

Fire safety solutions for tunnels

Planning Tool



Planning Tool – fire safety solutions for tunnels

Answers for infrastructure.



Answers for infrastructure.



www.siemens.com/infrastructure

The information in this document contains general descriptions of technical options available which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.

© Siemens Switzerland Ltd. 2010 • 021003

Siemens Switzerland Ltd
Industry Sector
Building Technologies Division
International Headquarters
Chloßstrasse 22
6301 Zug
Switzerland
Tel: +41 41 724 24 24

■ **Megatrends driving the future**
The megatrends – demographic change, and global urbanization, climate change, and globalization – are shaping the world today. These have an unprecedented impact on our lives and on vital sectors of our economy.

■ **Innovative technologies to answer the associated toughest questions**
Throughout a 160-year history of professional research and engineering talent, Siemens has continuously provided its customers with innovations in the areas of heat recovery, energy, industry, and infrastructure – globally and locally.

■ **Increase productivity and efficiency through complete building life cycle management**
Building technologies offers intelligent integrated solutions for industry, commercial and residential buildings, and public infrastructure. Over the entire facility's life cycle, our comprehensive and environmentally conscious portfolio of products, systems, solutions, and services for low voltage power distribution and electrical installation technology, building automation, fire safety and security ensures the optimum comfort and highest energy efficiency in buildings.

■ **Improve safety and security for people, processes, and assets**
– increases business productivity.

Fire control panels



The Sinteso™ FC20 fire control panels with integrated power supply offer a logical, menu-driven user interface with interactive, dialogue-based procedures. Network up to 32 panels via FNet (ideal when multiple tunnels are monitored via 1 control center). The panels are accessible remotely over Ethernet (remote operation, system diagnosis, configuration changes, simple maintenance, and troubleshooting).

Voice alarm system



The E100 voice alarm system linked to loudspeakers in shelters and exits. Automatically activated by the fire detection system on confirmed alarm, and capable of broadcasting live or pre-recorded evacuation messages to users to ensure safe and rapid evacuation of the tunnel tubes.

Extinguishing control panels



The XC10 range includes control units for single or multiple (up to 16) detection zones extinguishing sectors. All relevant incidents are forwarded to connected fire control panels. The XC10 units also interface with ventilation systems.

Linear heat detection



The Fibrolaser™ fiber optic cable detects both radiated and convected heat, reducing the influence of air-flow on the detection rate. It gives instant information on the fire size, direction and speed, the number of fire sources, and the temperature inside the tunnel (with graphical visualization, data refresh cycle time <15 seconds). The cable is maintenance-free (operating life of 30 years).

Smoke detectors



Early fire warning by smoke detection in road tunnels with high ceilings and ventilation levels thanks to the continuous measurement of smoke concentration. These detectors are also ideal in environments with corrosive atmospheres, and offer fog suppression by heating. A temperature sensor enables the location of fires. Signal output via relay contacts or Profibus.

Aspirating smoke detection



Aspirating smoke detectors enable early and reliable detection of fires in highly ventilated zones: they can be positioned in the technical room or at air intake points inside the tunnel to prevent external environmental conditions (e.g. smoke caused by fires of criminal origin) to affect the continuity and safety of the traffic through the tunnel.

