SECURITON

Partially enclosed/open buildings

SecuriBeam ILIA

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1 Introduction

Partially enclosed and partially open buildings are defined differently from a building classification point of view, but present similar challenges when it comes to fire detection – and both are extremely common in industrial and storage applications around the world. Typical examples are loading docks with short-term transient storage zones, bus terminals and areas used for storage or maintenance, such as train depots and water treatment plants.

A partially enclosed building is a structure that allows wind to flow in through openings on one or more walls, but not (or little) out. partially open buildings are these with large openings on multiple sides will allow wind to flow through but still trap some air inside. Such wind hazards create a buildup of internal pressure, which complicates fire and life safety perspectives and creates very challenging ambient environmental conditions that can impact on fire detection reliability and consistent long-term performance.

Fire safety professionals need to design a fire detection system capable of automatically detecting fires in such challenging conditions, to reliably alert staff on site and potentially to actuate suppression systems. Due to the harsh and changeable environmental conditions, false alarms can be an issue. The detection equipment must also be able to survive significant temperature changes and the effects of dust and airborne moisture.

Securiton's beam smoke detectors (sometimes referred to as Linear Type Smoke Detector LTSD) SecuriBeam ILIA are a robust, reliable and quick acting smoke and fire detection system well suited for all types of partially enclosed/open buildings. SecuriBeam ILIA can be designed as a standalone smoke/fire detection system, or fail-safe SIL[1]-2 or SIL-3 design to meet most challenging detection requirements. Other key advantages include its dual beam offering solid performance within a significant deviation range, removing the need for regular re-alignment over the product lifecycle. With suitable accessories, the detectors can work reliably in very dusty or deep freeze environments with no false alarms. Unlike other LTSDs, SecuriBeam ILIA requires minimal routine maintenance in which all routine inspection services are performed conveniently at ground level through a user-friendly controller.

The purpose of this Case Study is to provide fire safety and protection consultants, qualified fire system specifiers, design engineers or technicians, with recommendations for the application and use of SecuriBeam ILIA LTSD to protect partially enclosed/open buildings.

This case study is also suitable for facility management and end-customers alike to gain a high-level insight to cost-effective, fit-for-purpose and fire-engineered fire detection and protection solutions to manage these areas with high risks and hazards not fully covered by prescriptive (Deem-to-Satisfy) fire detection and protection compliance requirements. A key design objective is to enhance fire detection methods to avoid business interruption and mitigate risks from partially enclosed/open buildings through the best fire prevention practices.

The scope of this case study covers detailed recommendations, design considerations and practices for SecuriBeam ILIA for typical partially enclosed/open buildings.

To facilitate the best risk management practices and reliable emergency response procedures through early intervention and elimination of potential fire incidents, this case study touches on Securiton 360° Fire Protection Solution (FACP and ECP[2]) and provides key requirements on Inspection, Testing and Maintenance (ITM) of SecuriBeam LTSD; and world-class technical and application support offered by Securiton through its headquarters teams in Europe and its vast global network of regional offices and distribution partners.

[1] SIL: Safety Integrity Level

[2] FACP: Fire Alarm Control Panel, also known as Fire Alarm Systems (FAS) or Fire Indication Panel; FACP is often categorised into Main and Sub panel; Related devices include Mimic Panel and Repeater Panel. ECP: Extinguish Control Panel

2 Aspects of fire safety and prevention

The International Code Council (ICC) has a number of classifications for buildings [1]: Open, enclosed, partially enclosed and partially open. A partially enclosed building is a structure that allows wind to flow in through openings on one or more walls, but not (or little) to flow out. partially open buildings are those with large openings on multiple sides which allow wind to flow through but still trap some air inside. These airflow characteristics create a buildup of internal pressure (ASCE[3] [2]), and therefore construction design must evaluate the potential impact on building safety, especially in the case of extreme winds.

From a fire and life safety perspective, design considerations for internal open space pressure changes must also be taken into account in daily operational environments in which the ambient conditions could affect how a fire may ignite, as well as smoke propagation and heat dispersion. All of these characteristics impact the effectiveness of installed fire detection and protection equipment.

The fire risks and hazards classifications for partially enclosed/open buildings are prescribed in common building and life safety codes such as NFPA 101, NFPA 5000 and International building Code (IBC 2021), and industrial specific safety codes such as NFPA 820. Examples of the primary concerns of fire safety in typical partially enclosed/open buildings include overheating induced fire ignition, potential rapid spread of fire and smoke due to open areas used as permanent or temporary Material Transfer Zone (MTZ) and short-term transient storage configuration.

2.1 Partially enclosed/open buildings

While other terms may also be used per the local code language (such as semi-enclosed, unenclosed and unenclosed covered area) for the purpose of this case study, the term ‘partially enclosed/open buildings’ is adopted to illustrate structures with the following characteristics (illustrated in Figure 1):

(a) Partially enclosed manufacturing areas such as those used for food processing or paper mills
(b) Partially enclosed/open storage areas such as big box retail units and loading docks with a short-term transient storage zone;
(c) Partially enclosed/open operational areas including bus terminals and areas used for storage or maintenance, such as train depots.

(a) Examples of partially enclosed manufacturing areas (left: food processing; right: paper mill)

(b) Examples of partially enclosed/open storage areas (left: big box retails; right: loading docks with short-term transient storage zone)

[3] ASCE: American Society of Civil Engineers

(c) Examples of partially enclosed/open operational areas (left: bus terminals; right: areas used for storage or maintenance (e.g. train depots))
Figure 1 Examples of partially enclosed/open buildings

2.2 Fire risk, consequence and safety

Partially enclosed/open buildings can be used for various operations and business purposes. These, and the materials to be found on the premises, will have a major bearing on fire risk characteristics. For example, open timber yards or storages have risk of a Class A[4] fire; partially enclosed/open loading docks can involve flammable liquids of a Class B fire; while risks of Class C fire present in any spaces that contain electrical cabinets, motors, conveyors driven by high current electrical cables.

