

Mineroom Student Residence Leoben

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Building Type : Student residence
Construction Year : 2016
Delivery year : 2016
Address 1 - street : 2700 LEOBEN, Österreich
Climate zone : [Dfb] Humid Continental Mild Summer, Wet All Year

Net Floor Area : 5 900 m² NGF
Construction/refurbishment cost : 12 500 000 €
Number of Dwelling : 139 Dwelling
Cost/m2 : 2118.64 €/m²

General information

The mineroom Leoben student dormitory was opened on October 1, 2016 after only 11 months of construction. With the Montan University, Leoben accommodates over 4,000 students. The hostel will be a contemporary home for 201 international students during their time in Leoben. The close connection of the region and the university to nature and its resources should be reflected in the building. Also quotes from the mining, with which the city and the university have been connected for generations, can be found in the building again.

Urban design concept and building structure. The structure was developed from a perimeter block development, which opens to the lower development in the west. This protects courtyard and garden from street noise. The components are staggered at the height of EG + 5 to EG + 3 and thus adapted to the smaller-scale development of the neighboring plots. By lowering the southern connecting tract, the tanning of the inner courtyard is optimized. On the southern facades, "green walls" of plant troughs were provided, which positively influenced the microclimate in the street and courtyard. The recessed and transparent ground floor zone provides an insight into the student life and views into the courtyard and creates a weather-protected meeting zone in front of the building.

Change as a design element. Inspired by the liveliness and the play of colors of the ore stone, the formally clear structures were covered with plastic, multi-colored wooden formwork. The pre-grayed shuttered formwork, which repeatedly bursts out of the smooth, untreated larch wood formwork, runs vein-like over the building and will gradually discolour irregularly in various grays, browns and reds.

Stuben for buddy. Stollen lead through the building as irregularly wide corridors, break through the building skin again and again and open out in the form of generally used rooms and apartment common areas. As a result, all aisles are naturally exposed. In order to further emphasize the bond with Montan University, large-format photo wallpapers with motifs from mining and technology were etched in the rooms and hallways.

Construction. With the exception of the entrance area, the basement and the two staircases, the entire building was built in timber construction. The outer walls consist of a prefabricated, with mineral wool-finished timber frame construction. They mostly have no supporting function. Horizontal bracing is provided by partition walls made of cross laminated timber wall elements in conjunction with BSH ceiling panels. In the building about 1,900 m³ of wood were used for the supporting structure and the façade, thereby binding approx. 2,000 tonnes of CO₂. Partition walls and ceilings are fitted with plasterboard liners to meet the fire and sound insulation requirements. Beams and columns were over-dimensioned to burnup and could therefore be left visible.

Upcycling. The door cut-outs of the KLH interior walls were turned into mobile furniture. Tables, benches, stools and sideboards bring the wood

character back into the living and common areas. The use of 250 m² glulam instead of chipboard, which could save some 25 tons of CO₂.

The house offers a wide range of residential and common areas. Single apartments, double rooms as well as shared apartments for 2-5 residents enable the students a differentiated housing offer. On each floor, so-called parlors offer individual retreat areas. On the ground floor are common areas such as the extended living room, a laundrette, music practice room, meeting and study rooms, gym and a multi-purpose room for chilling out and celebrating. In the courtyard there is seating and table tennis, in the garden wooden decks for lounging.

The **mineroom** is designed as a passive house. In **addition to** a highly efficient ventilation system with heat and moisture recovery, an optimized building envelope and the largest possible PV system, power-consuming components have also been optimized and standby functions avoided. The entire object was equipped with LED lighting. A space or empty piping for a possible battery storage have already been provided.

By means of water saving valves with an extended cold water range (cold water in the middle position), the hot water consumption, which is above average in the houses of the OeAD-WV from experience, should be reduced.

Certification. The building is klima: aktiv GOLD certified. Certification by the Passive House Institute Darmstadt has also been carried out. Passive House Plus Standard was achieved.