Point type fire detectors

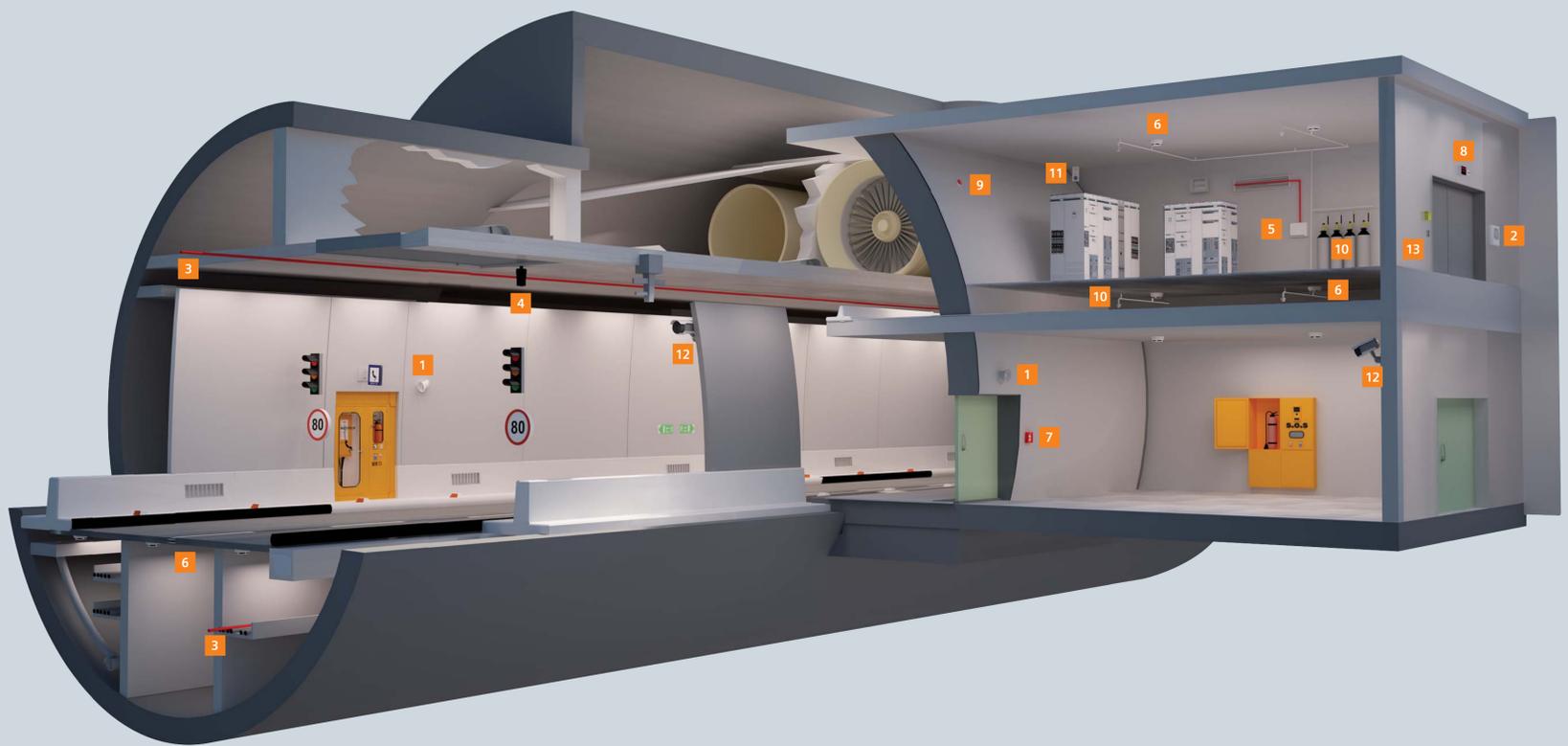


Sinteso S-LINE detectors are based on the ASATechnology™ developed by Siemens. The range includes optical, thermal, and combined fire detectors (e.g. for rooms containing electrical cabinets), a multi-sensor model for smoke, heat and carbon monoxide (e.g. for shelters), and EX models (e.g. for use in the emergency power supply storage room).

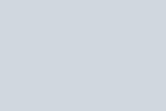
Manual call points



For immediate manual actuation of an alarm, manual call points are placed along the exit routes.



Alarm indicators



In the complex environment of tunnels and technical rooms, alarm indicators ensure that the danger area is immediately identifiable even if the detector in alarm status is not visible.

Input/output modules



For the connection with potential-free contact, used to acknowledge or activate technical states (e.g. door, ventilation, portable fire extinguisher).

Sounder and sounder beacons



Sounder and sounder beacons provide both acoustic and optical alarms, ensuring that tunnel users and staff are immediately alerted even in noisy environments such as in shelters or in the tunnel tubes.

