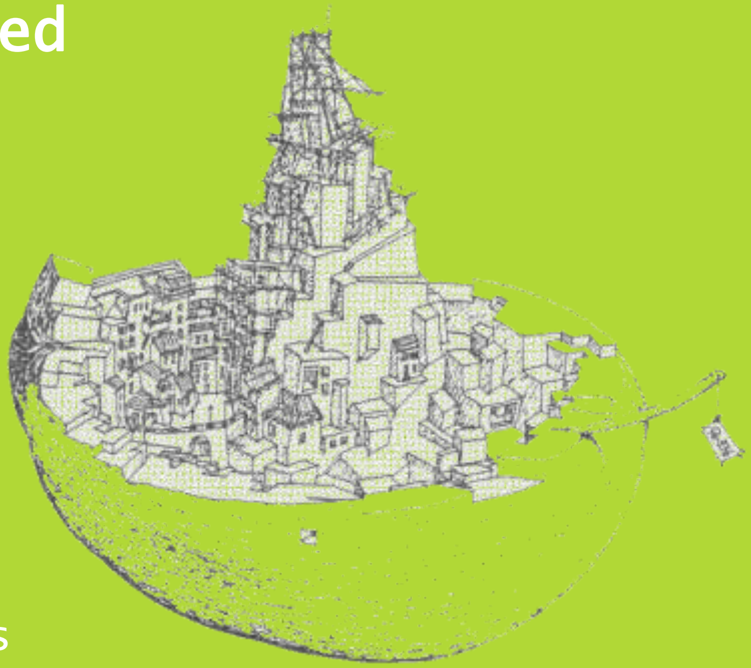
University of Natural Resources and Applied Life Sciences, Vienna

Resource-orientated Constructions



Sustainable and future reliable Architecture with resource orientated Constructions

Sustainability

Historical Development:

The term originates in German language from the **forest industry.** First mentioned in **12th century.**

1144: Forest arrangement of the alsatian cloister Mauermünster – „**not to cut more wood than it can grow back again**“.

1480: Requirement - „**to preserve the forest, because the progeny will once also need it**“.

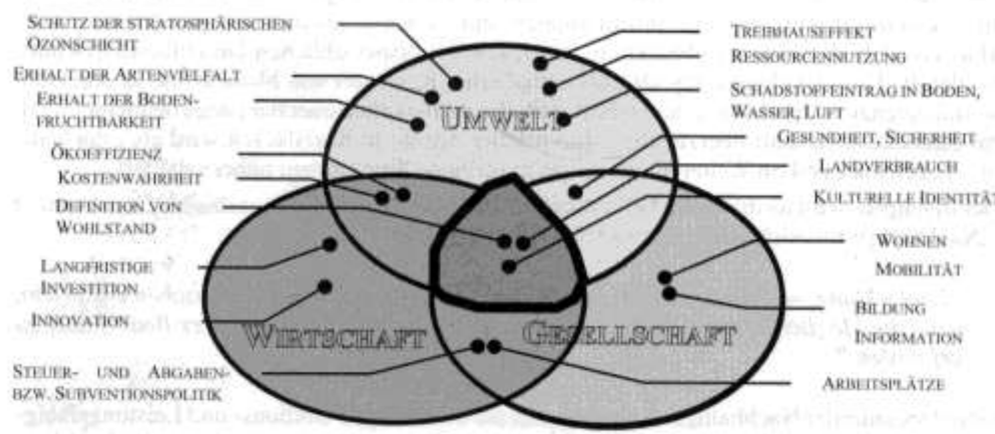
1713: Saxony Captain Hans Carl von Carlowitz demanded in „Sylvicultura Oeconomica“, „**that a continuing sustainable use should become indispensable**“.

1992: **Earth Summit in Rio de Janeiro** defined the sustainable development as a development, that can be continued over the whole earth without affecting the natural balance and the society in their functionality.

1997 and 1998 the EN ISO 14.040 and 14.041 were published, handling the **Ecobalancing**, replacing the simple SETAC Scheme.

1999 **Contract of Amsterdam**: Sustainability is and intangible part of the European Union.

2001 Göteborg: European council adds the environmental dimension to the social and economic dimension.



[Quelle: GRAUBNER, C.-A., HÜSKE, K. 2003]

Resources in Building Industry

Energy: for Material production, operating buildings, demolition and disposal

Soil: ground for building, living space for organisms and production of biomass, oxygen and drinking-water

Water: living space, origin of life

Resources: renewable vs. non-renewable resources.

Rock and Earth Caves: the earliest forms of human housing

Advantage: Living temperature in the cave=middle-year temperature of the surrounding, Summer – cool, winter –warm, constant

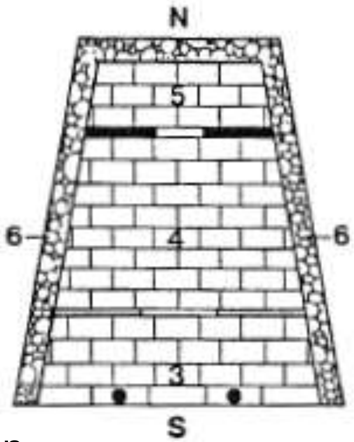
Examples: in the valleys of Dordogne and Vézére (F), Göröme (Turkey), Matmata (Tunisia), Loyang (China), Montezuma Castle (Arizona), Mesa Verde (Colorado), Matera (Apulien)

Höhlenwohnungen in Matmata, Tunesien

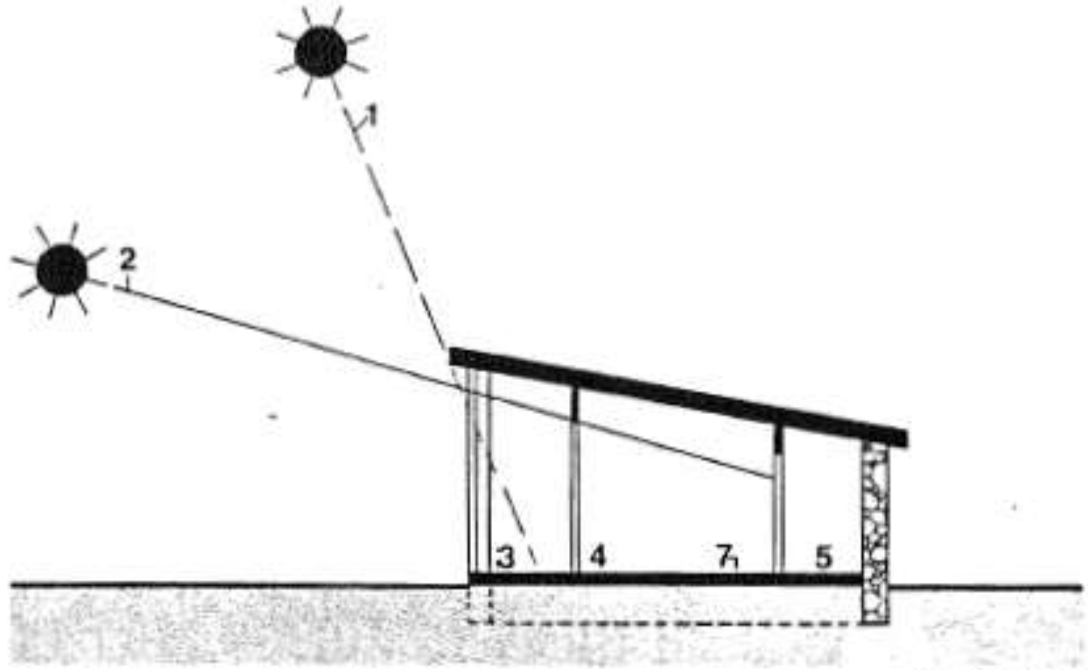
Matera

Matera, Apulien

Sunhouse of Socrates (469 – 397 v. Chr.)