Data reliability

3rd part certified

Stakeholders

Contractor

Name : ARGE Swietelsky Baugesellschaft m. b. H. & Weissenseer Holz-System-Bau GmbH - Totalübernehmer

Construction Manager

Name : ARGE Swietelsky Baugesellschaft m. b. H. & Weissenseer Holz-System-Bau GmbH - Totalübernehmer

Owner approach of sustainability

The OeAD-WohnraumverwaltungsGmbH as a dormitory operator offers annually about **12,000 students** accommodation in Austrian university towns.

A cornerstone of the OeAD is: "**Successive generations are close to our hearts:** through an ecologically-oriented design, we actively reduce the ecological footprint of our guesthouses, giving students an insight into the benefits of this form of responsible building and thus help raise awareness of the next generation."

Since 2005, the guest houses are only built in the minimum standard passive house.

Due to the increasing number of students, especially from abroad, the Montanuniversität turned to OeAD-WV with the wish to build a dormitory in Leoben. Together with the Wohnungs- und Siedlungsgenossenschaft Ennstal as the client, a detailed description of the construction and equipment was prepared and a loaded competition was praised. The goal of mineroom Leoben was the optimization of the Passive House standard towards positive energy and the use of ecological, sustainable building materials.

Architectural description

The student dormitory mineroom Leoben was opened on 1 October 2016 after only 11 months of construction. Leoben is the only non-state capital to have a world-renowned university with more than 4,000 students from all continents. Since there was a great need for accommodation for students, the Gemeinnützige Wohn- und Siedlungsgenossenschaft Ennstal in cooperation with the city of Leoben and the Austrian Exchange Service Housing Administration (OeAD-WV) developed a concept for the competition for a dormitory for 200 students in passive house and timber construction. The building site is located in the south-west of Leoben. The main square of Leoben is at a walking distance of 1.5 km, the university is 1.8 km away. Various local utilities and a small shopping center can be reached within a 2-minute walk. The surrounding area character is characterized by residential development, in the east with four to five-storey, in the south with up to three storey residential buildings, in the east leads a busy street. On the almost level plot was still the former indoor pool of Leoben, which was completely demolished. The dormitory will be for 201 international students during their time in Leoben, one-time home. The close connection of the region and the university to nature and its resources should be reflected in the building. Also quotes from the mining, with which the city and the university have been connected for generations, can be found in the building. Urban concept and building structure. The structure was developed from a block edge development, which opens to the lower development in the west. This protects the courtyard and garden from the street noise. The components are graded in the amount of EG + 5 to EG + 3 and thus adapted to the smaller-scale development of the neighboring plots. The property was designated as a building land of the core area excluding shopping centers. In the competition, a building density of up to max. 2.5 from the point of view of the municipality Leoben allows, but a density of approximately 2.0 should be sought. The density of student dorm mineroom is 2.12. By lowering the southern connection tract, the tanning of the inner courtyard is optimized. On parts of the southern façades "green walls" of plant troughs were provided which positively influence the microclimate in the street and courtyard. The recessed and partially transparent ground floor zone provides insights into the student life and views into the courtyard and creates a weather-protected meeting zone in front of the building. Change as a design element. Inspired by the liveliness and the play of colors of the eruptive stone, the formally clear structures were covered with plastic, multi-colored wooden formwork. The pre-grained forge formwork, which repeatedly breaks out of the smooth untreated larch wood formwork, runs vein-like over the building and over time will discolour irregularly in various grays, browns and reds. Stuben für Kumpel. Stollen lead through the building as irregularly wide corridors, always breaking through the building skin and opening out to the outside in the form of generally used living rooms and apartment common areas. This will naturally expose all the aisle and stairwell area. In order to further emphasize the bond with the Montanuniversität, large-scale photo wallpapers with motifs of mining and engineering were identified in the rooms and hallways. The photos were taken by the Rector of the Montanuniversität Mr. Univ.-Prof. Dr. Wilfried Eichlseder provided. Construction. With the exception of the entrance area, the basement and the two staircases, the entire building was built in timber construction. The exterior walls are made of a prefabricated, wood wool-finished timber frame construction. They have predominantly no supporting function. Horizontal bracing is provided by the partition walls made of laminated plywood wall elements in conjunction with BSH ceiling panels. In the building approx. 1,900 m³ of wood were used for the support structure and the façade, thus binding approx. 2,000 tonnes CO₂. Partition walls and ceilings are fitted with plasterboard liners to meet the fire and sound insulation requirements. Beams and columns were oversized for burnup and could therefore be left visible.