Building and life safety codes such as NFPA 101 [3], NFPA 5000 [4] and IBC 2021 [5] prescribe specific protection needs for various building occupancies such as Industrial (include Factory), Storage and High Hazard. Hazardous materials are classified as per physical and health risks. High hazard contents are "*those that are likely to burn with extreme rapidity or from which explosions are likely.*" Additional fire safety requirements apply based on the high-hazard classification such as maximum allowable quantity (MAQ) and control areas. Classes of fire are often based on the actual contents and materials present in the risk areas (e.g. NFPA 10 [6]) where hazardous materials identification and display are mandatory (e.g. NFPA 704 [7]) on site.

Partially enclosed/open buildings can also be classified hazardous zones. For example, per NFPA 820 [8], "*Most semi-enclosed and enclosed process areas in wastewater treatment facilities are classified as Class I, Division 1 or Division 2, Group D. Proper ventilation of an area may reduce classification to Division 2 or non-classified.*" The standard requires the ventilation of the hazardous location to be monitored, and suitable detection (including combustible gas detectors) and alarm signalling are mandated.

Below are just some examples of the risks involved in partially enclosed/open buildings:

- The failure of loading dock equipment, electrical or lightings. Examples include the failure of hydraulic dock levellers for adjustable grade of approach, elevating platform involving electrical and mechanical components or lubricant oils are all potential fire hazard.
- Loading docks clutter with things like cardboard, shrink wrap, production materials, broken wooden pallets and banding materials, could become fire ignition source when they come into contact with truck heat build-up areas such as exhausts, brakes and tyres, or any other material that will insulate and/or burn.
- Electrical hazards with fires involving electrical equipment, distribution, heating and lighting equipment due to faulty connections, overloaded circuits or loose wiring. Fires could originate in open areas, concealed spaces or cable pathways [9].
- Characteristics of high hazard premises is having significant quantity of fuel load in areas such as storages. Should a fire break out, the spread of smoke and flames is much more rapid than it would be in a low hazard occupancy because of the highly volatile ambient environment or stacked storage flammable materials.
- The nature of a partially enclosed/open building can also move and dilute smoke or heat from a fire quickly due to the influence of wind from outside the building.
- Excluding intentionally lit fires, electrical distribution, lighting and heating equipment are by far the major causes of fire in the warehouses and storage facilities [10].

In the five years to 2015, an average 37,910 fires in industrial and manufacturing properties were reported to U.S. fire departments per year, with an estimated US$1.2 billion in property damage per year [9]. According to fire statistics in England [11], there were 15,815 primary fires in non-dwelling (commercial) buildings in 2016/17, resulting in 892 non-fatal casualties and 17 fatalities. Among these, industrial premises accounted for 2,112 fires, 1 fatality and 129 non-fatal casualties.

[4] Class A: For ordinary combustibles, such as wood, cloth, paper, rubber, and many plastics; Class B: For flammable liquids; Class C: For electrical equipment

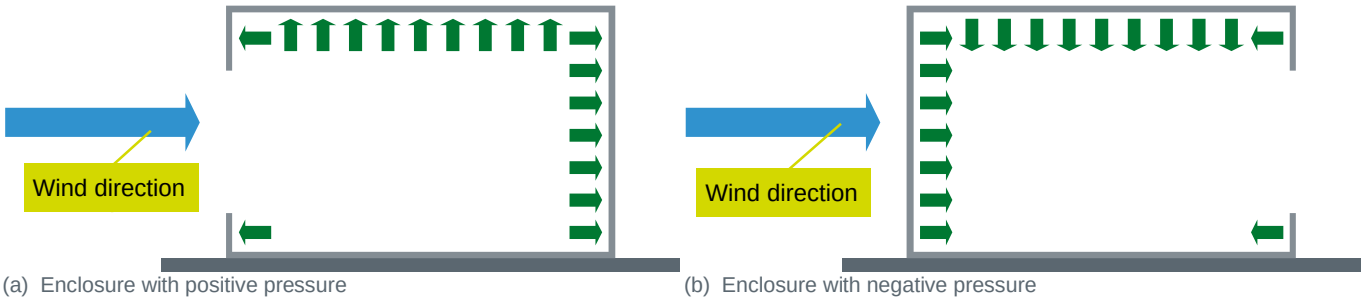
Furthermore, factory fires remain the top reason for supply chain disruption. With nearly 1,000 factory fires monitored in 2020 (up 67% year-over-year) [12], about 200 factory fires had substantial consequences.

While fire hazards and risk mitigation measures vary from one building to another depending on the actual building occupancy and risk profile, a common fire safety and fire protection principle is to ensure a suitable fire detection system is provided for not only the alarm signal but also firefighting system actuation. With a reliable fire detection system for partially enclosed/open buildings, fire incidents can be managed to avoid or minimise operation interruption and damages. Widespread evacuation and power-shutdowns will also be avoided. Even as the fire situation progresses, fire services can be notified automatically and arrive at the scene much earlier before the fire spreads.

3 Challenges to reliable fire detection

For partially enclosed/open buildings, from fire and life safety perspectives, design considerations for internal open space pressure changes must be placed in daily operational environments in which the ambient conditions could affect how a fire may ignite, as well as smoke propagation and heat dispersion, and hence the effectiveness of installed fire detection and protection equipment.

Figure 2 below illustrates (a) positive internal pressures when air is blown into a space and cannot freely leave; and (b) negative internal pressures when air is sucked away from a space cannot be freely replaced.



(a) Enclosure with positive pressure (b) Enclosure with negative pressure

Figure 2 partially enclosed/open building internal open space pressure changes

Suitable fire detection in partially enclosed/open buildings should automatically detect fires and potentially actuate suppression systems. The system must be able to perform in the general outdoor-like ambient conditions, with corresponding seasonal temperature fluctuations, direct sunlight or reflection, and weather elements such as sea salt corrosion. In winters, the temperature could fall -20°C (-4°F) or lower, while in summers, temperatures could be well over 40°C (104°F). All of these factors can affect detection performance, service requirements and product lifespan. Careful consideration of the system should be given with regards to false alarms, which can become a nuisance in such circumstances.

While there are practical difficulties in choosing suitable detection products, SecuriBeam ILIA is an ideal solution to address the key challenges of ensuring a reliable fire detection for partially enclosed/open buildings while avoiding false alarms (see Table 1).

