SECURITON

Railway Carriages and Railcars

SecuriSmoke ASD

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1 Introduction

Despite all innovations in transport and connectivity, rail systems remain one of the most popular forms of transport in the world today. The 200-year-old concept remains one of the most effective ways of moving large numbers of people or weight of goods, and new railways continue to be built. In particular, the world's growing urban centres are installing rail – both above and under the ground – to cope with their increased populations and mobility demands.

Fire safety is critical for any service involving crowds of people. In the case of railways, large numbers of people are confined in a vehicle moving at speed and cannot necessarily exit the vehicle quickly in an emergency. Tight rules govern the design of passenger trains to help minimise the risk of fire and allow for evacuation if one does break out. But fires on railed vehicles do happen and therefore early and reliable detection is also crucial.

Challenges to fire detection on a train or tram include the airflow generated by their movement (which can vary depending on whether windows are open or HVAC is running); the requirement for a device that can cope with changing environmental conditions as well as the shocks and vibrations of movement; the need to detect early to allow for an orderly evacuation including stopping the train at a point where it can be exited safely; and the imperative to avoid false alarms because of the requirement for immediate disruptive action (such as stopping the train) when a fire is detected.

The minimum requirements for fire detection and alarm systems on passenger rail vehicles are generally stipulated by national or regional regulations. Across Europe these requirements are set out in EN 45545-6 which, instead of stipulating national detection limits, sets out a functional performance standard. The system should respond to a fire within 60 seconds and detectors must be active when vehicles are occupied and must be functionally suitable for the expected fire. Other jurisdictions generally have similarly high standards. Individual railway operators may have further, or higher, standards that need to be met by any prospective onboard fire detection provider.

Securiton's SecuriSmoke ASD 535 aspirating smoke detector is not only capable of meeting these requirements, but it can also exceed them. This allows for earlier detection of a smouldering fire, therefore further minimising risk to passengers and increasing the chances that a fire incident can be tackled without major property loss. SecuriSmoke ASD 535 has been installed on trains in several countries, including in Europe, not only meeting standards but also performing to a high degree of satisfaction.

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 SecuriSmoke ASD 535 to protect:

- Railway passenger carriages
- Railcars, trams and rail multiple units

Many of the main relevant safety standards are referenced and discussed. However, the approach is one of Performance-based Design (PBD) methodology, with the aim of designing the best possible fire detection system for the stringent requirements of public rail carriages. This approach is more than capable of meeting regulatory requirements and can usually exceed them.

The Case Study is suitable for system integrators 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 meet prescriptive (DtS[1]) fire detection and protection compliance as well as enhanced fire detection methods to avoid business interruption, asset losses and mitigate risks through the best fire prevention practices.

The document further touches on Inspection, Testing and Maintenance (ITM) requirements of SecuriSmoke ASD; and the 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] DtS: Deem-to-Satisfy

2 Aspects of fire safety and prevention

Although extremely rare in relation to the vast number of rail journeys that take place globally, unfortunately serious fire incidents on trains do happen and can have dire consequences. To give some recent examples:

- The Tezgam Express passenger train fire in Pakistan. On 31 October 2019, three carriages of the Tezgam Express caught fire while travelling near Liaquatpur, Pakistan. The blaze originated within the passenger coaches and ultimately destroyed them. Initial reports suggested a gas stove explosion, but a later inquiry concluded that an electrical short-circuit within the carriage caused the fire. The incident resulted in 75 deaths and 43 injuries.
- SEPTA Silverliner IV electrical fires (USA). In 2025, the U.S. National Transportation Safety Board (NTSB) reported multiple fires involving SEPTA Silverliner IV commuter railcars. One significant event occurred on 6 February 2025, when the lead railcar of train 3223 caught fire shortly after departure in Ridley Park, Pennsylvania. The fire began in the propulsion system beneath the car and spread into the passenger compartment, igniting seats, wall panels, and the roof. Several similar carriage-based fires followed throughout the year. In the February 6 incident, overheating components in the propulsion system ignited the undercarriage and spread into the passenger compartment. Other fires were linked to failures such as dynamic brake malfunctions, miscalibrated components, and overheating resistor grids.
- Train carriage fire after crane collapse, Thailand. On 14 January 2026, a construction crane collapsed onto a moving passenger train in Nakhon Ratchasima, Thailand. The second carriage absorbed most of the impact and subsequently caught fire, trapping passengers and contributing to at least 32 fatalities. Although the initial cause was external (the crane collapse), the fire itself ignited inside the affected carriage, making it a notable carriage fire incident.

