Architectural & Engineering Specification for

Taut Wire intrusion detection sensor (TWIDS)

Purpose of document

This document is intended to provide performance specifications and operational requirements for the DTR-2000 Taut Wire Intrusion Detection Sensor. It is written in a generic format without referring to the system by name or by specific identifiers. These specifications may be copied verbatim to form a generic procurement specification for taut wire barrier intrusion detection system.

Classification of equipment

DTR-2000 is a tensioned wire sensor system employing an array of tensioned wires and electromechanical sensors for outdoor perimeter intrusion detection.

Disclaimer

Contents

1.0 General performance specifications

1.1 System description

The system shall be a horizontal array of parallel, pre-tensioned barbed or barbless wires attached to sensors to form a combined fence and sensor. The wires shall be attached to anchor posts at each end of a sector and the sensors shall be mounted to a sensor post located typically midway between the anchor posts.

A specialized electromechanical switch monitors two wires. The switch activates whenever a force is applied to a wire that corresponds to:

- spreading the wires
- climbing over the wires
- cutting any wire
- leaning a ladder on the array and climbing over

For multiple wire systems, multiple independent switches shall be required.

1.2 System technology

1.2.1 Taut Wire Array

The horizontal tensioned wires shall have a typical separation of 10 cm (4 in.). They shall be supported by various sliding devices in such a way that any vertical motion of the wires is translated into horizontal wire movement at the sensors. A vertical displacement of 8 cm (3.1 in.) of any wire shall be sufficient to cause an intrusion alarm.

1.2.2 Electromechanical Sensors

The sensors shall be self-adjusting electromechanical switches, sealed and containing a special dampening material so as to inhibit activation from environmental changes, without decreasing sensitivity to human attempts at intrusion.

1.3 Detection properties

1.3.1 Detection sensitivity

The system shall detect intruders with a significant mass (size) while rejecting other environmental stimuli.

1.3.2 Detection performance

1.3.2.1 Probability of detection (PD)

The probability of detecting a human intruder passing through the perimeter at random locations shall be greater than 97% with a 95% confidence factor.

1.3.2.2 Intruder weight

The system shall detect any intruder who applies pressure on the wires greater than 15 kg (33 lb.).

1.3.2.3 Intrusion types

The system shall detect human intruders who spread, climb or cut the wires, or lean a ladder against or on the wire array and climb the ladder.

The system shall incorporate special features to prevent clamping and cutting individual wires. The system shall also use breakaway tabs on the anchor posts as tie points for the individual wires. This will result in the release of the wires if an intruder attempts to climb the anchor post.

1.3.3 False/nuisance alarms

False/nuisance alarms are divided into three categories, system-generated, small animal and environmental.

1.3.3.1 System-generated alarms (false alarms)

Alarms generated by internal electronic processes shall occur at a rate of less than one per three months per kilometer of fence (averaged over a year and over the total number of zones in the system).

1.3.3.2 Small animal alarm rejection

The system shall not detect an intruder who applies pressure on the wires less than 7 kg (15 lb.).

1.3.3.3 Environmental alarms (nuisance alarms)

The system shall operate within specifications in typical outdoor environments. The system must be installed in accordance with the manufacturer's guidelines to minimize the possibility of nuisance alarms while maintaining the full PD for valid intruders. The following conditions shall not affect the system’s PD:

- rain
- sunrise/sunset
- wind less than 70 km/h (43 mph)
- temperature changes
- snow
- hail
- fog
- sandstorms
- motion of nearby objects (vehicles, etc.)
- nearby radio-frequency sources

- seismic vibration
- acoustic or magnetic effects

Before installation, the installer shall alert the customer, in writing, as to all site-specific conditions, which may contribute to a higher environmental alarm rate. The customer shall decide whether to remedy the situation, or accept the environmental alarm sources without any further responsibility on the part of the installer or the manufacturer.

