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# NSP/008/002 – Guidance on Installation of Intruder Detection System in Distribution Substations

## 1. Purpose

The purpose of this document is to provide the guidance and specification of an intruder detection system required to be installed in any indoor secondary distribution substation to ensure protection against unauthorised access.

This document supersedes the following documents, all copies of which should be destroyed;

Document Reference	Document Title	Version	Published Date
NSP/008/002	Guidance on Installation of Intruder Detection System in Distribution Substations	1.1	Dec 2014

## 2. Scope

The scope of the specification contained within this document extends to the installation of intruder detection systems in new or existing indoor distribution substations.

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### 3. General

All works to be carried out to the relevant safety rules and operational codes of practice.

All intruder alarm systems shall be designed, manufactured, installed and commissioned in accordance with all current and relevant regulations and legislation.

Equipment shall be installed so as not to pose an increased risk to normal operations within the site and careful consideration of the positioning of equipment installed so as to avoid risk from exposed lv conductors (lv wall boards etc.) at installation and future maintenance activities.

All persons carrying out works shall hold suitable Company authorisation to allow access to and work within distribution substations, including where necessary the holding of safety documentation.

Letters as indicated by the Company shall be delivered to local residents in the vicinity of the substation to ensure awareness of the new installation.

#### 3.1. Intruder Detection System – Design / Specification

The intruder detection system shall be designed in accordance with BS EN 50131 & PD 6662 with the security grade required for substations as Grade 2X and operate to the following conditions:

Motion sensing passive infra-red (PIR) detectors shall be fitted inside the substation buildings to detect unauthorised access. The detectors shall integrate with a control panel. The control panel shall also integrate with an internal sounder device and external bell box.

In response to unauthorised access, the internal sounder and external bell box shall be activated giving off audible and visual warnings. The intention is that the internal sounder will force the intruder to exit the building before stealing metal, limiting access to trespass only, and the external bell box will alert the local residents of activation so as to alert the police or the Company.

There is no requirement to commission any off site alarm output, however the equipment supplied should have the ability to enable this facility if required in the future using wireless / GSM / GPRS technology.

Unwanted destruction of any equipment (control panel, detectors or any output devices) shall activate the system.

The details of equipment and layouts relating to new and modified installations shall be recorded and submitted to the Company. Control panels installed shall for ease of operation and future maintenance/fault finding be of a type agreed with Company Telecoms section details of preferred equipment is identified within section 3.14

#### 3.2. Control Panel

A mains powered control panel shall be located, wherever possible, immediately inside the main entry/exit door to the building. Under no circumstances shall the control panel be located within a CO2 protected space.

The system shall be designed to provide zoned protection and shall incorporate an alarm delay facility which allows a delay from activation of instantaneous operation to 3 minutes. After installation the delay shall be set at 20 seconds. Entry to the building other than by the main entry point shall result in an instantaneous activation of the alarm. The control panel shall have an entry/exit buzzer. The control panel functions shall be accessed via input of a four digit code on a remote key pad.

The control panel shall include a 12 volt battery capable of maintaining the integrity of the system for a minimum of 8 hours, during mains interruptions to the site. The control panel/remote key pad shall have indication/lights to display system set status (armed/unarmed) zone operation, mains healthy supply and shall give alarm outputs to an on-site internal audible device ("sound bomb") and to an external bell box.

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### 3.3. Detectors

Dual technology PIR/Microwave motion sensing detectors shall be fitted within the distribution substation building to detect unauthorised access into the building. These detectors should be adjusted such that the PIR and Microwave elements are operating in an optimum range. Dual Tec detectors shall be used to minimise false alarms in the harsh environment found within substations.

Where several access points are present, all access points shall be protected with detectors, including all doors and any building ventilation point where access could be gained.

Where a substation consists of several rooms, all rooms with electrical equipment contained within them shall be protected. Rooms that have no electrical equipment but provide access into such rooms shall also be protected.

### 3.4. Internal Sounder (“sound bomb” or “master blaster”)

The control panel alarm output shall give an on-site internal alarm from an audible device with an output greater than 90dB. Dependent upon the room size and the vulnerability of the site, the usual installation of a “sound bomb” (typically 110db) maybe upgraded to a “master blaster” type klaxon (127db). Where a “master blaster” type klaxon is installed as directed by the Company, this shall be connected in to the substation power circuit via an un-switched fused connection unit with neon indication as per NSP/008/001

### 3.5. Alarm off Site

The system and equipment shall be such that there is facility to add an alarm confirmation link to the Company Control Centre security staff via wire-free technology at some future date. This functionality can be added to existing control panels by the replacement of the remote key pad with a model which incorporates an auto dialler via GSM.

### 3.6. External Bell Box

The control panel alarm output shall also give an on-site external alarm from an externally mounted bell box device providing both an audible and visual warning with an output not less than 90dB but within the legal noise nuisance level. Each bell box shall have a stroboscopic light which flashes on activation of the alarm and continues until the system is reset.

External bell boxes shall be vandal-proof, tamper-proof and be manufactured from materials which are weather-proof and not subject to corrosion. The bell box where possible, shall be prominently positioned external to the building in such a way that it cannot be reached without the aid of a ladder, or from the roof of a building, or used as a climbing aid. In all cases the bell box shall be protected with some form of guarded protection to withstand attack.