Fire incident data obtained from eight of the world’s top 12 transit agencies in North America and Europe over the period from 1998 to 2009 revealed that 12% of the reported fires involved the passenger vehicle [1]. The New York City Fire Department (FDNY) for instance responded to 1’490 calls to the transit system in 2004. While these figures incorporate all responses including fire, EMS[2], and other emergencies, the most common fire calls involved electrical fires [2] with smouldering smoke and visible fires from time to time as reported by fire fighters attending the scenes.

2.1 Carriages, EMUs/DMUs and railcars

Modern railways use a wide variety of railcars and carriages; each designed for specific functions and passenger or freight needs. Passenger coaches are the most familiar: standard day coaches provide seating for short to medium distance travel, while sleeper cars include bunks or private cabins for overnight journeys. Dining cars offer onboard meal service, and observation cars feature large panoramic windows or elevated domes to enhance sightseeing on scenic routes. All of the above are pulled by a separate engine and driver unit (see Figure 1 (a)) and the carriages are can easily be added or removed.

In commuter and urban transport, ‘multiple units’ combine traction and passenger space within the same vehicles. These units accelerate quickly and can operate efficiently on frequent-stop services (Figure 1 (b)). Tram and light rail vehicles are similar but engineered for mixed street and track environments. An EMU (electrical multiple unit) is generally a multi-carriage trainset designed for high-capacity, high-acceleration suburban/commuter service using overhead or third-rail electricity. A railcar, on the other hand, refers to a self-propelled, single-unit vehicle (or very small unit) designed for lower-demand, regional, or branch-line routes, often powered by diesel.

Urban and suburban passenger rail transport relies heavily on multiple units:

- Electric Multiple Units (EMUs) for electrified routes
- Diesel Multiple Units (DMUs) where overhead wires or third-rail systems aren’t available

These integrate both propulsion and passenger space, allowing faster acceleration and efficient operation on routes with frequent stops. They’re common in commuter networks, metros, and high-frequency regional services.

High-speed networks also use dedicated high-speed trainsets, as illustrated in Figure 1 (c), which are typically fixed formation EMUs optimized for aerodynamics, stability, and passenger comfort at very high speeds. With many modern passenger trains, the distinction between a traditional carriage and engine set-up and a multiple unit can be hard to distinguish at first glance, as bespoke cabs and smooth, aerodynamic joints connections between the carriages make several carriages appear semi-permanently connected. For the purposes of designing a fire detection system using ASD, it is important to note that in all these cases – including multiple units – individual segments are sometimes removed and changed.

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[2] Emergency Medical Services

(a) Traditional rail carriages with separate engine units.

(b) Multiple Units: Large electric multiple unit (EMU double decker) (left); and small 3-car multiple unit (right)

(c) High speed train

(d) Urban transport: Tram (electric railcar) (left); and underground train multiple unit (right)

Figure 1: Types of train, carriage, and multiple unit

2.2 Fire risk, consequence and safety

The fire risks on a passenger train are varied and depend partly on the kind of train involved. For electric (or diesel-electric) trains, high-current electrical equipment, with large amounts of equipment and cabling installed in compact spaces, concealed areas and ducts inside and around railcars and trains, present significant risks of fire.

Lint and oil build-up in the kitchen cars, oil spills in engine rooms or undercarriage cabinets housing high power equipment can lead to overheating or friction fires caused by mechanical equipment failure. Human factors, such as smoking in the toilet or sleeper cabin can also lead to a fire incident.

Risk of unnoticed incipient fires in enclosed, concealed and dusty spaces, unsupervised areas and unmanned operation (within the carriages), increases the chance of a much-delayed emergency evacuation.

Other fire safety challenges include restricted or limited access for routine service and maintenance during the train operating hours; hence a highly reliable and fail-safe fire detection system is important.

For life safety on trains, running capability for each train, in case of fire, are defined as part of train fire safety design requirements (e.g., EN 50553 [3]). To ensure safe movement of large crowds embark and disembark from trains in the railway stations and metro platforms, quantitative requirements for station and platform design are also taken into account. For example, as per NFPA 130 [4], evacuation time is quantitatively specified as maximum time allowed to evacuate a platform (e.g. 4 min) then to a point of safety (e.g. 6 min).

3 Challenges to Early Warning Fire Detection

Train movement creates strong air currents (piston effect) that dilute smoke beyond the detection limits of traditional point-type smoke detectors. Additional to the airflow created by the train's movement, many modern rail carriages have a forced-air ventilation system and climate control, equating to more air movement; and older carriages which don't have ventilation usually rely on open windows which makes for a mixed-airflow environment that also includes dust, lint and whatever other airborne pollutants are present in an area as the train or railcar passes through.