Extinguishing with Sinorix™ CDT N₂



For outstanding and rapid extinguishing. This technology is widely used in data centers and therefore ideal for tunnel technical rooms: the nitrogen-based agent is harmless to people, the environment, and the electrical infrastructure. The unique constant discharge technology employed ensures minimum overpressure and turbulences, reducing the risk of further damage to critical systems.

Control center



The ITCC from Siemens caters for tunnels of all types and sizes, allowing not only the traffic guidance and control equipment, but also the light, air, and power supplies, the fire detection systems, pollution measurement, or emergency call systems to be centrally managed. Integration takes place at automation level for increased redundancy and reliability.

Intrusion detection



Detection of unauthorized entries into the technical rooms with comprehensive intrusion detection systems. Scalable systems with powerful alarm management tools, high immunity to false alarm, and integration with video surveillance and access control systems.

Automatic incident detection

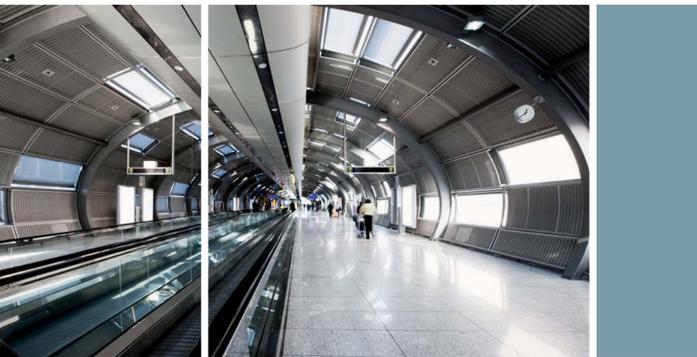


Video surveillance inside the tunnel and the technical room. Automatic incident detection inside the tunnel using Siveillance™ technology: this universal video application generates events when user-defined safety and security rules are violated. Video streams can be analogue (CCVS), video over IP or pre-recorded MPEG4 and AVI files. PAL and NTSC supported.

Access control



The range of SiPass access control systems provides a very high level of security without compromising convenience. Access readers at the technical rooms' doors restrict access to critical systems to authorized personnel. SiPass systems integrate in existing IT environments and support advanced multi-site identity management, remote connectivity, and integration with video surveillance and intrusion detection.



Planning Tool – fire safety solutions for tunnels

Answers for infrastructure.



Holistic fire safety – an economic must for tunnels

Tunnel safety is a complex and far-reaching topic. Complex because it encompasses structural engineering and operational measures both inside and outside the tunnel. Far-reaching because by improving tunnel availability, safety measures also help keep entire regional economies running.