Cabling to the bell box shall be run such that it is not visible or accessible external to the building.

When installed the time setting for the external bell to operate should be set at a maximum of 10 minutes beyond which it will go silent with the strobe remaining active.

### 3.7. Cabling

All cables shall have stranded copper conductors as follows unless a cable design can be provided for alternative:

- Alarm Circuits
  - 8 cores of 7 stranded 0.2mm tinned copper conductors
  - Aluminium screened and Insulated with high grade PVC to meet BS6746
  - The cores are colour coded to aid identification 8 cores: red, yellow, blue, black, white, green, brown and orange

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- Voltage rating of cable is 60v a.c minimum
- Alarm Power Circuit
  - To be installed in accordance with Northern Powergrid Guidance Document NSP/008/001

Cables complying with BASEC or IEC approved equivalent standards will be accepted.

Cables shall be installed without joints other than at equipment and terminal fittings.

Armoured cables complying with BS 6346 shall be used in external situations and other areas where the environment is considered unsuitable for conduit/ trunking enclosed cables. Armoured cable shall be installed:

- Secured adequately using proprietary clips and non-ferrous screws.
- With galvanised steel guards where mechanical damage is likely.

With moisture proof connection to fittings using sealed glands and PVC shrouds

### 3.8. Trunking and Conduit

Cables shall be enclosed in heavy gauge PVC conduit of diameter 20/25mm diameter and fixed to surfaces with spacer bar saddles. In situations where trunking is more appropriate it should be high impact white plastic and of minimum 16mm x 16mm.

### 3.9. System Design

If required by site conditions, it should be possible to disable one or more zones whilst keeping other zones activated.

### 3.10. Instructions & Operation Manual

Guidance for the basic operation of the control panel, successful arming/disarming and to disable one or more zones whilst other zones activated shall be provided and located within easy view when using the control/key panel.

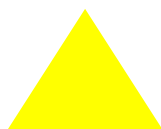
### 3.11. Signage

Signs warning that the building is alarmed shall also be fixed to the outside face of all external doors which provide access in to a protected area. (Not to be fitted to unprotected room – i.e. toilet)



Size approx. 100mm x 100mm

In addition to the above sign a further sign shall be fixed to all doors leading to the location of the main control panel commencing with the external entrance door as shown below:



Size approx. 100mm x 100mm

### 3.12. Protection from attack

The design of distribution substations often means that the location of the intruder alarm control unit, bell box, sensors and internal sounders is such that they are open to attack from intruders. The individual elements shall be placed to reduce the opportunity for interference from third parties but where this is not possible the

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items at most risk shall be protected within substantial steel mesh cages (sounders /klaxons/ bell boxes/ strobes etc.) and the control box shall be covered by a substantial seam welded steel box (min 3mm thickness) which shall be affixed to a masonry structure with minimum 4 expanding type bolt fixings. The fixings shall be of normal type (not security heads) such that company staff can remove the box to undertake investigation and maintenance on the control unit. The remote entry pad can then be mounted either on the box or remotely.

Power circuits supplying a control unit placed in a vulnerable position should terminate/be restrained such that if they are violently pulled they do not tear the internal parts of the control unit out.

The aim is to delay the eventual failure of the system from the intruder attack such that local/remote awareness is gained and maintain the internal sounders/klaxons long enough to force the intruder to leave.

### **3.13. Recording**

Installation of intruder alarm systems shall be recorded in Company asset database systems and maintenance intervals set for routine and battery maintenance.

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## 4. References

### 4.1. External Documentation

Reference	Title
BS EN 50131	Intrusion systems
PD 6662	Application of European Standards for intruder alarm systems

### 4.2. Internal Documentation

Reference	Title
NSP/008/001	Guidance on Distribution Substation Design - Heating Lighting Power

### 4.3. Amendments from Previous Version

Reference	Description
Whole Doc Review	

## 5. Definitions

Term	Definition
Dual Tec PIR	PIR Detector using both Infrared and Microwave detection elements
GSM GPRS	Cellular Communications Network protocols/systems
PIR	Passive Infrared Detector

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## 6. Authority for Issue

### 6.1. CDS Assurance

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

		<b>Date</b>
Liz Beat	Governance Administrator	05/02/2024

### 6.2. Author

I sign to confirm that I have completed and checked this document and I am satisfied with its content and submit it for approval and authorisation.

**Review Period** - This document should be reviewed within the following time period;

Standard CDS review of 3 years?	Non Standard Review Period & Reason	
Yes	Period:	Reason:
Should this document be displayed on the Northern Powergrid external website?		Yes
		<b>Date</b>
Ben Wilson	Specification and Design Engineer	27/02/2024

### 6.3. Technical Assurance

I sign to confirm that I am satisfied with all aspects of the content and preparation of this document and submit it for approval and authorisation.

		<b>Date</b>
Mark Thompson	Specification and Design Manager	14/02/2024

### 6.4. Authorisation

Authorisation is granted for publication of this document.

		<b>Date</b>
Dave Sillito	Head of Major Projects	06/02/2024