The vibrations and movements of the train, including occasional strong deceleration during an emergency stop, place stress on any devices operating on the vehicle, especially a complex system involving piping spanning the entire carriage and a sensitive electronic device. Fire detectors installed on a railed vehicle generally need to meet requirements designed to ensure they do not fail under these stresses.

The physical layout of a rail carriage further complicates the installation of a smoke detection system: Space is at a premium, and yet with the public often having unsupervised access, the main control unit ideally needs to be located securely out of sight and under lock and key. Those spaces that are available tend to be confined and filled with electrical cabinets and other control panels which obstruct detector installation and maintenance. Another key physical limitation is that carriages, even those in multiple units, are occasionally uncoupled and re-attached in a new configuration. Any carriage or section that can be separated therefore requires a stand-alone detection system. This includes the ASD pipe network, which must not extend beyond the carriage.

It should also be noted that not only does the imperative need for rapid evacuation necessitate early detection, but also that an insulated train car's shape and limited cubic capacity cause faster heat buildup and quicker smoke/fire spread than is generally seen in buildings.

Table 1 below summarises the fire detection challenges on passenger railway vehicles and explains how Securiton's SecuriSmoke ASD 535 system solves them.

Challenge	Securiton advantages
Forced or changing ventilation	Flexible placement of sampling points and spacing between them; high sensitivity.
Rapidly diluted smoke	Very high, consistent detection sensitivity for incipient fires.
Vibration and g-forces	Proven capacity to operate in tough conditions.
Need for VEWFD	High sensitivity, powerful active aspiration, multi-level alert and alarm to support staged response. Approvals for VEWFD/Class A.
Unsupervised public access	Main control unit can be placed in suitable cabinet, only discrete tube runs into public area, can be concealed in fittings.

Challenge	Securiton advantages
False alarms	Built-in features for false alarm rejection, high sensitivity coupled with multi-stage alert and alarm.
Low TCO and easy access for maintenance	SecuriSmoke ASD main detector units are installed in an easy access area with only sampling pipes run into the protected areas. Routine service and testing are done from the main detector unit with no interruption to business operation.

Table 1 Summary of how SecuriSmoke ASD 535 meets the challenges of fire detection on railed passenger vehicles.

4 Optimal Design and Use Case

The minimum requirements for fire detection and alarm systems on passenger rail vehicles are specific and stringent, and yet with the right system it is possible to not only satisfy regulation but also provide performance advantages in terms of early detection and alarm. In any case, the European regulatory requirements set out in EN 45545-6 which sets out a functional performance standard for fire detection on trains, similar in practice to a Performance-based Design (PBD) approach. This makes a design which meets these requirements widely suitable for use in other jurisdictions.

The choice of a detection device is especially important on trains, as there are specific requirements that must be met: Securiton's SecuriSmoke ASD 535 aspirating smoke detector is not only capable of meeting these requirements, but it can also exceed them. This allows for earlier detection of a smouldering fire, therefore further minimising risk to passengers and increasing the chances that a fire incident can be tackled without major property loss.

SecuriSmoke ASD 535 has been installed on trains in several countries, including in Europe, not only meeting standards but also performing to a high degree of satisfaction.

4.1 Design codes of practice

Fire detection and fire safety requirements can vary from region to region, or country to country depend on the adopted codes and standards [5]. Examples of these include:

- DIN 5510-6 [6] in Germany with example requirement of fire alarms to be independent of overhead power and report to the driver are required on certain classes of railway vehicles.
- BS 6853 [7] in UK with example requirement of (1) use of fire detection system at 'present an increased risk' locations, such as in sleeping vehicles and automatic unmanned vehicles; and (2) using fire detectors within the air conditioning or ventilation ducting, as well as requirements on response to fire detection with *"an audible alarm sounds in all areas of the affected vehicle and a signal is sent to warn the responsible crew or staff member. The system should also activate the mechanisms which inhibit or control the movement of smoke within the vehicle and through the ventilation or air conditioning ducting as well"*.
- NF F16-103 [8] in France and UIC 564-2 [9] across the Europe with example requirement of heat detectors must be installed in any compartment within a thermal engine.
- NFPA 130 [4] in USA with example requirement of battery installation area provided with a fire alarm system for heat and smoke detection.