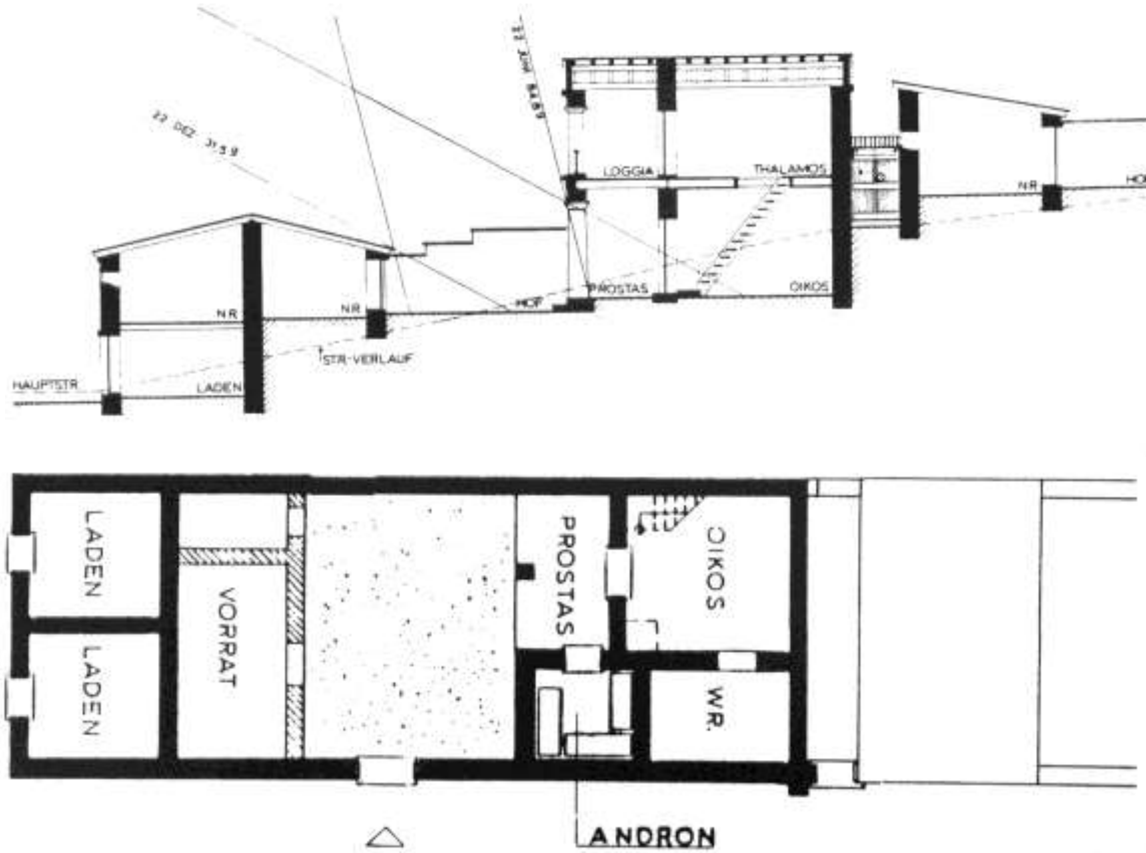


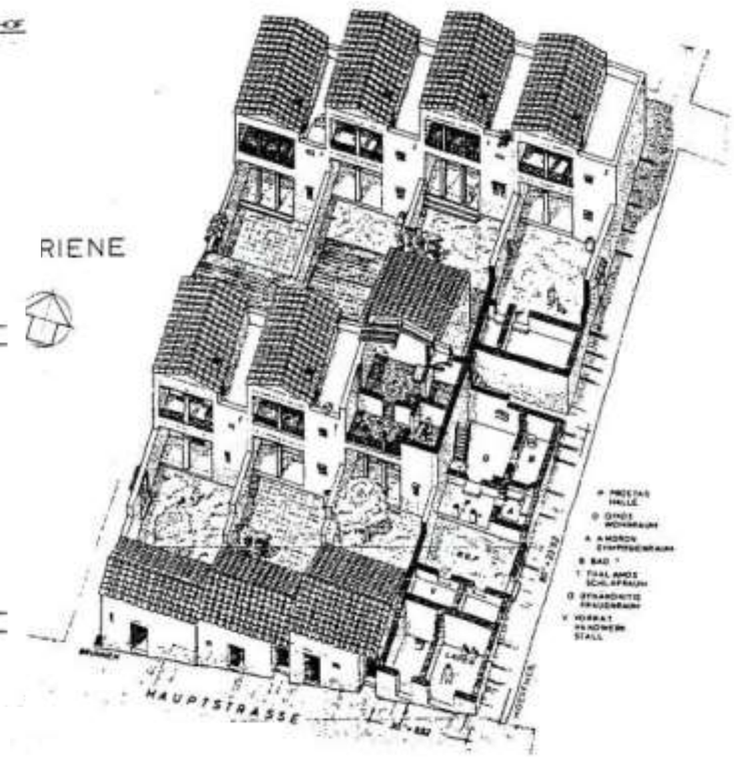
Floor plan



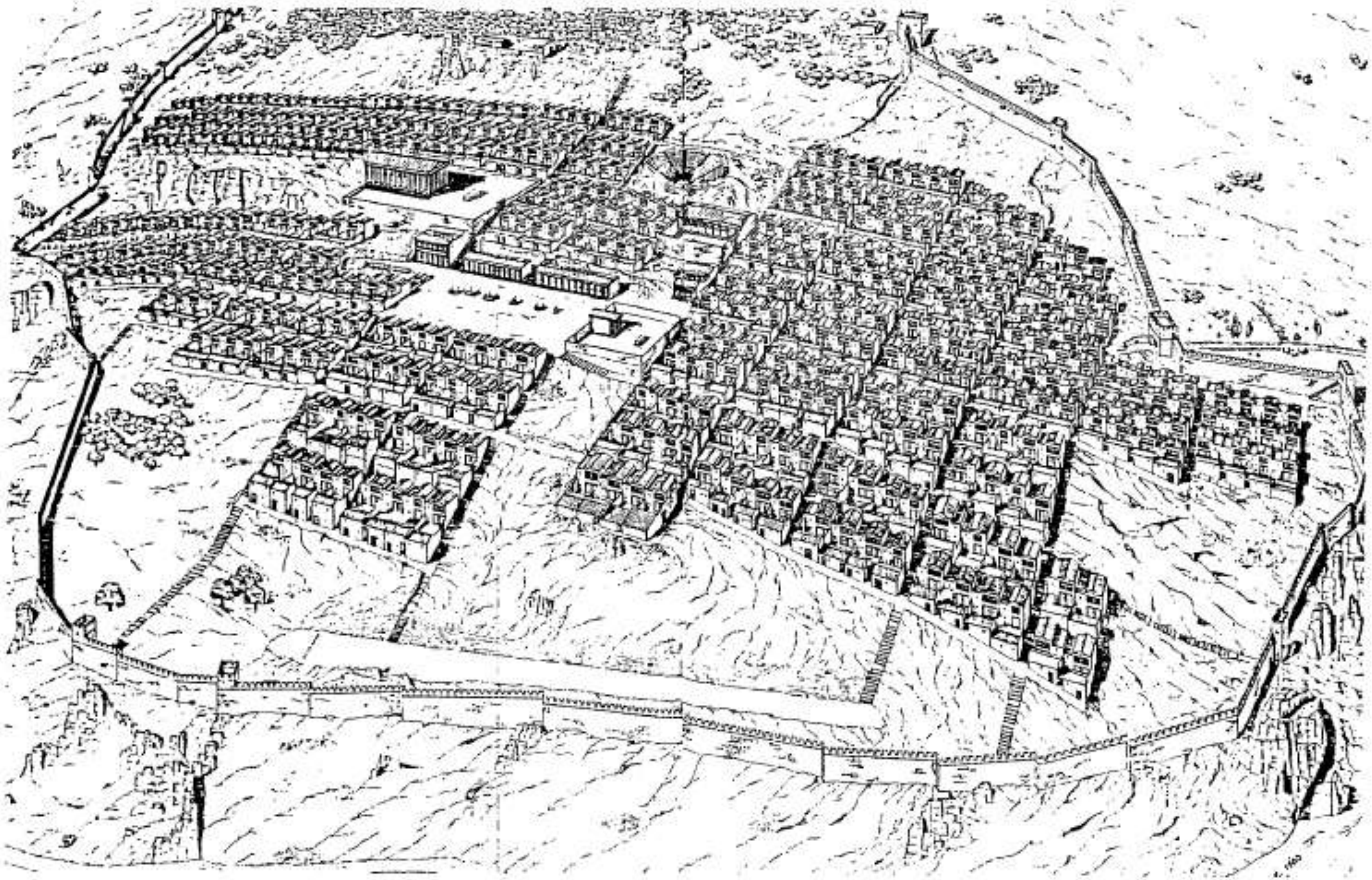
Cross section

Legend:
3 Terrace, Forecourt
4 Living space
5 Storage room, also buffer zone
6 Massive Wands for accumulation of heat
7 Stonefloor, also heat accumulation

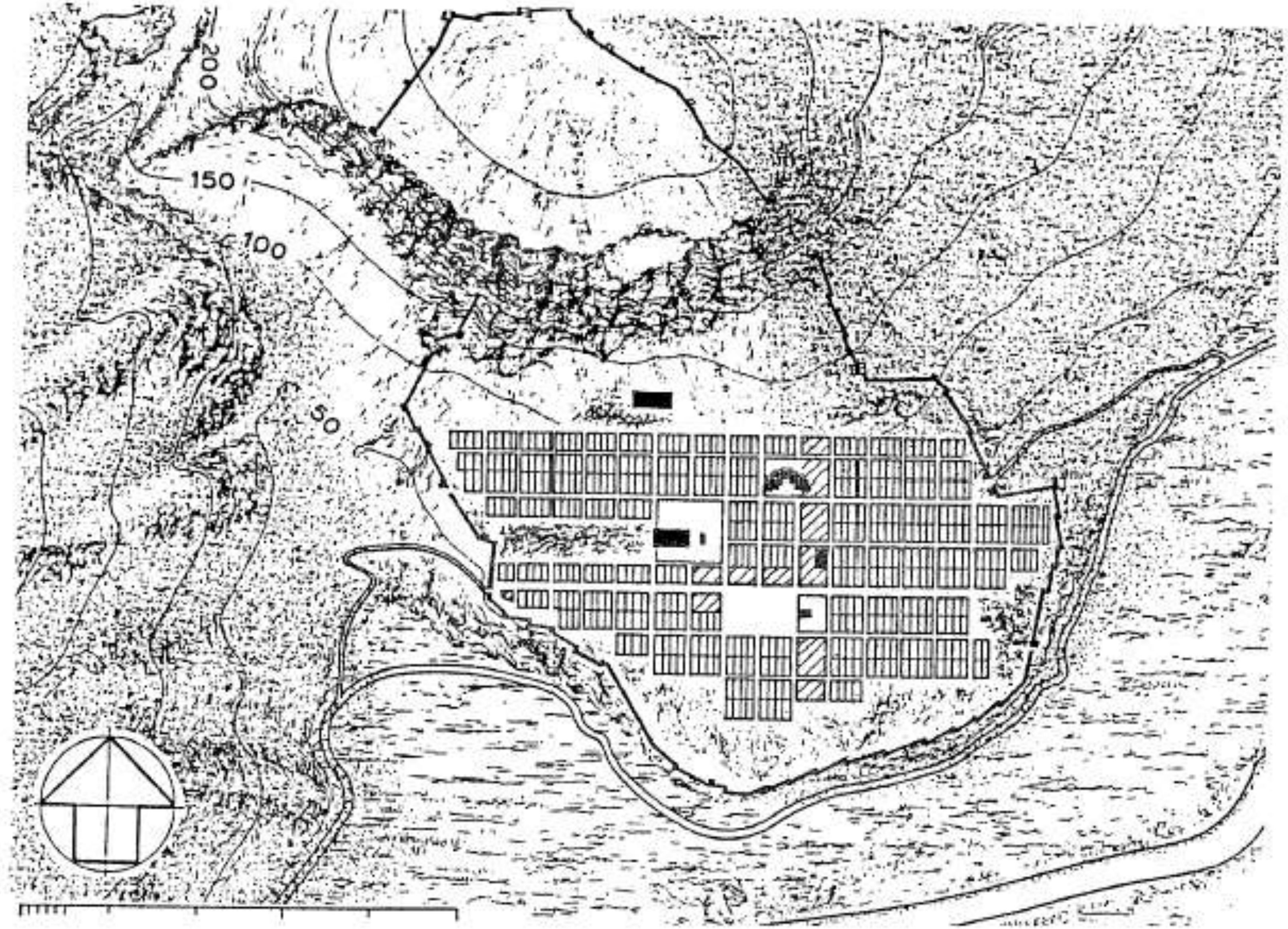




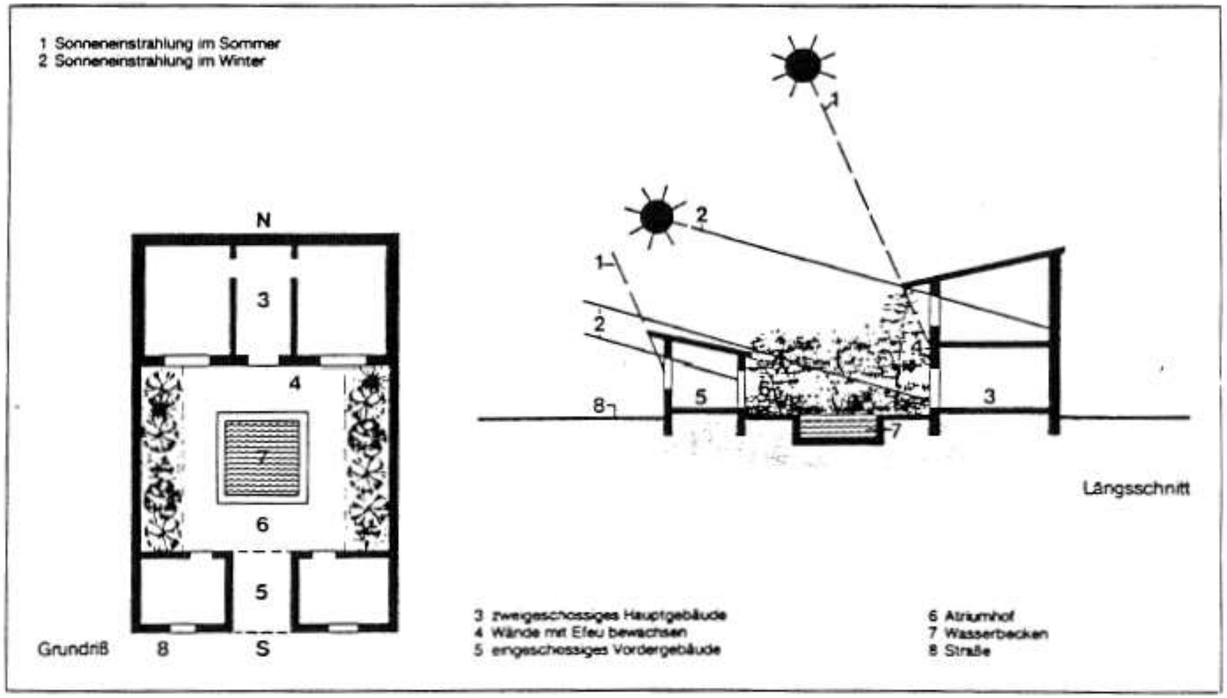
Atriumhouse in Priene



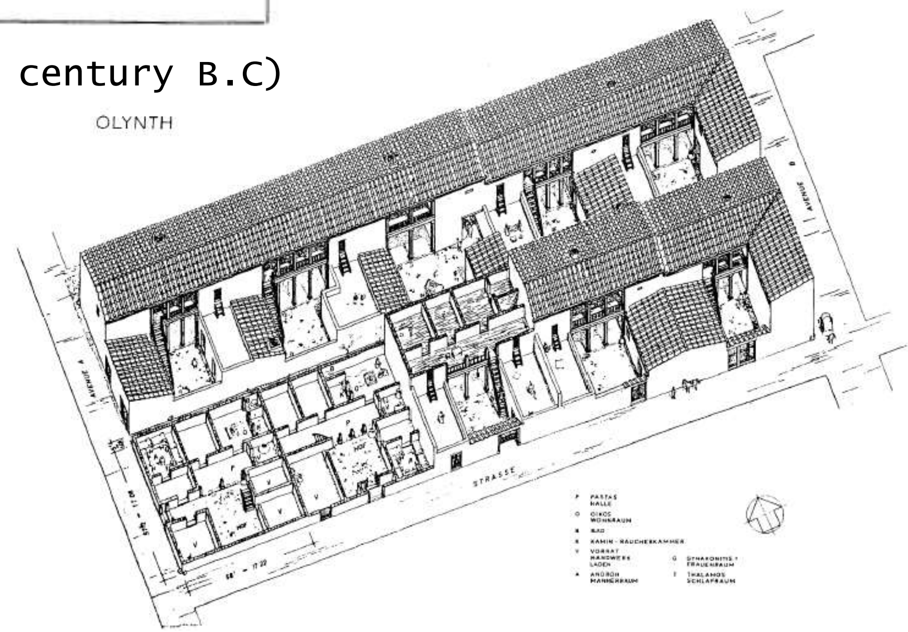
Reconstructed View of the Priene City (300 B.C)