Challenge	Securiton advantages
Diluted smoke and heat dispersion due to outdoor-like environments	Use of SecuriBeam ILIA for both smoke and fire detection due to its unique optical detection technology
Wide ambient temperature range	SecuriBeam ILIA operating temperature range from -20°C to +65°C (-4°F to + 149°F). With model approved for explosive environments can go down as low as -40°C (-22°F), IP rating of IP65 or IP66
Practical design considerations (include dusty, cold or hazardous ambient conditions)	Product accessories include those used for harsh environments (e.g. nano coated glass, clean air barrier) and product physical protection (e.g. Protective cage) (see Appendix A: for suitable SecuriBeam ILIA accessories). SecuriBeam ILIA PRO or ILIA PRO offer two levels of alert and alarm per detection zone, facilitate both earlier incident alert to tackle potential fires to minimise damage and disruption, and fire alarm to be integrated with pre-action sprinklers for timely fire suppression and fire services notification.

Challenge	Securiton advantages
Risk-based detection	Cost-effective SecuriBeam ILIA detectors can be designed for multilevel detection or fail-safe SIL-2 or SIL-3 design scheme to suit the most reliable detection design requirements.
Unique advantages	SecuriBeam ILIA IR radiation technology provides alarms with respect to (a) smoke detection (smoke) with attenuation to start of evaluation damping increasing in a certain time window; and (b) fire detection (Fire) with presence of frequency (change in smoke or fire).
False alarms	SecuriBeam ILIA offers both smoke and flame detection; high false alarm immunity; Reliable performance in dusty environments.
Low TCO[5], ongoing services and maintenance	ILIA's dual beam offers solid performance within a significant deviation range, removing the need for regular re-alignment over the product lifecycle. The whole detection system requires minimal routine maintenance in which all routine inspection services are performed conveniently at ground level.

Table 1 Challenges to and solutions for partially enclosed/open buildings protection with SecuriBeam ILIA

4 Optimised design & use case

To address partially enclosed/open buildings fire detection needs, specific risks must be taken into account together with the operating environments and consistent detection performance. This chapter provides details of optimised SecuriBeam ILIA LTSD design and use case as follows:

- Design codes of practices
- Design criteria
- Application scenarios include code compliance and risk-based detection design, as well as system integration considerations

4.1 Design codes of practices

Fire protection professionals work within the prescriptive constraints of the applicable building codes and standards such as NFPA 101 [3] and IBC 2021 [5] while applying the best engineering practices to address industry and building occupancy specific needs. For partially enclosed/open buildings where fire hazards and business operation can be unique, a risk-based approach is the key to meeting specific building and life safety requirements, as unique building structure or operation conditions mean prescriptive codes cannot be relied upon to fully mitigate fire risks. Performance-based Design (PBD) is typically implemented [13] with added fire detection and firefighting considerations to achieve either of the following:

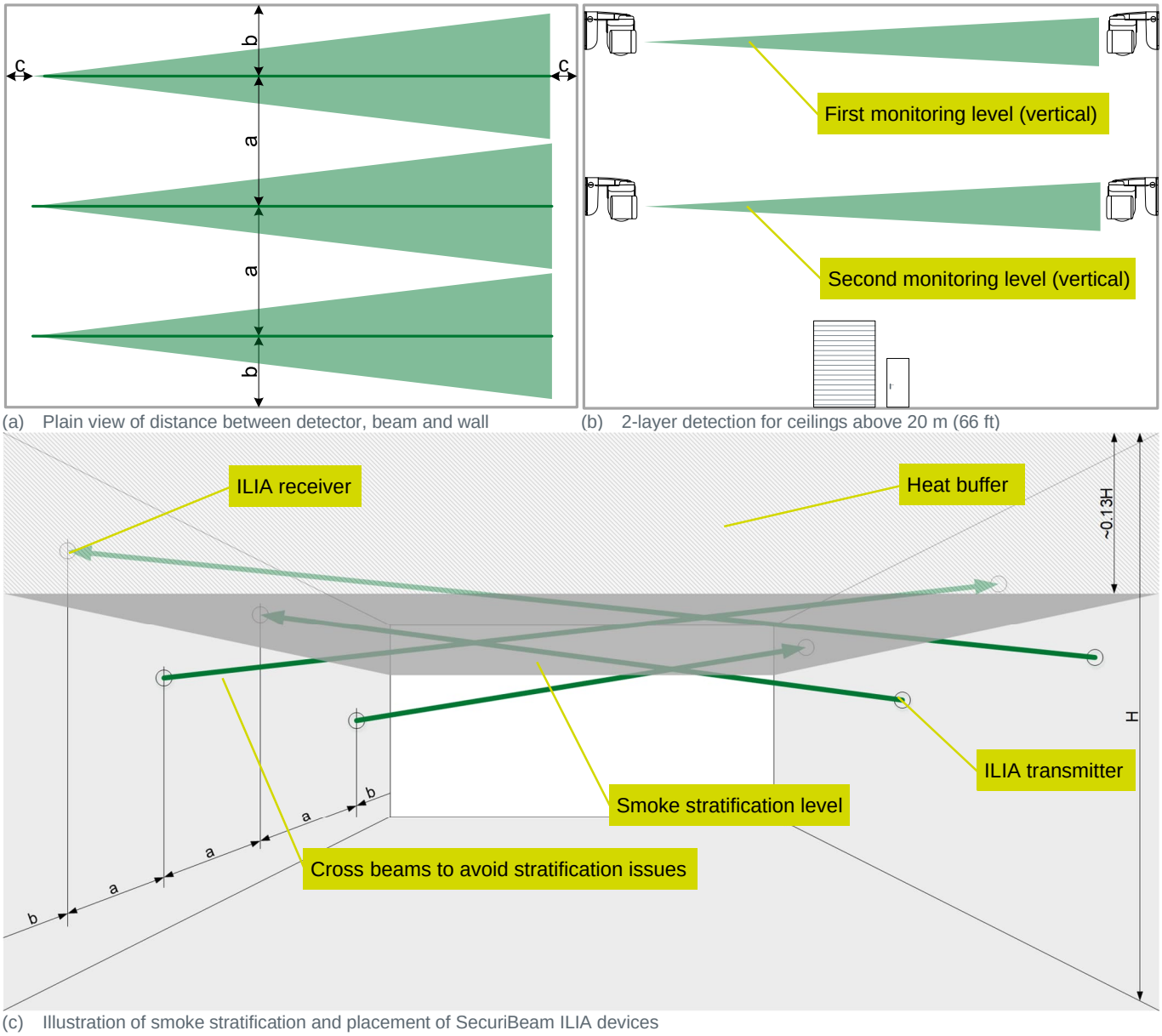
1 As a means to determine equivalency to a prescriptive code or standard
2 As an approach to achieve broadly defined fire safety goals and objectives