Energy

Energy consumption

Primary energy need : 80,69 kWhpe/m².year
Primary energy need for standard building : 153,00 kWhpe/m².year
Calculation method : Other
Final Energy : 50,12 kWhfe/m².year
Breakdown for energy consumption :
HEB (heating energy demand): 14.13 kWh / m2a
HHSB (Household Electricity Demand): 16.43 kWh / m2a
And PEB (primary energy demand): 80.69 kWh / m2a

Envelope performance

Envelope U-Value : 0,22 W.m⁻².K⁻¹
More information :
Checking the tightness by means of a blower door test n50 = 0.27 l / h in accordance with Ö standard EN 13829, method A
Building Compactness Coefficient : 0,06
Indicator : EN 13829 - n50 » (en 1/h-1)
Air Tightness Value : 0,27

Renewables & systems

Systems

Heating system :

- Urban network
- Water radiator
- Low temperature floor heating

Hot water system :

- Urban network

Cooling system :

- No cooling system

Ventilation system :

- Double flow heat exchanger

Renewable systems :

- Solar photovoltaic

Renewable energy production : 50,00 %
Other information on HVAC :
Yield PV 2017 92367kWh
PV system on the roof
388 PV modules in east-west orientation
Total rated power 116kWp
Total savings CO2 per year: 12,600 kg

Environment

GHG emissions

GHG in use : 14,26 KgCO₂/m²/year

Water management

Use of water saving valves with extended cold water area to reduce the disproportionately high hot water area in dormitories.

Indoor Air quality

Use of a chemical management to avoid air pollutants by building materials and materials used. Air pollutant measurement prior to occupancy

of the building.

Products

Product

Trox Cube ventilation unit

BPS Engineering in Zusammenarbeit mit der Fa. Trox

office@bps.co.at

<http://www.bps.co.at/content/bps/>

Product category : HLK / Belüftung, Kühlung

The ventilation unit is located in component B on the first floor in the building services room. The regulation takes place via the control system in the ventilation center. The ventilation unit was split into the ventilation center via a mounting opening in the north of the building and assembled in the building services room.

The ventilation unit is a central ventilation unit with 2 parallel rotary heat exchangers with heat and moisture recovery. The parallel rotating heat exchangers and the use of special pocket and pleated filters (F9) reduce the flow resistance of the ventilation system and thus reduce the energy consumption of the system. The device was developed by the BPS-Engineering building technology office.

- Air handling unit Trox Cube with 2 rotary heat exchangers
- Air flow 4,500m³ / h per rotation exchanger
- Reverse heat number (EN308) 90.58%
- moisture content 73.14%.



Post-tie facade

Schüco

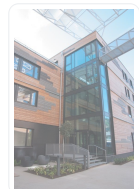
<https://www.schueco.com/web2/de>

Product category : Rohbau / Struktur, Mauerwerk, Fassade

Alu-Post Bolt façade system Schüco Facade FW 50 + .SI

The Schüco post and rail façade FW 50 + .SI achieves today's climate targets - Passive House certified.

Schüco FW 50 + .SI is today the thermal insulation standard in the field of mullion-transom facades. The use of highly heat-insulating materials also limit freedom of design and simple and efficient processing.