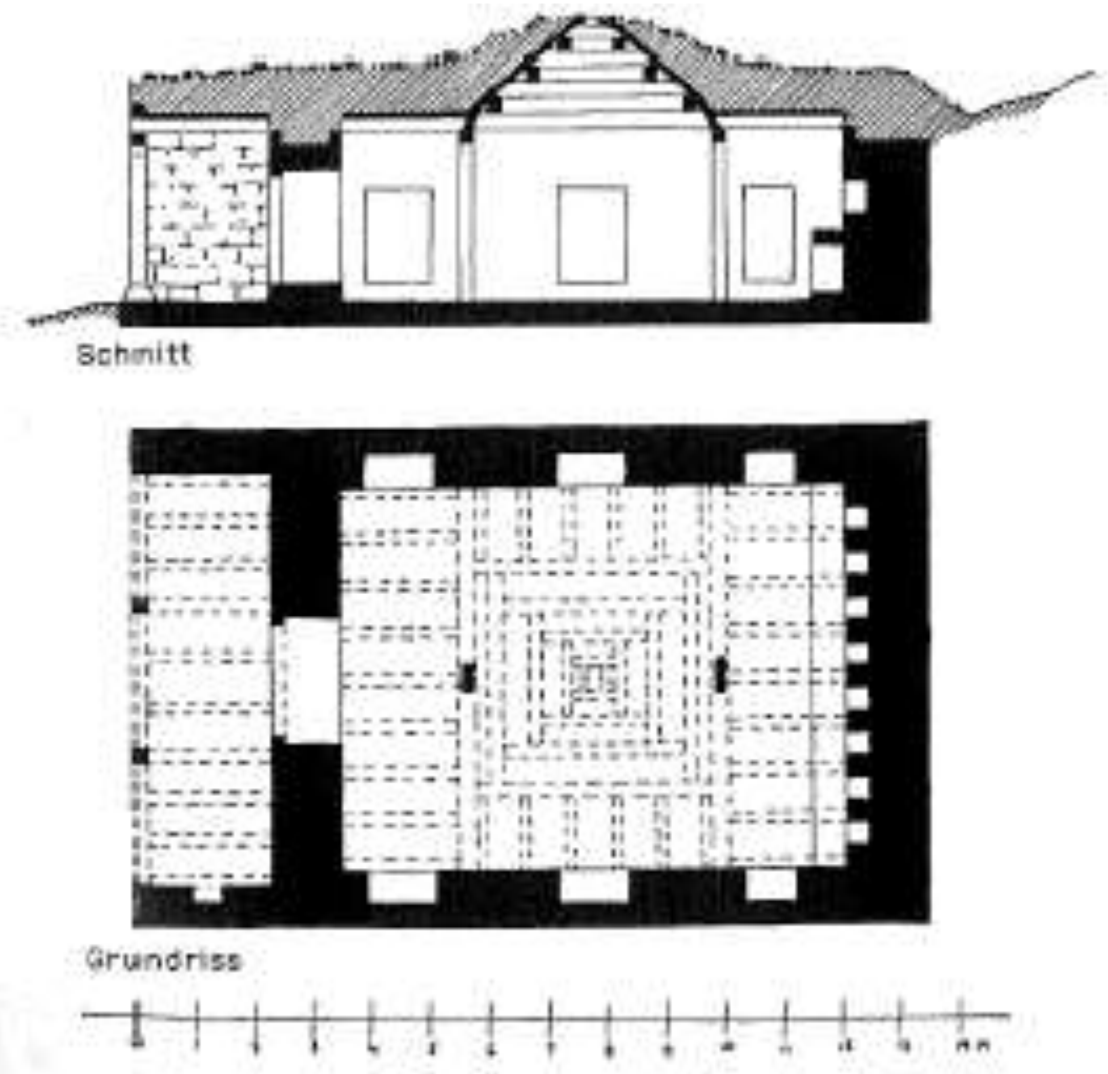


Streetplan of Priene

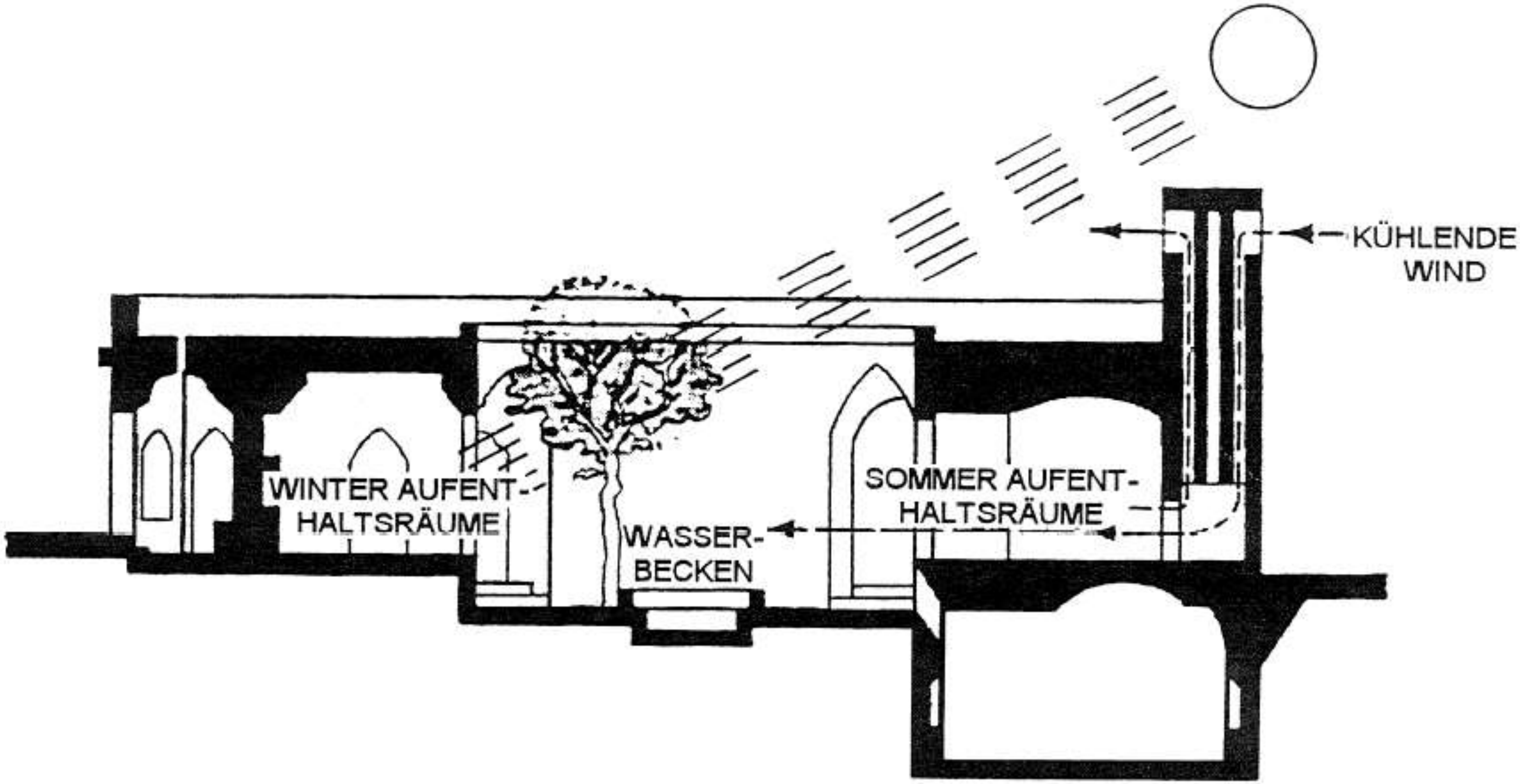


Atrium house of the ancient time (from 2nd century B.C)

