



RBtec MBS-405 Magnetic Buried Sensor Cable

Architectural & Engineering Specifications

Purpose

The purpose of this document is to provide performance specifications and operational requirements for the RBtec MBS-405 Magnetic Buried Sensor Cable technology for perimeter intrusion detection.

This document is written in a generic format without reference to the RBtec MBS-405 Magnetic Buried Sensor Cable.

These specifications may be copied to form a generic procurement specification for buried intrusion detection systems.

Equipment Classification

The MBS-405 Sensor Cable is a concealed, passive and buried perimeter intrusion detection system that is designed to detect and locate intruders moving over or under unseen boundary lines and perimeters.

The RBtec MBS-405 Magnetic Buried Sensor Cable system functions as a standalone system or as an integrated solution as part of a centralized control and maintenance facility.

Disclaimer

This A&E text is based upon MasterFormat™ [2004 Edition] issued by the Construction Specifications Institute (CSI) www.csinet.org/masterformat. By removing the article “Manufactured units”, the text may be used also in performance-based specifications.

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Division 28 – Electric Safety and Security
Section 28.16.43 – Perimeter Security Systems

PART 1 GENERAL

1.01 General Description

- A The system shall be:
 - 1. A modular concealed and buried sensor cable designed for outdoor perimeter intrusion detection
 - 2. Designed to passively detect and locate intruders moving ferromagnetic materials over or under unseen boundary lines and perimeters.
 - 3. Based on the ‘Magnetic Anomaly Detection (MAD)’ principle.
- B The detection system shall be of manufacturer’s official product line, designed for commercial/industrial 24/7/365 use.
- C The system shall be capable of operating as a standalone, single zone device or as a multi-zoned networked device.

1.02 Quality Assurance

- A All installation, configuration, setup, system programming and related work shall be performed by technicians thoroughly trained and certified by the manufacturer in the installation and service of the equipment provided.
- B All general equipment provided shall be backed by a minimum of one year. Manufacturer warranty, except where manufacturer guarantees state otherwise.

1.03 Definitions

- A Protected or Protection Zone: A space or area or area which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.
- B Standard Intruder: A person who weighs 100 lbs. (45 kg) or more.

1.04 Submittals

- A Product Data: Components for sensing, detecting, and control, including dimensions and data on features, performance, electrical characteristics, ratings and finishes.
- B Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this project.
 - 1. Functional Block Diagram: Show single-line interconnections between components. Indicate control, signal and data

communication paths and identify control interface devices and media to be used. Describe characteristics of network and other data communication lines.

- C Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

PART 2 PRODUCTS

2.01 General Detection Properties

A The sensor shall:

1. Be designed to detect intruders' passing ferromagnetic materials over or under the detection zone.
2. A sensor module shall contain the electronics required to:
 - a. Detect the local change in magnetic flux of the earth caused by movement of ferromagnetic materials and ignore local changes in magnetic flux caused by other sources.
 - b. Amplify the magnetic flux within the detection zone for analysis.
 - c. Indicate an alarm when intrusion occurs.
 - d. Transmit an alarm condition to a control device.
3. Be capable of monitoring all types of ferromagnetic materials.
4. Detect intruders by detecting localized changes in the magnetic flux of the earth caused by movement of ferromagnetic materials and ignore local changes in magnetic flux caused by other sources
5. Be capable of functioning either as a standalone system or as an integral part of a centralized control and maintenance facility.

B Probability of Detection

1. The probability of detection (PD) of an intruder passing ferromagnetic materials over or under the detection zone shall be of a confidence factor of 98.999% or greater.

