

# Do I have the right ambient conditions for my experiment?

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The laboratory solution from Siemens provides perfect room and safety conditions while reducing energy consumption.

Answers for infrastructure.

**SIEMENS**



## The key to safe, economical and comfortable laboratories

A laboratory is a challenging work environment. It is subject to strict guidelines and regulations in order to protect people and environment. The key to a safe, economical and comfortable laboratory is an integral approach that comprises the entire building infrastructure – from fume hood and laboratory room control to primary plants as well as building and energy management. The comprehensive concept of the Siemens laboratory solution enables the interaction of the different disciplines. This leads to an improvement in safety and a significant reduction of the energy consumption. At the same time, the comfort of the work places will be increased.

# Comprehensive single-source solution

## ■ Improving room climate energy-efficiently

Thanks to building technology, modern laboratories can offer users state-of-the-art laboratory and work space conditions. Stringent requirements placed on technical plant systems in a laboratory are not just limited to safety-related concerns. The goal is to achieve a comfortable climate in the building while fulfilling economic and ecological criteria – and to protect laboratory personnel from dangers.

Laboratories equipped with optimum technology offer numerous energy saving opportunities with building automation and control assuming a key role, since it provides the plants dynamically and demand-dependent. The more information is available to the system, the better the plants operate while increasing safety and comfort aspects. Intelligent linking of the building technical plants through building automation and control significantly improves the energy efficiency of a building and increases its value over the long term.

## ■ DESIGO™ – flexible and energy-efficient building automation

The Siemens laboratory solution is a complete and comprehensive building automation and control solution with specific functions for the entire laboratory. It improves safety and comfort while simultaneously optimizing the building's economic viability. It is a single-source solution based on the DESIGO building automation and control system. In addition to heating, ventilation and air conditioning, DESIGO provides comprehensive and integrated building automation and control, including lighting and blinds control, video surveillance and access control systems as well as fire safety and energy distribution.

## ■ Unique integration possibilities

A thorough integration of control and monitoring of laboratory fume hoods and rooms in the system is a unique aspect of the Siemens laboratory solution. It allows you to easily achieve a maximum of comprehensive functions, while eliminating additional interfaces to other electrical and mechanical installations.

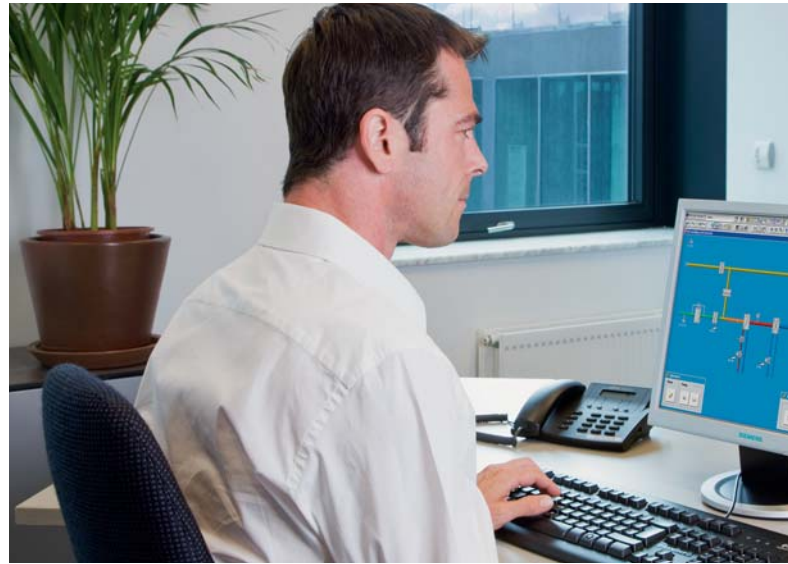
## ■ A safe solution from one source

Whether new buildings or renovations – with Siemens, you receive everything you need from project management to implementation and maintenance from one source. This means less time to execute, no unnecessary interfaces, clear responsibilities and you benefit from high flexibility after the completion of a project. In addition, devices and software tools from Siemens are designed to work together, thus providing even more dependability during planning and execution. The Siemens laboratory solution fulfills the European Standard EN 14175, no matter what the fume hood type.