To select a suitable fire detection system, relevant design and alarm codes must be applied. Examples of include NFPA 72 [14], BS 5839-1 [15], VdS 2095 [16], and others like AS 7240/ISO in Australia [17], DIN VDE 0833-2 [18] in Germany, NEN 2535 in Netherland [19], R7 in France [20] and DBI 232 in Denmark [21]. Taking into account requirements from all relevant codes and standards, including industry codes of practice [22] [23] for safety, an approach combining risk and PBD is a fitting fire engineering methodology to devise a suitable fire detection solution to safeguard partially enclosed/open buildings.

An adequate fire detection system, such as SecuriBeam ILIA, that automatically alarms local fire services can make a huge difference in minimising the damage that a potential fire can cause. The ability to detect and alert early also allows local building management or facility operators to control the initial outbreak or to remove potential hazards that would help the fire grow, prevent avoidable business interruption and facilitate orderly and safe evacuation as the fire evolves. A suitable fire detection system can be designed and installed at a low total cost of ownership (TCO) which can achieve building and life safety objectives as well as protection of business assets.

[5] TCO: Total Cost of Ownership (of a Fire Detection system)

Figure 3 below illustrates:
(a) Plain view of distance between detector, beam and wall
(b) 2-layer detection for ceilings above 20 m (66 ft)
(c) Smoke stratification[6] and placement of SecuriBeam ILIA devices



(a) Plain view of distance between detector, beam and wall
(b) 2-layer detection for ceilings above 20 m (66 ft)
(c) Illustration of smoke stratification and placement of SecuriBeam ILIA devices

Figure 3 Illustration of SecuriBeam ILIA LTSD placement

Table 2 shows how LTSD fire detection system performance and other design parameters such as environmental conditions and typical applications, are defined. Note that design of SecuriBeam ILIA in this case study is in the context of PBD, response classes and environment groups per EN 54-12 [24]; and temperature classes and range of spacing options (as illustrated in Figure 3 (a)) per NFPA 72 [14] are applied as design references.

Beam detectors must always be mounted underneath the stratification level to be able to detect smoke early and reliable. Due to seasonal changes in temperature the heat buffer (illustrated in Figure 3 (c)) above the stratification level may vary significantly in its thickness resulting in a varying height of the smoke stratification level. To compensate for this change over the season, ILIA transmitters and ILIA receivers should be mounted on different levels, hence crossing the open space. Experience shows that the lowest level of stratification can be expected at ~13% of the room height, thus mounting the ILIA transmitters below that level ensures early and reliable detection.

Attention must be paid to not expose the receivers to direct sun light, for example through windows in the roof or ceiling. Direct sunlight is a disturbance that should not be neglected as it influences the reliability and can lead to false alarms.

[6] Smoke stratification: A phenomenon occurring when smoke from a fire in a tall building forms a stagnant layer before reaching the ceiling or roof.

Design Parameters	BS/EN 54-12 [24]	NFPA 72 [14]	FM Global DS 5-48 [22]
Code requirements			
a (beam-beam)	15.0 m (49 ft)	<18.3 m (60 ft)	<9 m (30 ft)
b (beam-wall)	½ a	½ a	½ a
c (wall-device)	NA	<¼ a	NA
Beam from ceiling	25 – 600 mm (1 – 24 in.)	NA	NA
Ceiling height H	Single layer detection when H ≤ 20 m (66 ft); 2-layer detection when over 20 m (66 ft)		
Manufacturer Recommendations			
Beam Spacing a	13 m (42.7 ft)	14 m (45.9 ft)	15 m (49.2 ft)
Ceiling Height H	12 m (39.4 ft)	16 m (52.5 ft)	20 m (66.6 ft)
Area Coverage	1,300 m^2 13,993 ft^2	1,400 m^2 15,069 ft^2	1,500 m^2 16,146 ft^2

Table 2 Design and performance parameters for LTSD per codes and standards

4.2 Design criteria: SecuriBeam ILIA

This chapter describes design criteria using the Line Type Smoke Detector (LTSD) SecuriBeam ILIA products to protect partially enclosed/open buildings. SecuriBeam ILIA detects both smoke and fire based on changes of amplitude modulation only or combined amplitude and frequency modulation between the transmitter and receiver installed at either end of a large protected area, hence the “end-to-end” detection type. SecuriBeam ILIA detectors have inherent high false alarm immunity that are proven to perform reliably in dusty and otherwise challenging ambient environments.

A summary of SecuriBeam ILIA products key performance parameters is shown in Table 3 below.

Model	Key performance parameters
Type	End-to-End (Transmitter and Receiver)
Sensitivity Range (%obs/m)	4.5 – 29 (ILIA) 4.5 – 60 (ILIA PRO)
Detection	Smoke and fire
Operating Distance	10 m – 200 m (32 – 656 ft) (VDE 0833-2 compliance [18]: up to 100 m (328 ft))
Monitoring Width (Max.)	15 m (49 ft) (VDE 0833-2 compliance: 12 – 15 m (39 – 49 ft))
Monitoring Area (Max.)	1,600 m^2 (17,222 ft^2) (VDE 0833-2 compliance: 1,500 m^2 (16,146 ft^2) Non-code compliance: up to 3,000 m^2 (32,292 ft^2)
Misalignment Tolerance	±1° @200 m (656 ft)
Setting Levels	16 (ILIA) 23 (ILIA PRO)
Hazardous Areas	ATEX Ex d II 2G; IIC T6; INERIS 02
Rating and operational data	
Rating	IP65
Operating temperature	-20°C to +65°C (-4°F to + 149°F)
Early Warning (Pre-Alarm)	No (ILIA) Yes (ILIA PRO)
Detector Networking	CSRLS-2 Controller: Link 2 ILIA detectors (stud connection) CSRLS-PRO Controller: Link 2 ILIA Pro detectors (stud connection) SMLS Controller expansion module: six additional ILIA detectors (loop connection)
Network Wiring Length (Max.)	Addressable loop: 2,400 m (1.50 mile) Stub connection (each): 1,200 m (0.75 mile))