C Nuisance Alarm Rate/ False Alarm Rate (NAR/FAR)

1. Nuisance Alarms: The system shall operate within specification in typical outdoor environments.

2. The system, as a buried detection device shall not be affected by the following usual sources of nuisance and false alarms:
 - a. Precipitation including rain, snow, hail and fog.
 - b. Sunrise/sunset
 - c. Wind
 - d. Temperature changes
 - e. Sandstorms
 - f. Motion of nearby objects (vehicles, etc.) Up to a distance of 33 feet (10 meters).
 - g. Motion at surface or below surface water. Up to a distance of 33 feet (10 meters).
 - h. Nearby vegetation up to 1 foot (30 centimeters) in height.
3. Before installation is to begin, the installer shall report to the customer, in writing, as to all site-specific conditions that may contribute to a higher Nuisance Alarm Rate.
4. The customer shall decide whether to remedy the situation or accept the nuisance alarm sources without any further responsibility on the part of the installer or the manufacturer.

2.02 Sensor Characteristics

A Zone Length:

1. The maximum length of each zone shall be 656 feet (200m) of magnetic sensor cable. Individual zone lengths shall be determined by the physical boundaries of each zone.
2. The sensor cable shall be supplied in rolls of 1968 feet (600m) and shall be cut to the correct length at the time of installation.

B Zone Width:

1. The maximum width of each zone shall be 3.94 feet (1.20m) of magnetic sensor cable.

C Zone Depth:

1. The maximum depth of burial of the sensor cable shall be 16" (40cm).

D Detection area:

1. When buried in the ground at the suggested depth, the detection area above the sensor cable shall be approximately 6.5' (2.00m).

2.03 Sensor Cable Specifications:

1. The cable used as the magnetic sensor shall be designed for the process control industry and shall be constructed in accordance to NEC Article 725 Class 1 for use in Division 2 Hazardous areas.
2. The conductor shall be:
 - a. Bare copper
 - b. Stranded, 7 strands concentric as per ASTM B-8, class B.

- c. 16AWG, 7x0.494mm.
- 3. The insulation shall be:
 - a. FR PVC as per BS 6746 Type 5.
 - b. 0.4mm nom.
 - c. Overall Diameter of 2.3mm nom.
- 4. The pair lay-up shall be:
 - a. Lay length of 50mm nom.
 - b. White x Black
 - c. With a binder of polyester tape of 12 μ
- 5. The overall shield shall be:
 - a. 23 μ polyester-aluminum foil, providing 100% coverage, laid in close contact with a tin-plated, 20AWG stranded (7x0.32mm) drain-wire.
- 6. The inner jacket shall be:
 - a. FR PVC as per BS 6746, Type 9.
 - b. 0.5mm nom. thickness
 - c. Overall diameter of 5.7mm nom.
- 7. The moisture barrier shall be:
 - a. Bonded aluminum tape with a thickness of 200 μ .
- 8. The outer jacket shall be:
 - a. FR PE
 - b. 0.8mm nom. thickness.
 - c. Overall diameter of 8.7mm nom.
- 9. The electrical properties shall be:
 - a. DC resistance of 13.9 Ohm/Km max @ 20c.
 - b. Dielectric strength of:
 - 1. Insulation: 2000volts/1 minute minimum between conductors.
 - 2. Jacket: 5000volts/1 minute minimum.
- 10. The general properties shall be:
 - a. Total weight of 93.0Kg/Km nom.
 - b. Bend radius of 102mm min.

2.04 Processor Specification

A The field processor shall:

1. Be capable of processing up to 2 independent detection zones. The processor shall operate either as a standalone unit with local alarm relays and optocouplers, or as an integral component of a centralized control and maintenance facility.
2. Be capable of remote sensitivity management of each individual zone.
3. Be capable of arming/disarming or shunting each individual zone
4. Be protected by a tamper switch.
5. Be capable of automatically adjusting zone sensitivities resulting from weather related changes. The processor shall have circuitry that accepts and analyzes weather condition measurements for rain, wind and hail.
6. Have internal circuitry to protect against lightning and voltage transients.