1.4 Sensor characteristics

1.4.1 Wire Characteristics

The double braided with reverse twist barbed or barbless wire array shall contain galvanized or stainless wires of 14 AWG, with a high tensile strength of at least 9000 kg/cm^2 (130,000 PSI). The barbed wire shall have 4-point barbs.

1.4.2 Detection Sector and Reporting Alarm Zone lengths

A detection sector shall consist of a wire array connected to two anchor posts and a sensor post. Sliding devices and intermediate spirals shall be used to maintain the wire array parallel and to increase translation of vertical movement of the wires into horizontal movement at the sensors. The maximum length of an individual sector shall be 60 m (200 ft.). The minimum sector length shall be 15 m (50 ft.) without specialized hardware.

Two or more detection sectors may be combined to create a single reporting alarm zone. A reporting alarm zone can be of any length greater than 15 m (50 ft.) without specialized hardware.

1.4.3 Barrier Configuration

The effective detection barrier shall be continuous and uniform over the protected site perimeter. A typical barrier shall have a height up to 2.0 m (6.6 ft.) above ground (based on twenty wires) plus a 0.8 m (2.6 ft.) outrigger (based on eight wires) inclined at 45 degrees to the vertical in a free-standing installation. Higher detection barriers and longer outriggers shall be possible by using more wires.

Outriggers shall be capable of facing inward or outward or both (Y pattern). Outriggers shall be available in a standalone configuration for attachment at the top of a wall.

1.4.4 Terrain-following characteristics

The detection barrier shall not be limited to line-of-sight operation. The zone length, detection barrier dimensions and performance characteristics shall be valid over uneven terrain including grade changes of up to 5 degrees. Steeper grade changes shall be possible with the installation of anchor posts or pulley posts at the ends of the grade and with the installation of the sensor post perpendicular to the grade. The wire array shall be parallel to the grade.

1.4.5 Range of containment

The system shall not detect any object or creature that does not physically interact with the wire array.

1.5 Physical installation criteria

1.5.1 Physical installation

The wire array shall be tensioned at the start or end of the zone and shall be supported every 3 m (10 ft.) by main spiral devices. The wires shall be further supported by intermediate spiral devices located midway between the main spirals.

The wires shall be capable of being mounted, with or without outriggers, in the following configurations:

- Fence-mounted - on an existing, or new, perimeter fence
- Freestanding - on freestanding poles in an open area as the perimeter fence
- Roof-mounted - on rooftops or on the top of structures
- Wall-mounted – on walls or on the sides of structures

1.5.2 Determination of zone length

The length of each detection zone shall be determined by the physical boundaries of the site subject to the requirements of Section 1.4.2 above.

1.5.3 Location of signal processor

The signal processor shall be mounted inside the sensor post.

The optional standalone transponder shall be mounted either on the sensor post, or inside the perimeter at a secure location (e.g. on a post), or indoors.

1.5.4 Enclosures

The signal processor shall be hermetically sealed and located inside the sensor post.

For outdoor installations, the standalone transponder shall be housed in a weatherproof NEMA 4 enclosure. The enclosure shall be capable of being mounted on walls and posts.

1.5.5 Lightning protection

The signal processor and the standalone transponder shall include internal components to protect circuitry from electrostatic discharge (ESD) and lightning. This protection shall include, but not be limited to, relay contacts, input power, and communication lines. The system shall comply with MIL-STD-9094 for Lightning and Electronic transients.

The installer shall provide a solid earth ground that is properly connected to the enclosure. The installer shall follow standard industry procedures to provide separate grounding for the fence.

1.6 Performance history

1.6.1 Previous installations

The system shall have been installed in at least ten similar configurations, at least five of which shall have a perimeter length greater than 5 km (3 mi.). A list of these projects shall be available.

1.6.2 Customer references

The vendor shall submit the names and telephone numbers of at least four users who shall serve as references for the satisfactory performance of the equipment. These users shall have a minimum of one year's performance experience with the equipment.