Uf value (> =)

0.7

Min. View width

50 mm

Max. Glass thickness

64 mm

Max. mass

700 kg

statics

7160.6 cm⁴

surfaces

powder

Air permeability

AE900

Water tightness

RE1200

burglary

RC3

shock resistance

I5 / E5

crash safety

fully crash-proof

Costs

Urban environment

The site is located in the south-west of the regional center of gravity of Leoben at the intersection of the busy Landesstraße 101 / Josef Heißl-Straße and the Anzengrubergasse. The area is designated as a residential area without a central function. According to the regional development program for the planning region Leoben, the planning area is within the public transport quality. The permissible building density was set by the municipality with a maximum of 2.5. The railway line of the ÖBB is 250m west of the property, but is only used more for the traffic of the Gösser beer brewery. The city's main square is at a walking distance of 1.5 km, and Montan University is approximately 1.8 km. Immediately adjacent to the property are bus stops for the bus line Göss-Donauwitz.

On the almost level plot was the former indoor pool of Leoben, a building from the 70s, which was a landmark point at this intersection. The building followed the street alignment in the course of Josef Heißl-Strasse and Anzengrubergasse and despite the amorphous shape at this corner of the street. It was completely demolished in the course of the construction work.

The surrounding character of the area is characterized by three residential areas, most of which define the street area as a perimeter block. To the east is a five-storey U-shaped residential complex. The south-western corner of this development is opposite the site. The courtyard of this building opens onto the street space. On this green space there is a one-storey commercial building. To the south and west along the Josef-Heißl and Anzengrubergasse are three- and four-storey residential buildings.

In the north, in the direction of the center, there are some supermarkets and specialty stores, the building structure is disorderly here, the street space is characterized by advertising signs and adjacent parking lots.

The building of the student dormitory was developed from a block edge development, which opens to the lower development in the west. This protects the courtyard and garden from the street noise and sums up the street space.

The building is located on Josef Heißl-Straße at a height of ground floor + 5 and set off to the north by one floor. Smooth facades form a clearly defined counterpoint to the subsequent demolished development structure. The façades are accentuated by colored frames around the large windows of the common rooms and by loggia-like recesses in front of the living areas of the residential communities in which plant troughs with kitchen herbs are arranged. The northern building body does not run parallel to the basic boundary but is aligned at right angles to the tract at the Josef Heißl road. This opens the yard to the garden. The location of the covered bicycle storage area in the north creates a semi-public space at the north-eastern corner of the building on Josef Heißl-Straße. This forms the transition to the side entrance and the bicycle parking spaces. In the middle of this square is a "house tree" and benches invite you to linger. In close proximity to this square is the bus stop so that this space can be used by both students and waiting people.

The recessed and partially transparent ground floor zone, in the area of the common areas of the home, provides insights into the student life and views into the courtyard and creates a weather-protected meeting zone in front of the building. An information screen informs here about news from the student dorm and weather-protected Fahrradbügelermöglichen visitors parking their "bike". This return makes the building's internal structure visible, also from a constructive point of view: the general area on the ground floor, which is indented, is solid in steel, and the study areas are timbered.

At the southern facade in Anzengrubergasse, the buildings are graded at the level of EC + 5, EG + 3 and EG + 2, and thus adapted to the smaller-scale development of the neighboring plots. By lowering the southern connecting tract, the tanning of the inner courtyard is optimized and the building in the Anzengrubergasse, also by a return of the lower building part, structured in smaller pieces. Parts of the south façades on Anzengrubergasse and in the courtyard have been provided with "green walls" of plant troughs, which positively influence the microclimate through evaporation, filtering of fine dust, release of oxygen and the sound-absorbing property of the vegetation. In the Anzengrubergasse, this green wall on the connection section fills the volume up to the building line and "completes" the building with it.

At the end of the south wing, a driveway leads to the parking spaces on the property. Under a cantilever there are 6 covered parking spaces two with an e-gas station. There are international students in the home

Land plot area

Land plot area : 3 214,00 m²

Built-up area

Built-up area : 1 440,00 %

Parking spaces

Projected 100 covered bicycle parking spaces directly at the entrance, possibility of housing 40 parking spaces on the property demonstrated, built 20 PKW parking spaces. Since the dormitory is inhabited by international students, the Stzllplatzbedarf is small, therefore, the area of 14 parking spaces was provided with sports field markings and is available to the students for activities. Charging facilities for e-bikes and e-cars are available.

