



User Guide Biomedicum

**Campus Solna
Building 95:81**



Illustration
Architect: CF Møller

Information for tenants and users

January 2018



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A FEW WORDS FROM THE ARCHITECT

Karolinska Institutet's new workplace Biomedicum turns the 'building in a park' campus concept on its head, resulting in a park in a building concept which will create its own identity as a world-class scientific research environment.

KI Campus Solna is renowned for its green parkland scattered with red brick buildings. The 'park in a building' concept has been a central tenet throughout the design work behind Biomedicum. With its green colour, Biomedicum also becomes part of the park, and thanks to the large glass roof, green walls and atrium with wooden details, the campus area flows right into the building. The lab blocks are directly adjacent to the park landscape of the atrium.

Biomedicum is a building divided into four sections, with a total floor space of 65,000 square meters spread over 11 floors. Each section is angled outwards to break up the long glass facades and create shadow effects, identity and varied architecture.

The oblique positioning/angling of the 1,500 or so glazed sections gives the building a unique identity and ensures variation. Their size reflects the natural cadence of the bay, the distance between architectural elements, used for the laboratories. The glazing behaves differently depending on the weather and cardinal direction, sometimes acting as a mirror, sometimes completely transparent.

The main entrance of the atrium is an open environment with a myriad public function, including a coffee shop, exhibition area, auditorium and conference rooms.

The gaps between Biomedicum's lab blocks form open spaces extending from the atrium to the facade and passing through all floors. These are referred to as 'slits'. They offer views of the surroundings while openings in the floors provide visual contact between levels. The slits provide meeting places and access to the different blocks, refreshment stations and informal lounge areas. Vertically, the slits are connected by a green wall.

All material and colour selections have been made while keeping in mind the fact that Biomedicum is a building which will stand for many years to come. Classic and modern at the same time. The wood creates a warm and inviting environment. As does the champagne colour of the handrails. The terrazzo flooring of the main entrance, with its red and green accents in stone, reflects the brick buildings and parklands of Campus Solna. The glazed walls of the four stairwells have a practical function as they illuminate the stairs while the warm light falling on the hand-blown glass panes also gives the entire atrium character.

The 10th floor has most of the larger internal conference rooms, the faculty club and two lunchrooms, which also have access to the outdoor terrace and its fantastic views. Another lunchroom can be found on the 4th floor. Biomedicum is designed with the aim of creating a flexible, accessible and functional work environment with many natural meeting places for sharing ideas and experiences, as well as for promoting cooperation between the 1,600 or so people who will work here. The physical work environment of the laboratories is marked by transparency within the building, in that you can see colleagues from other departments.

