators:

#### Enclosed, geared floor [or bench] stands.

#### Interconnect so operators will work as a unit from a single point with a(n) [crank lever] [or] [interconnecting electric operator.]

#### Interconnecting Shafts:

##### Stainless steel with flexible couplings at ends.

##### Diameter sufficient to prevent sagging.

##### Include flanged coupling to allow precision weir leveling.

### Type 1, Hand-wheel Operated Bench Stands:

#### Sealed, ball thrust, roller, UHMWPE or needle bearing type and equipped with bronze lift nut, internally threaded with Acme threads.

#### Furnish mechanical seals at housing penetrations.

#### Hand-wheel and Baseplate: Cast iron [or cast aluminum.]

#### Manual Effort: Not to exceed 18 kilograms.

### Type 2, Crank Operated Bench Stands:

#### Weatherproof housings, mounted [on a cast aluminum or cast iron base] to the top horizontal member of the slide gate frame as described under subsection 2.4.4 - Operator Support Yoke.

#### Solid Bronze Lift Nut: Integrally threaded with Acme threads.

#### Ball Thrust or Tapered Roller Bearings:

##### Locate above and below operating nut flange to support opening and closing thrusts.

##### Include grease lubrication fittings and input pinions.

#### Manual Crank Effort: Shall not exceed 18 kilograms.

### Type 3, Geared Floor Stands:

#### Crank operated, with weatherproof housings with solid bronze lift nut.

#### Mount on high strength cast iron, cast aluminum or fabricated stainless steel pedestal or base.

#### Floor stands mounted on slab to be able to withstand maximum force generated by valve seating without detaching from the slab.

#### Maximum manual crank effort to operate gate shall not exceed 18 kilograms.

#### Lift Nut: Internally threaded with Acme threads.

#### Gears shall be bevel style. Orient to suit the location of the gate.

#### Suitable for portable electric drill operation after removal of the hand-crank. Furnish one adapting chuck to fit slide gate operators and to fit electric drill operators specified in Section 11280 – Fabricated Sluice Gates.

### Type 4, Electric Motor Operators:

#### 900 mm high steel pedestal, totally enclosed weatherproof electric drive unit, and a totally enclosed gear box that operates a two piece, bronze stem nut, which lifts the gate stem.

#### Gears: Heat treated alloy steel, supported throughout by antifriction ball or roller bearings and grease lubricated.

#### Automatic double acting geared limit switches and double acting torque switches.

##### Gear directly to the operating gear train and shall be "in step" at all times, whether in motor or manual operation.

##### Wire geared limit switches internally to stop the motor at the fully OPEN and fully CLOSED positions.

##### Wire torque switches internally so that, in the event of a mechanical overload in either direction, the motor will be stopped.

#### Equip with side mounted hand-wheel for manual operation.

##### Include an automatic clutch to positively disengage the hand-wheel at any time that the drive motor control is energized.

##### Design hand-wheel operator so that failure of the motorized gearing will not prevent hand operation of the gate.

#### Drive Unit:

##### Electric motor as specified on the Induction Motor Data Sheet (attached as a supplement to this Section) with integral OPEN/ STOP/CLOSE weatherproof pushbuttons, reversing controller, [575/120] volt control power transformer, space heaters in the limit switches and in the control compartments, mechanical dial type position indicator, and transparent plastic pipe stem cover and cap [unless otherwise specifically noted on the Contract Drawings.]

##### For any equipment containing grease and/or oil, a drip-pan must be installed in order to capture any leakage over time – especially with respect to potable water processes.

##### Furnish motor enclosure with drainage and breathing holes.

##### Self-locking, with approximately 300 mm per minute gate travel speed, and a rated running torque equal to 20 percent of the motor starting torque at a rated running time of [15] [5] minutes, without exceeding the allowable NEMA temperature rise for the insulation class used.

#### Operation: Drive the gate to its fully OPEN or CLOSED position when the OPEN or CLOSED pushbutton is depressed momentarily. Motor shall stop in mid travel when the STOP button is depressed.