Model	Key performance parameters
Product Type Approval Standards and compliance level	
EN 54-12; EN 54-17, VdS	Conform to required detection and safety performance levels
IEC EN 61508 Safety Level	SIL-2 and SIL-3
Explosive Environments	Model ILIA PRO – AtEx: based on ILIA PRO with key difference of (a) rating of IP65, (b) Misalignment Tolerance of 2.5 m (8.2 ft) or 1º and (c) Operating Temperature from -30°C to +65°C (-22°F to + 149°F)

Table 3 SecuriBeam ILIA and ILIA Pro LTSD detectors

In general, relevant codes and standards for the design of a smoke detection system to meet prescriptive requirements are referenced as the basis of design. The ILIA transmitters and receivers can be installed for open areas under the roof with maximum or reduced beam spacing depending on the level of detection performance required. The control units themself can be connected and operate a network of up to 8 SecuriBeam ILIA detectors at ground level, for easy access with no business interruption.

In addition, surrounding rooms may also require other forms of detection or accessories. Securiton's other related detection portfolio is listed in Table 4 for reference.

Model	Type	Function[7]
SecuriSmoke ASD	High sensitivity ASD type smoke detector	Non-hazardous/Hazardous
Smoke Switch LRS	Duct Type (Smoke)	Non-hazardous
Fire Door Control	Open/Close	Non-hazardous
Multi-criteria point type	Smoke with Temperature and/or CO	Non-hazardous
MCP	Manual Call Point	Hazardous
Smoke Detectors	Point type (Smoke)	Hazardous
Temperature Detectors	Point type (Heat)	Hazardous

Table 4 Securiton detection products portfolio

4.3 Application scenarios

SecuriBeam ILIA is ideal for partially enclosed/open buildings, in naturally-ventilated sheds with constant large openings and semi-enclosed applications where proper use of reliable smoke and fire detection is paramount. The use of SecuriBeam ILIA requires proper design to detect fire earlier with long term performance consistence and minimal ongoing service requirements.

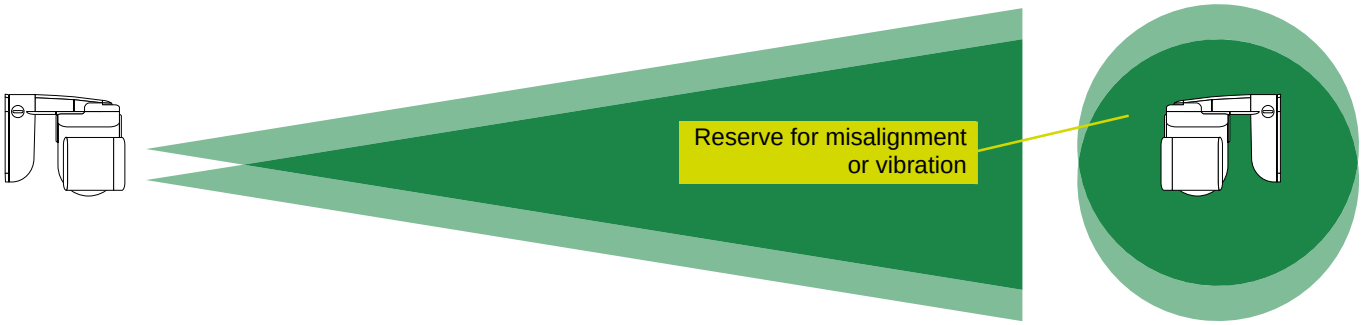
This chapter outlines design recommendations and methods using SecuriBeam ILIA products to protect partially enclosed/open buildings:

1 Code compliance and risk-based detection design
2 System integration considerations

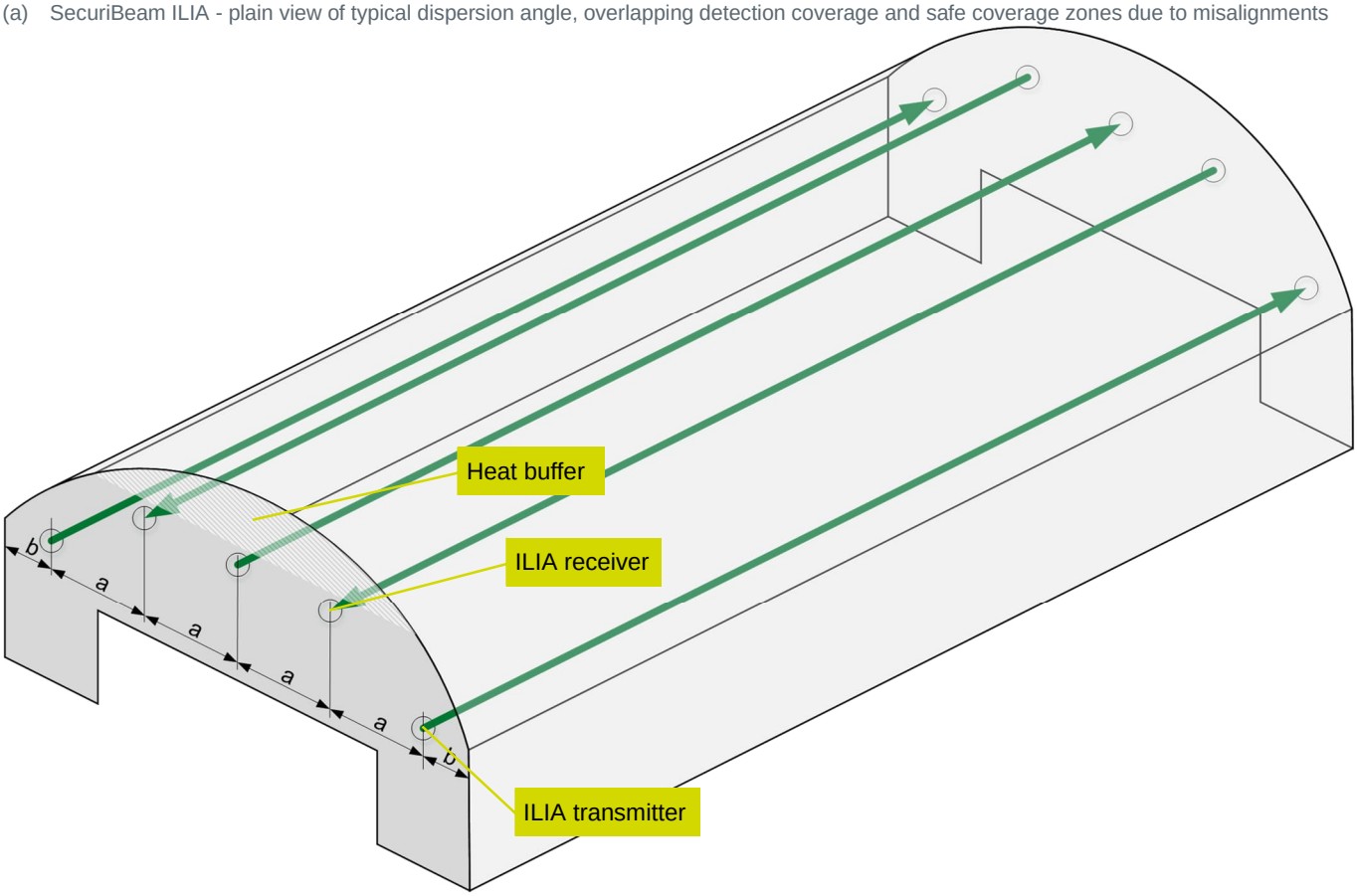
4.3.1 Code compliance and risk-based detection design

