

Occupancy Sensors Specification

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Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Cover page	March 2023	Remove 'Capital Projects Group' to reflect organizational changes
1.2.3, 1.3.2, 2.2.5	March 2023	Add 'the latest version of' Updated Electrical Nomenclature and Identification specification number and Updated Design requirements
2.2.13, 2.2.14. 3.1	March 2023	Added another technology type to wall and ceiling mounted occupancy sensors and Updated installation requirements

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1. GENERAL

1.1. SCOPE OF WORK

- 1.1.1. Labour, products, equipment, and services necessary for Occupancy Sensors Work.
- 1.1.2. Vacancy Sensors and Occupancy Sensors for this Specification will be called Occupancy Sensors.
- 1.1.3. Metrolinx utilizes a preferred Vendor for security systems . Equipment specified and supplied by the security Vendor for use in the Vendor's security systems is excluded from this Specification. Any remaining security applications outside of the security Vendor scope are covered by this Specification.

1.2. DESIGN REQUIREMENTS

- 1.2.1. The equipment furnished and the equipment installation, wiring methods and materials used shall conform to the latest edition of the Ontario Electrical Safety Code, Electrical Safety Authority (ESA) Bulletins and Supplements issued by the Electrical Safety Authority, and the applicable Metrolinx Standards. In case of any conflicts, the more stringent requirement shall apply.
- 1.2.2. Design electrical equipment and systems to all applicable standards of CSA, ULC, IEEE, ESA.
- 1.2.3. Design electrical equipment and systems to the latest version of GO DRM.
- 1.2.4. Design electrical equipment and systems to standards and codes to be latest editions adopted by and enforced by local authorities having jurisdiction (AHJ).
- 1.2.5. Occupancy sensors shall be designed to meet heavy-duty, industrial grade requirements. Commercial grade devices are unacceptable.
- 1.2.6. Occupancy sensors shall be used for both system control (lighting, heating, etc.) and for security alarming.
- 1.2.7. Utilize different occupancy sensor technologies (as noted in Section 2.1 General below) based on what is best suited for that particular application
- 1.2.8. Integration of occupancy sensors into systems is covered by the Contract documents and related Sections.
- 1.2.9. IP addressable occupancy sensors shall be used where possible to communicate with both the lighting control system and the security system.

1.3. RELATED WORKS

- 1.3.1. Section 26 05 00 Electrical General Requirements.
- 1.3.2. Section 26 05 53 Electrical Identification and Nomenclature

1.3.3. Section 26 50 00 - Lighting and Controls.

1.4. REFERENCE STANDARDS

1.4.1. Ontario Electrical Safety Code (OESC).

1.4.2. Ontario Building Code (OBC).

1.4.3. Metrolinx Standards, Drawings and Specifications.

1.4.4. GO Design Requirement Manual (DRM).

1.4.5. ANSI, American National Standards Institute.

1.4.6. NEMA WD 7-2011(R2016) Occupancy Motion Sensors Standard.

1.5. SPARE PARTS

1.5.1. Not applicable.

1.6. TRAINING

1.6.1. Not applicable.

1.7. WARRANTY

1.7.1. The contractor shall provide an installation warranty for the work of this section for a minimum warranty period of two years after acceptance by Metrolinx. The contractor shall provide a manufacturer warrant for the work of this section with a minimum warranty period of five years after acceptance by Metrolinx.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Contractor to protect equipment from damage, weather and moisture in accordance with manufacturer's instructions.

1.9. SUBMITTALS

1.9.1. Product Data Package:

- a) Submit manufacturer's Product data indicating:
 - 1) Technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;
 - 2) Performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;
 - 3) Product transportation, storage, handling, and installation requirements; and

- 4) Product identification in accordance with GO DRM.

1.10. QUALITY ASSURANCE

- 1.10.1. Refer to Section 26 05 00.
- 1.10.2. Manufacturers Qualifications: Company specializing in Occupancy Sensors with at least five years documented experience.
- 1.10.3. Regulatory Requirements: Furnish Products listed and classified by CSA and ULC, as suitable for application, and shall be stamped accordingly

2. PRODUCTS

2.1. GENERAL

- 2.1.1. The occupancy sensors shall be able to withstand the environmental conditions stated in Section 26 05 00 without damage or degradation of operating characteristics.
- 2.1.2. Sensing technologies shall be active and/or passive in nature, in that the occupancy sensor system shall not emit or interfere with any other electronic device, or human characteristic. Acceptable known technologies are:
 - a) PIR sensor which detects the heat difference by Infrared radiation measurement detecting a temperature change;
 - b) Ultrasonic Sensors which transmits high frequency sound waves and uses a microphone to detect the doppler shift or reflected sound wave change created by human movement in the space;
 - c) Microwave detectors emit and detect reflected waves;
 - d) Acoustic which senses the presents of a human by the change in sound created by human presence in the space; or
 - e) Any combination of the above.
- 2.1.3. The occupancy sensor shall sense the presence of human activity within the desired space and work with the related system to fully and automatically control the system.
- 2.1.4. All sensors, power packs, and relays shall be ULC and/or CSA Listed under either Industrial Control Equipment, or Energy Management Equipment. Appliance Control listing shall not be accepted.
- 2.1.5. Proper coverage of the area for all types of human activity, and any necessary relays or miscellaneous devices is the responsibility of the Contractor.

