

# **RBtec IRONCLAD Fence Line Sensor**

## **Architectural & Engineering Specifications**

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**Purpose**

*The purpose of this document is to provide performance specifications and operational requirements for the RBtec **IRONCALD Fence Line Sensor** technology for fence disturbance detection.*

*This document is written in a generic format without reference to the RBtec **IRONCALD Fence Line Sensor**.*

*These specifications may be copied to form a generic procurement specification for vibration type fence disturbance detection systems.*

**Equipment Classification**

*The RBtec IRONCLAD system is a transducer fence disturbance sensor, used in conjunction with fences, walls and all types of physical barriers, for indoor and outdoor perimeter intrusion detection.*

*The RBtec IRONCLAD 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](http://www.csinet.org/masterformat). By removing the article “Manufactured units”, the text may be used also in performance-based specifications.*

*All information in this document is subject to change without notice. RBtec reserves the right to make changes to product design or manufacturing methods, as research & development, or as other circumstances warrant.*

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

**PART 1 GENERAL**

1.01 General Requirements

- A Provide a complete perimeter security system consisting of a fence, razor coil, wall or other barrier type mounted sensor including all appropriate controls, wiring and accessories, monitoring hardware, as required, to provide a complete and fully functional perimeter security system.
- B The system shall be used in conjunction with fences, razor coil, walls and other types of physical barriers to protect the perimeter of a site.
- C The system shall be capable of monitoring different types of barriers, such as;
  - 1. Metal Fabric Fences:
    - a. Chain link
    - b. Expanded metal
    - c. Bar type
    - d. Welded mesh
- D The detection system shall be of manufacturer's official product line, designed for commercial/industrial 24/7/365 use.
- E The detection system shall be based upon standard components and proven technology using open and published protocols.

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 two years manufacturer warranty, except where manufacturer warranties 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 less.

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' attempts of climbing, lifting or cutting a fence while rejecting other types of disturbances to the fence fabric.
  - 2. Consist of an ultraviolet resistant vibration transducer cable, two wires, coaxial type cable and a microprocessor based dual zone digital signal processor.
  - 3. Be capable of monitoring different types of metal fabric fencing such as chain-link, expanded-metal or welded-mesh.
  - 4. Detect intruders by utilizing signals generated by the minute flexing of the sensor transducer cable, caused by attempting to cut, climb, or lift the fence fabric.
  - 5. Be capable of functioning as either a standalone system or as an integral part of a centralized control and maintenance facility.

The cable shall be ultraviolet resistant, coaxial vibration cable, coated By adhesive layer of steel mash with max diameter of 4.8mm (0.188").
- B Probability of Detection
  - 1. The probability of detection (PD) of an intruder cutting the fence, and for unaided climbing attempts shall be of a confidence factor of 98% or greater.

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

1. Nuisance Alarms: The system shall operate within specification in typical outdoor environments. The system shall be installed in accordance with manufacturer's recommendations to minimize the probability of alarms generated from the following factors while maintaining the full PD for valid intrusion attempts.
  - 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 8 feet (2.4 meters).
  - g. Motion at surface or below surface water. Up to a distance of 8 feet (2.4 meters).
  - h. Nearby vegetation up to 1 foot (30 centimeters) in height.
  - i. Nearby sources of radio-frequencies (RFI) and electro-magnetic (EMI) interferences.
  - j. Seismic ground vibrations
  - k. Acoustic or magnetic field effects.
2. 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.
3. 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.
4. False Alarms: The maximum rate for False Alarms generated by internal electronic processes (not including cables) shall be less than one per zone per 12 months, averaged over the total number of zones in the system.

2.02 Sensor Characteristics

A Zone Length:

1. The maximum length of each zone shall be maximum 1000 feet (305m) of Fence Line Sensor. Individual zone lengths shall be determined by the physical boundaries of each zone.
2. The sensor cable shall be supplied in rolls of 250/500/1000 feet (75/152/305m) and shall be cut to the correct length at the time of installation.

B The sensor cable shall:

1. Be specifically designed for outdoor use.
2. Contain one micro coax type single core insulated wires shielded with an overall braid tinned copper, providing 95% coverage.
3. Have an outer casing, double-jacketed with PVC compounds.
4. **MUST have outer jacket made of a steel braid armor as integral part of the cable and inseparable.**
5. Have an overall diameter of not more than 0.189 inches (4.80mm).
6. Have a total weight of not more than 230 pounds per mile (65 kg/km).
7. Have a END line resistor of  $1M\Omega$ , capsulated in a seal plastic 130K with IP-67 pre-installed from the factory.