Due to varied roof structures, heights of the ceilings and building uses of partially enclosed/open buildings, SecuriBeam ILIA transmitters and receivers are often installed on either side of the wall, under the roof structure. Considering business operation needs, such as high-bay racking storage or movement of material handling equipment, suitable installation height of transmitters and receivers should be assured to maintain a clear line of sight.

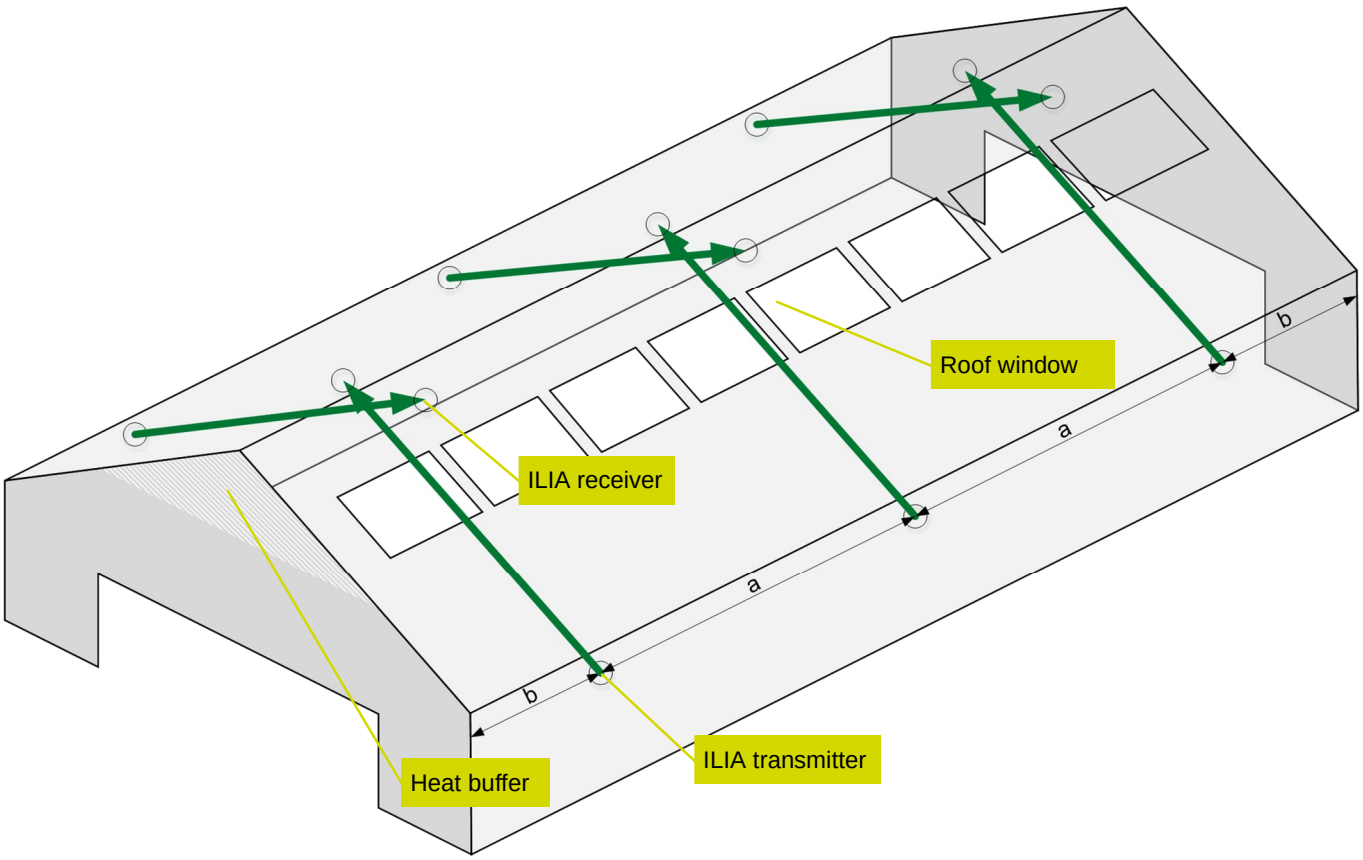
[7] Products listed as 'Hazardous' or 'Non-hazardous' function are connected to building FACPs such as Securiton SecuriFire Fire Alarm Systems