## Highlights

- Improved energy efficiency and comfort with demand-driven volume flow control
- Optimized operation efficiency and transparency based on complete integration in the building management and control system
- Maximum flexibility for subsequent changes
- One competent single source for the entire laboratory environment during the whole life cycle





# Economically increasing safety and comfort – with DESIGO

The DESIGO building automation and control system is the basis for the Siemens laboratory solution. It ensures optimum integration of fume hood control, temperature control and room air exchange – for increased safety and reduced costs.

## ■ Availability and reliability

DESIGO stands for energy efficiency and cost optimization for any building, regardless of its size. The product portfolio comprises a range of sensors, actuators, operator units and controllers – using standard communications.

The laboratory solution consists of carefully matched standard components. Communicating volume flow controllers with typical laboratory functions are also an integral part of DESIGO and ensure complete data throughput. A fume hood operator unit that can be operated intuitively complements the fume hood control on site.

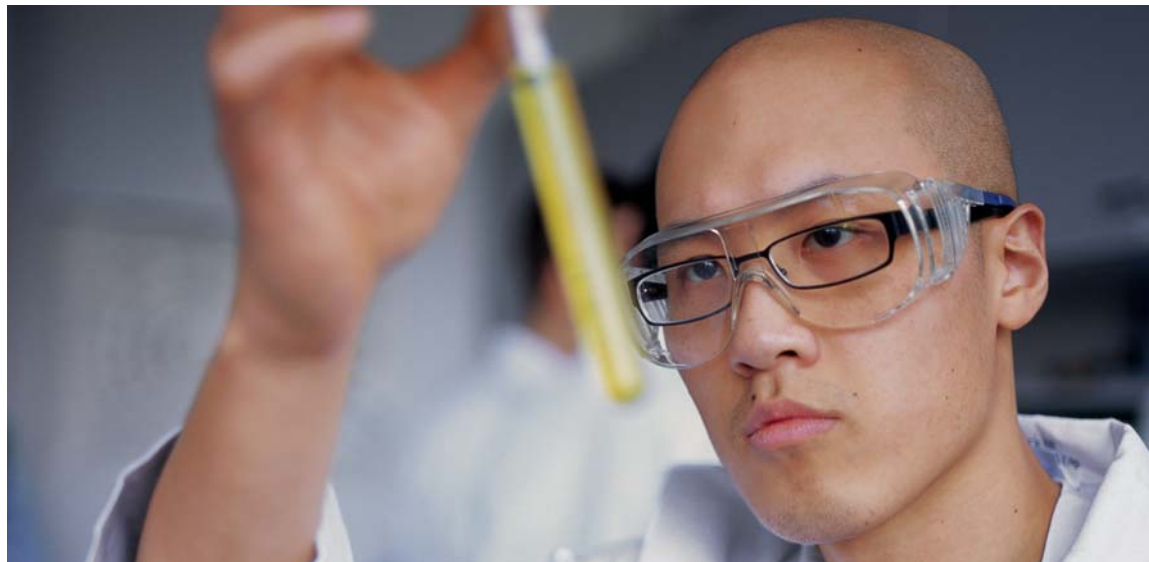
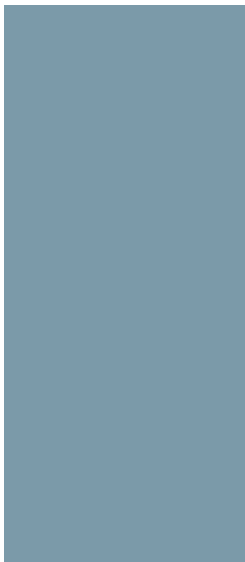
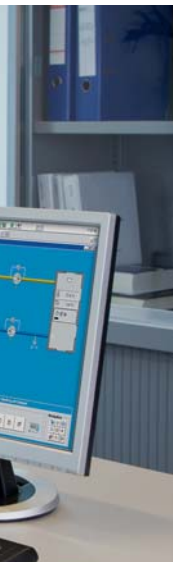
## ■ Scalability and flexibility