Lotte Søborg, C.F. Møller



ADDRESSES AND PARKING

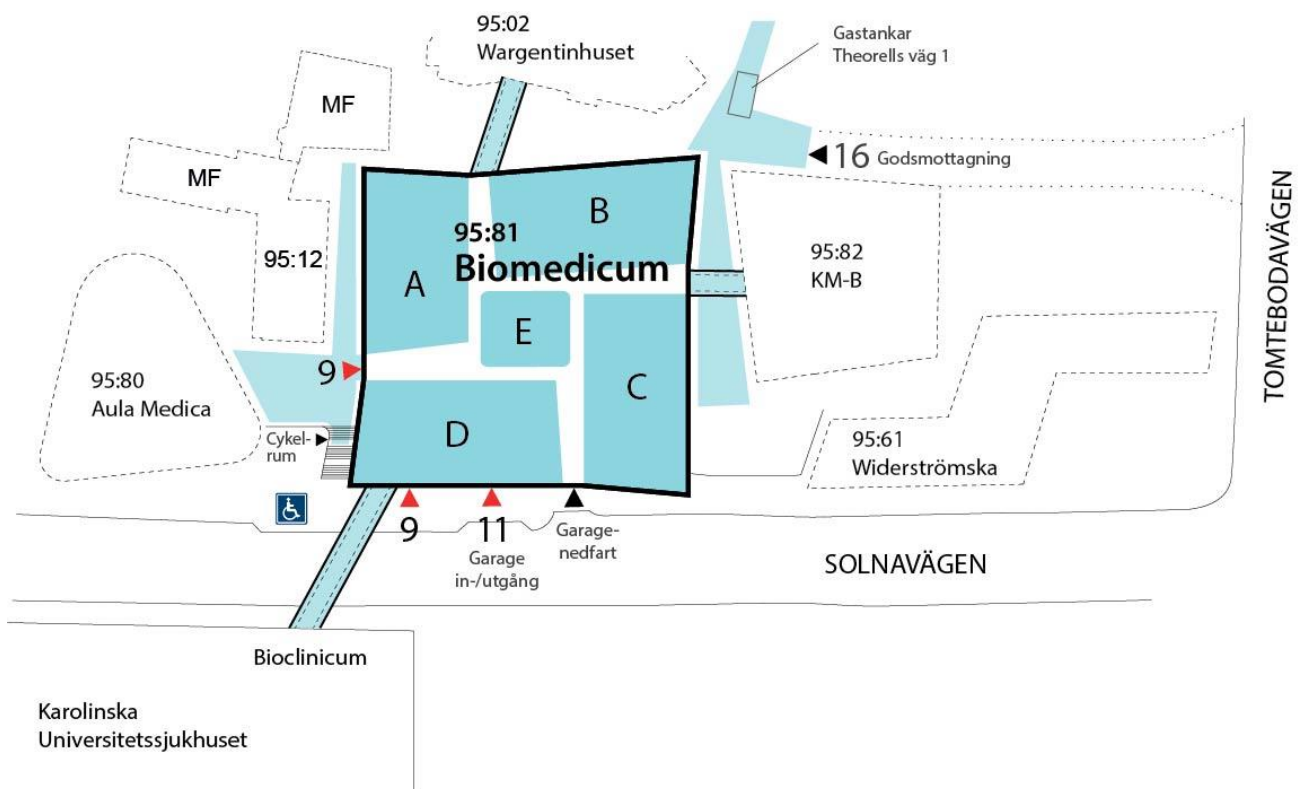
The building is owned and managed by Akademiska Hus with Karolinska Institutet as the tenant.

This User Guide was produced in 2017. If you have any questions about the building, please feel free to contact the building manager or maintenance engineer at Akademiska Hus. See the noticeboard at the main entrance to the building or visit www.akademiskahus.se.

Akademiska Hus's administrative office is located at Berzelius väg 8.

Addresses

Main entrance:	Solnavägen 9
Goods receiving:	Tomtebodavägen 16
Garage:	Solnavägen 11
Gas bottles, outdoors:	Theorells väg 1



Carparks

Biomedicum has a public underground garage with an entry ramp from Solnavägen. The garage offers parking for motorcycles and about 145 cars, including electric cars and vehicles with disabled permits. For motorists with a disabled permit, there are also designated parking spaces on Solnavägen, which also has a drop-off and pick-up point.

Cycle parking

There is a cycle room which can be accessed from the door by the stairs from Solnavägen. Cycle parking is provided along Solnavägen and at the main entrance to Biomedicum at Solnavägen 9.



REPORTING PROBLEMS AND MAINTENANCE SERVICE

Facility Management (FM)

For maintenance service, the building is organised along the lines of a shared service, so-called Facility Management, or FM for short. Facility Management involves the strategic management and control of the resources and services required for a building to function efficiently. Biomedicum's FM organisation supports Biomedicum's core activities and is divided into five areas. These support functions include:

- Goods and logistics
- Labware dishwashing
- Environment, health and safety
- Service and technology
- Purchasing and supply entre

Reporting problems

In the first instance, problems should be reported to the FM organisation, which refers the matter to the appropriate party at Akademiska Hus or Karolinska Institutet.

In the case of **immediate danger** to property which can result in personal injury, Akademiska Hus' 24-hour emergency hotline can be reached at +46 685 76 87. See also the noticeboard at the main entrance to the building.

Always specify the room number when reporting a problem. This can be found on the exterior door frame/outside the room; see the Building section below for more information.



room number

Alterations to the building and transporting heavy goods

Should you wish to make alterations to the building, you must first contact the FM organisation, which will refer the matter to Akademiska Hus and Karolinska Institutet for further consideration.

Offices and labs are fitted with a practical rack system to be used for mounting shelves and the like. For a list of approved mounting systems, please contact FM.

You are **not** allowed to make alterations to the building without FM's approval. This includes, for example, making holes in walls and remodelling or altering the installations found in the building. **Nor** are you allowed to transport, move or install equipment weighing more than 450 kg without permission. The FM organisation helps transport goods and liquid nitrogen. See the Building, Structure and Lifts sections for more information.