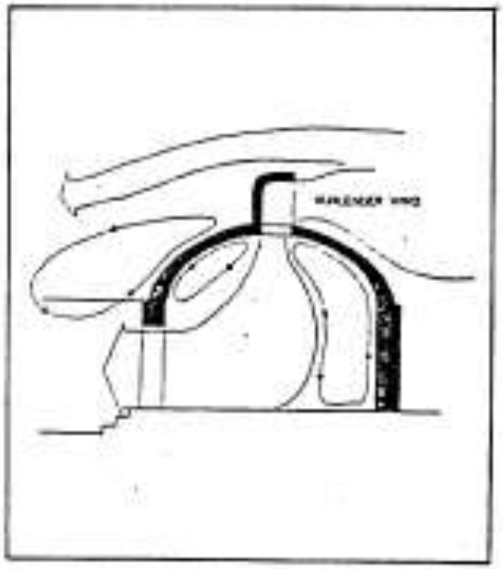


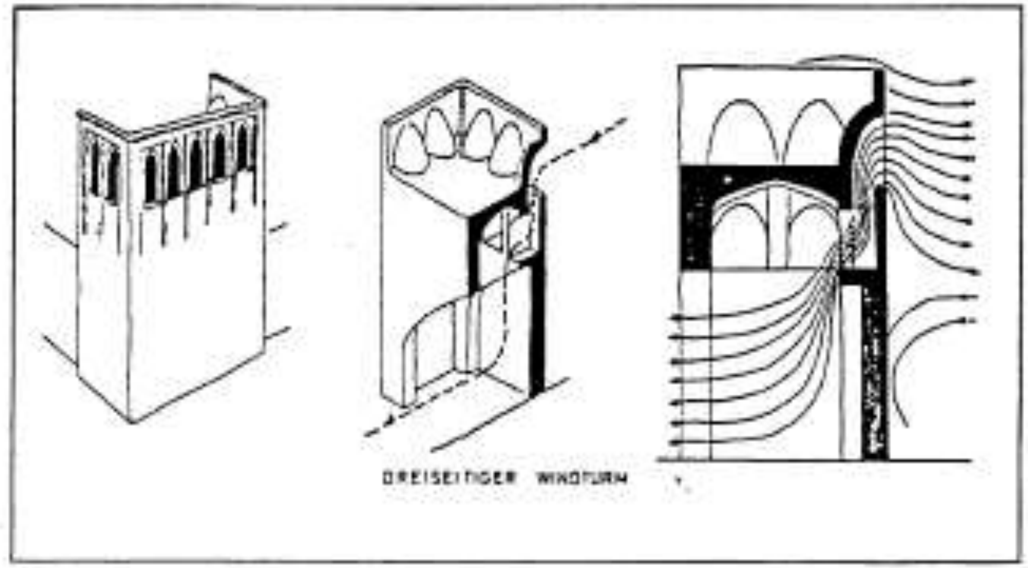


House in Digomi, Afghanistan



Persian House with sunloggia and wind tower





Natural air conditioning in building of persian times

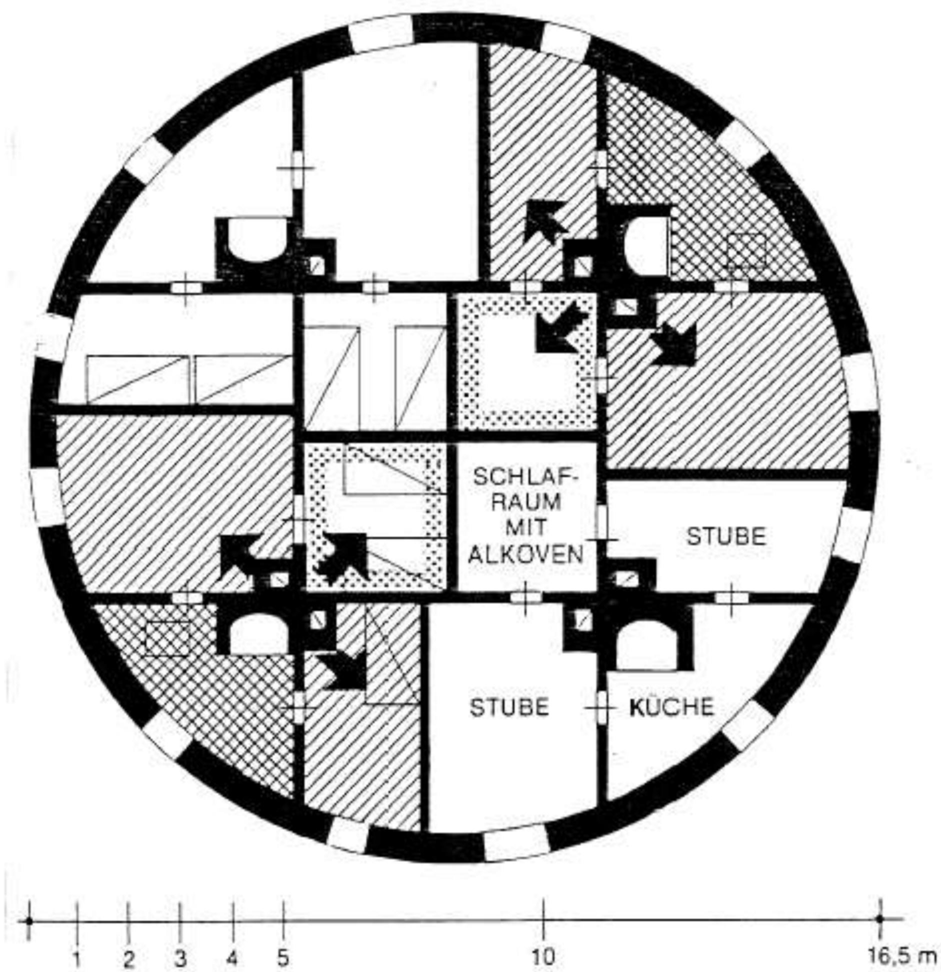


Abb. 2.10.: Rostocker Rundkate

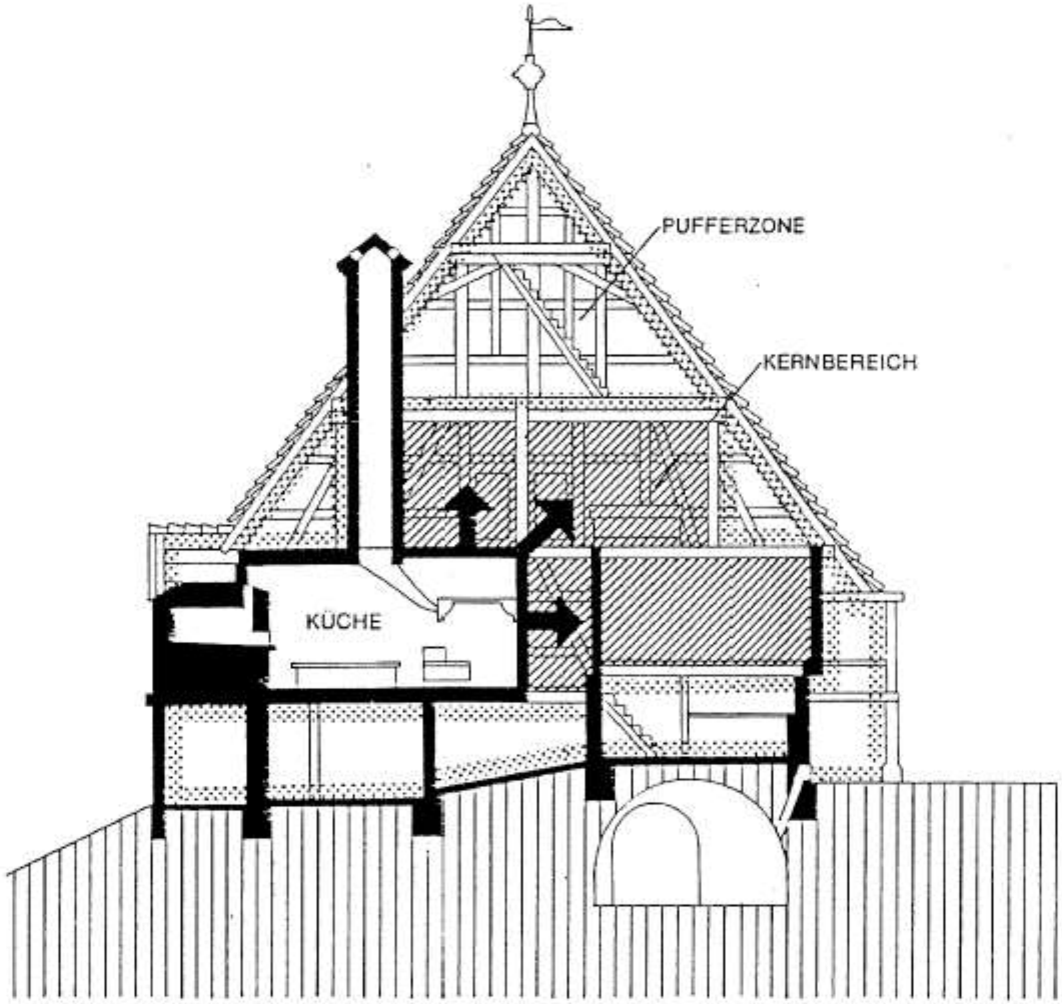
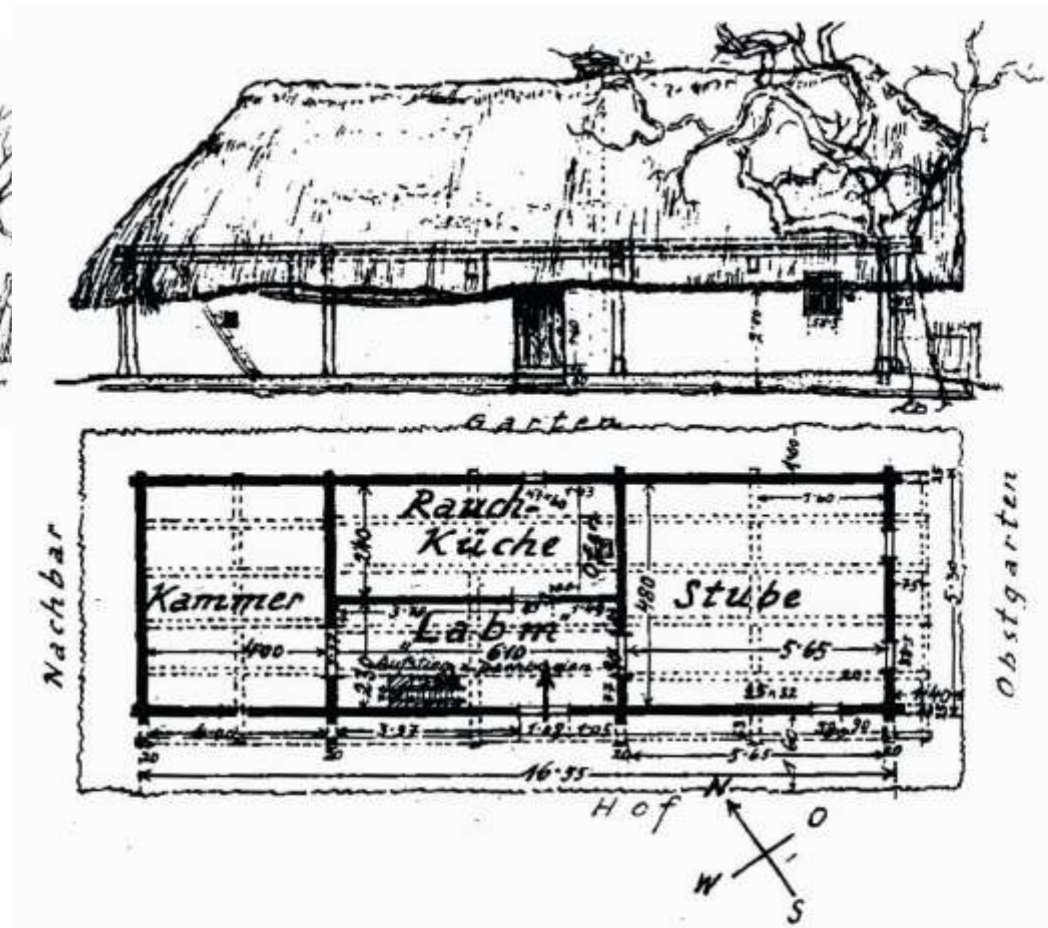


Abb. 2.11.: Süddeutsches Bauernhaus, Schemaschnitt

Anonymous House-forms, Burgenland

- Three-room house,1780



Farmhouse in Steyregg / Oberösterreich

17. century

Living space = 72,24 m², 170 kWh/m²a heating consumption

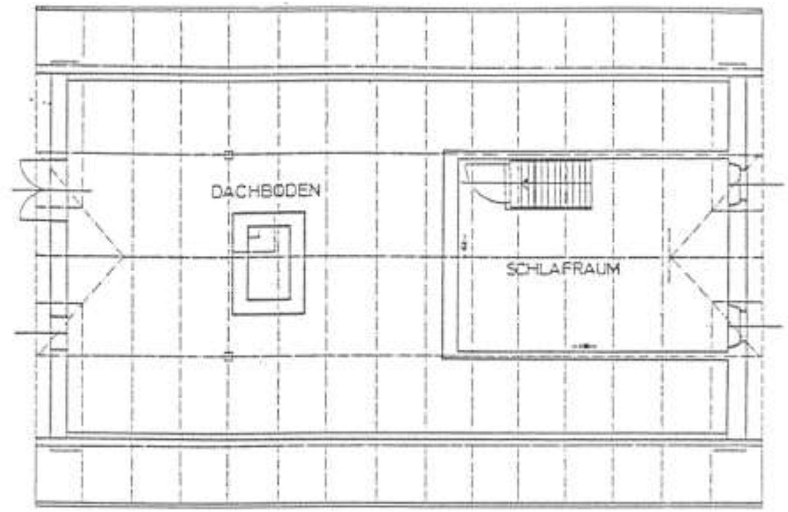
factory, storage, stash and bedroom- not heated

Heatet living space = 41,66 m², 290 kWh/m²a

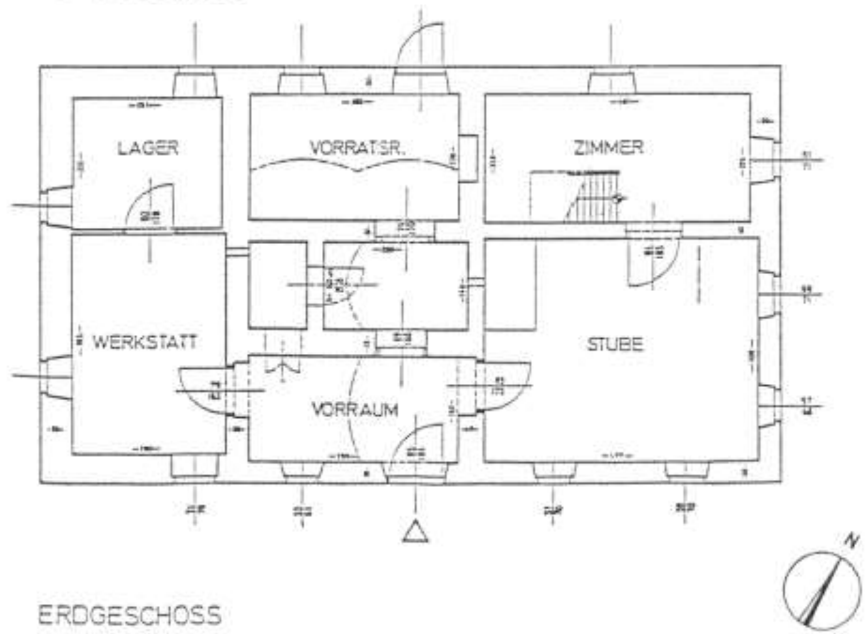
4,5 fm = 2.500 kg wood per heating season

