

SC3-C Cable in Conduit Measurement Process

Introduction

Fiber SenSys (FSI) intrusion detection systems mounted on perimeter fences are designed and tested to function with our **SC-3** sensing cable. The SC-3 cable jacket is designed to provide consistent sensitivity for optimum performance of the Alarm Processing Unit (APU).

SC3-C is FSI SC-3 cable pre-installed in Fiber SenSys ½" conduit. Fiber SenSys offers SC3-C as a time and cost saving alternative to using traditional conduit kits and pulling the cable on site. A bit of upfront planning and accurate zone measurements are required prior to ordering. Stainless steel wire ties and conduit to junction box couplers must be purchased separately when using SC3-C. For additional product information, please refer to the SC3-C Spec Sheet.

This document outlines the processes of measuring zone lengths, calculating cable lengths, dividing the cable lengths into SC3-C spools, and assigning the spools to zones.

In addition to made-to-order lengths, SC3-C is also available in several common preset lengths.

SC3-C	600-31631	Sensor cable in 1/2" conduit per meter. Made-to-order lengths. Minimum 100m – maximum continuous length 800m
SC3-C-250	600-23588	250 meter spool of SC3-C; Sensor cable in 1/2" conduit
SC3-C-500	600-33589	500 meter spool of SC3-C; Sensor cable in 1/2" conduit
SC3-C-800	600-43590	800 meter spool of SC3-C; sensor cable in 1/2" conduit



* The maximum continuous length is 800 meters. A full spool weighs 50kg (110lb).

Measuring Zone Lengths

The initial design characteristics that should be known at the beginning of the installation process include the number of zones, the transition points between zones, and the installation design (single

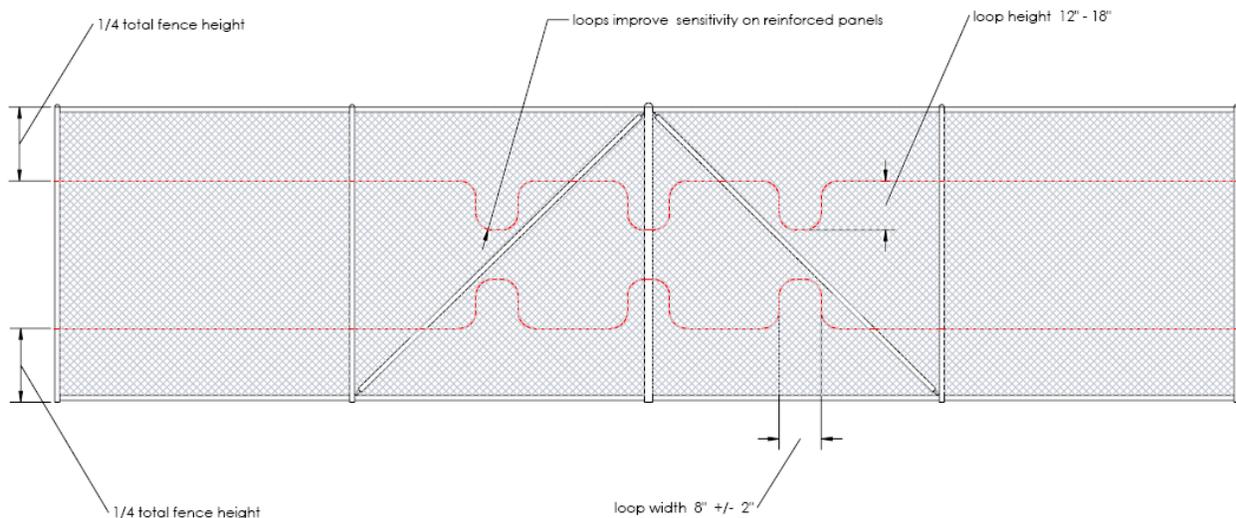
run, double run, or military grade high-security). The next step is to measure and record the zone lengths; these measurements should be accurate as they will be used to determine the amount of cable required for installation. The recommended method for measuring the length of each zone is by using a surveyor's wheel and walking the full length of each zone.

Calculating Cable Lengths

The objective when calculating cable length is to plan for an amount that is as close to the cable run as possible; having slightly too much cable is far better than not having enough. FSI recommends the use of predetermined multipliers that are based on the installation design. These multiplier values take into account the standard cable path for each respective layout as well as additional cable used for service and sensitivity loops. Service loops provide additional cable in case the fiber is accidentally broken. Sensitivity loops refer to added sensing cable in conduit at reinforced sections and corners along the fence line. This additional sensor helps balance the overall sensitivity throughout the zone which in turn reduces the risk of nuisance alarms.