The system consists of scalable automation stations, flexible individual room controllers and easy-to-operate management stations. The alarm management centrally records, processes and evaluates all alarms. They can be forwarded via SMS, fax, e-mail or pager. Uniform operating structures for all electrical and mechanical installations increase transparency and provide user-friendly operation on the management station or via the Web. Individual or pre-defined reports transfer data into meaningful information for different target groups. And easy-to-operate tools analyze operating data so plants can be optimized in a targeted manner.

## Highlights

- Scalable DESIGO portfolio with proven devices and standardized communication
- Comprehensive reports to analyze consumption and costs
- Management station with graphical designs that apply with any building structure
- Customized, easy and intuitive system operation
- Central alarm management with flexible alarm forwarding





# Building automation and control for unlimited possibilities

Laboratories have various technical plants. It is the linking of the plants, however, through the building automation and control system that forms them into a unit and allows optimum operation.

## ■ Seamless information exchange

Interconnecting the individual plants of a laboratory offers many advantages. First, it opens the possibility to exchange information. This allows the system to take advantage of its full potential with regard to safety, economic viability and comfort. For example, demand data from the rooms is available directly to the primary plants. Occupancy data can be used together with temperature control and lighting control. Even the fume hood and laboratory room data are completely integrated in this design concept.

## ■ Uniform interface for simple operation

All systems have the same user interface and can thus be operated on the same management level. Using an overview – typically an outline of the building – the operator can navigate to all system details by simply clicking the mouse. Standard dialog boxes provide all important information to ensure the overview is available at all times. Attractively colored

operating images report on all operating and alarm states for the fume hood and the laboratory room. Standardized images result in transparent operations. The system displays an alarm symbol directly at the site of a triggered alarm. Plant faults are easily recognized, as they are encased in color.

## ■ Data analyzing and reporting tools

Automation facilities communicate via BACnet™ or LONWORKS® technology and are therefore open to integrate other systems. Even data from third-party devices can be integrated into the DESIGO system. Examples include temperature monitoring of refrigerators or elevator control. The data can be processed and archived on the management station. Data can be queried at any time with a few simple moves or are available in a more dense form in freely definable reports.

## Highlights

- Ease of operation due to uniform operation concept
- Clear plant overview thanks to dialog boxes with standardized design
- Transparency through standardized images and color coding
- Integration of data from third-party devices possible
- Individualized and pre-defined reports for comprehensive overview
- Proven analysis tools allow optimizing plants in a targeted manner



# Safety – the alpha and omega in laboratories

In a laboratory, people work with dangerous or toxic substances. This is why safety facilities must be designed to protect both users and the environment under all circumstances. Users should be able to fully concentrate on their work and to rely on safety facilities.

## ■ Integrative safety approach

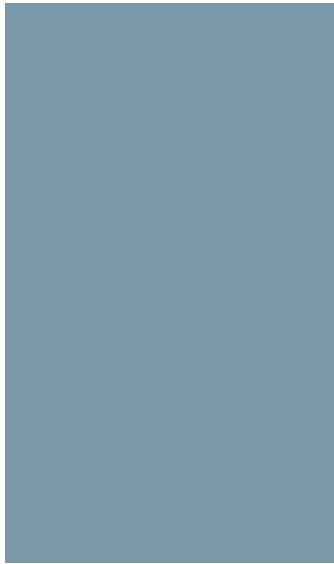
In addition to monitoring the volume flows in laboratory fume hoods and rooms, the Siemens laboratory solution continuously monitors its own functional operation. Trouble-free operation is optically displayed directly on site on the fume hood or in the room. When the system discovers a deviation from a pre-set value, users are immediately alarmed both optically and acoustically.