(a) SecuriBeam ILIA - plain view of typical dispersion angle, overlapping detection coverage and safe coverage zones due to misalignments



(b) Positioning of SecuriBeam ILIA detectors considering stratification in pitched or dome roof



(c) Positioning of SecuriBeam ILIA detectors allowing for zoning of the protected area

Figure 4 Fire detection placement SecuriBeam ILIA (code compliance and risk-based protection)

Figure 4 above shows correct transmitter and receiver placement when using SecuriBeam ILIA for both code compliance and risk-based protection design:

(a) Plain view of typical SecuriBeam ILIA dispersion angle, overlapping detection coverage and safe coverage zones to compensate possible misalignments or vibrations

(b) Positioning of SecuriBeam ILIA detectors considering smoke stratification in pitched or dome roof ('a' is the space between two adjacent LTSD detectors)

(c) Positioning of SecuriBeam ILIA detectors if the monitored area is to be divided into zones ('a' is the space between two adjacent LTSD detectors)

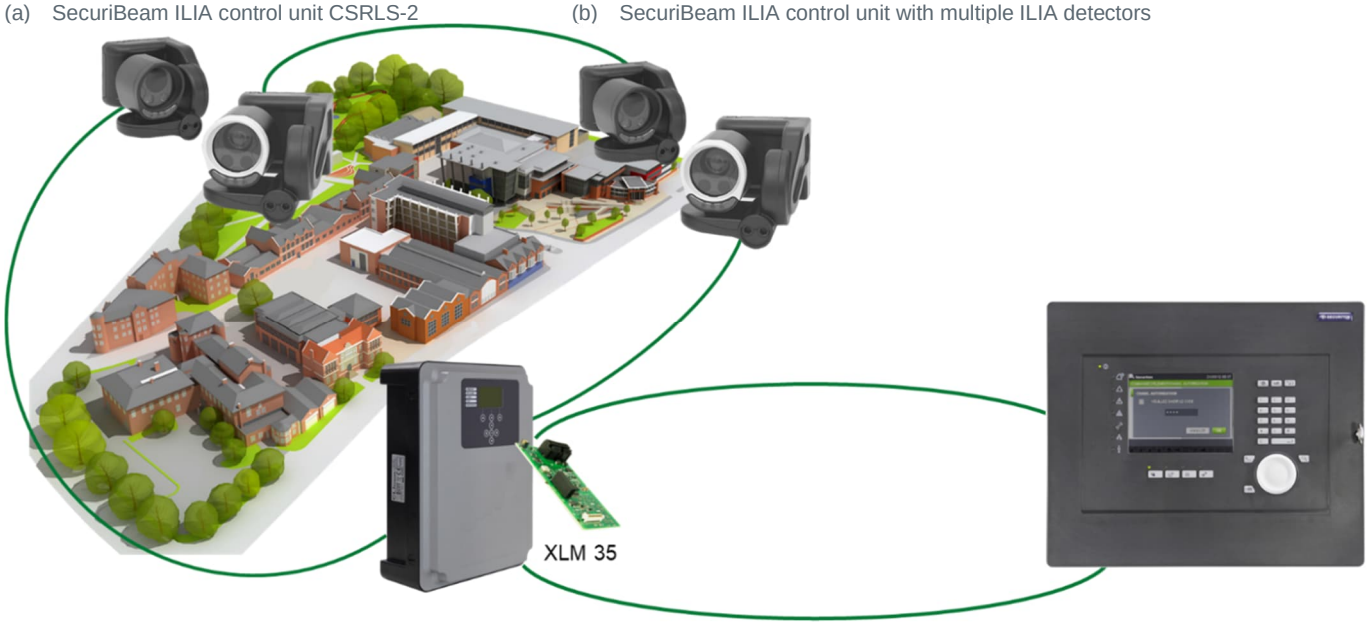
Variable	Design recommendation
Spacing Placement Orientation	▪ See Table 2 and Figure 4.
Additional notes	▪ Ensure clear line of sight of the entire length of light beam with free of objects of at least 0.5 m (1.6 ft.). ▪ When there may be issue of stratification, both transmitter and receiver units are to be installed approximately 13% of room height of the distance from underside the roof. ▪ SecuriBeam ILIA receivers must not be exposed to direct sunlight.

4.3.2 System integration considerations

Depending on the scale of the partially enclosed/open buildings, SecuriBeam ILIA detectors can be connected to the SecuriBeam ILIA Controller for easy configuration or troubleshooting (graphical user interface as shown in Figure 5 (a). Figure 5 (b) shows the connection of such a controller with multiple ILIA detectors.

(a) SecuriBeam ILIA control unit CSRLS-2

(b) SecuriBeam ILIA control unit with multiple ILIA detectors



(c) Illustration of SecuriBeam ILIA detectors networked via RS485 through a control unit CLI and an extension card XLM 35

Figure 5 System integration considerations for SecuriBeam ILIA

SecuriBeam ILIA detectors can also be networked via RS485 to a CLI control unit. With the installation of an XLM 35 loop interface module, the CLI can be connected to a SecuriFire Fire Alarm System (as illustrated in Figure 5 (c)).

If a pre-action or dry pipe type sprinkler system is used, SecuriBeam ILIA detector can also be configured to actuate the release of the fire extinguish systems. For failsafe design, option to use two sets of ILIA detectors is considered that requires both detectors' alarm to actuate the single or double interlock sprinkler systems.

5 Securiton 360° fire protection solution

Securiton 360° Fire Protection Solution (illustrated in Figure 6 below) is built on its advanced Securiton Fire Alarm Systems (FAS). SecuriFire is not just reliable in operation with its modular, decentralised system architecture, it is also versatile and expandable to cater for current and future needs to connect all approved fire safety devices such as signalling, alarming, display and control units.