2.0 Sensor processor specifications

2.1 Processor description

The signal processor shall contain the electronics necessary to perform the collection and redistribution of sensor switch closure information. The processor shall operate as a networked unit, shall be hermetically sealed, and shall be located inside the sensor post with the sensor switch array. The sensor post shall have a tamper switch that activates when the sensor post cover is removed.

Alternatively, a transponder shall be available to translate switch closure information into relay contact closures. It shall operate as a standalone unit and shall be housed in a weatherproof enclosure, when installed outdoors. The enclosure shall have a tamper switch that activates when the cover is opened.

2.2 Signal processor operation

2.2.1 Distributed processing

Signal processors distributed along the perimeter shall perform the collection and redistribution of sensor switch closure information. The failure of one processor shall not affect the other processors along the perimeter. Each processor shall provide coverage for up to 60 m (200 ft.) of perimeter.

2.2.2 Total perimeter length

Total perimeter length shall be expandable from the 60 m (200 ft.) maximum coverage of one processor to an unlimited length using multiple processors. There shall be uniform coverage and no gap in the detection barrier between individual zones.

2.2.3 Alarm outputs

The signal processor shall identify, by type, intrusion, tamper and communications cable failure alarms.

An alarm caused by an attempt to penetrate the wire array shall be identified as an intrusion alarm. The processor shall identify to the Central Controller in which group of wires, from a possible seven groups, that the intrusion has occurred. For a typical 2-m (6.6-ft.) fence height, this shall provide a vertical resolution of intrusion no greater than 50 cm (20 in.).

An alarm caused by opening the enclosure of the sensor post and/or the signal processor shall be identified as a tamper alarm. Tamper alarms shall be distinctive from intrusion alarms and shall be reported as supervisory alarms.

Alarms caused by power failure, internal electronic failure, or tampering with the communications cable shall be identified as fail alarms. Fail alarms shall be distinctive from intrusion alarms and shall be reported as supervisory alarms.

Supervisory alarms shall continue until the fault is corrected.

2.2.4 Network transponder/device (optional)

The processor shall be capable of being integrated into a CCC or Crossfire™ alarm data collection and distribution network. The processor shall function as a network transponder capable of communicating alarm data and diagnostic information to a Central Controller.

2.3 Environmental conditions

The signal processor shall operate within specifications in the following range of conditions:

Temperature: –40ºC (–40ºF) to 72ºC (162ºF)

Humidity: Up to 95%, non-condensing

2.4 Powering Requirements

The signal processor shall be powered at 12 to 24 VDC.

The standalone transponder shall accept an input voltage of 9 to 30 VDC.

2.5 Sensor calibration

Once installed according to manufacturer’s instructions, the sensors shall require no calibration.

3.0 System installation and commissioning

The system shall be installed and commissioned in accordance with the manufacturers’ recommended procedures, as defined in the product's installation and setup guides.

Prior to installation, the installer shall have completed a 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 the installation and commissioning of the system.

Acceptance tests shall be performed in accordance with standard procedures, available from the manufacturer.

4.0 System maintenance and repair

System maintenance shall include periodic visual inspections of the site and operational checks of the effectiveness of the detection zones.

4.1 Recalibration requirements

There shall be no requirement to recalibrate the system after initial calibration.

4.2 Product support

The supplier shall provide technical support and warrant that spare parts and assemblies shall be available for a minimum of 10 years.

5.0 Product certifications

The product shall be manufactured in accordance with ISO 9002 standards.

All outdoor components shall comply with MIL-STD-810C.

The system shall comply with MIL-STD-9094 for Lightning and Electronic transients.

The system shall comply with MIL-STD-461/462 for Electromagnetic and Radio Frequency Interference (EMI/RFI).

6.0 System availability

A product that meets or exceeds this specification is the DTR 2000 Taut Wire outdoor intrusion detection system, available from:

Senstar Corporation
119 John Cavanaugh Drive
Carp, Ontario
Canada K0A 1L0
Telephone: (613) 839-5572
Fax: (613) 839-5830
Toll Free: 800 390-5796 – Canada
Toll Free: 800 676-3300 – US

www.senstar.com
info@senstar.com