Other industry focused directives or guidelines, such as TÜV ARGE[3] guidelines [10], also describe the functional testing and fire alarm system for the determination of the response time of the fire detector at the installation location for variables like smoke, heat and radiation from design fire scenarios on railway vehicles. However, EN 45545, with 7 parts to address all aspects of fire protection on railway vehicles, range from fire behaviour of materials and components, fire resistance requirements for fire barriers, fire safety requirements for rolling stock design and fire control and management systems. In the context of this Case Study, the following are to describe the most relevant train operation and design categories per EN 45545-1 [11] (see Table 2), and requirements for installation locations of fire detectors per EN 45545-6 [12] (see Table 3).

[3] ARGE = ARbeitsGEmeinschaft (working group / consortium)

Category	Description
Operation	
Category 1	Trains operating predominantly in open air where passengers can usually evacuate directly to a safe area within a short time. Typical examples are urban tramways, metro systems with frequent exits, and regional rail services with limited tunnel exposure.
Category 2	Trains operating mostly in open air, but where evacuation may be somewhat constrained due to route characteristics, infrastructure layout, train length, bridges, cuttings, or short tunnel sections.
Category 3	Trains regularly operating through tunnels or other environments where evacuation takes significantly longer and passengers may remain inside the train for an extended period after fire detection. Many modern mainline passenger trains fall into this category.
Category 4	Trains operating in very long tunnels or locations where self-evacuation is particularly difficult, and emergency access may be delayed. Examples include dedicated long-base tunnels under mountains or beneath large bodies of water.
Design	
Category A	Vehicles forming part of an automatic train, having no emergency trained staff on board
Category D	Double decked vehicles
Category S	Sleeping and couchette vehicles
Category N	All other vehicles (standard vehicles)

Table 2 Railcars and trains, operation and design categories

Design Categories	Locations as per Operation Categories												
	Passenger areas	Sleeper compartment	Toilets	Staff areas	Cooking or catering area	Technical cabinets	HVAC Unit	Combustion engines under the car	Electric traction equipment under the car	Combustion engines inside the car	Electric traction equipment inside the car	Engine compartment on locomotives	Luggage compartment
N & D	3 4		2 3 4	4	4		3 4	1 2 3 4	2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
S & DS	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
A	3 4		2 3 4	4	4	3 4	3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Table 3 Requirements for installation locations of fire detectors

Since 2016, fire detection in European train carriages is primarily regulated by the mandatory standard EN 45545, specifically through the requirements outlined in EN 45545-6 for fire control and management systems. This standard applies to all railway vehicles operating across Europe and supersedes all previous national standards. The regulations are part of a comprehensive fire protection strategy aimed at protecting passengers and staff by minimizing the risk of fire and controlling its development.

While EN 45545 and 50155 specifically cover European rail fire control systems, the closest global equivalents involve national standards (like USA's NFPA 130 for transit), international material testing standards (ISO 5660, ISO 5659), and emerging harmonised frameworks that focus on material fire performance and overall system safety, aiming to protect occupants and manage fire spread, with a strong emphasis on material properties (heat release, smoke, toxicity).

Although the EN 45545 is formally a European (CEN) standard and mandatory within the EU, it has become a de facto global benchmark for railway fire safety. While ISO 9828-1 [13] is the first true ISO-level framework intended to globalize railway fire safety principles, its practical adoption is still emerging, and EN 45545 remains dominant for rolling stock procurement and is commonly applied in the following regions and countries:

- Asia: China, Hong Kong, Singapore, India
- Middle East: Saudi Arabia, UAE, Qatar
- Australia
- South America: Chile, Brazil
- Africa: Morocco, Egypt, South Africa

EN 45545-6 specifically details the requirements for fire detection and alarm systems: Detectors must be active when vehicles are occupied and must be functionally suitable for the kind of fire that may realistically be expected on the vehicle; Automatic fire detection must trigger a series of predefined actions, including local and remote alarms, selective shutdown of energy, door control, and activation of fixed firefighting systems if present.

The regulations also specify the areas that requiring monitoring. These include passenger compartments, corridors, toilets, staff areas, technical cabinets, cooking zones, and areas containing lithium-ion batteries or combustion engines. Audible and visual local alarms are required in passenger areas. Remote alarms must alert the driver or control centre, indicating the location of the activation.

The standard EN 45545-6 does not specify fixed minimum detection levels (e.g., specific ppm, obscuration %/m, or temperature thresholds) for fire detectors. Instead, it sets requirements for the functional performance and response times of the fire detection systems within different areas of the railway vehicle.

The standard requires the detection system to be functionally verified through testing, considering factors such as the type of fire, materials involved, air flow, and detector type. The key requirements for fire detection in EN 45545-6 are based on response time in different areas of the train, typically specified by the ARGE Guideline [10] referenced by the standard:

- Passenger and staff areas: The system must respond to a fire within 60 seconds.
- Technical areas (e.g., control cabinets, engine compartments): The system must respond within 120 seconds.