Besides centrally monitoring the plant, the management station also processes and forwards deviations and alarms. The room can even be set to increase or decrease pressure from the management station for special events. It can also trigger an intensive air flush or immediately close the dampers.

## ■ Volume flow control – the heart of safety

A core element for safety and efficiency regarding fume hood is the volume flow control unit with operator unit and display. You can lower or raise the set point for the fume hood flow with a Siemens control unit. The fast-acting control system prevents the escape of dangerous gases when opening the sash. Air flow is increased within a few seconds.





#### ■ Maintaining room pressure and minimum air exchange rate

The Siemens laboratory solution offers reliable sensors to record the opening area of the sash to establish the set point for the volume flow controller. The room supply and exhaust air is controlled at the same speed accordingly. This maintains the room pressure at a constant level and ensures that the minimum air exchange in the laboratory is always secured.

#### ■ Easy-to-operate fume hood operator unit

The fume hood operator unit is divided into three function groups:

- fume hood monitoring
- volume flow requirements
- lighting control

The most important function group is the fume hood monitoring. It clearly signals to the users whether or not they can work without risk. The Siemens laboratory solution can also automatically consider work outside of normal working hours. Any movement of the fume hood sliding panel or additional motion detectors signal to the system that the room is occupied. The room then switches to laboratory operation and all plants are ramped up. In other words: safe operation at all times.

### Highlights

- Optical and acoustic alarm if deviation from preset values occurs
- Securely maintaining room pressure
- Increased safety with fume hood monitoring
- Safe operation even outside working hours with motion detectors
- Precise acquisition of the open sash panel surface
- Automatically safe operational state when power returns





# Realizing maximum energy savings for your laboratory

The Siemens laboratory solution is an investment that pays for itself from day one. Its holistic approach from the laboratory fume hood to building automation and control allows for a broad range of energy saving opportunities.

## ■ Demand-controlled energy consumption

Saving energy is a fundamental task of the DESIGO building automation and control system. All information is available in the overall system thanks to a thorough data flow from the room via the primary plant up to the management station. This allows the system to adapt heating, cooling and fan output as well as lighting to the effective current demand. DESIGO permanently records all operating data of the entire system and provides powerful operating and fault reports.

This transparency of building operation allows the operator to assign operating costs at any time to the given subsystem of the laboratory. As a rule, plants for laboratory room ventilation are designed for maximum operation, i.e. air demand when the fume hood sash panel is fully open. In practice, however, this type of operating state rarely occurs. As a result, the maximum air volume could be designed to be lower and the primary plants could be sized smaller, as long as there is no impact on safety. The Siemens laboratory solution monitors the entire air flow continuously and raises alarm in a timely manner prior to exceeding the maximum capacity of the ventilation plant.

## ■ Conclusion

The Siemens laboratory solution allows you to reduce both operating and investment costs while maintaining safety levels for the laboratory users.

## Highlights

- Increased energy savings thanks to occupancy-based operating when using time scheduler
- High-quality pressure sensors allow controlling of very small volume flows
- Reduced throttling loss and noise development
- Sash closing user reminder after a certain period of time by the fume hood operating panel
- Reduced operating and investment costs when using simultaneous functions





# Optimal room air exchange and room climate

The Siemens laboratory solution enables you to create a comfortable work environment for your employees, while you can save both energy and costs. Its flexible operation concept makes the solution even more attractive.

## ■ Comfortable working conditions

Whenever safety requirements allow a reduced air flow, this will automatically increase comfort and reduce typical noise pollution in the laboratory. The combination of climate control as well as light and blind control provide optimum working conditions. Next to automated functions, the user can always interfere locally.

## ■ Easy system control even within the laboratory

The Siemens laboratory solution can be operated both centrally on the management station and decentralized directly on the fume hood. An easy-to-understand operating unit and displays facilitate system handling for laboratory personnel.