#### Remote Position Indication: Integral position transmitter producing a 4 to 20 mA dc output in direct proportion to gate position for connection to an external instrument loop. Fully CLOSED position shall correspond to 4 mA dc. The transmitter shall be capable of driving an external load impedance of 350 ohms minimum.

#### Controls: Furnish the following in accordance with the operator control styles listed below and specified in the Slide Gate Schedule (attached as a supplement to this Section):

|  |  |
| --- | --- |
| Feature | Description |
| A | Local OPEN/STOP/CLOSE pushbutton station. |
| B | End position limit switches; OPEN and CLOSED position switches shall be normally open contacts that close at the end position; contacts shall be dry and rated for 5 amps, 120V ac. |
| C | Continuous position output; provide a signal converter to generate a 4 to 20 mA dc signal to an external loop in direct proportion to gate position; the signal converter shall be factory mounted in a NEMA 250-2014, Type 4 enclosure. |
| D | LOCAL/REMOTE weatherproof selector switch and provisions for remote OPEN/STOP/CLOSE operation; remote commands will be by way of a four-wire circuit, as shown on the Contract Drawings; the motor operator shall impress the voltage required to read these contacts and shall go to the commanded position or stop when in the REMOTE mode. |

##### Operator Control Styles:

###### Style 1: Includes control feature A only.

###### Style 2: Includes control features A and B.

###### Style 3: Includes control features A, B, C, and D.

#### Acceptable Manufacturers:

##### *[Consultant to provide list of acceptable Manufacturers and Products*]

##### Or Equivalent.

### Identification Tagging Requirements:

#### Tagging to be in accordance with Section 01080 – Process Equipment Location Tagging bearing the gate tag number shown in the Slide Gate Schedule (attached as a supplement to this Section) for each gate operator.

#### Attach the tags to the operator by soldered split key rings so that the ring and tag cannot be removed.

## Aluminum Stop Logs

### Logs:

#### 300 mm high horizontal sections suitable for vertical stacking.

#### Interchangeable, so they can operate in any order of placement.

#### Designed for channel size and differential head shown on the Slide Gate Schedule (attached as a supplement to this Section).

### Assembly:

#### Log sections with stiffeners and lifting bolts.

#### Aluminum or stainless steel guides for wall surface mounting; logs to slide smoothly in the vertical guides.

#### Lifting device with latch to engage and disengage logs, suitable for attaching to an overhead hoist, crane, or cable. Weld lifting brackets to stop logs.

#### Edges of Log Sections: Parallel to each other, with sides at right angles to the bottom.

### Seals:

#### Resilient seal along the bottom or top and sides of each log to form watertight seal.

#### One spare set of seals to be provided suitably packaged for long term storage.

#### Seal strips for stop log guides to ensure leakage rate in accordance with AWWA C561-14.

## Appurtenances

### Lifting Lugs: Furnish suitably attached for equipment assemblies and components weighing over 45 kg.

### Anchor Bolts: ASTM A193/A193M-16, Type 316 stainless steel [sized by the equipment manufacturer] at least 13 mm in diameter, or as shown on the Contract Drawings, and as specified in Section 05500 - Metal Fabrications General. Anchors must be supplied with the equipment by the gate manufacturer.

### Staff Gauges: For stainless steel, downward acting weir gates. Graduated in 6 mm and marked every 50 mm and metre.

## Shop/Factory Finishing

### Coat all aluminum surfaces which may come into contact with concrete with un-thinned bitumastic paint in accordance with Section 09900 - Painting and Protective Coatings, or insulate with suitable protective neoprene gasket material.

# EXECUTION

## Installation

### In accordance with the manufacturer’s written instructions.

### Disassemble factory assembled gate components before installation.

### Field mount operators after installing gates.

### Brace thimbles internally during concrete placement.

### Accurately place anchor bolts using templates furnished by the manufacturer and as specified in Section 05500 - Metal Fabrications General.