Waste management

The building has a well-devised waste management system. Disposal stations for different fractions are found throughout the building. The waste from these is then gathered at a single recycling point in the building in goods receiving, all according to internal procedures.

When receiving goods, the user is responsible for the removal of delivery pallets and packaging.

Plug and Play responsibility

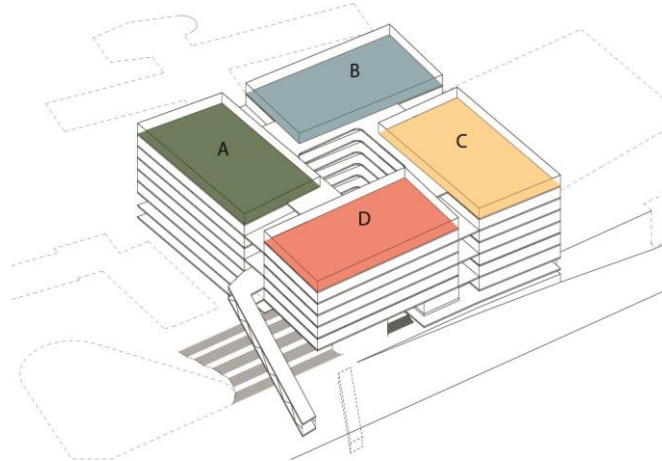
The division of responsibility in labs between building owner and tenant is documented. Contact the FM organisation for more information about, for example, plug and play for various media.



BUILDING

General

Biomedicum has a total floor space of about 65,000 square metres spread over 10 floors and an underground garage. The building is comprised of four sections, designated A, B, C and D. Floors 0-3 under the atrium are designated building section E. From the 3rd floor and above, the building sections are subdivided into blocks, housing both offices and labs.



The garage is on floor 0 of the building.

The 1st floor consists of maintenance areas and the tunnel to Bioclinicum.

The 2nd floor comprises the entrance from Solnavägen, the ramp to the underground garage, a cycle room, goods receiving, the waste room, the dishwashing facility, the archives and more.

The main entrance is on the 3rd floor, together with the foyer, conference rooms, an auditorium for 215 people, the atrium with its coffee shop and offices, meeting rooms and laboratories.

The 4th floor has a lunchroom, labs, offices and meeting rooms, as well as connecting walkways to KM-B, Wargentinshuset and Bioclinicum.

The 5th to 9th floors house labs, offices and meeting rooms, as well as breakrooms.

In addition to fan rooms, the 10th floor houses two lunchrooms, meeting rooms and a faculty club.

Room numbers

In order to more easily orient oneself in the building, all rooms are allocated a room number according to the following pattern:

B0317 – the letter indicates the building section.

B0317 – the first and second digits indicate the floor.

B04**37** – the third and fourth digits indicate the location of the room within the block.



room number

Keep in mind that:

The same numerical combination can be found in all building sections. This means that the building section letter must be included to correctly locate the room.



Structure

Each floor of the building is comprised of both site-cast and prefabricated concrete supported by beams and columns. The structure can generally tolerate a load of 450 kg/m² with a uniform distributed load. Larger point loads can be placed in the building following an assessment by and consultation with the FM organisation.

On the 3rd floor of blocks B and C, as well as the 4th to 9th floors of blocks A, B, C and D, the floors have a natural frequency no lower than 8 Hz. This offers good conditions for placing equipment sensitive to vibrations on the floors, possibly on anti-vibration supports.

The ceiling height in the laboratories is 2.7 metres. The ceiling height above the open-plan workstations along the block facades is 3 metres.

Windows and doors

Biomedicum has no openable windows.

Each block has two doors in the facade for maintenance work and for cleaning the windows in the double-skin facade.

These doors must **not** be blocked when work is in progress. The doors must be openable by and comprise an emergency exit for anyone working inside the double-skin facade.

There are facade platforms and an internal cradle for cleaning the windows both inside and outside.

Keep in mind that the building's doors should be kept closed:

- for the climate.
- to maintain the pressure difference between different areas.
- to dampen noise.
- to contain any fires.
- to contain any chemical spills.
- to prevent unauthorised access.

Rules of conduct

Creating and maintaining a good work environment with high security requires that certain rules are established and respected.