2.05 Distributed Processing

A The Field Processor shall:

1. Be capable to communicate to central control via the following industry accepted protocols:
 - a. RS-232
 - b. RS-485
 - c. TCP/IP
2. Have at least 8 dry contact optocoupler outputs.
3. Be capable of interfacing with system networks via the following industry accepted communication buses:
 - a. Copper
 - b. Fiber Optics
 - c. Wireless

B The Field Processors shall:

1. Be capable of being rack mounted in the central control area of the specific site; or be capable of being distributed along the proposed protected perimeter.

C Where processors are distributed along the perimeter:

1. Each processor shall receive and process the signals from the sensors along the cable while providing fail-safe operation.
2. The failure of one processor shall not affect the signal processing of the other processors along the perimeter.

2.06 System Component Requirements

- A Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.
 - 1. Minimum protection for power lines 120V and more: Auxiliary panel suppressors complying with requirements in Division 26 Section “Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits.”
 - 2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 26 Section “Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits” as recommended by manufacturer for type of line being protected.
- B Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.
- C Tamper Protection: Tamper switches on cabinets and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central control unit alarm display shall identify tamper alarms and indicate locations.

2.07 Environmental Operating Range

- A The system shall operate within specifications under the following environmental conditions:
 - 1. Temperatures between -40°F and 220°F (-40°C and 105°C)
 - 2. Relative humidity between 0 and 100%.

2.08 Power Requirements

- A The field processor shall operate at 12VDC and shall accept input power from DC power supplies at:
 - 1. 12 to 15 VDC for individual unit powering.
The individual unit DC power supplies shall accept AC power at 115 V/60 Hz or 230 V/50 Hz.

2.09 Reliability

- A The field processor shall have a mean time between failures (MTBF) of greater than 40,000 hours and a mean time to replace (MTTR) of less than 30 minutes.

2.010 Physical Installation Parameters

- A When installed outdoors, the field processor shall:
 1. Be installed in a weatherproof, double-walled enclosure which meets standard IP65.
 2. Include a hinged cover and a tamper device.
 3. Be buried in the ground at the beginning point of each detection zone.
 4. Include a suitable grounding rod, which is connected to “earth ground”.

2.011 Weather Generated Noise Discriminator

- A A weather generated noise discriminator module shall monitor weather conditions at the site and supply related data to the field processor.
- B The field processor shall be capable of utilizing the data to increase the level of discrimination between environmental effects such as; thunder storms and actual intrusion attempts.

PART 3 INSTALLATION

3.01 Manufacturer’s Recommended Procedures

- A The system shall be installed and commissioned in accordance with the manufacturer’s recommended procedures as defined in the product’s installation and setup manuals.

3.02 Installer Certification and ATP

- A Prior to installation, the installer shall have completed a manufacturer’s training program and be certified by the manufacturer. Alternatively, the installer shall be required to have the manufacturer, or their designate, provide qualified technical support for installation and commissioning.
- B Acceptance tests shall be performed in accordance with standard industry accepted procedures available from the manufacturer.

PART 4 SYSTEM MAINTENANCE AND REPAIR

4.01 Recalibration Requirements

- A There shall be no need for recalibration after the system has been fully calibrated and commissioned except as the fence condition deteriorates over time or from unexpected occurrences that may affect the stability of the fence posts or fabric components.

4.02 Sensor Cable Repair

- A If the sensor cable is cut or damaged, it shall be capable of being repaired using additional cable, if required, and an appropriate splice kit. The splice kit shall require the use of only standard tools (i.e. screwdriver, wire strippers, wire cutters, etc.)

4.03 Product Support

- A The field processor shall carry a minimum one-year warranty from the date of purchase.



- B The sensor and sensor cable shall carry a manufacturer's warranty to be free from defect and/or failure for a minimum of 10-years from the date of purchase.
- C The supplier shall warrant that the product shall be supported by spare parts and assemblies for a minimum of 10-years.

PART 5 CERTIFICATIONS

5.01 ISO 9002 Standard

- A The products, including sensors, cables and field transponders, when integrated into one whole system, shall be manufactured in accordance with ISO 9002 standards.