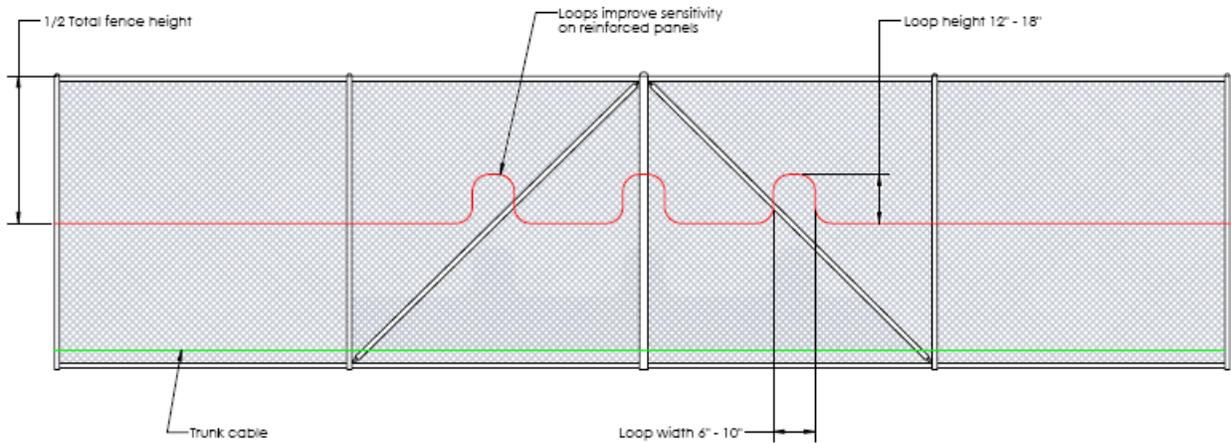
Installation Types

The most common installation method offers a high degree of security and is referred to as the “double-run” or standard loop-back design. For this type of installation, sensor cable extends to the end of the zone and loops back with service loops located at the center of each zone and “sensitivity loops” located at all reinforced areas.

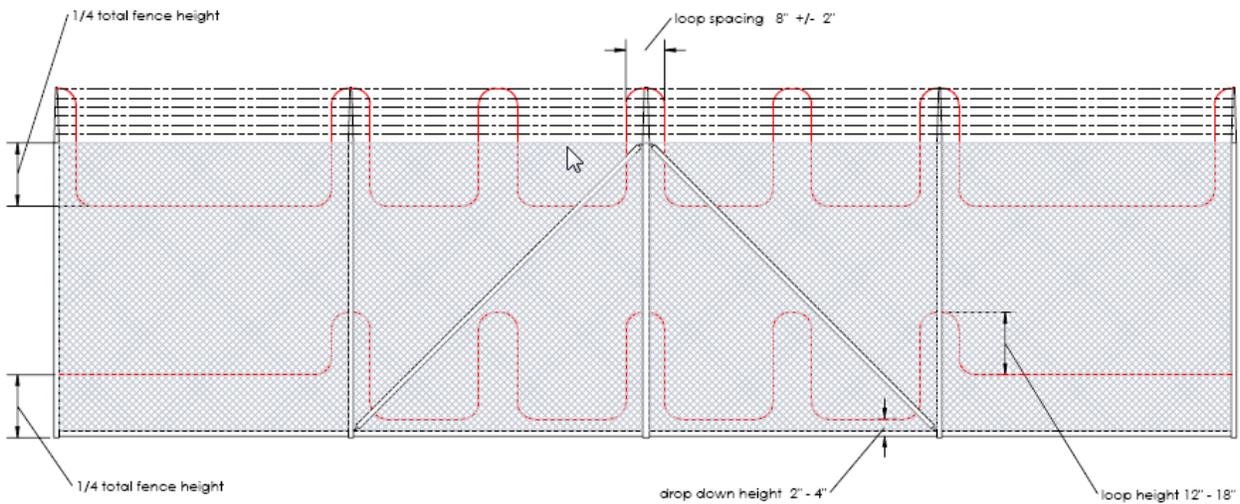


*Observe the double-run (standard loop-back) installation design. The additional loops in the middle are sensitivity loops added to the reinforced chain-link fence section.

The “single-run” installation design refers to when the sensing cable in conduit is routed horizontally in a single path along the center of the fence. Single-runs are typically implemented for lower security sites possibly with very long zone lengths. Like the double-run, the single-run multiplier also allows for service loops and sensitivity loops.



*Observe the single-run installation design. Sensitivity loops are added to the reinforced chain-link fence section.



