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**Part 1            General****1.1            RELATED SECTIONS**

- .1        Section 01 00 10 – General Instructions.
- .2        Section 26 05 00 – Common Work Results for Electrical.
- .3        Section 26 05 31 - Splitters, Junction, Pull Boxes and Cabinets.
- .4        Section 26 36 23 – Automatic Transfer Switches.

**1.2            REFERENCES**

- .1        Canadian Standards Association (CSA International)
  - .1        CSA C22.2 No.14-05, Industrial Control Equipment. Includes Update No. 3 (2008)
- .2        National Electrical Manufacturers Association (NEMA)
  - .1        NEMA ICS 1-2000 (R2008), Industrial Control and Systems: General Requirements.

**1.3            SHOP DRAWINGS**

- .1        Submit shop drawings in accordance with Section 01 00 10 – General Instructions.
- .2        Include schematic, wiring, interconnection diagrams.

**1.4            WASTE MANAGEMENT AND DISPOSAL**

- .1        Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.
- .2        Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3        Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .4        Divert unused metal and wiring materials from landfill to metal recycling facility as approved by the Departmental Representative.

**Part 2           Products****2.1            AC CONTROL RELAYS**

- .1        Control Relays: to CSA C22.2 No.14 and NEMA ICS 1.

- .2 Convertible contact type: contacts field convertible from NO to NC, types as indicated as follows: electrically held; permanent magnet latched; double-voltage type with sliding barrier to permit access to contacts only or coil only; with solid state timer. Coil rating: voltage and burden (VA) as indicated. Contact rating: voltage and current as indicated.
- .3 Sealed contact type: electrically held permanent magnet latched with poles and front mounted contact block to provide additional poles. Coil rating: voltage and burden (VA) as indicated. Contact rating: voltage and current as indicated.
- .4 Universal pole type: electrically held type with poles, convertible from NO to NC by changing wiring connections. Coil rating: voltage and burden (VA) as indicated. Contact rating: voltage and current as indicated.
- .5 Fixed contact plug-in type: general purpose or low coil current heavy duty with multiple poles. Coil rating: voltage and burden (VA) as indicated. Contact rating: voltage and current as indicated.

## **2.2 RELAY ACCESSORIES**

- .1 Standard contact cartridges: normally-open - convertible to normally-closed in field.

## **2.3 SOLID STATE TIMING RELAYS**

- .1 Construction: AC operated electronic timing relay with solid-state timing circuit to operate output contact. Timing circuit and output contact completely encapsulated to protect against vibration, humidity and atmospheric contaminants.
- .2 Operation: on-delay or off-delay.
- .3 Potentiometer: self contained to provide time interval adjustment.
- .4 Supply voltage: as indicated, AC, 60 Hz.
- .5 Temperature range: minus 20 degrees C to 60 degrees C.
- .6 Output contact rating: maximum voltage 300 V AC or DC. Current: NEMA ICS 1 – 10 A minimum.
- .7 Timing ranges: minimum 0.1 s, maximum 60s.

## **2.4 INSTANTANEOUS TRIP CURRENT RELAYS**

- .1 Enclosure: CSA Type 1 or open type in custom or motor control equipment.
- .2 Contacts: NO, NC automatic reset with adjustable tripping point.
- .3 Control: 3 wire, with provision for shorting contacts during accelerating period of motor.
- .4 Contact rating: NEMA ICS 1 – 10 A minimum.

## **2.5 PUSHBUTTONS**

- .1 Illuminated, heavy duty oil tight. Operator recessed with 1-NO and 1-NC 120 V contacts rated at 10 A, AC, labels as indicated. Stop pushbuttons coloured red, provision for padlocking in depressed position labelled "stop". Emergency stop with red mushroom head.

**2.6 SELECTOR SWITCHES**

- .1 Maintained 2 or 3 position labelled as indicated; heavy duty oil tight; operator's standard knob, contact arrangement as indicated, rated 10 V, 120 VA, AC.

**2.7 INDICATING LIGHTS**

- .1 Heavy duty oil tight, transformer LED type, push-to-test, lens colours: as indicated, supply voltage, lamp voltage and V, labels as indicated.

**2.8 CONTROL AND RELAY PANELS**

- .1 CSA Type 1 sheet steel enclosure with hinged padlockable access door, accommodating relays timers, labels, as indicated, factory installed and wired to identified terminals.

**2.9 CONTROL CIRCUIT TRANSFORMERS**

- .1 Single phase, dry type.
- .2 Primary: 60 Hz ac and secondary voltages as indicated.
- .3 Rating: as indicated or required for control circuit burden.
- .4 Secondary fuse: select for short circuit protection.
- .5 Close voltage regulation as required by magnet coils and solenoid valves.

**2.10 TERMINAL STRIPS**

- .1 For installation in terminal cabinets
- .2 Terminals strips to be heavy duty industrial screw-type rated 600 volts, mechanical pressure type with self-locking provision
- .3 Material: current carrying parts – copper; phenolic base.

**Part 3 Execution****3.1 INSTALLATION**

- .1 Install pushbutton stations, control and relay panels, control devices and interconnect.

**3.2 FIELD QUALITY CONTROL**

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.
- .3 Upon completion of sectional test, undertake group testing.
- .4 Check out complete system for operational sequencing.

**END OF SECTION**