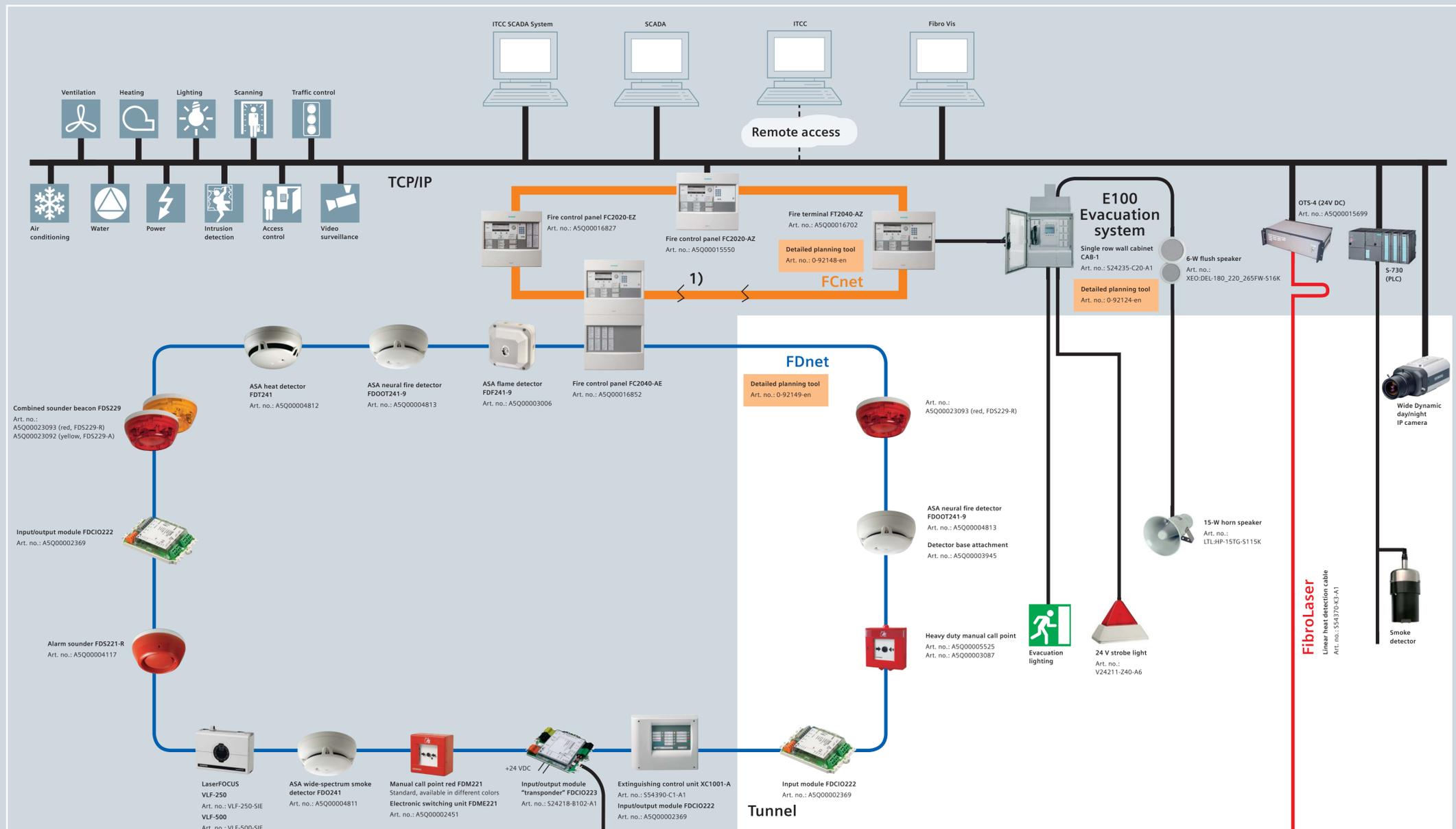
And although most of the fire safety technologies deployed in this type of infrastructure may be similar to more standard buildings, they have to address very unique challenges in terms of people self-rescue and evacuation, but also incident mitigation and structural damage limitation. Taken in a context of changing traffic patterns and increasing volumes, fire safety system planning considerations therefore need to go beyond the current technological merit of individual products or systems: They must cater for potentially changing requirements in terms of how fire safety as a whole is regulated, managed, maintained, and modernized over the entire life cycle of each tunnel.