These performance-based criteria ensure the system detects fires quickly enough to allow for effective fire control and safe evacuation, regardless of the specific detector technology used.

The stringency of the EN requirements depends on the vehicle's "Hazard Level", which is determined by its operation category (e.g., how long it spends in tunnels, if it has sleeping compartments, or if it is automatic). These hazard levels and their respective requirements are summarised in Table 4 below. In essence, the differences in hazard levels under EN 45545-6 reflect the proportional increase in the required level of fire safety technology and performance to protect passengers and staff based on the inherent risk of the railway operation.

Hazard Level	Description	Typical Applications	Required Fire Safety Measures
HL1	Lowest hazard level; basic safety requirements.	Urban trams and surface-level commuter trains with easy and immediate evacuation options.	Less stringent requirements for detection and alarm systems; standard fire protection measures.
HL2	Medium hazard level.	Standard intercity and regional trains.	More demanding requirements for fire detection, alarm systems (e.g., local alarms in passenger areas), and equipment shutdown compared to HL1.
HL3	Highest hazard level; most severe requirements.	Metro systems, high-speed trains, sleeper cars, and double-decker trains, where evacuation may be difficult or take longer (e.g., in long tunnels).	Strictest requirements for all fire control and management systems, including sophisticated detection, automatic responses, communication systems, and fixed/portable firefighting systems.

Table 4: Hazard level classification under EN 45545

The EN 45545 standard does not directly specify g-force tolerance in terms of material fire performance requirements. Instead, the standard focuses on fire safety requirements for materials and components (EN 45545-2) and the functional performance of fire control systems (EN 45545-6), which implies they must be operational under typical railway conditions.

The physical tolerance of fire detectors to shock and vibration (g-force) on a train is governed by a separate, specific standard for electronic equipment used in rolling stock: EN 50155. Under the EN 50155 standard, which references the mechanical testing standard EN 61373, fire detectors body-mounted on a train must tolerate peak shock accelerations of up to 50 m/s² (≈5g) during operation.

In addition to shock, the equipment must also withstand continuous random vibration during operation. The vibration levels are measured in G_{rms} (root mean square acceleration) and are significantly lower than the shock peaks. The equipment must tolerate continuous random vibration with a G_{rms} value of approximately 0.2 G_{rms} (2.0 m/s^2) across a frequency range of 5 Hz to 250 Hz for 10 minutes per axis. In some cases, increased random vibration tests require tolerance up to approximately 1.2 G_{rms} (12 m/s^2) for 5 hours per axis. These tests ensure the long-term reliability and functional capability of the equipment in the demanding railway environment.

4.2 Design Criteria

SecuriSmoke ASD 535 devices are ideal for installation in railed passenger vehicles and have been fitted in railway carriages in several countries, where they perform very successfully. In order to meet the requirement that smoke from a fire be detected and alarmed within 60 seconds (the legal requirement in Europe and a suitable Performance-based Design standard anywhere else) the pipe layout must be considered carefully. Pipe network layout and length of single or aggregated pipe length determine the transport time from each sampling hole to the detector. The response time must also allow for the time taken for smoke from the furthest possible fire points to reach a sampling hole. Both sampling hole sensitivity and transport time can easily be calculated using Securiton's ASD PipeFlow design tool.

Design recommendations described in this chapter assume the transport time meets the overall response time required for passenger rail vehicles as described in Section 4.1 above. In general, the NFPA's VEWFD (Very Early Warning Fire Detection) designation, or the equivalent EN 54-20 designation of 'Class A' detection, will be suitable to meet the response time requirements for train carriages. As single ASD 535 device can comfortably cover the area of one train carriage to this standard, including separate detection for HVAC grilles and enclosed spaces such as electrical cabinets and toilets. The maximum generally approved capabilities of the device are shown in Table 5 below.

Criteria	ASD 535 performance and ratings
Sensitivity	0.002% obs/m
Operating temperature	-30 to +60°C (-22 to +140°F)
IP Rating	IP54
Aggregate tube length	300 m or 2x 300 m
Distance to furthest sampling hole	110 m or 2x 110 m
Maximum number of sampling holes (VEWFD or Class A)	18 or 36
Shock rating	5 g

Table 5 SecuriSmoke ASD 535 ratings and operational criteria

4.3 Detection design schemes

The precise design of an aspirating smoke detection system will depend on the layout of a rail carriage, but in general the pipe system will be placed under the carriage ceiling (both ceilings for double deck carriages). In many cases it may be possible to conceal the pipe inside a ceiling space or false ceiling, with suitable capillaries to the sampling holes. The number and positioning of sampling holes will be informed by Securiton's PipeFlow software, which can take into account likely airflow conditions on the train and design a system capable of alarming inside the 60 second window. A typical pipe layout for a single deck, modern passenger carriage – relevant for traditional carriages or as part of a multiple unit or high speed train – is illustrated in Figure 2 below.