### Lubricate stems before operating.

## Field Quality Control

### Functional Tests: Conduct on each slide gate.

### Performance Test:

#### Conduct performance testing on each slide gate under actual or approved simulated operating conditions.

#### Test for a continuous [3 hour] period without malfunction.

#### Adjust, realign, or modify units and re-test if necessary.

### Commissioning shall be performed in accordance with Section 01810 – Equipment Testing and Facility Commissioning.

## Manufacturer’s Services

### Manufacturer’s Representative: The Contractor shall ensure that the manufacturer’s representative will be present at Site or the classroom designated by [the Region,] for the minimum number of Person-days listed below, travel time excluded:

#### [ ] Person-days for [installation assistance] [and] [inspection.]

#### [ ] Person-days for [functional] [and] [performance] testing and completion of the Manufacturer’s Certificate of Proper Installation.

#### [ ] Person-days for pre-startup classroom or Site training.

#### [ ] Person-days for facility startup.

#### [ ] Person-days for post startup training [of the Region’s personnel.] [Training shall not commence until an accepted detailed lesson plan for each training activity has been reviewed by the Consultant.]

#### See Section 01820 – Demonstration and Training.

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

### The Contractor shall ensure that the manufacturer’s representative will be present at the Site in accordance with Section 01640 - Manufacturers’ Services, for installation assistance, inspection and certification of proper installation, equipment testing, startup assistance, and training of [the Region’s] personnel for specified component, subsystem, equipment, or system.

## Supplements

### The supplements listed below form part of this Specification.

#### Slide Gate Schedule.

#### Induction Motor Data Sheet.

**END OF SECTION**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **SLIDE GATE SCHEDULE** | | | | | | | |
| **Gate Tag Identification No. and Location** | **Assembly Style** | **Wall Opening (width/height mm)** | **Acceptable Leakage Rate** | **Gate Height (mm)** | **Material** | **Design Operating Head (metres)**  **Seating/ Unseating Condition** | **Wall Thimble Type/Depth** | **Operator Type/Control Style** |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Note: Gate disc contains weir openings. See Contract Drawings for configuration and invert elevations

Data shall be provided in an electronic format suitable for uploading to the Region’s CMMS.

|  |  |
| --- | --- |
| Table to be provided in electronic format suitable for up-load to the CMMS (Maximo) INDUCTION MOTOR DATA SHEET | |
| Project: | |
| Region: | |
| Equipment Name: | |
| Equipment Tag Number(s): | |
| Type: Squirrel-cage induction meeting requirements of NEMA MG 1-2016 | |
| Manufacturer: For multiple units of the same type of equipment, furnish motors and accessories of a single manufacturer | |
| Hazardous Location:  Furnish motors for hazardous (classified) locations that conform to UL 674 and have an applied UL listing mark | |
| Motor Horsepower: | Guaranteed Minimum Efficiency at Full Load:  percent |
| Voltage: | Guaranteed Minimum Power Factor at Full Load:  percent |
| Phase: | Service Factor (@ rated max. amb. temp.):  1.0  1.15 |
| Frequency: | Enclosure Type: |
| Synchronous Speed: rpm | Mounting Type:  Horizontal  Vertical |
| Multispeed, Two-Speed: | Vertical Shaft:  Solid  Hollow |
| /  rpm | Vertical Thrust Capacity (kg): Up  Down |
| Constant Horsepower | Adjustable Speed Drive: See Section 16260, Low Voltage |
| Variable Torque | Adjustable Frequency Drive Systems. |
| Constant Torque | Operating Speed Range:  to % of Rated Speed |
| Winding:  One  Two | Thermal Protection: |
|  | Space Heater:  volts, single phase |
|  | Oversize main terminal (conduit) box for motors |
|  | Terminal for connection of equipment grounding wire in each terminal box |
| Additional Motor Requirements:  [Consultant to provide specification on] AC Induction Motors | |
| Special Features: | |
|  | |
|  | |