Planning for success with a forward-thinking fire safety partner

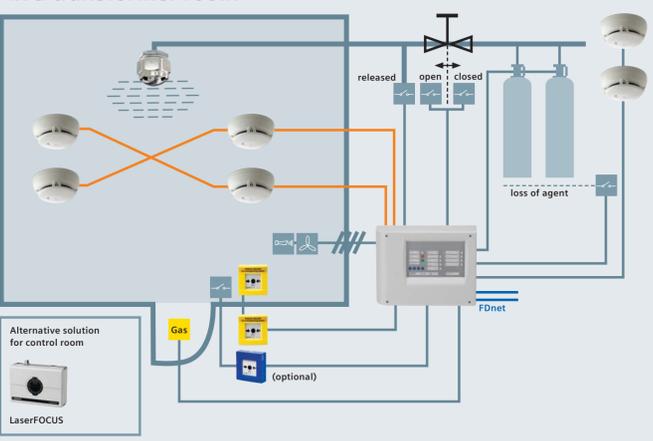
- Making sense of tunnel complexity**
 Each tunnel provides its own unique safety challenges, based on where it is located, its layout, height, and traffic volumes and patterns. Siemens brings its expertise in fire safety and critical infrastructure protection to help planners and engineering companies reconcile available fire safety technologies with the specificities of each tunnel: by balancing out regulatory constraints and best practices with budget considerations, we contribute towards user safety targets whilst providing optimal cost/benefits to tunnel operators and investors, over the entire life cycle of a tunnel.
- Holistic tunnel fire safety**
 Effective tunnel safety requires operational systems that can monitor all important parameters, ensure smooth traffic flow, and support incident response coordination. The all-encompassing system described here covers all the areas in a tunnel that, if affected by fire, could have a serious impact on user safety, tunnel structural integrity, or on operational systems that are crucial both to day-to-day tunnel availability and incident management. These solutions draw from over 150 years of fire safety research and development: Meeting or exceeding current European tunnel safety regulations and industry standards, they were chosen for their consistent track record in the many tunnel projects Siemens has been involved in over the years, as much as for their capability to integrate into a holistic tunnel safety concept.
- The service success factor**
 When selecting fire safety systems, particular consideration should also be given to the service levels offered by the chosen provider – and their effects on daily tunnel availability and safety levels. Siemens offers a comprehensive service portfolio, Advantage™ Services – encompassing life cycle management, operational services, alarm management, as well as system maintenance and knowledge services. Combined with our "Guaranteed Repair Time", this means that we remain proactive in our involvement over the entire tunnel project life cycle, thereby ensuring high performance in the long run.
- Future-proof safety technology strategy**
 Siemens understands the impact that the confined environment of tunnels, their critical economic role and the regulations have on fire safety performance requirements, today and in the future. As your partner of choice, we help you establish a future-proof fire safety technology strategy, tailored to each tunnel and translating into an overall system that will deliver consistently high performance in the long term. This is also why we only recommend systems that are seamless to install, commission, integrate, operate, maintain – and modernize. Our long-term project management capability is complemented by comprehensive documentation processes that ensure records of upgrades and maintenance are kept and available throughout the tunnel life cycle – compensating for the inevitable tunnel engineer and operator turnover.
- Strive for integration**
 Fire safety solutions from Siemens – such as those presented here – can be managed stand alone or integrated into the overall tunnel management system (e.g. SCADA). Integration ensures that all tunnel systems work together and react automatically to incidents with minimum operator interaction, e.g. triggering accident warnings at the tunnel entrance or appropriate road signals along the route emergency services are taking to reach the tunnel. Integration therefore empowers tunnel operators and owners to manage operational fire safety and incident response more effectively, thus reducing the costs of tunnel closures, repairs and traffic diversions – and bringing a measurably improved return for investors.

Highlights

- Nearly 50 years experience in tunnel fire safety
- Complete fire safety project management from one partner over the tunnel life cycle
- Rely on a fire safety expert for a future-proof safety technology strategy
- Combine industry-certified products and systems into high-performance safety systems
- Improve compliance with national and international safety regulations
- Maximize investment protection thanks to best-in-class service levels



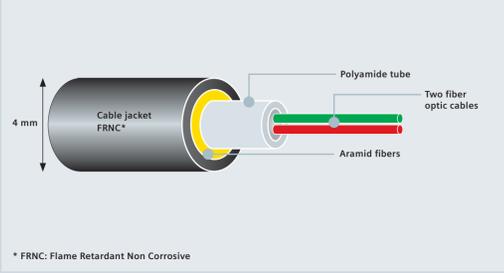
Example extinguishing system with XC10 control unit in a transformer room



Tunnel battery/generator room

Ex zone

FibroLaser linear heat detection



1) Alternative: Line extension using fiber optic cables and interface modules.