Exterior walls: 46 cm Sandstone

U=1.92 W/m²K



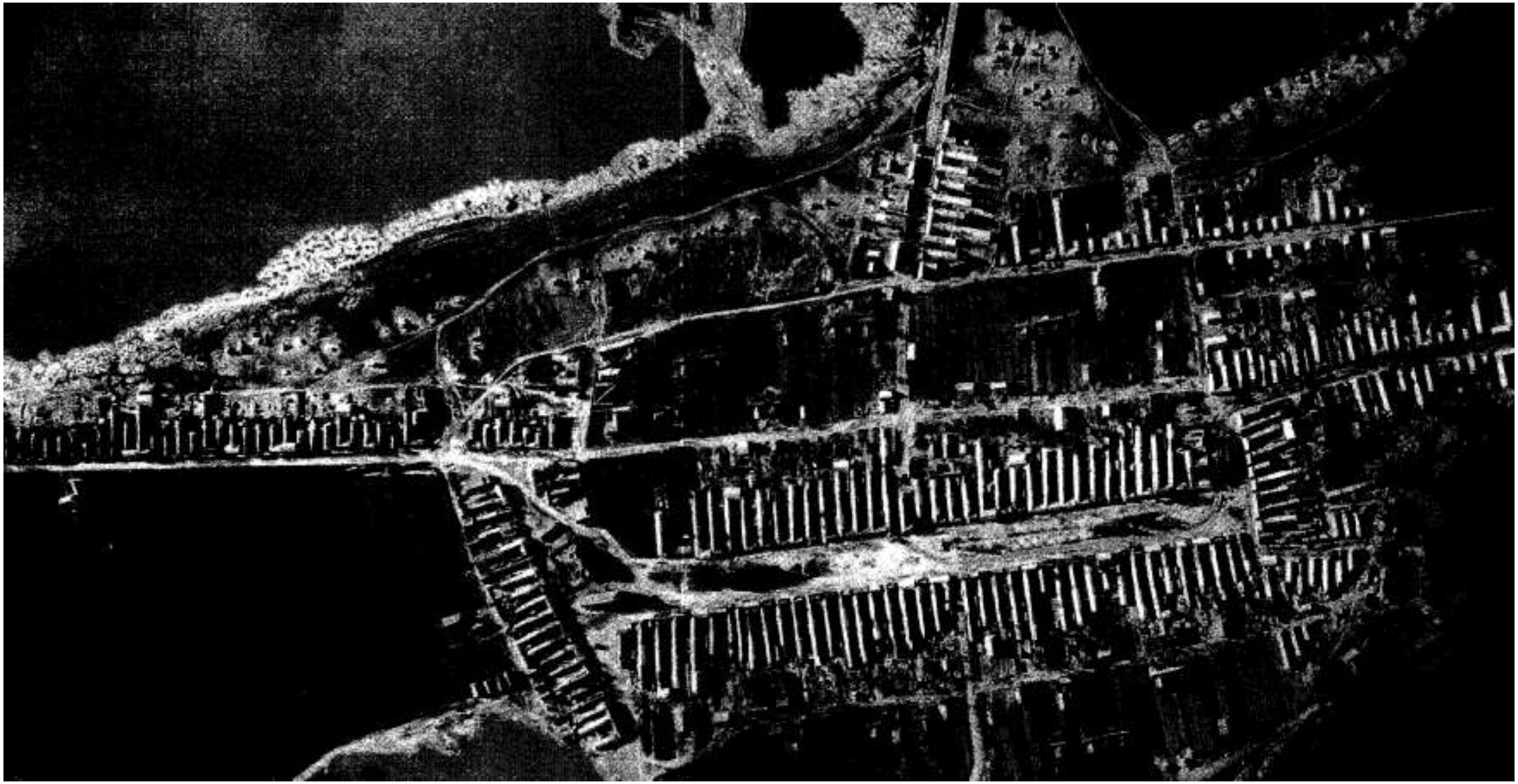
DACHGESCHOSS



ERDGESCHOSS

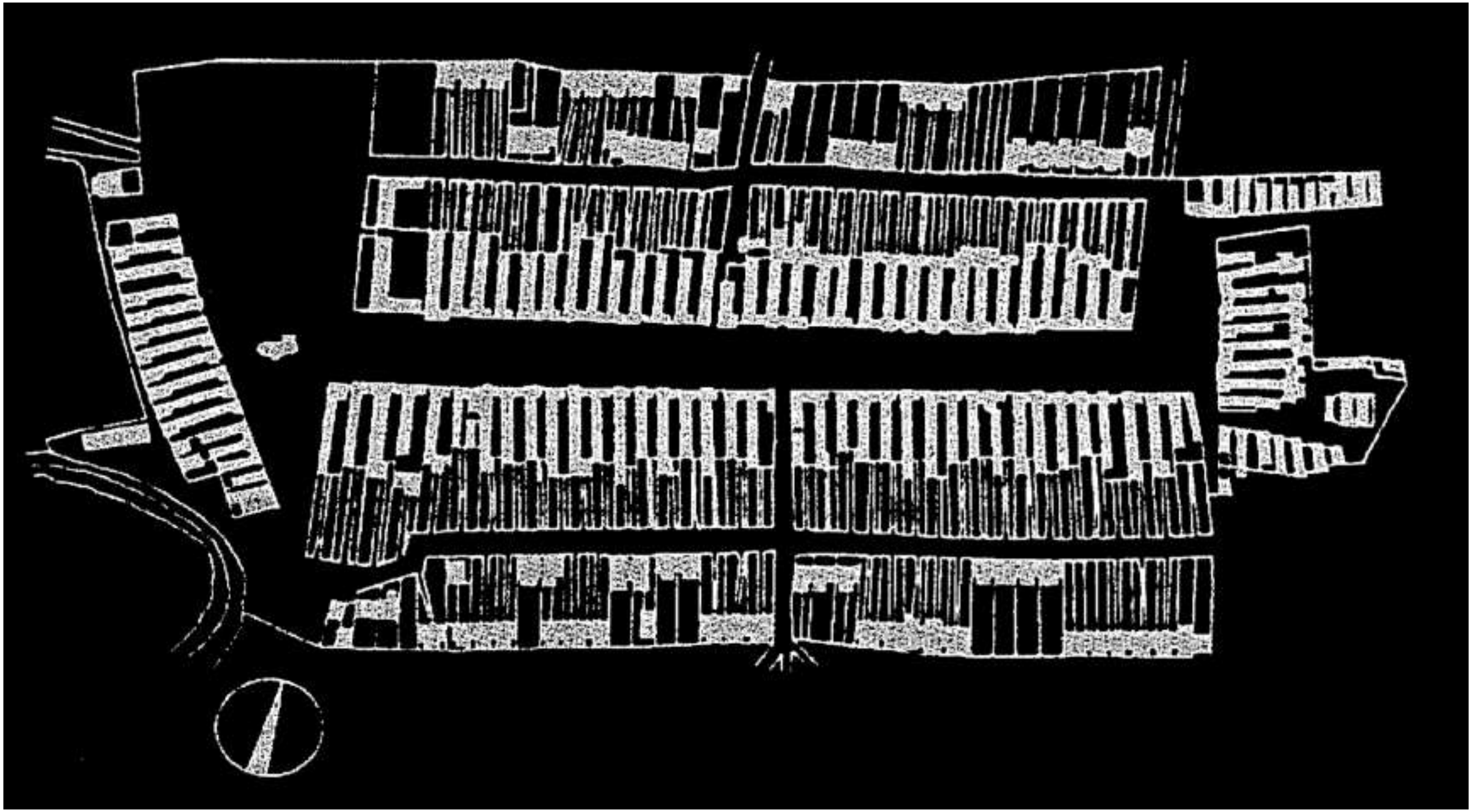
Ingenieurdörfer, Burgenland

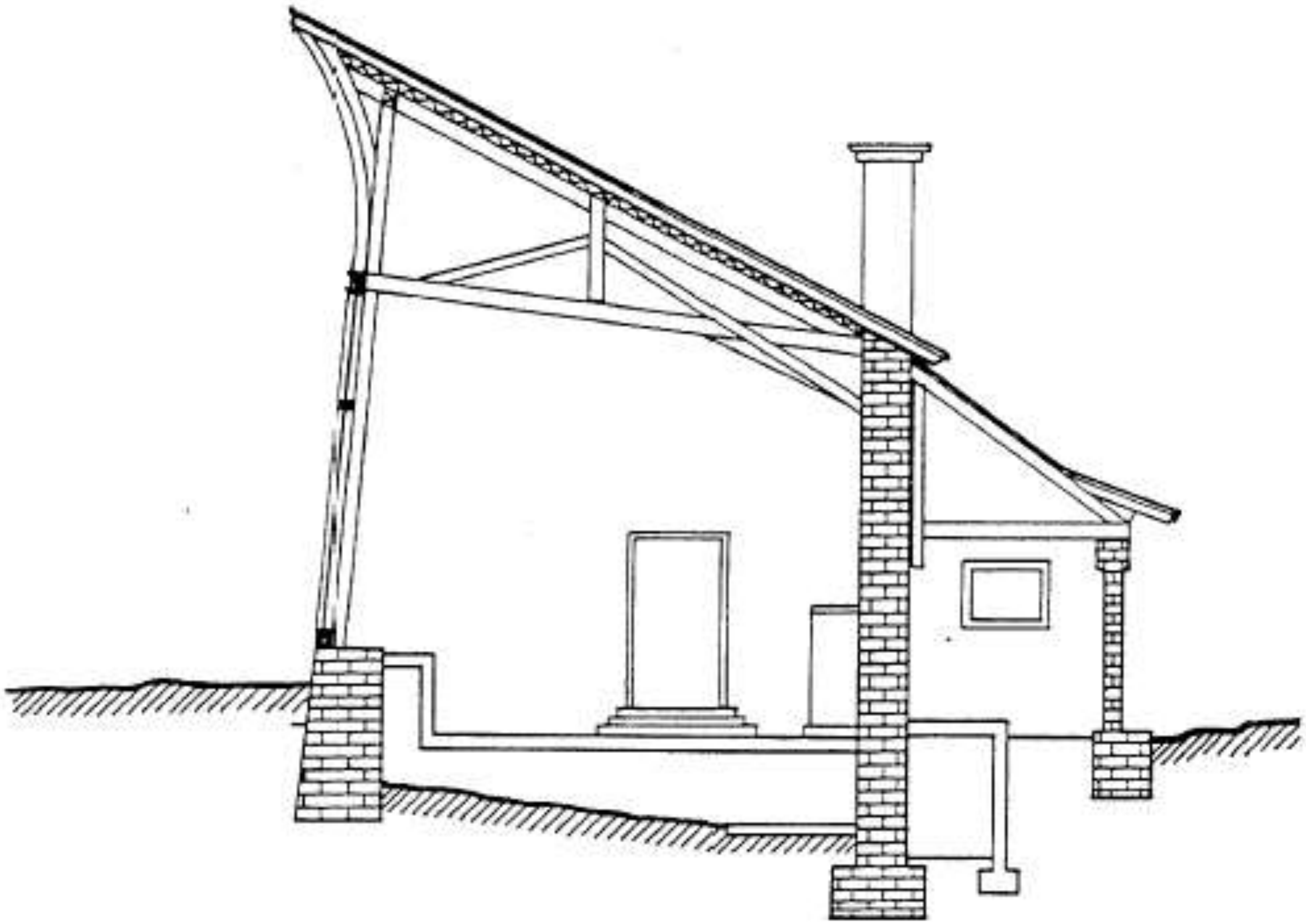
St. Andrä, aerophoto



Ingenieurdörfer, Burgenland

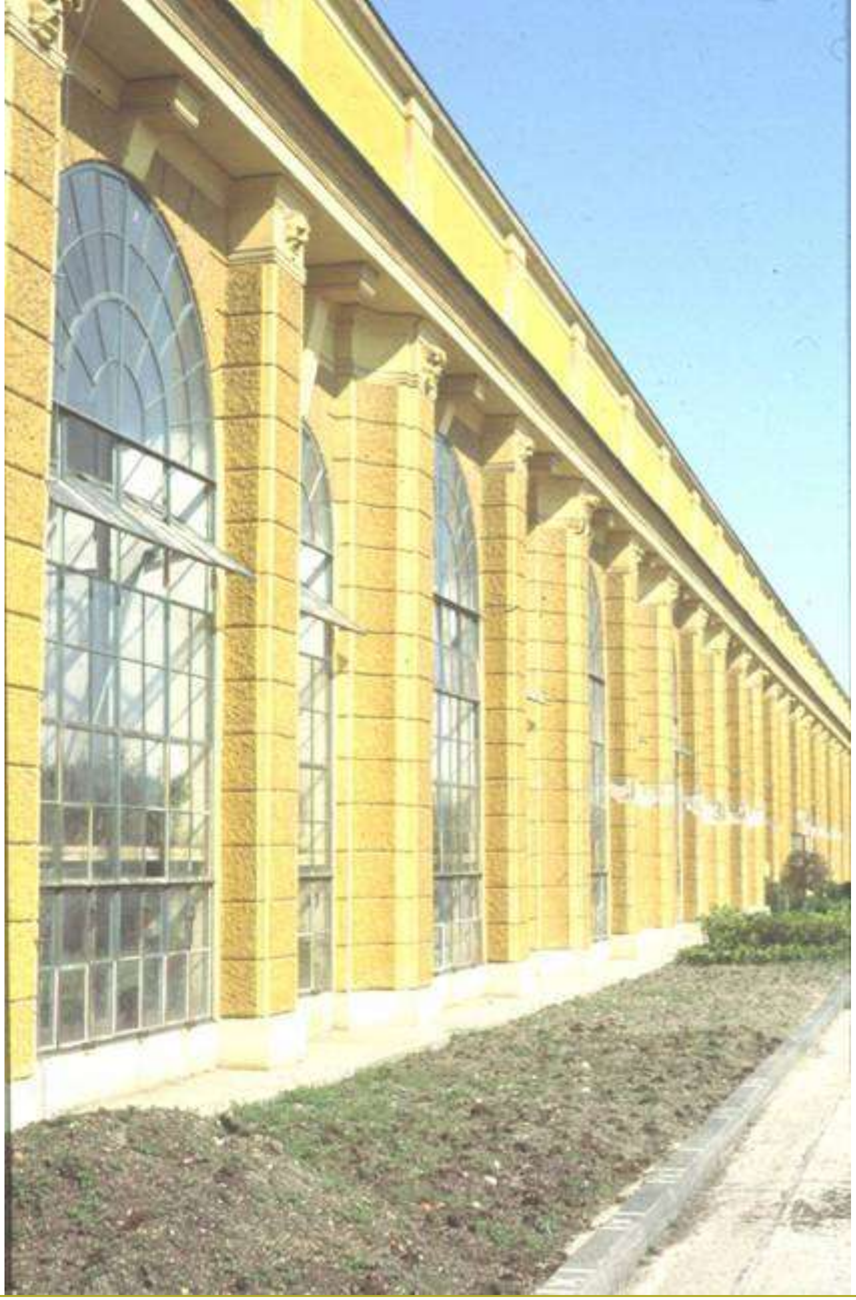
Cityplan St. Andrä. Frontage: SE, NW; Court façade: NE, SE