For example, the following are **not** permitted:

- smoking indoors.
- pets on the premises.
- parking cycles indoors, other than in the cycle room on the 2nd floor.
- blocking doors to maintenance areas and installation shafts.
- blocking escape routes and communal areas with furniture and other objects.
- keeping doors open in the building's fire compartments other than by use of the door openers connected to the fire alarm.



ACCESSIBILITY

General

Biomedicum is designed to be accessible. There are some exceptions and these are due to the activities conducted.

Parking

For motorists with a disabled permit, there are designated parking spaces in the underground garage accessed from the ramp on Solnavägen. There are even designated parking spaces for motorists with a disabled permit on Solnavägen, where a drop-off and pick-up point can also be found.

Entrances and lifts

The building's entrances are accessible and all operations floors offer lift access.

Safety alarm in disabled toilets and rest rooms

Each block has disabled toilets and block A3 has two rest rooms.

Each disabled toilet and rest room is fitted with a safety alarm with a red button. The alarms trigger local audio and visual (red flashing light) signals outside the room in question. The alarm is also forwarded to a station that is staffed 24 hours a day.

The alarms can be cancelled inside each room by pressing the green reset button.



safety alarm



reset button

Changing rooms

The building has accessible changing rooms in block D2 with a shower with wheelchair access.

Auditorium

Spaces for wheelchair users are available in the front lower section of the auditorium, as well as in the rear higher section.



Temporary evacuation point

The building has temporary evacuation points where those with functional impairments can call for help in the event of an evacuation.

These evacuation points are located in the stairwells of blocks A and C on the 2nd to 10th floors and by the auditorium. On the 3rd floor, evacuation is made directly outdoors. Follow the emergency exit signs with the wheelchair symbol.



signage

A temporary evacuation point comprises a separate fire compartment and is equipped with an emergency phone for two-way communication. When you press the red button, an alarm is sent to a station staffed 24 hours a day. Voice communication is established with the evacuee and assistance is arranged.



sign at evacuation point



emergency phone



LIFTS

General

The building has a total of 11 lifts, with PH11 comprising a platform lift.

The lifts are equipped with a speech synthesiser which announces each floor, as well as notifications in case of emergency power and fire alarm operation.

Lift name	Lift type	Location	Max load	Door size (mm)	Car size (mm)
TH01	Goods and passenger lift	Building section A Floors 1-10	3500 kg / 46 people	W1800 x H2600	W2000 x D3150 x H2700
TH02	Goods and passenger lift	Building section C Floors 2-10	3500 kg / 46 people	W1800 x H2600	W2000 x D3150 x H2700
PH02	Passenger lift	Building section B Floors 2-10	1600 kg/ 21 people	W1100 x H2100	W2000 x D1600 x H2300
PH03	Passenger lift	Building section B Floors 2-10	1600 kg/ 21 people	W1100 x H2100	W2000 x D1600 x H2300
PH04K	Passenger and nitrogen lift	Building section B Floors 2-10	1600 kg/ 21 people	W1100 x H2100	W2000 x D1600 x H2300
PH06	Passenger lift	Building section D Floors 2-10	1600 kg/ 21 people	W1100 x H2100	W2000 x D1600 x H2300
PH07	Passenger lift	Building section D Floors 2-10	1600 kg/ 21 people	W1100 x H2100	W2000 x D1600 x H2300
PH08K	Passenger and nitrogen lift	Building section D Floors 2-10	1600 kg/ 21 people	W1100 x H2100	W2000 x D1600 x H2300
PH09	Passenger lift	Building section D Garage-Solnavägen	1275 kg / 17 people	W1100 x H2100	W2000 x D1400 x H2300
PH10	Goods and passenger lift	Building section D Floors 0-3	2200 kg / 29 people	W1400 x H2200	W1500 x D2700 x H2400
PH11	Platform lift	Building section C/D Floor 2	500 kg / 5 people	W900	W1100 x D1467



Lifts in case of fire

The lifts must not be used in a fire.

In the event of a fire, all lifts travel to a predetermined evacuation floor, any passengers are exited and the lifts are then locked down. In the event of a fire on the predetermined floor, the lifts travel to an alternative floor for evacuation.

Lift emergency signal

If a lift stops between floors, the emergency signal button should be pressed for at least 10 seconds. An alarm will sound outside the faulty lift and an emergency alarm with two-way communication will connect to the emergency lift service, which is staffed 24 hours a day. Personnel will be sent to free those trapped in the lift.

Lifts in case of power failure

In the event of a power failure, emergency power is activated to power the lifts.