2.03 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 accepting of 4 general purpose dry contact inputs
3. Be capable of remote sensitivity management of each individual zone.
4. **Be capable of local sensitivity management of each individual zone as a standalone unit by Dip Switches with no software.**
5. Be capable of arming/disarming or shunting each individual zone
6. Be protected by a tamper switch.
7. Be capable of automatically adjusting zone sensitivities resulting from standalone weather station unit input on board or communication. The processor shall have circuitry that accepts and analyzes weather condition measurements for rain, wind and hail.
8. Have internal circuitry to protect against lightning and voltage transients.

2.04 Distributed Processing

A The Field Processor shall:

1. Be capable to communicate to central control via the following industry accepted protocols:
  - a. RS-232 – On Board
  - b. RS-485 – On Board
2. Have at least 2 dry contact alarm optocoupler outputs.
3. Have at least 4 dry contact general outputs.

4. Be capable of interfacing with system networks via the following industry accepted communication buses:
  - a. Copper
  - b. Fiber Optics
- B The Field Processors shall:
  1. 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.

#### 2.05 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.



2.06 Environmental Operating Range

- A The system shall operate within specifications under the following environmental conditions:
1. Temperatures between -40°F and 176°F (-40°C and 80°C)
  2. Relative humidity between 0 and 100%.

2.07 Power Requirements

- A The field processor shall operate at 12-24VDC and shall accept input power from DC power supplies at:
1. 12 to 24 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.

2.08 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.

2.09 Physical Installation Parameters

- A When installed outdoors, the field processor shall:
1. Be installed in a plastic weatherproof, double-walled enclosure which meets standard IP66/NEMA4X.
  2. Include a hinged cover and a tamper device.
  3. Be mounted on a fence pole, or wall on which the sensor cables are mounted, on the secure side of the perimeter.

2.010 Weather Compensation

A. Weather compensation module shall be available to monitor weather conditions at the site and supply related data to the field processor.

B. Weather compensation module would feed the information directly into the field processor with dry contacts or through communication.

C. The field processor shall be capable of utilizing the data to increase the level of discrimination between environmental effects such as; wind, rain and hail and actual intrusion attempts.

The unit shall be capable to be mounted on a pole, fence or a wall.

1. The weather compensation unit will be constructed from:
  - UV protected plastic wind anemometer.

- 3 round metal plates, only 2 will have vibration sensors for sensing rain.
  
- 90 degree metal arm to hold the weather compensation unit.

### **PART 3 ALARM MANAGEMENT SOFTWARE / DISPLAY SYSTEM**

#### **3.01 The Alarm Reporting/Graphic Display**

1. The Alarm management software shall be able to operate on Microsoft Windows XP/Vista/7/8/10
2. The Alarm management software shall be based on .NET architecture and in a server-client form allowing one server with multiple monitoring stations.
3. The Alarm management software shall work with mouse and keyboard or touch screen with no adaptations.
4. The Alarm management software shall communicate with the system management unit via RS232 or USB, both methods need to be available and operational.
5. The alarm management software and the system management unit shall work in redundancy, in case the soft does not operate the system management unit would take over the monitoring of the system automatically and continue to monitor the system
6. Audible annunciation and visual indication for each alarm event will be provided by a monitor display in the control room. The monitor shall indicate a flashing zone along the fence identifying the exact alarming zone.
7. All system activity shall be permanently recorded in a permanent database stored in the main server, exporting the reports shall be available in the forms of paper printer, word, excel and pdf files. All the information shall be stored on the hard drive.
8. The officer operating the software shall be capable after acknowledging the alarm to categorize it by the reason such as true alarm, false alarm, rain and wind, system check, work near the fence for future analysis of the database.

### 3.02 The Alarm Management Unit

1. The system management unit shall communicate via RS485 with the various processor units (transponders) distributed around the perimeter or located in the control room.
2. The system management unit shall be capable of fully monitoring and operating the fence intrusion detection system including acknowledge alarms, deleting alarms, changing sensitivity by zone, arm/disarming by zone, changing communication method with the PC software.
3. The system management unit shall take over automatically on the monitoring of the perimeter in case of server failure.
4. The system management unit shall log, save and report until server is back to operation, once it is it will transfer all the information into the server for logging automatically.
5. The system management unit shall have a LCD screen and at least 6 buttons for menu, esc, up, down, acknowledge and delete.
6. The system management unit shall have input for weather station in order to monitor weather for the whole perimeter and distribute the signal to the other electronics.

## **PART 4 INSTALLATION**

### 4.01 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.

### 4.02 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 5 SYSTEM MAINTENANCE AND REPAIR**

### 5.01 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.

5.02 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.)

5.03 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 6 CERTIFICATIONS**

6.01 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.