Baroque greenhouse

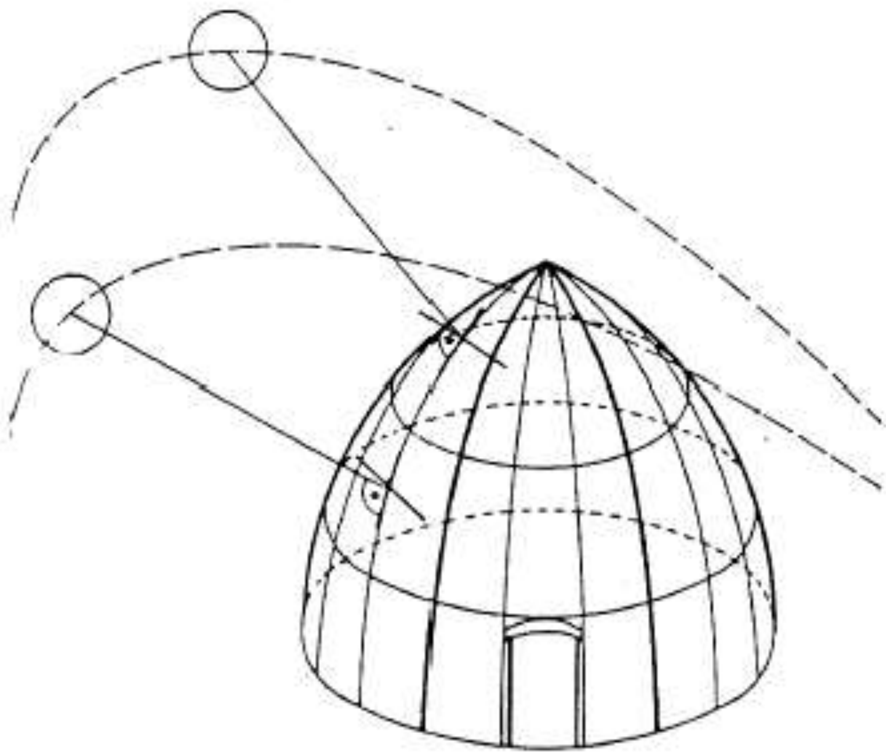
Greenhouse Telc, Czech republic



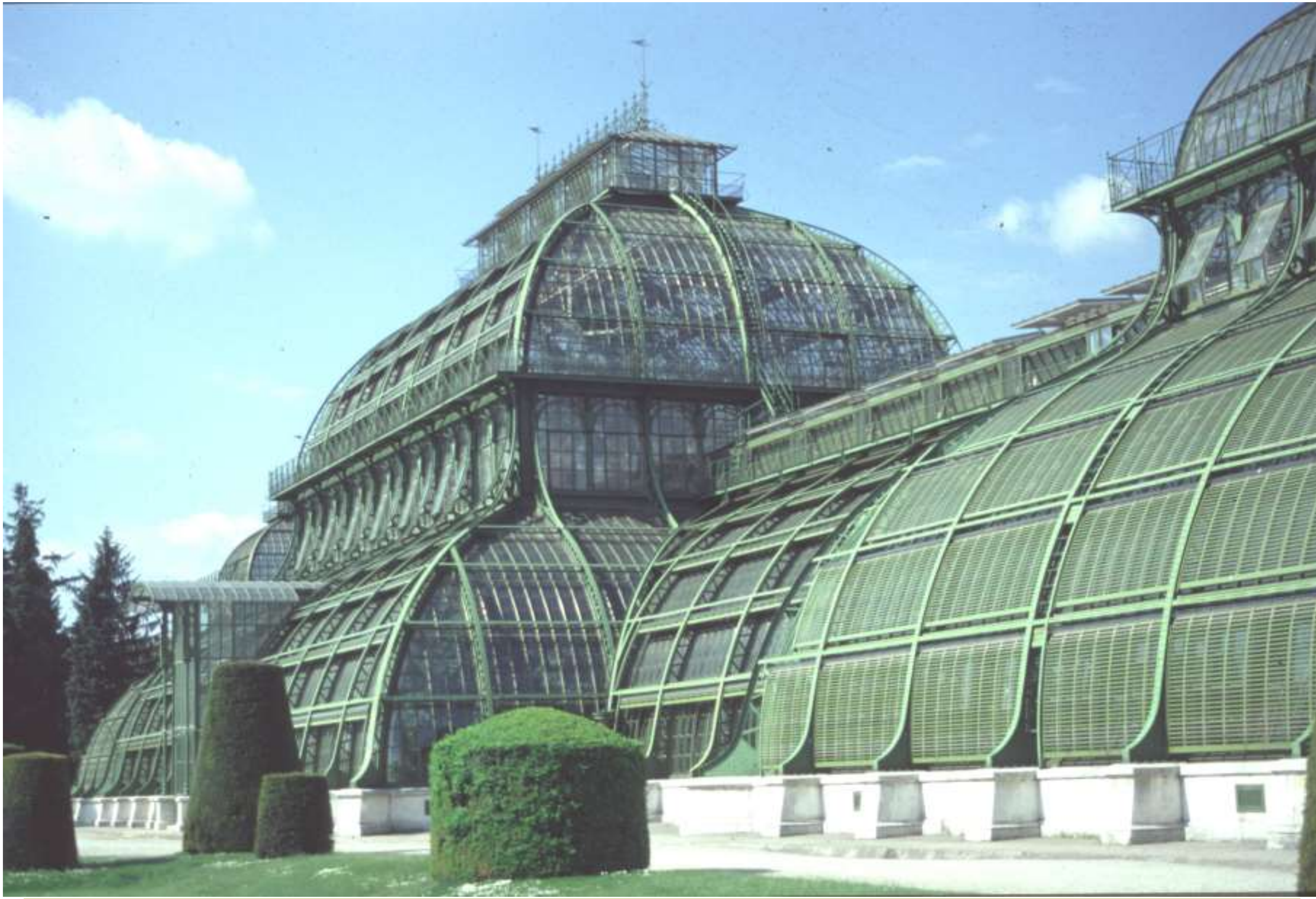
Orangery Castle Schönbrunn, Vienna, 1755

Orangery Castle Schönbrunn, Vienna, 1755

Crystallpalace (1851), London by Sir Joseph Paxton.



Scheme of a spherical glasshouse



La Coruna, Galizien, North-west Spain

Glass-fronts, 1840 – 1890

Houses from massive granite

Climate sunny, windy, humid

More living quality through the glass-fronts

High carpenter handcraft - shipbuilding

Large Glasswork „La Corunesa“, 1830

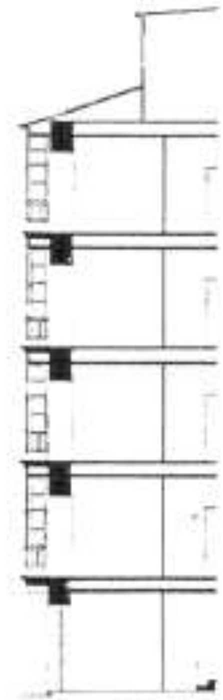
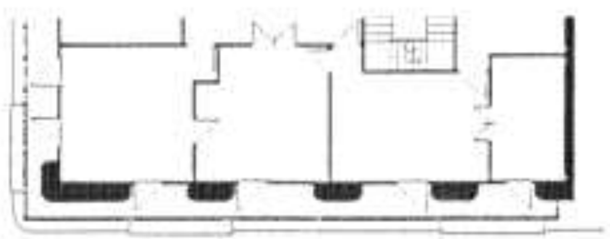
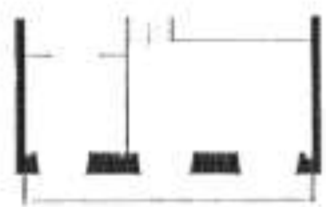
Building regulations for glass-fronts, 1854


Piccadilly

Street wiev – Avenida de la Marina

Santiago de Compostela



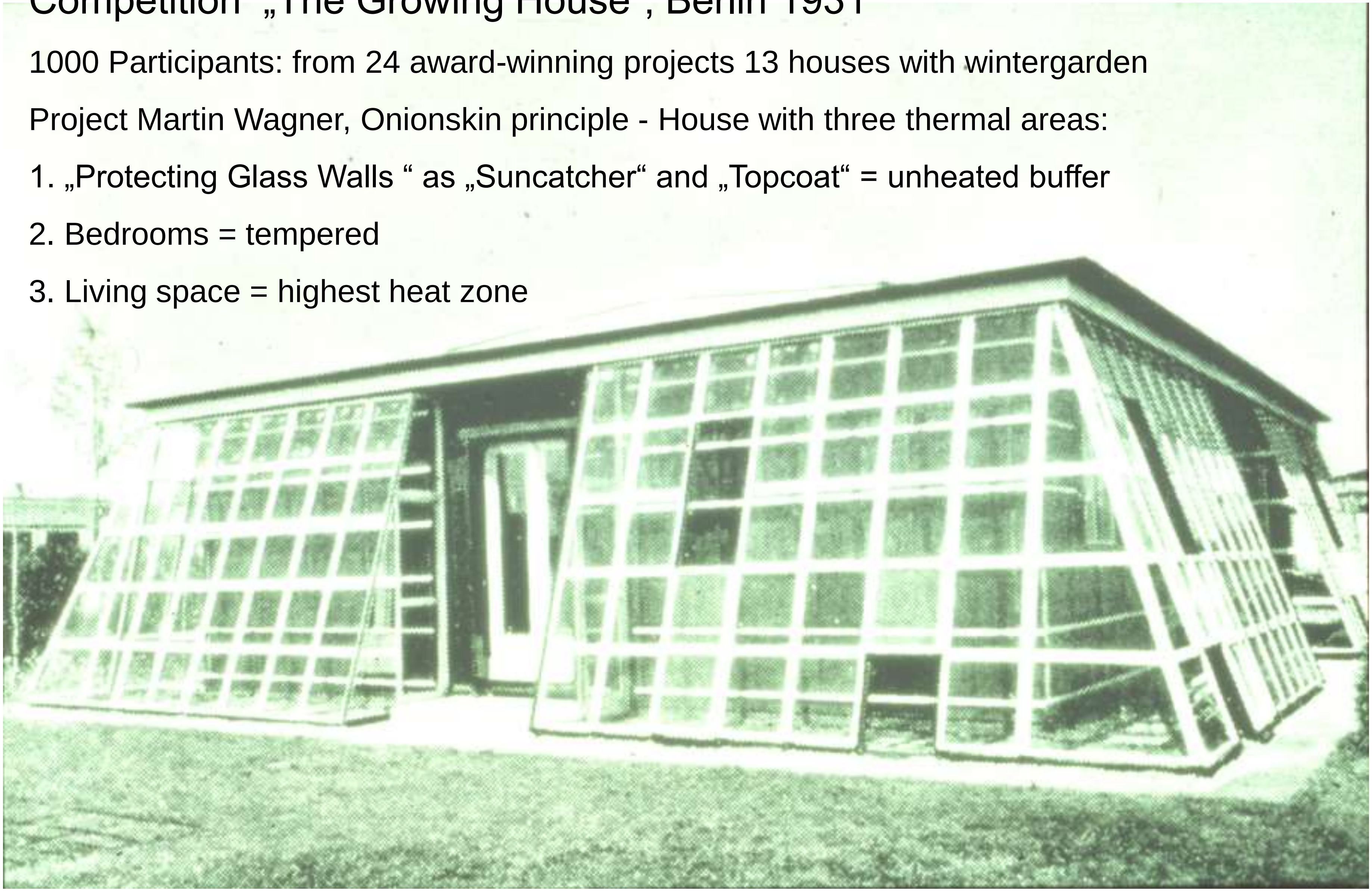




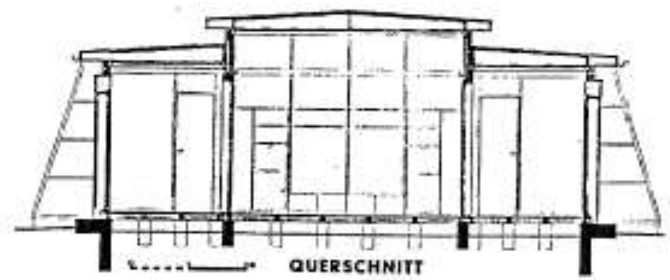
Competition „The Growing House“, Berlin 1931

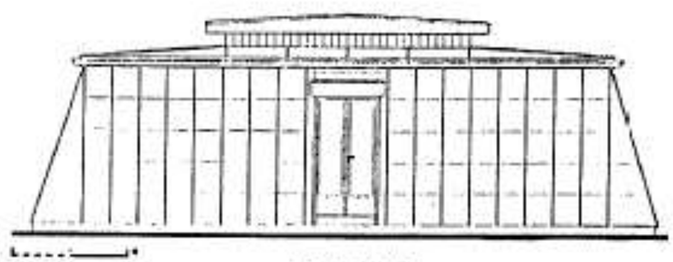
1000 Participants: from 24 award-winning projects 13 houses with wintergarden

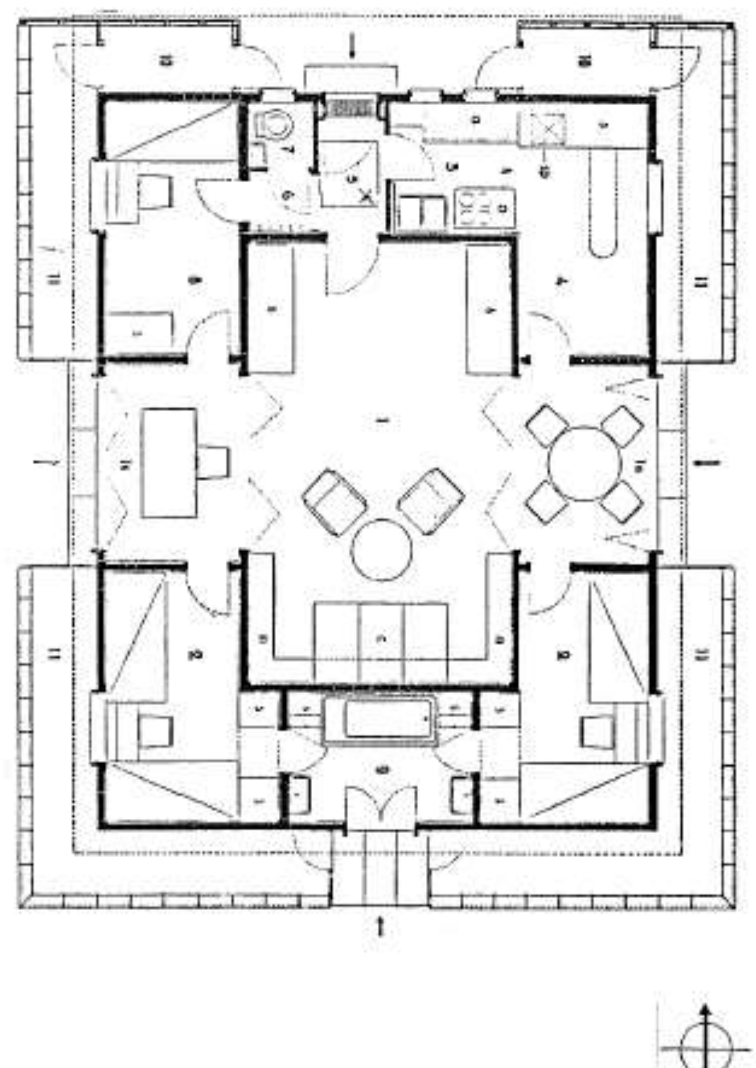
Project Martin Wagner, Onionskin principle - House with three thermal areas:

1. „Protecting Glass Walls “ as „Suncatcher“ and „Topcoat“ = unheated buffer
2. Bedrooms = tempered
3. Living space = highest heat zone