## ■ Decentralized operation

- The fume hood device reports on operating and alarm states. The volume flow can be manually increased or decreased on the fume hood.
- The temperature in the laboratory room can be set as desired thus increasing the comfort level.
- Lighting and blinds operation can be integrated.

## ■ Central, graphic operation

- On the DESIGO INSIGHT management station.

## Highlights

- Establishing ideal room climate
- Establishing ideal room air pressure
- Central and decentralized operation possibilities
- Attractive color operating images using standardized symbols
- Plant faults are easily recognized at the impacted location



# Flexible, scalable and independent

Siemens offers planning dependability. The highly flexible concept, the matched control components and the specific control strategies offered by the Siemens laboratory solution provide for complete freedom in planning and design.

## ■ Trouble-free project handling

The well-thought-out modular control technology concept provided by the Siemens laboratory solution makes it possible to equip laboratories from simple to the most complex. It can be flexibly sized and expanded. Thanks to its adaptable volume flow control electronics, the Siemens laboratory solution works with any fume hood and volume flow dampers. The concept allows planners to integrate and expand any number of additional laboratory air technical facilities in the laboratory.

Our control components establish VAV units that meet the highest demands placed on laboratory air control: fast volume flow control for fume hood exhaust air, precise and stable volume flow control for maintaining room air pressure. Matched devices and software tools by Siemens provide planning and implementation certainty, ensuring trouble-free project handling.

## ■ Everything from one source

Yet Siemens offers even more: Total Building Solutions provide a comprehensive solution and product spectrum from a single source. This optimizes, above all, the interaction between building automation and danger management. As a Siemens customer, you will also benefit from a global technology network and local service.

## Highlights

- Secure investment, increase of building value
- Universal volume flow control for all volume flow dampers
- Controller processes all common volume flow processes
- Highly precise and fast volume flow control
- Sequential and parallel control of control dampers
- Equip existing dampers with control electronics
- Room pressure control



A laboratory with variable volume flows at Dow Europe in Horgen, Switzerland.

# Increased energy efficiency and safety through integrated building automation solution

The integrated Siemens laboratory solution at Dow Europe enables energy-efficient monitoring and controlling of fume hoods, the laboratory environment and primary plants. DESIGO INSIGHT supports comprehensive visualization of the integrated subsystems within the building automation system.

## ■ Dow Europe GmbH, Horgen, Switzerland

Dow Europe is one of the largest chemical companies worldwide – with headquarters in Midland, USA and Horgen in Switzerland. In fact, it is one of the leading companies in the area of research and technology for chemicals, plastics and agricultural products for the entire world.

The research facility in Horgen is continually expanded. At all times, safety for personnel and environment comes first. Regarding energy efficiency, Dow Europe has also always been the class winner. Because next to safety and a comfortable climate, economic and ecologic aspects are also very important for Dow Europe. “Energy efficiency is of great importance to us”, says Christoph Fröhlich, Facility Manager of Dow Europe.