2.2. OCCUPANCY SENSORS

- 2.2.1. Occupancy sensors shall utilize low voltage control circuits and be interlocked with the BAS, digital controls and switch circuit for local auto/off control.
- 2.2.2. Occupancy sensors must be designed to work in conjunction with remote power packs, relays, or other control systems. Occupancy sensors must operate with a Class 2, low voltage wiring strategy. Sensors must be capable of being parallel wired for multi-sensor applications.
- 2.2.3. Occupancy sensors must accept 5, 12 to 24 volts AC or DC. Occupancy sensor must provide a transistor output, returning the voltage input rectified to DC, to control remote power packs, relays, or other control systems.
- 2.2.4. Power pack should be provided as occupancy sensors with the same rating input voltage as the occupancy sensor and include sufficient capacity for trouble free operation.
- 2.2.5. Occupancy sensors shall be fully covered during any kind of work where it could be exposed to dusts, mists, or other atmospheric phenomenon that could affect its operation.
- 2.2.6. Occupancy sensors must have optional single pole, double throw signal relay capable of being wired as "open on occupancy" or "closed on occupancy".
- 2.2.7. Occupancy sensors must provide optional photocell output for daylight override. Sensor shall not consume more than 14 milliamps of current. Photocell override shall be factory set to the off mode but be field adjustable.
- 2.2.8. All adjustments shall be concealed once installed.
- 2.2.9. Sensor shall provide a green LED motion indicator. Red LED denoting life safety shall not be permitted.
- 2.2.10. Occupancy sensors for interior uses at entrances shall turn on the load within 2 feet of entrance and shall not initiate on outside of entrance unless required by Contract Documents.
- 2.2.11. Timed occupancy sensor
 - a) Upon detection of human activity by the occupancy sensor, a time delay shall be initiated within the occupancy sensor to activate lighting for a pre-set period.
 - b) The occupancy sensor must have the function in the controls to be overridden by systems like the BAS or timers.
 - c) The occupancy sensor time delay setting shall be factory preset for typical applications, and field adjustable in 30 second increments from 30 seconds to 20 minutes. The timing circuit settings shall be digital or analog providing adjustment by simple rotation only.

2.2.12. Sensitivity

- a) Detect occurrences of 150 mm (6-inch) minimum movement of any portion of a human body that presents a target of not less than 232 sq. cm (36 sq. in).
- b) Detect a person of average size and weight moving not less than 305 mm (12 inches) in either a horizontal or a vertical manner at an approximate speed of 305 mm/s (12 inches).

2.2.13. Wall mounted occupancy sensors

- a) Powered by low voltage POE or 120V.
- b) 180 degrees, 300 sq. ft. minimum coverage.
- c) Infrared, ultrasonic, acoustic or dual-technology type.
- d) Heavy duty, specification grade, with SCR power switching devices.
- e) Adjustable range or sensitivity, adjustable time delay, integral manual override switches.
- f) Suitable for mounting in single gang wall mounted boxes.
- g) Combination of wall switch and wall mounted occupancy sensors shall not be used without special Metrolinx approval.

2.2.14. Ceiling mounted occupancy sensors

- a) Powered by low voltage POE or 120V.
- b) 360 degrees coverage, 1000 sq. ft. minimum coverage
- c) Dual technology type (infrared, ultrasonic or acoustic).
- d) Heavy duty, specification grade, with SCR power switching devices.
- e) Adjustable range or sensitivity, adjustable time delay, and suitable for mounting in ceiling mounted boxes.

2.2.15. Dual technology occupancy sensors

- a) Powered by low voltage POE or 120V.
- b) 180 or 360 degrees coverage, 1000 sq. ft. minimum coverage
- c) Combination of ultrasonic and passive infrared type. The ultrasonic component shall be of a frequency compatible with hearing aids.
- d) Heavy duty, specification grade, with SCR power switching devices

- e) Adjustable range or sensitivity, adjustable time delay, and suitable for mounting in ceiling mounted boxes.

2.2.16. Vacancy Sensors

- a) For the purposes of this Specification, a vacancy sensor is defined as a device where lights are manually turned on in a area or zone and will automatically turn off when no human activity is detected for a period.
- b) Upon detection of absence of human activity by the vacancy sensor, a time delay shall be initiated within the vacancy sensor to deactivate lighting after a pre-set period.
- c) The vacancy sensor must come with the capability to be overridden by systems like the BAS or timers.
- d) The vacancy sensor time delay setting shall be factory preset for typical applications, and field adjustable in 30 second increments from 30 seconds to 20 minutes. The timing circuit settings shall be digital or analog providing adjustment by simple rotation only.
- e) Vacancy sensors shall only be used in back-of-house service rooms.

2.3. IDENTIFICATION

- 2.3.1. Furnish color coding in accordance with Electrical Identification and Nomenclature Specification 26 05 53
- 2.3.2. Provide identification for equipment and its sub-components in accordance with Electrical Identification and Nomenclature Specification 26 05 53
- 2.3.3.
- 2.3.4. Provide nameplates, warning signs and labels as required by the AHJ.
- 2.3.5. Where the occupancy sensor is an IP addressable or wireless device then the occupancy sensor label identification must include this information. Refer to Electrical Identification and Nomenclature Specification 26 05 53 for further details.

3. EXECUTION

3.1. INSTALLATION

- 3.1.1. System installation shall be in accordance with all national and local electrical codes.
- 3.1.2. Locate and aim sensors in correct location required for complete and proper volumetric coverage within range of coverage(s) of controlled areas in accordance with manufacturer's recommendations.

- 3.1.3. Coordinate layout and installation of ceiling mounted occupancy sensor with other construction such as but not limited to light fixtures, HVAC equipment, smoke detectors, fire suppression systems and piping.
- 3.1.4. Low voltage wiring from occupancy sensors to the end device shall be installed in conduit.
- 3.1.5. Mount identification nameplates in accordance with Electrical Identification and Nomenclature Specification 26 05 53 for each device.

END OF SECTION