

WIRE AND BOX CONNECTORS 0-1000 V

1. GENERAL

1.1 Section Includes

- .1 Materials and installation for wire and box connectors.

1.2 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No.18-98, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2 No.65-93(R1999), Wire Connectors.
- .2 National Electrical Manufacturers Association (NEMA)

2. PRODUCTS

2.1 Materials

- .1 Pressure type wire connectors to: CSA C22.2, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Clamps or connectors for armoured cable, as required to: CAN/CSA-C22.2.

3. EXECUTION

3.1 Installation

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
 - .2 Install fixture type connectors and tighten. Replace insulating cap.
 - .3 Install bushing stud connectors in accordance with manufacturer's recommendations.

END OF SECTION

WIRES AND CABLES (0-1000 V)

1. GENERAL

1.1 Related Sections

- .1 Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

1.2 References

- .1 CSA C22.2 No .0.3 Test Methods for Electrical Wires and Cables.
- .2 CAN/CSA-C22.2 No. 131 Type TECK 90 Cable.

1.3 Product Data

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

2. PRODUCTS

2.1 TECK Cable

- .1 Cable: to CAN/CSA-C22.2 No. 131.
- .2 Conductors:
 - .1 Grounding conductor: copper
 - .2 Circuit conductors: copper size as indicated.
- .3 Insulation:
 - .1 Chemically cross-linked thermosetting polyethylene rated type 600 V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: aluminum.
- .6 Overall covering.
- .7 Fastenings:
 - .1 One hole straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables.
 - .3 Threaded rods: 6 mm dia. to support suspended channels.
- .8 Connectors:
 - .1 Watertight, approved for TECK cable.

WIRES AND CABLES (0-1000 V)

3. EXECUTION

3.1 Installation of TECK Cable 0 -1000 V

- .1 Install cables.
- .2 Group cables wherever possible on channels.
- .3 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - 0 - 1000 V.

END OF SECTION

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1. GENERAL

2. PRODUCTS

2.1 Support Channels

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted or suspended.

3. EXECUTION

3.1 Installation

- .1 Secure equipment to masonry, tile and plaster surfaces with lead anchors or nylon shields.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .4 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.
- .5 Suspended support systems.
 - .1 Support individual cable with 6 mm dia threaded rods and spring clips.
 - .2 Support 2 or more cables on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.
- .6 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support cable runs.
- .7 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .8 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .9 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Contract Administrator.
- .10 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

CABLE TRAYS FOR ELECTRICAL SYSTEMS

1. GENERAL

1.1 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.1 No.126.1-02, Metal Cable Tray Systems.
- .2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA VE 1-2002, Metal Cable Tray Systems.
 - .2 NEMA VE 2-2001, Cable Tray Installation Guidelines.

1.2 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit manufacturer's product data sheets for cable tray indicating dimensions, materials, and finishes, including classifications and certifications.
- .3 Shop Drawings: submit shop drawings showing materials, finish, dimensions, accessories, layout, and installation details.
- .4 Show actual cabletrough installation details and suspension system.

2. PRODUCTS

2.1 Cabletrough

- .1 Ladder type
- .2 Trays: extruded aluminum or galvanized steel.
- .3 Fittings: horizontal elbows, end plates, drop outs, vertical risers and drops, tees, wyes, expansion joints and reducers where required, manufactured accessories for cabletrough supplied.
- .4 Barriers where different voltage systems are in same cabletrough.
- .5 Ground cable trays with #2 AWG bare copper conductor attached to each tray section in accordance with Manitoba Electrical Code requirements.
- .6 Provide fire stop material at firewall penetrations.

2.2 Supports

- .1 Provide splices, supports as required.

CABLE TRAYS FOR ELECTRICAL SYSTEMS

3. EXECUTION

3.1 Installation

- .1 Install complete cabletrough system
- .2 Support cabletrough on both sides.
- .3 Remove sharp burrs or projections to prevent damage to cables or injury to personnel.

3.2 Cables In Cabletrough

- .1 Install cables individually.
- .2 Lay cables into cabletrough. Use rollers when necessary to pull cables.
- .3 Secure cables in cabletrough at 600 cm centres, with nylon ties.

END OF SECTION

WIREWAYS AND AUXILIARY GUTTERS

1. GENERAL

1.1 Related Sections

- .1 Section 01 33 00 - Submittal Procedures.

1.2 References

- .1 Manitoba Electrical Code

1.3 Product Data

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

2. PRODUCTS

2.1 Wireways

- .1 Wireways and fittings: to CSA C22 No.26.
- .2 Sheet steel with bolted cover to give uninterrupted access.
- .3 Finish: baked grey enamel.
- .4 Elbows, tees, couplings and hanger fittings manufactured as accessories to wireway supplied.

3. EXECUTION

3.1 Installation

- .1 Install wireways and auxiliary gutters.
- .2 Keep number of elbows, offsets, connections to minimum.
- .3 Install supports, elbows, tees, connectors, fittings.
- .4 Install barriers where required.
- .5 Install gutter to full length of equipment.

END OF SECTION

MOULDED CASE CIRCUIT BREAKERS

1. GENERAL

1.1 Section Includes

- .1 Materials for moulded-case circuit breakers.

1.2 Related Sections

- .1 Section 01 33 00 - Submittal Procedures.