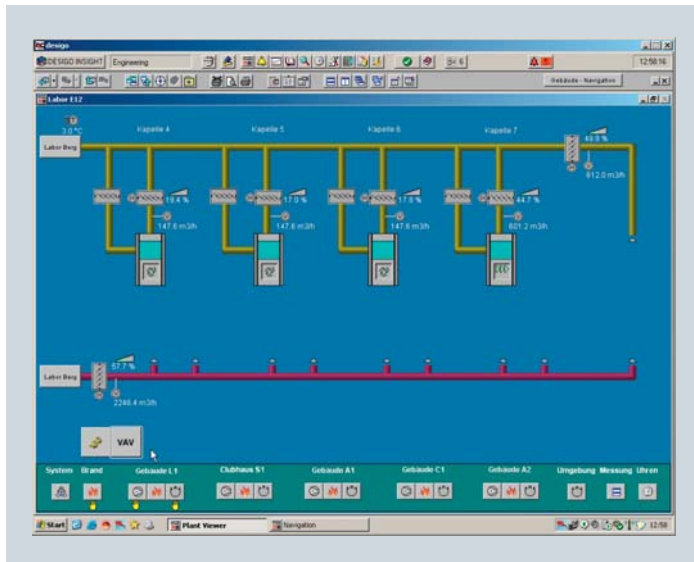
## ■ An integrated solution

Dow Europe found the answer to these three challenges with the Siemens laboratory solution – a comprehensive building automation solution with specific functions that includes the entire laboratory. It increases safety as well as comfort and optimizes the efficiency of the building at the same time. Christoph Fröhlich points out that the possibility to fully integrate the laboratory solution: “Into our existing DESIGO building automation system also convinced us that this is an ideal solution for us.”

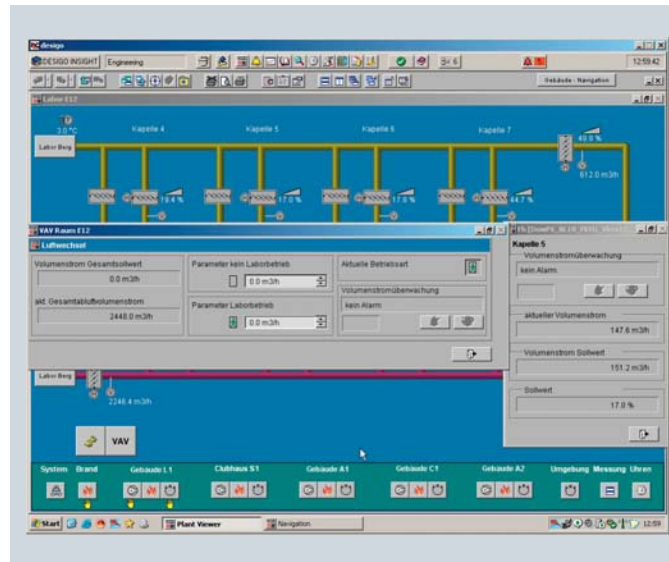
## ■ Variable volume flow for the fume hood

The fume hood is the most essential protection device for the laboratory technicians in research at Dow Europe. Through targeted air flow or aspiration it ensures that no explosive concentrations develop. “Contaminated air from the fume hood must not flow back into the laboratory.”, states Christoph Fröhlich. Siemens answer is an efficient and comfortable solution: a dynamic adaptation of the volume flow to the current position of the sash.

Sensors identify the position of the sash and accordingly define the set point for the volume flow. For Dow Europe, safety and efficiency are optimally combined and realized with the Siemens laboratory solution.



The building management system provides a central overview of all fume hoods.



The standard communication interface allows reliable monitoring of the laboratory, all volume flows as well as an individual parameterization of the volume flows and air exchange rates at different operating hours.

### Flexible room conditions

At Dow Europe, every fume hood is operated with a volume flow between 150 – 600 m<sup>3</sup>/h, depending on the operating mode and the position of the sash. To ensure a minimum air exchange rate and air circulation in the laboratory, the room exhaust air is controlled variably.

Each volume flow unit was equipped with an independent control unit, which allows the flexibility Dow Europe wanted. Should the floor plan or the room set up change eventually, it will cause only the adaptation of software configuration.

### Total Building Solutions – assuring efficient and reliable operation

The already existing DESIGO building automation and control system at Dow Europe bundles all information of all subsystems. The data points of the newly added Siemens laboratory solution are now integrated and thus part of the Total Building Solutions. All data points of the ventilation system, the laboratories and fume hoods as well as hundreds of fire detectors, gas detectors and the monitoring of critical doors are displayed in a clear and concise manner in the plant diagram. This ensures efficient operation and fast intervention in case of an emergency, as users have to know only one system.

This is also why Dow Europe needs only a small team to operate its sophisticated plant. Christoph Fröhlich is very satisfied: "The integration has many advantages. First, our building management personnel has to master only one system to monitor everything. It also saves long ways, for example to detect a ventilation problem in a laboratory located in another building. And it enables quick reactions and corrections if needed."