Auxiliary power comes online and all lifts travel to the evacuation floor in a predetermined order where they are locked down. Inside the lifts, the Swedish text 'Nödströmskörning' (emergency power operation) scrolls across the display.

Nitrogen lifts

In conjunction with the special transport of liquid nitrogen, either lift PH04K or lift PH08K, which are equipped with oxygen alarms, shall be used. The nitrogen lift is called using a keycard and pressing the 'Aktiverad kvävekörning' button (activated nitrogen transport). A passenger lift will be called at the same time. When transporting nitrogen, no one is permitted to ride in the nitrogen lift.

On each floor outside the lifts, 'Prioriterad körning' (prioritised transport) is displayed and the lift call buttons are deactivated.

Once the nitrogen has been unloaded, the lift is restored to normal functionality by pressing the 'Deaktiverad kvävekörning' button (deactivated nitrogen transport).

Goods lifts

The goods lifts are only for authorised personnel and are operated by keycard.

The goods lifts are equipped with a key switch for priority transport. When priority transport is activated, the lift call buttons on each floor are deactivated.

For lift TH01, floor 0 is normally inaccessible and only available during major renovation work.



FIRE PROTECTION

Automatic fire alarm

The building is equipped with smoke detectors which when detecting smoke from a fire automatically trigger a fire alarm.

The evacuation signal is sounded by floor/block and comprises a siren which, in some rooms, is accompanied by a white flashing light.



siren



flashing light

On the ground floor, in the auditorium and in the atrium on the 3rd to 10th floors, the evacuation signal comprises a voice alarm in Swedish and English.

If a fire is confirmed, call 112.

If two smoke detectors have detected smoke, **the fire alarm is forwarded to the emergency services (SOS Alarm)**. You can trigger the fire alarm by using the red buttons along the escape routes.



push button in case of fire

Sprinklers

The building is equipped with an automatic water sprinkler system.

Triggered sprinkler alarms are **forwarded to the emergency services (SOS Alarm)**, Karolinska Institutet and Akademiska Hus. If a sprinkler is triggered in the garage, the evacuation signal for the garage is activated. Sprinklers on other floors do not trigger the evacuation signal.

A sprinkler head consists of a glass bulb which at 68°C or if damaged pops and begins dispersing water from the affected sprinkler head.



sprinkler head



Fire compartments

The buildings are divided into a number of fire compartments in order to prevent fire and smoke from spreading. Each fire compartment is separated by fire-resistance rated floors, walls and doors. In general, each stairwell, each floor of each block, the auditorium, lift shafts, maintenance areas, waste rooms and the garage comprise individual fire compartments.

The 10th floor has smoke curtains facing the slits in the lunchrooms to provide a smoke-free environment in the event of evacuation.

Doors between fire compartments

Some doors have an opener function in the door mechanics and can be held open with the push buttons found on the adjacent walls. The push buttons can be used to close the doors manually. If the fire alarm is triggered, they will be closed automatically.

Doors between fire compartments must never be held open with doorstops or the like.



door opener



EVACUATION

Escape routes

Evacuation plans are posted on each floor, showing escape routes, the locations of fire-extinguishing equipment, evacuation points in case of fire and the assembly point.

Escape routes are marked with green emergency exit signs. Escape routes, stairways and security controls must be kept accessible and **must not be used to store flammable materials**.

Close all doors behind you, as this slows both the development of the fire and the spread of hazardous smoke. **The lifts must not be used in a fire.**

In the event of a triggered fire and evacuation alarm, go to one of the fire displays found throughout the building.

Fire displays

Fire displays are installed throughout the building as part of the fire alarm system.

These displays provide information about where in the building fire has been detected and based on this suitable actions and escape routes can be determined. The fire displays are located by the lifts in each block and in the atrium on the 3rd to 10th floors and cannot be controlled manually.



fire display

All blocks need not be evacuated at the same, so evacuation takes place section by section.

Staff familiar with the premises evacuate to the diagonally opposite block if possible. Otherwise, they are to evacuate to the designated assembly point.

Emergency exit doors

The angled green emergency exit handles may only be used for emergency evacuation as they trigger the alarm when used.



angled emergency exit handle



LOCAL ALARMS

Pressure deviation – cell culture lab

The laboratory sections are designed with a pressure difference between certain labs and anterooms. When the pressure drops upon the opening of a door, a local alarm is triggered which signals a pressure deviation until the door is closed.