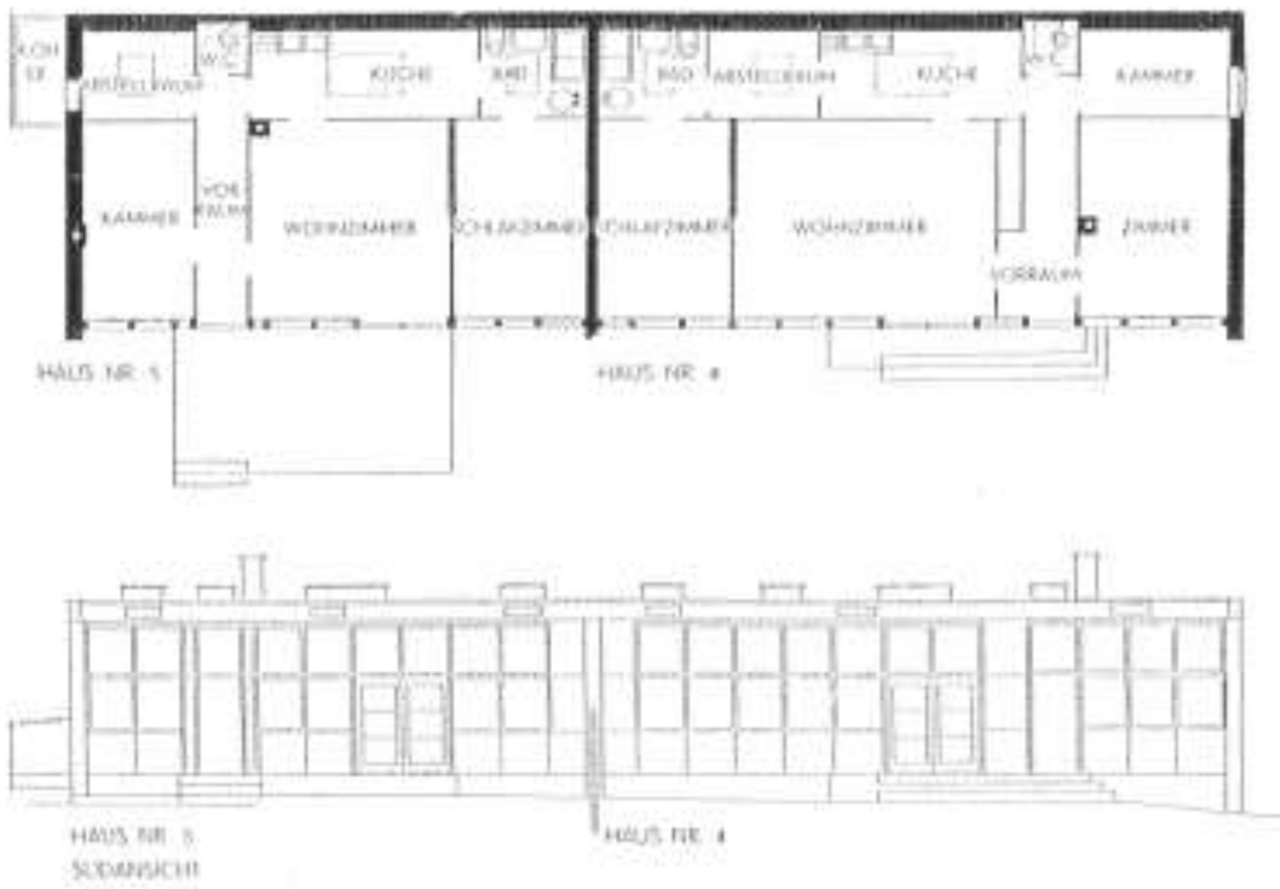








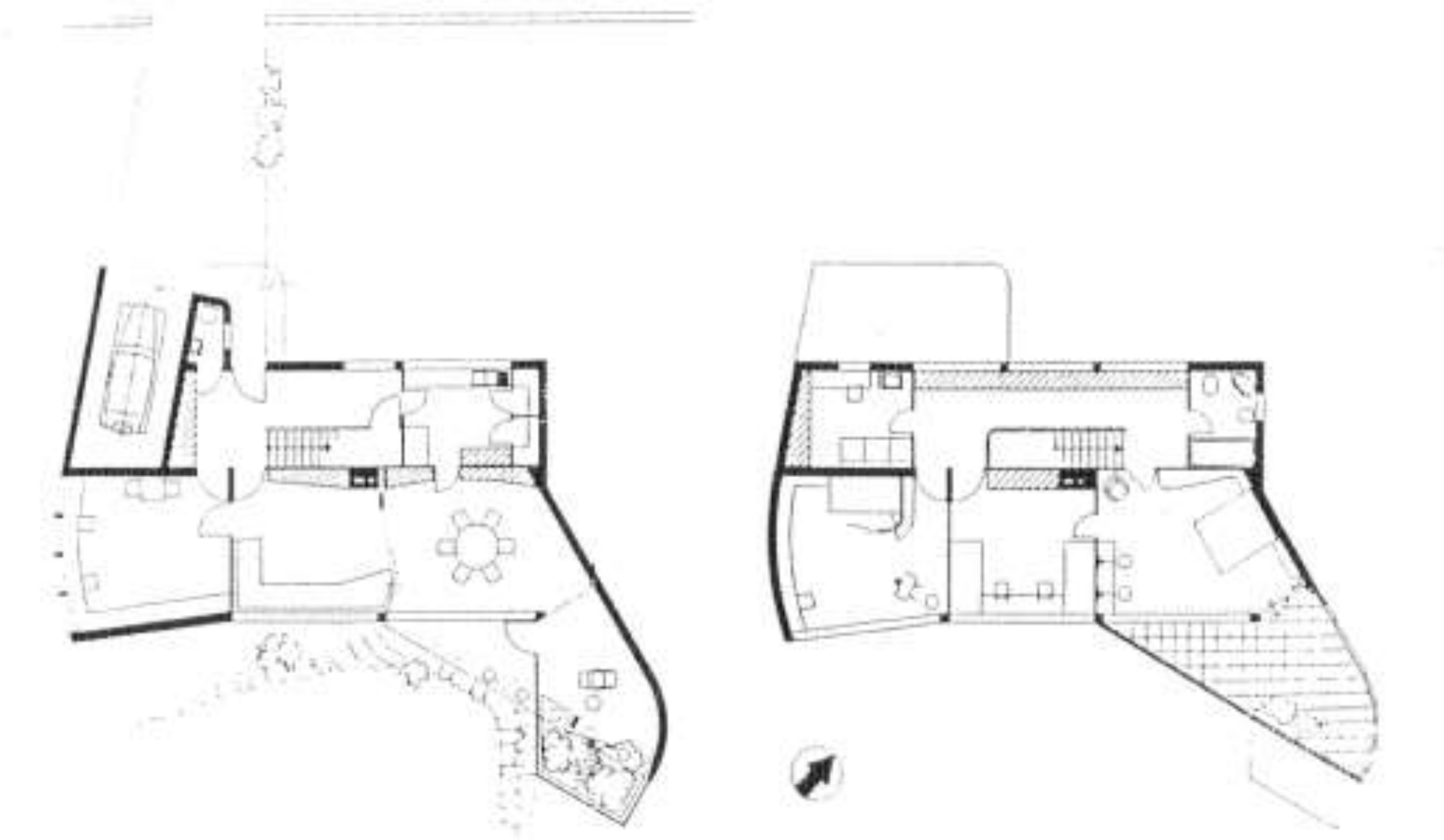
Martin Wagner – Competition project, “The growing House”