Any separate compartments which do not have free air circulation to the main passenger area will need a minimum of two sampling holes, either designed into the main pipe run or facilitated by branching or capillary (as shown for the toilet in Figure 2). If the windows of the carriage can be opened, smoke may dilute quickly. In this case it a second length of pipe running below the windowsill helps detecting smoke in irregular airflow (see Figure 2).

Should this – or the need to cover a second storey of the compartment – surpass the maximum constraints of VEWFD in the single-channel ASD 535, a dual channel version is available with expanded capacity. This ensures that just one device is needed per carriage, as is desirable given that space to securely position a fire detector away from public access is usually limited on passenger carriages.

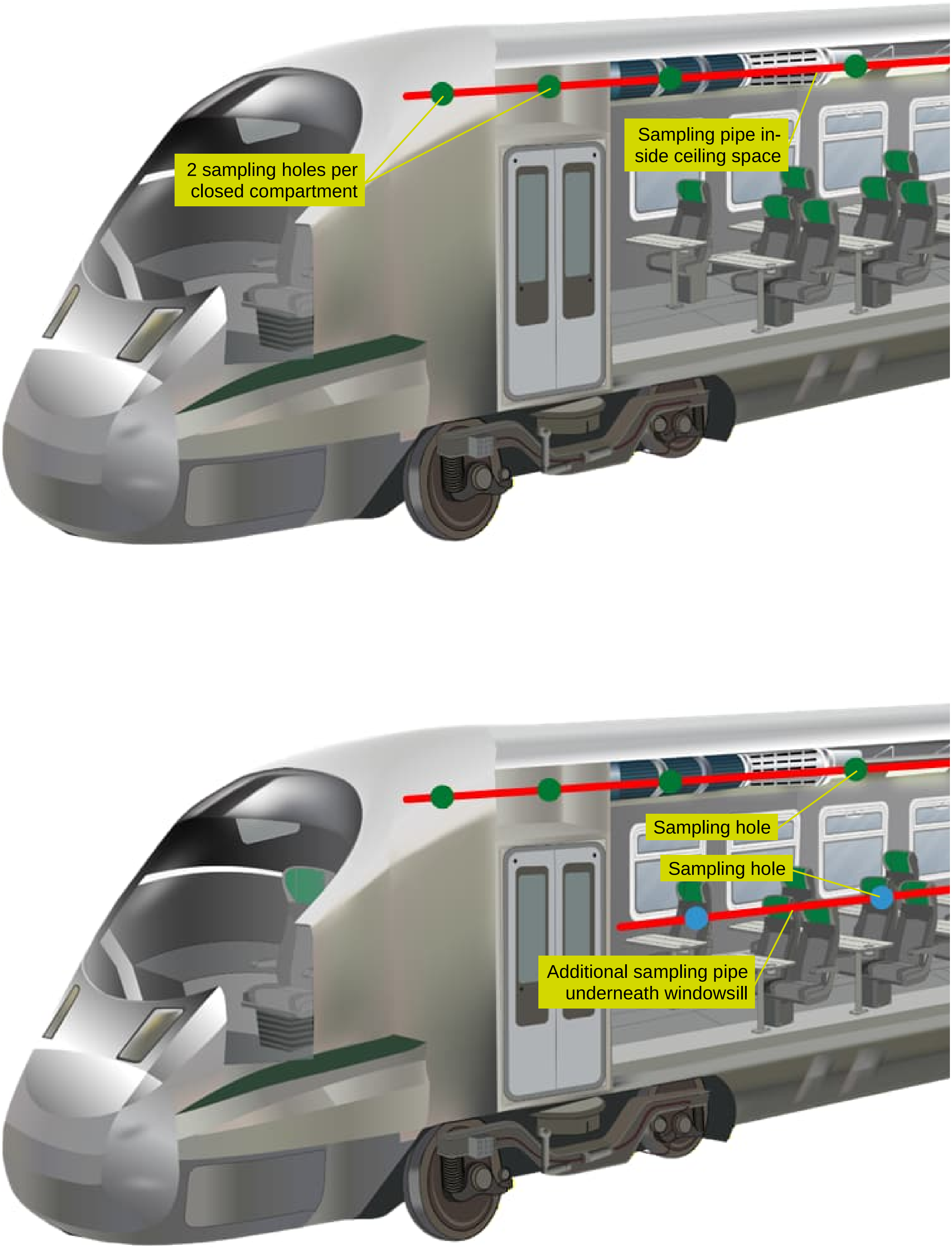
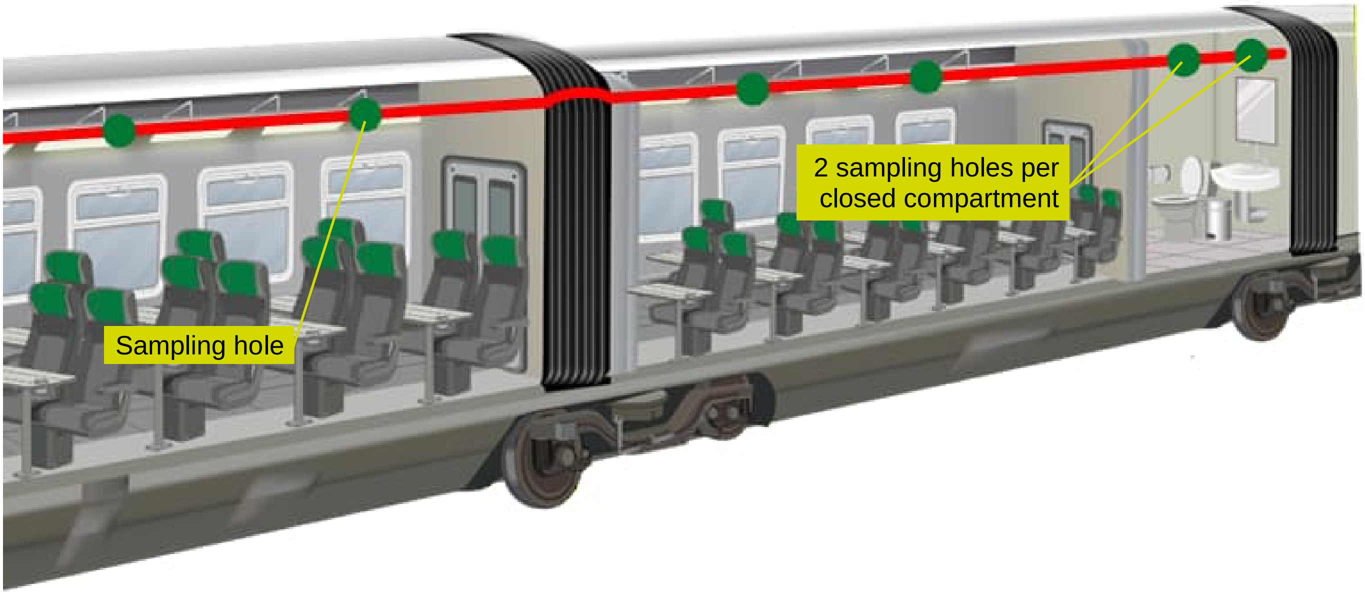
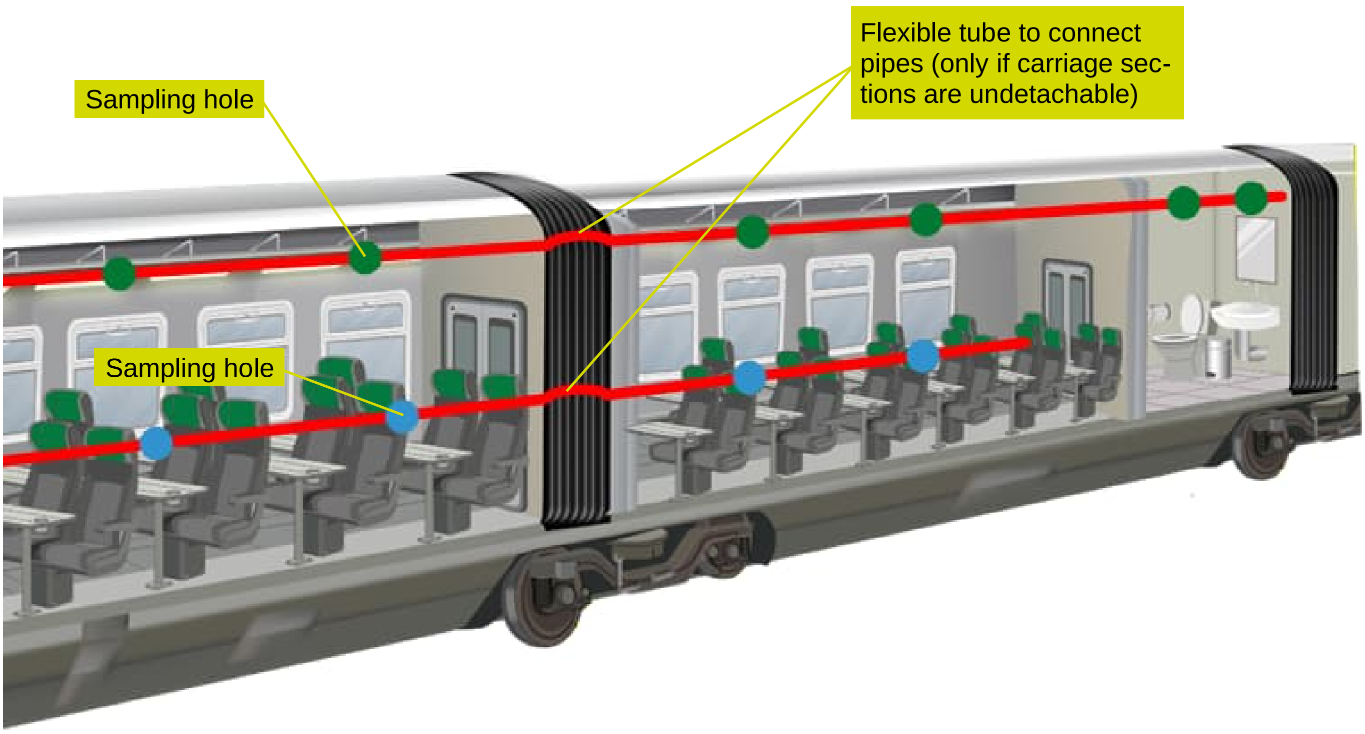