The alarm is local and comprises a red light in the room.

If the alarm is triggered the door must be closed. A green light indicates that the pressure difference has been restored and cell culture activities can continue.



pressure deviation in lab

Oxygen alarm

Rooms/labs in which liquid nitrogen is handled are fitted with an alarm that is triggered if the oxygen level drops too low. The alarm is local and is indicated by a sound and a blue flashing light outside the affected room. **It is important** that upon seeing and hearing this alarm that you check whether anyone is in danger.



oxygen alarm flashing light

Chemical spill alarm

In the event of a chemical spill requiring evacuation, an alarm can be activated manually with one of the blue push buttons. The push buttons are found by entry doors in the general lab and activate an alarm within the block. The alarm is local and is indicated by a sound and a blue flashing light.

Close doors to prevent the chemical spill from spreading.

Once the block has been evacuated, only authorised personnel may enter the premises until decontamination is completed.



chemical spill push button



flashing light - chemical spill



FORWARDED ALARMS

Freezer room safety alarm

Freezer rooms are fitted with safety alarms with red buttons. The alarms trigger local audio and visual (red flashing light) signals outside the room in question. The alarm is also forwarded to a station that is staffed 24 hours a day.

The alarms can be cancelled inside each room by pressing the green reset button.

Freezer rooms on the 2nd floor are fitted with an emergency opener.



emergency signal



emergency opener 2nd floor

Other alarms

For other forwarded alarms, such as in disabled toilets and lifts, as well as in the event of fire and triggered sprinklers, see the sections Accessibility, Lifts and Fire protection.



ELECTRICITY

Power supply

The normal power supply (referred to as B power) supplies essentially all equipment and installations, including lighting, electrical outlets and power outlet panels.

Auxiliary power (A power) comes online in case of a power failure and takes over the power supply for lifts, process ventilation units, KB rails and guide lights.

The transition between normal power and auxiliary power is not instantaneous, rather it takes between 15 seconds and 2 minutes. Auxiliary electrical outlets are marked in red.

If required, a completely uninterruptible power supply, or UPS for short, can be installed following a technical assessment of the concerned activities. The cost falls to the concerned operations.

Electrical rooms

Distribution boards are located in locked electrical rooms in the building.

In the case of a power failure/tripped fuse, users can check the following before contacting Akademiska Hus for further troubleshooting.

Check and reset:

1. Residual-current device in power outlet panel.
2. Fuse in electrical outlet on KB rail.

Outlets in laboratories

The labs have electrical outlets on the KB rails installed on the ceiling. Electrical equipment and power outlet panels equipped with electrical outlets and residual-current devices can be connected to these rails.

Electrical equipment that requires more than 16 amps must be powered directly from a distribution board.



lab bench
power outlet panel



electrical outlet on KB rail.



auxiliary electrical outlet on KB rail



LIGHTING

General

Lighting in entrances and stairwells is automatically controlled by timers and acoustic sensors. During the daytime, general lighting is controlled by motion detectors and daylight sensors. A few lights on each floor are always lit 24 hours a day, so-called guide lights.

Lighting in toilets, disabled toilets, cleaning cupboards etc. is automatically controlled by motion detectors.

A push button panel for various lighting scenarios in the atrium is installed in reception.

Offices, labs and smaller meeting rooms

The lighting in offices and smaller meeting rooms is controlled manually by push buttons. When no one remains in the room, the lighting is automatically switched off by motion detectors after a set time.

Open-plan workstations

The lighting in open-plan workstations is individual, with the ceiling lamp uplights controlled automatically by motion detectors and daylight sensors. The ceiling lamp downlights are controlled manually with a pull cord.

Pull cords

The ceiling lamp downlights in offices and by open-plan workstations can be switched on and off with the pull cord on each lamp. Turn on and off with a short pull and regulate the lighting level with a long pull. Downlights which have been turned on are turned off automatically by motion detectors.



pull cord

Conference rooms and larger meeting rooms

In these rooms, the lighting can be controlled with a push button panel with different lighting scenarios. Switch on the lighting by selecting one of the preset lighting scenarios with the buttons numbered '1' to '4'. Use the '0' button to switch off the lighting.