1.3 References

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-C22.2 No. 5-02, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.4 Submittals

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

2. PRODUCTS

2.1 Breakers General

- .1 Moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation to match existing breakers in panel B-100.
- .2 Common-trip breakers: with single handle for multi-pole applications.
- .3 Circuit breakers to have minimum 10,000 symmetrical rms amperes interrupting capacity rating.

3. EXECUTION

3.1 Installation

- .1 Install circuit breakers in panel B100 as indicated.

END OF SECTION

DISCONNECT SWITCHES – FUSED AND NON-FUSED

1. GENERAL

1.1 Section Includes

- .1 Materials and installation for non-fused disconnect switches.

1.2 Related Sections

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 26 05 00 - Common Work Results for Electrical.

1.3 References

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA C22.2 No.4 Enclosed Switches.

1.4 Submittals

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

2. PRODUCTS

2.1 Disconnect Switches

- .1 Non-fusible disconnect switch in NEMA 4x Enclosure.
- .2 Provision for padlocking in off switch position.
- .3 Quick-make, quick-break action.
- .4 ON-OFF switch position indication on switch enclosure cover.
- .5 Provide ABB disconnect switches p/n EOT16U3P4-P.

2.2 Equipment Identification

- .1 Provide equipment identification as shown on Drawings.

END OF SECTION

VARIABLE FREQUENCY DRIVES

1. GENERAL

1.1 Related Work

- .1 Mechanical: Division 23.

1.2 Scope

- .1 Division 26 shall supply, install, connect supply and motor wiring to VFD units.
- .2 Other divisions shall supply and connect control wiring.
- .3 It is the responsibility of this division to commission VFDs using the operator keypad including ensuring drive operation under load and any other necessary drive operation.

1.3 Standards Motor

- .1 All VFDs supplied under this Contract meet or exceed the following specifications.
- .2 Harmonic loading will not exceed a motor service factor of 1.0.
- .3 Products shall comply with IEEE Standard 519.
- .4 VFD unit shall be ULC listed or CSA certified.
- .5 VFD unit shall comply with applicable requirements of the latest standards of CSA, ANSI, IEEE and the Canadian Electrical Code.

1.4 Tests

- .1 Field testing.
 - .1 The Contractor shall provide on-site start-up, fine-tuning, commissioning, operator training and instruction.

1.5 Warranty

- .1 The Contractor shall provide warranty coverage for a period of one year.

2. PRODUCTS

2.1 Variable Frequency Drives

- .1 Variable Frequency Drives as manufactured by:
 - .1 Schneider Electric. Part numbers as indicated on Drawings.
 - .1 Line voltage sags down to 85% of rated voltage of up to one second duration.

VARIABLE FREQUENCY DRIVES

3. EXECUTION

3.1 Operations Manual Information

- .1 Installation:
 - .1 Identify mounting requirements and include all materials and labour.
 - .2 Install VFDs in locations as indicated on Drawings, and connect up all necessary wiring.
 - .3 Motor supply cables/conductors shall be run in cables separate from supply feeders to line side of VFD.
- .2 Field Quality Control:
 - .1 Contractor shall be responsible for complete commissioning of each variable speed drive to satisfaction of the Prime Contractor and the City.
- .3 Variable Frequency Drive Check-list:
 - .1 Upon the award of the Contract to the successful Contractor, the Prime Contractor will furnish a VFD checklist that is to be completed and submitted with the VFD Shop Drawings.
- .4 Software:
 - .1 Provide VFD programming/troubleshooting software to the City.
 - .2 Provide VFD Parameter list "as programmed during commissioning" for each VFD
- .5 VFD Shop Drawings:
 - .1 The Shop Drawings for each type/size of VFD must be specific to that unit. Generic Shop Drawing shall not be acceptable. The Shop Drawings are to include dimensions and physical details of the cabinets, a wiring diagram and a ladder diagram showing both internal connections and terminals for field wiring. Separate diagrams are required for each VFD/motor functions. Generic diagrams shall not be acceptable.
 - .2 All Drawings, manuals, parameter settings, and test reports are to be included with the "Electrical Maintenance Manual". This manual shall be issued in both hard copy, and electronic format.

END OF SECTION

VARIABLE FREQUENCY DRIVES

VFD CHECKLIST

INSTALLED VFD TEST

VFD EQUIPMENT NO. _____ DATE OF TEST _____

DRIVEN MOTOR EQUIPMENT NO. _____

DRIVEN LOAD CHARACTERISTIC: CONSTANT TORQUE _____

VARIABLE TORQUE _____

SETPOINTS:

MINIMUM FREQUENCY _____ Hz

MAXIMUM FREQUENCY _____ Hz

ACCELERATION TIME _____ Sec

DECELERATION TIME _____ Sec

SPEED RANGE: MANUAL ____ RPM, ____ RPM

CDACS ____ RPM, ____ RPM

VFD CURRENT AT FULL LOAD: PH.A. Amp, PH.B Amp, PH.C Amp.

MOTOR CURRENT: PH.A. Amp, PH.B Amp, PH.C Amp.

MOTOR NAMEPLATE DATA:

MFR.: _____ MFR. TYPE _____ FRAME _____ hp _____

VOLTS: PHASE RPM SERVICE FACTOR

AMPS _____ FREQ. _____ Hz _____ AMBIENT TEMP. RATING _____ °C

TIME RATING _____ DESIGN LETTER _____

kVA CODE LETTER _____ INSULATION CLASS _____

CERTIFIED _____ Date _____

Contractor's Representative

WITNESSED _____ **DATE** _____