*Observe the military grade, high-security installation. The sensitivity loops here are routed up the top guard barbed wire outriggers within the middle of the panels as well as at the poles.

Military grade, high-security designs are recommended and implemented on sites containing people or materials of extreme value, danger, or importance. Implementing a high-security design on a chain-link perimeter fence requires the SC3-C to loop up and around the barbed wire outriggers. Looping up the outriggers effectively increases the security by adding excess sensing capacity to the more ridged pole sections and by sensitizing the barbed wire, which repels stealthy climbs and ladder assisted climbs. See the cable multipliers in **Table 1** below:

Table 1

Installation Design	Multiplier	100m Zone Example
Single-Run	1.25x	100*1.25=125m cable length
Double-Run (Standard Loop-Back)	2.5X	100*2.5=250m cable length
Military Grade, High-security	3.5X	100*3.5=350m cable length

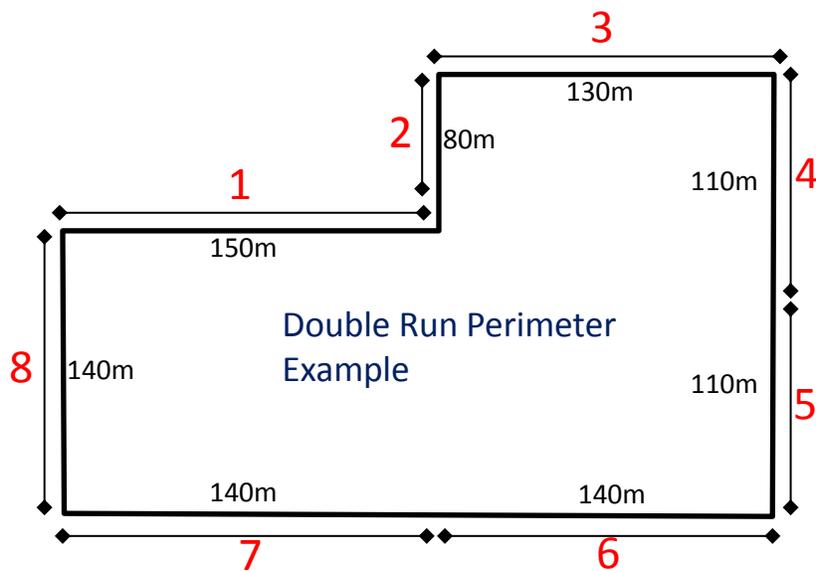
*The multipliers shown above account for the design implementation including service and sensitivity loops.

Calculating and Labeling Pool Lengths

After calculating the cable lengths for each zone, the next step is calculating the pool lengths and assigning the correct label for each spool. The objective when calculating the pool lengths is to include the cable in conduit for as many zones as possible within each spool, which has a maximum capacity of 800m.

Each pool should include zones that are adjacent to one another to simplify the installation process. Add the calculated cable lengths beginning with the first zone until the total cable length is as close to 800m as possible. Record the reel lengths along with the assigned zones; see the example below:

Cable Calculation Example



*Consider the double-run or standard loop-back perimeter above

Zone #	Multiplier	Zone Length	Cable Length
Zone 1	2.5	150m	$150 \times 2.5 = 375\text{m}$
Zone 2	2.5	80m	$80 \times 2.5 = 200\text{m}$
Zone 3	2.5	130m	$130 \times 2.5 = 325\text{m}$
Zone 4	2.5	110m	$110 \times 2.5 = 275\text{m}$
Zone 5	2.5	110m	$110 \times 2.5 = 275\text{m}$
Zone 6	2.5	140m	$140 \times 2.5 = 350\text{m}$
Zone 7	2.5	140m	$140 \times 2.5 = 350\text{m}$
Zone 8	2.5	140m	$140 \times 2.5 = 350\text{m}$

*Use the multiplier for a double-run design as seen in Table 1

Spool #	Spool Length	Spool Labels
Spool 1	375+200 = 575m	Zones 1 and 2
Spool 2	325+275 = 600m	Zones 3 and 4
Spool 3	275+350 = 625m	Zones 5 and 6
Spool 4	350+350 = 700m	Zones 7 and 8

*Observe that the spools include adjacent zones and are the highest value without exceeding 800m.

Conclusion

There are a number of benefits to using SC3-C cable in conduit rather than getting the two elements separately. With a small amount of upfront planning and design work, SC3-C contributes to a successful high-security final product at significant time and cost savings. With the availability of several preset lengths, further time and cost savings may be appreciated.

The Fiber SenSys support team is available to provide assistance at **503-726-4455**.

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