Figure 2: ASD pipe layout (red) and sampling holes (green and blue) in a typical train carriage



2 sampling holes per closed compartment
Sampling hole



Flexible tube to connect pipes (only if carriage sec-tions are undetachable)
Sampling hole
Sampling hole

On the other hand, the capabilities of SecuriSmoke ASD 535 may sometimes technically allow more than a single carriage to be covered by each device. This is however not desirable, as carriages are regularly decoupled and switched around within the train. Even modern multiple units and high speed train sets retain this capacity, and operators do sometimes change carriages around to facilitate maintenance and repair, or to address changes in the required passenger capacity of their routes. Therefore, the designs presented here use on ASD 535 device per carriage or detachable section of a multiple unit, with the two-channel device used for double-deckers if PipeFlow deems that a single-channel device cannot satisfactorily alarm within 60 seconds of a fire incident.

4.4 Features and benefits

Developed in Switzerland and manufactured in Germany, 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.

The table below is a summary of the benefits of SecuriSmoke ASD 535 in regard to rail carriage protection.

Features	Benefits
Early and reliable smoke detection	Ensure safe egress for life safety
ASD unit away from sampling points	Easy access for services while ensuring operation continuity; Simplify intrinsically safe design
Automatic on-demand fault alarms	Minimal service required, hence low Total Cost of Ownership (TCO)
5-level of alerts and alarms	Enable fully integrated and orderly verify, control and response
Optimal alarm settings supported with design tool for code compliance	Eliminate false alarms in challenging environments
Dynamic use of aspirating technology to address unique operating conditions	Consistent detection performance in areas with pressure difference (e.g., in-duct sampling vs. room detection), high or low temperature or humidity

4.5 Integrated verify, control and respond

One of the advantages of using SecuriSmoke ASD detectors is the five levels of alerts (‘Pre-signal1’, ‘Pre-signal2’, ‘Pre-signal3’) and alarm signals (‘Alarm’, ‘Alarm2’). These alarm signals can be used by on-board system control for suitable pre-determined actions. For use on trains and other railed vehicles it is generally preferable to connect each unit to the on-board management system, which will be hard-wired to a suitable control and information point in the driver’s cab. Note that wireless systems are not generally approved or recommended for trains, and that any hard-wired solution other than that of the train operator is undesirable as it creates problems when coupling and un-coupling carriages.

4.6 Non-intrusive system access for ITM

The ASD pipe network is maintenance free, and only the control unit needs to be accessed for service and maintenance. Refer to Securiton product manuals for more details.

4.7 Support with peace of mind

SecuriSmoke products are supported with range of software tools for design, configuration and maintenance.
- SecuriSmoke ASD PipeFlow for design of air sampling pipe network
- SecuriSmoke ASD Config for on-site configuration, commissioning and ongoing ITM

Application support includes mainly:
- 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 every continent.

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