Building Environmental Quality

Building Environmental Quality

- indoor air quality and health
- consultation - cooperation
- acoustics
- comfort (visual, olfactive, thermal)
- energy efficiency
- renewable energies
- mobility
- building process
- products and materials

Contest

Reasons for participating in the competition(s)

ARCHITECTURE

The reference to the city of Leoben and the university to nature and its resources is reflected in the building Change as a design element, pre-graded formwork forms a vein over the untreated larch wood formwork, the façade will discolour irregularly over time Continuous space-forming edges preserve the closed street space in Anzengrubergergasse and extend the street space in Josef Heißl-Straße towards the city Blockrandbebauung protects the courtyard and the garden from street noise+ By lowering a southern part of the building sun-window to the yard

+ "Green wall" in front of south-facing façade parts in the courtyard and in Anzengrubergergasse, positive effect on the microclimate

The recessed ground floor zone along Josef Heißl-Straße and on the corner of Anzengrubergergasse provides insights into student life and views into the inner courtyard Natural lighting of the access zones, reduction of power consumption for lighting covered bicycle parking spaces next to the entrance

COOPERATIVE BUILDING

Architectural competition with general contractor and price guarantee as a basis Integration of the executing company and the specialist planner already in the competition phase ambitious schedule with a total of 18 months planning and construction time requires a high degree of responsiveness in decisions, flexibility and solution-oriented action by all parties involved Local building supervision (ÖBA) by the client, but support by the team of architects to ensure the architectural quality in agreement with the general contractor (architects are subcontractors of the general contractor!) continuous partnership working of all participants with the focus on completing the building in the best possible quality in the given time, meeting at eye level Opening of mineroom on schedule after only 11 months of construction

SUSTAINABILITY

Wooden construction except entrance, cellar and staircase 1,900 m³ of installed wood binds 2,000 t of CO₂ Upcycling, door cut-outs of the KLH walls become mobile furniture, 250 m² of chipboard are saved and another 25 t of CO₂ bound Passive House Plus Standard with high-energy-efficient ventilation system+ Use of all roof areas for the largest possible photovoltaic system

Optimization of power-consuming components and avoidance of standby functions International students become multipliers and carry the idea of a passive house and energy-efficient construction to their home countries

CONCEPT House technology

Building envelope passive house standard according to PHI Darmstadt Photovoltaic system 388 PV modules in east-west orientation occupied, modules monocrystalline á 300Wp with 3 inverters. Total rated power: 116 kWp Total production per year: 105,000 kWh Total CO₂ savings per year: 12,600 kg / a Floor space and piping for power storage already provided. Use of LED lighting throughout the building Motion detector and twilight switch in the general areas Comfort ventilation system with parallel rotary heat exchanger and use of special pocket and pleated filters to reduce the flow resistance of the ventilation system Ventilation unit Trox Cube with 2 rotary heat exchangers Air volume flow 4,500m³ / h per rotation exchanger Re-heat number (EN308) 90.58% Moisture content 73.14%.

Lifts with recovery of braking energy Use of water saving valves with extended cold water range to reduce hot water consumption Coverage of residual heat demand and hot water treatment with district heating (process waste heat from VOEST Alpine Stahl) Charging for e-bikes and electric cars

BUILDING DATA

Land area 3,214 m² Built area 1,449 m² Gross floor area 7.196 m² Usable area home 5,900 m² Total number of homes 201 Total accommodation 139

DATA BUILDING PHYSICS

Exterior wall 0.104 W / m²K

Roof 0.067 W / m²K

Ceiling against unheated 0,091 W / m²K

Windows / Uw

Building candidate in the category



Energie & gemäßigtes Klima



Abstimmung der Internet-Benutzer