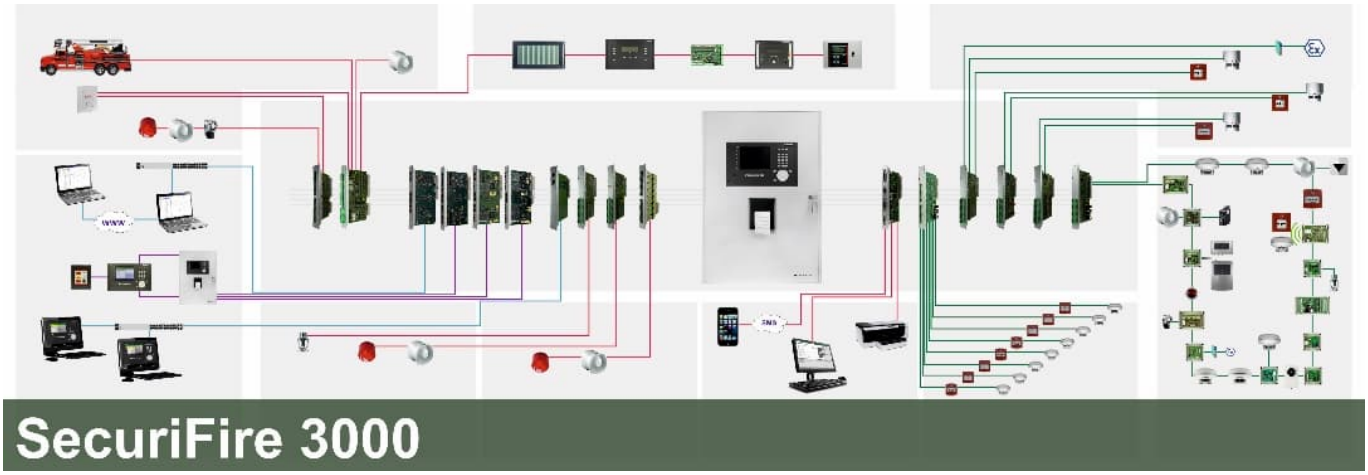


Figure 6 Securiton 360° fire protection solution (FACP and connections)

SecuriBeam ILIA detectors are networked through RS485 to a control unit. Alarms from the networked detectors from one site can be centrally monitored and managed when it is connected to the building FAS, such as a SecuriFire system for either an on-site control room or any authorised off-site location or certified remote monitoring centre.

5.1 Features and benefits

Developed and sourced direct from the original equipment manufacturer in Europe, Securiton AG as a whole is certified in accordance with ISO standards 9001, 14001 and 45001 and thus meets globally applicable standards with regard to quality management, environmental management, and occupational health and safety management systems.

Securiton's SecuriBeam ILIA LTSD products are suitable for a wide range of applications, particularly those with dusty or challenging ambient conditions, as well as hazardous classified areas. SecuriBeam ILIA detectors offer easy to install smoke detection that is immune to harsh environments and can easily be maintained at the ground level most of the time due to unique design attributes. The ILIA detectors conform to SIL level safety standards that are compatible with the failsafe design principle. The detectors can also be used in combination with SecuriSmoke ASD Early Warning Fire Detection in the most demanding Performance-based Designs.

Summary of benefits of SecuriBeam ILIA products are as follows:

Features	Benefits
Sensing optical axis orientation via precision screw thread	Rapid system set up with precision
Industrial grade toughness in product design	Withstand dust, liquids and washdowns
Advanced nano-coating of sensing element covers	Repels water droplets, dust, grease and dirt for improved durability, signal stability and clarity
Dual-beam design caters for wider deviation range	Consistent detection performance without needs for regular re-alignment during the system's lifespan
Extremely durable design with SIL	Suit for wide range of industrial and hazardous applications with complex design and operational requirements

5.2 Integrated verify, control and respond

SecuriBeam ILIA PRO detectors feature one or two levels of alert (‘Pre-signal’) and alarm signal (‘Alarm’). Typically, ILIA PRO detectors are selected where early warning alert is required. In this case, alert signal provides timely alert to a fire at its early stage of development, while alarm signal is used for fire alarm as well as pre-action sprinkler actuation.

Table 5 summarises the use of multilevel alarms from SecuriBeam ILIA PRO:

Level	Signal	Typical use
1	Pre-signal	Verify and control (manually initiate the suppression)
2	Alarm	Initiate fire alarm; call fire brigade; initiate suppression

Table 5 Alert and alarm levels for ILIA PRO

5.3 Minimal system access for ITM

The SecuriBeam ILIA detectors require minimal maintenance due to unique design features such as nano-coating of sensing element covers to keep cover free from dust built up, or dual-beam design that can cater for a wider deviation range from factors like building movement. Maintenance tips are as follows:

- Use of SecuriBeam ILIA control unit at ground level to check and adjust up to 8 networked detectors
- The control units, with password-protected login, are recommended to be mounted at easily accessible location, e.g. next to the FACP. This is to avoid interruption within the operational areas
- The control unit can also be used to conduct VdS approved test function for alarm and fault
- On detectors themselves inside the protected areas, only visual check is needed

5.4 Support with peace of mind

SecuriBeam ILIA LTSD products can be easily configured, commissioned and troubleshooted via the user interface on the control units.

Securiton application support includes:

- Partner accreditation program
- Application and field engineering support
- Worldwide reach through a network of partners as well as subsidiaries and investment companies, with branch offices or local employees on all continents.

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Appendix A: SecuriBeam ILIA Accessories

This Appendix provides a summary of SecuriBeam ILIA and ILIA PRO LTSD accessories (see Table 6).

Application	Illustration	Description
Challenging environment		**SOHI** Protective case for extremely dusty environments. Additional security for permanent acid concentrations in the air or aggressive dust concentrations. Protection against misalignment during cleaning and disinfection.
		**ASIS** SOHI can be expanded for dusty environment with the air shield to avoid dust deposit in front of the SOHI pane.
		**FAPO-G** Nano coated glass pane for protective housing SOHI.
Installation and protective		**GDP** Protective basket for ILIA and ILIA PRO to protect against shock and accidental misalignment
		**SACA-G** Adjustable wall/ceiling holder for ILIA

Table 6 Summary of SecuriBeam ILIA LTSD accessories for challenging environments

SECURITON

Securiton AG

Alarm- and Security Systems
Alpenstrasse 20, 3052 Zollikofen, Switzerland
www.securiton.com, info@securiton.com

A company of the Swiss Securitas Group

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