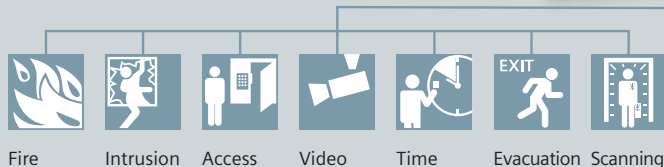
### Highlights

- Fully compliant laboratory solution according to EN 14175/SN EN 14175
- Increased safety due to dynamic volume flow adaptation
- Improved energy efficiency and comfort with demand-driven volume flow control
- High flexibility due to software configuration of the standardized automation hardware
- Optimal operation efficiency and transparency through complete integration in only one building management and control system
- Possibility to extend building management and control system to a Total Building Solution
- One competent single source for the entire laboratory environment during realization and ongoing operation



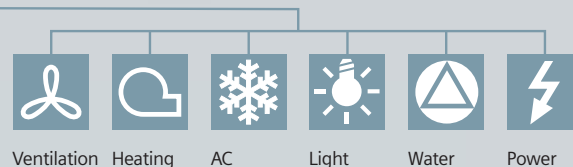
Risk management Assessment Consulting Process integration Training

### Support



Fire Intrusion Access Video Time Evacuation Scanning

### Security & Fire safety



Ventilation Heating AC Light Water Power

### Energy & Comfort

# Total Building Solutions

The Siemens laboratory solution can also be linked to other safety and security systems from Siemens. This opens a multitude of possibilities to protect your employees and research results systematically.

#### ■ The Siemens laboratory solution with access control system

An integrated security system in a laboratory environment deters piracy, prevents unauthorized entry and reduces the risk of contamination or product tampering.

- Security solutions from Siemens accurately combine several sources of information (e.g. access control databases, human resource records, historical access trends) in order to determine whether individual access can be granted at any given time.
- Continuous video surveillance reliably monitors personnel flow, processes, and procedures, and our high-performance motion detectors are strategically positioned to monitor room entrances for early intrusion detection.
- Links to room occupancy standards or automatic lighting functions eliminate the need for separate sensors and ensure comfortable working conditions for authorized personnel.

#### ■ The Siemens laboratory solution uses intelligent fire detectors

Highly reliable fire detectors with the new **ASAtechnology™\*** from Siemens allow detection of fire variables such as smoke, heat and flames at an early stage so that enough time remains for intervention.

Simply select the suitable sensor depending on deployment:

- optical smoke detectors
- heat detectors
- multi-criteria detectors
- linear smoke detectors
- flame detectors

Manual call points can be added for manual alarming by personnel.

#### ■ The Siemens laboratory solution with evacuation system

The evacuation system from Siemens eliminates the risk of panic reactions as much as possible, since the impacted personnel is informed on how to act during an emergency. Alarming and subsequent evacuation can be optical or acoustic, using audio signals or by speaking via specifically addressed speakers.

#### ■ Relying on expertise

Setting up and maintaining laboratories requires comprehensive, industry-specific know-how as well as a wide portfolio of holistic products, systems and services. As the world's largest fire safety and security provider for laboratories, Siemens supports you with powerful and professional solutions and advisory know-how.

## Highlights

- Safe laboratory environment thanks to access control and video surveillance
- A broad range of fire detectors for every application provide earliest possible fire detection
- Evacuation solutions with audio signals or voice messages prevent panic
- Siemens has in-depth know-how and a wide solution portfolio for laboratories

\* ASA = Advanced Signal Analysis

# Answers for infrastructure.

## ■ Megatrends driving the future

The megatrends – demographic change, 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 proven research and engineering talent, with more than 50,000 active patents, Siemens has continuously provided its customers with innovations in the areas of healthcare, 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,
- safety and security for people, processes and assets,
- increased business productivity.



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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.

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