If no one is in the room, the lighting is automatically switched off by motion detectors.



push button panel



Auditorium

In the auditorium, the general lighting is switched on and off with a spring-return push button. The auditorium is also fitted with a push button panel for various lighting scenarios. Switch on the lighting by selecting one of the preset lighting scenarios with the buttons numbered '1' to '7' and switch it off with the '0' button.

If no one is in the room, the lighting is automatically switched off by motion detectors.



spring-return push button



push button panel



INDOOR CLIMATE

General

To achieve good air quality in the premises, a needs-based ventilation system (VAV, Variable Air Volume) is installed. This means that the airflow is adjusted automatically depending on where in the building the room is located, motion detector signals and heat-emitting equipment. On very hot summer days, the indoor temperature is permitted to rise slightly.

In areas with open-plan workstations, the ventilation is designed for about 70% occupancy.

Extended ventilation operation – offices

Outside normal office hours, the ventilation in offices is turned off to save energy.

If necessary, such as if working late, the ventilation can be started manually with a push button found in the corridor. The ventilation will then operate in that block for a preset time interval.



start ventilation

In laboratory areas, the process ventilation system operates 24 hours a day.

Radiators

The building has radiators to provide heat and prevent drafts. They are controlled automatically and cannot be set manually.

Control panel

The normal temperature in meeting rooms and equipment niches can be altered slightly with a control panel on the wall. The current temperature is shown on the display and the push buttons with the up and down arrows raise and lower the temperature, respectively. The airflow can be forced manually with the push button with a propeller symbol.



control panel

Carbon dioxide sensor

The premises are equipped with carbon dioxide sensors for automatic control of the ventilation system. The sensors detect the number of people in the room and adjust the ventilation accordingly.



Forced ventilation

Meeting rooms and lunchrooms are fitted with a push button to force the ventilation. The airflow then increases for the set time.



forced ventilation

Climate protection

Biomedicum has a double-skin facade with internal sun shades for climate reasons. These are controlled automatically by sunlight and the season.

The facade in the general lab has exterior sun shades which can be lowered by zone and manually with remote controls. Lowered sun shades return to automatic control once every 24 hours.



push button sun shades

Blackout curtains

The auditorium is fitted with blackout curtains which are controlled from the AV panel.

The building's smaller meeting rooms have motorised blackout curtains which are operated by push buttons.



push button blackout curtains



ENERGY AND THE ENVIRONMENT

Energy

The following functions and design aspects give the building a favourable indoor climate and low energy use.

- The ventilation in office spaces is switched off outside office hours.
- The ventilation is controlled automatically by the number of people and current heat load.
- The lighting is controlled by motion detectors.
- The building's light sources are energy-efficient LED lamps.
- Heating and cooling energy are stored in the bedrock via 300-metre deep boreholes outside the building. Heat pumps utilise this heating and cooling energy in an efficient manner.
- The roof has solar panels on south and west facing sections.

Miljöbyggnad Silver

The building is certified 'Miljöbyggnad Silver' in compliance with the Sweden Green Building Council's certification system. This system addresses the most important environmental issues and makes it easier to compare the environmental performance of different buildings. Miljöbyggnad covers areas such as energy, indoor environment and chemical substances and is assessed according to the following criteria for newly built buildings.

- Energy use
- Thermal power requirement
- Solar thermal load
- Energy type
- Acoustic environment
- Radon
- Ventilation standard
- Nitrogen dioxide
- Damp protection
- Thermal climate – winter
- Thermal climate – summer
- Daylight
- Legionella
- Construction material documentation
- Phasing out of hazardous substances

Keep in mind!

In order for the building to retain its certification when reassessed, the property owner and tenant need to cooperate. The Miljöbyggnad system includes requirements for how the building is used and how the premises are remodelled. For example, if refurbishing then daylight requirements need to be considered, and if altering construction material choices then they need to be assessed in accordance with 'Byggarubedömningen' (BVB).

You can read more about Miljöbyggnad at www.sgbc.se.

Green roof

The building has a sedum roof which comprises stoncrop family sedum plants laid out on a special mat. This has a positive environmental impact in that, for example, the green roof:

- Insulates the interior of the building and thereby saves energy.
- Protects the waterproofing layer from UV light (which otherwise breaks down the surface layer material) and protects the roofing substrate from temperature fluctuations.
- Reduces and delays stormwater flows.
- Absorbs and binds air pollutants.
- Dampens noise and provides an aesthetically pleasing appearance.
- Creates new biotopes for birds, butterflies, insects and so on.