Hugo Häring – model house

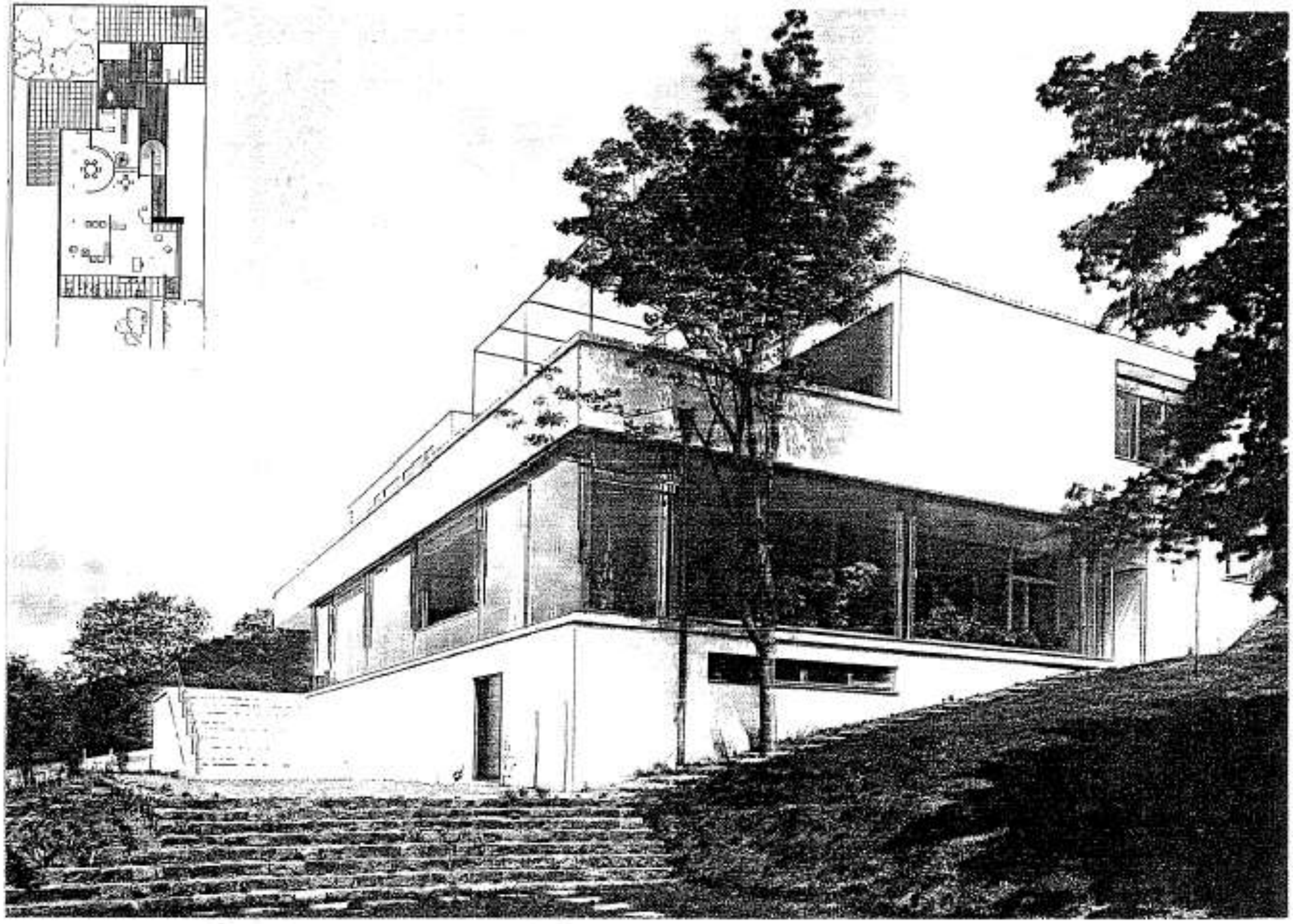
Palais Stocklet, Brüssel

by Josef Hoffmann

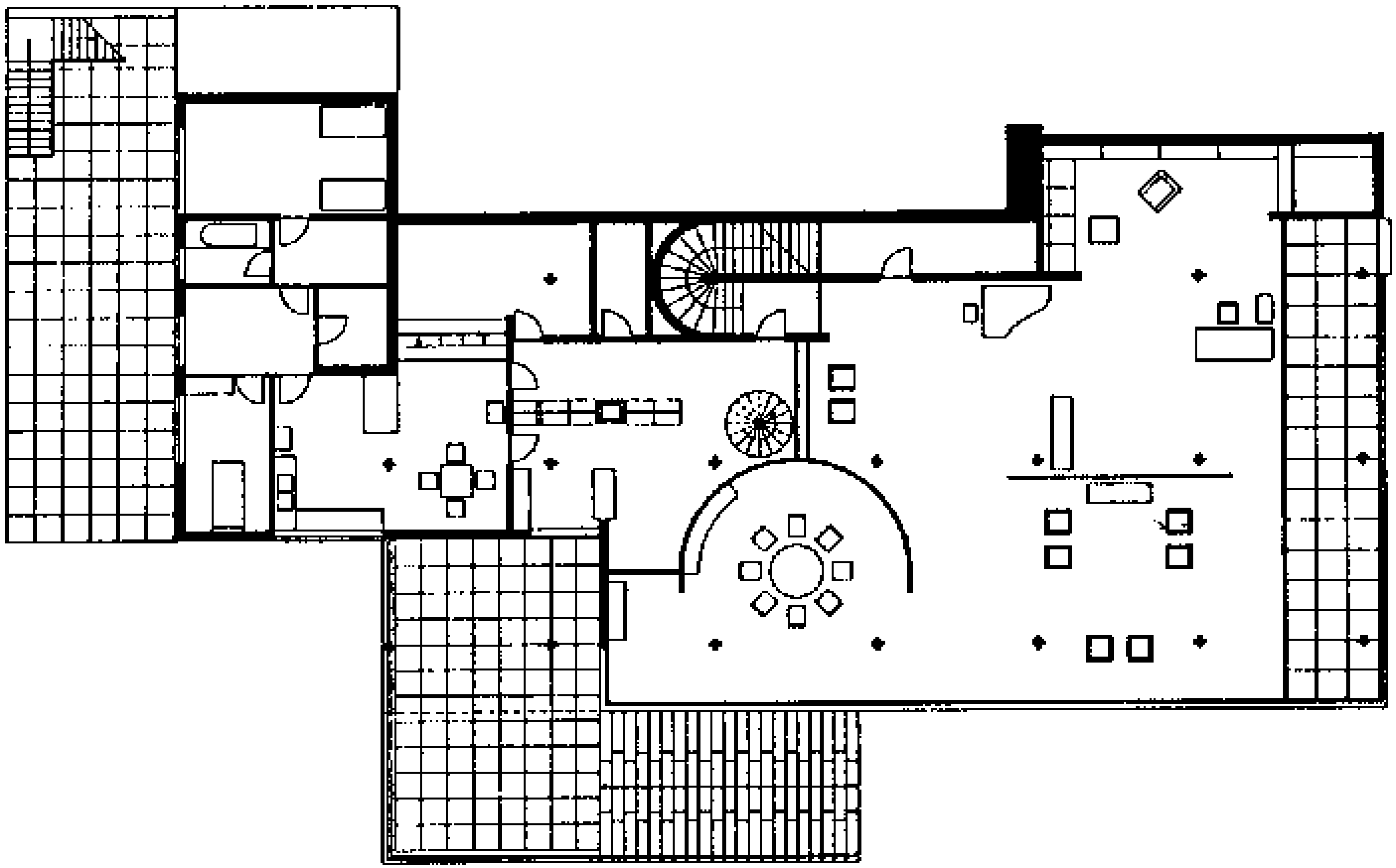


Lubomir Slapeta, Villa Kremer, Schlesisch Ostrau

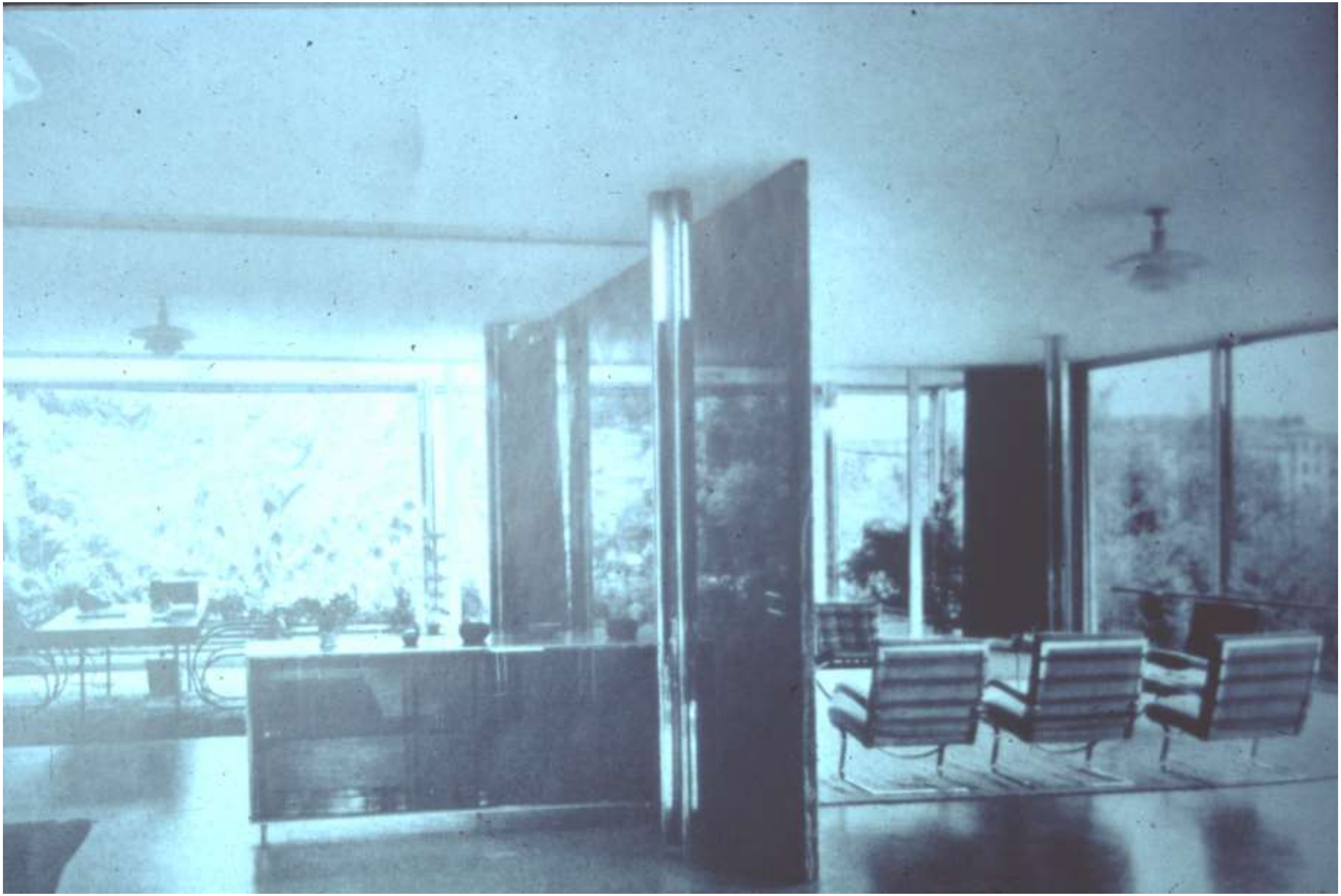
Villa Tugendhat, Brno, 1928 – 1930,
Ludwig Mies van der Rohe



Villa Tugendhat, Brno, 1928 – 1930, Ludwig Mies van der Rohe

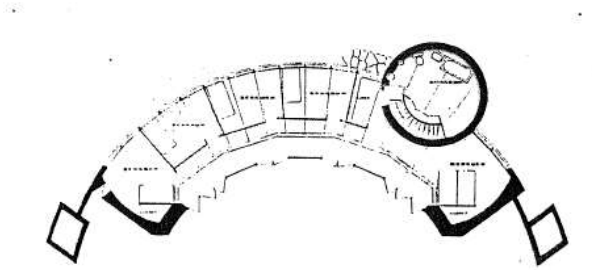


Villa Tugendhat in Brünn, 1928 – 1930, Ludwig Mies van der Rohe

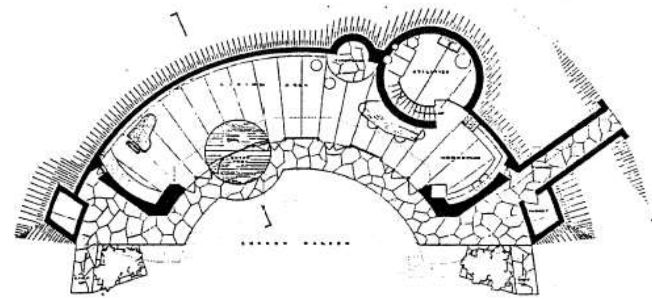


„Solar Hemicycle“

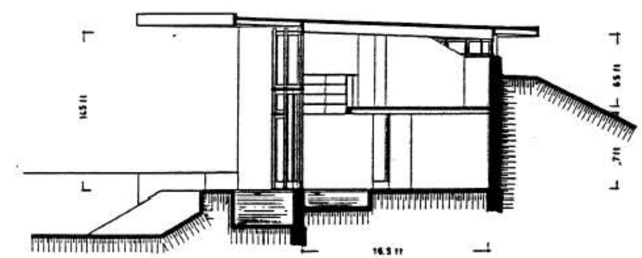
Frank Loyd Wright planned in 1944 for the journalist couple Jacobs their 2nd house under the name „Solar Memicycle“ in Middleton, Wisconsin



GRUNDRISS



GRUNDRISS



SCHNITT

Abb. 2.27.: Frank Lloyd Wright, Haus Jacobs, Middleton, Wisconsin

Van Melle Factory, Rotterdam
1928

Brinkmann, Van der Vluhgt

Open-air school in Cloistraat, Amsterdam, Jan Duiker, 1932

Constructor: Vereenigung voor Openluchtscholen voor het gezonde Kind

Solar-oven from Odeillo, 1970

Southern France, Pyrenäen

Professor Felix Trombé

3.800 °C – 1.600 W / cm²

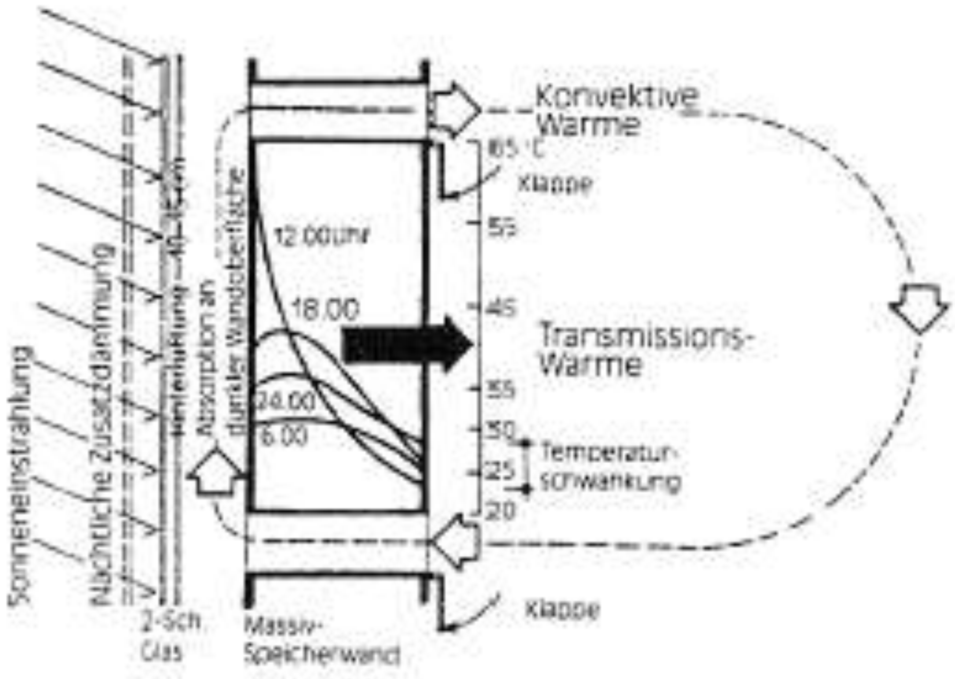
At 600 W/m² of direct radiation - 1.000 kW performance

Research building around the Mirror, 45m high 54 m width

Parabolic reflector with 2.000 m² mirror surface from 9.500 hardglassfacets (45 x 45 cm)

Trombé Houses for the Physicists of Solar-oven

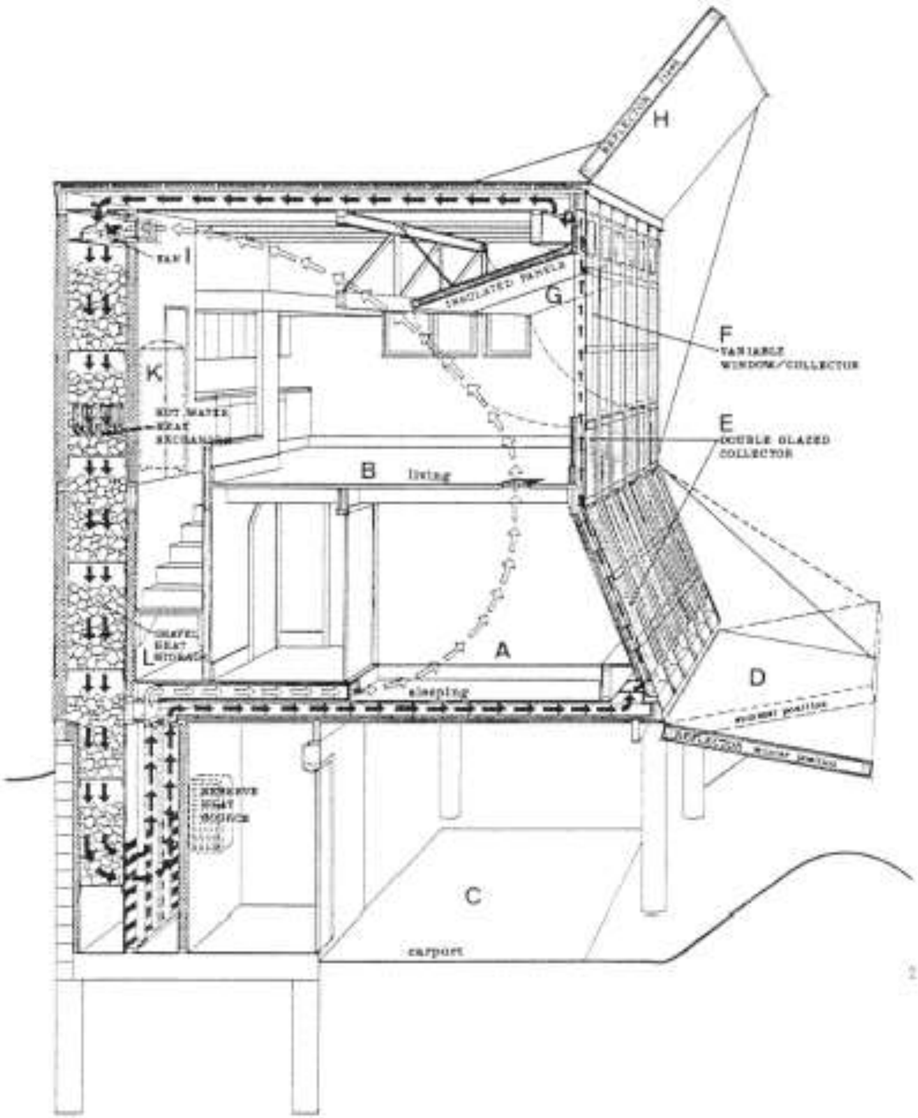
First houses with solarwalls (Trombéwand - System Professor Felix Trombé)


Konvektive Warme
Transmissions-Warme
Klappe
Klappe
Temperatur-schwankung
12.00 Uhr
18.00
24.00
6.00
65 °C
55
45
35
30
25
20
Sonneneinstrahlung
Nächtliche Zusatzdämmung
Absorption an dunkler Wandoberfläche
2-Sch. Glas
Massiv-Speicherwand

Steve Baer Haus, Corrales – New Mexico, 1972, Drumwall (oildrums filled with water)

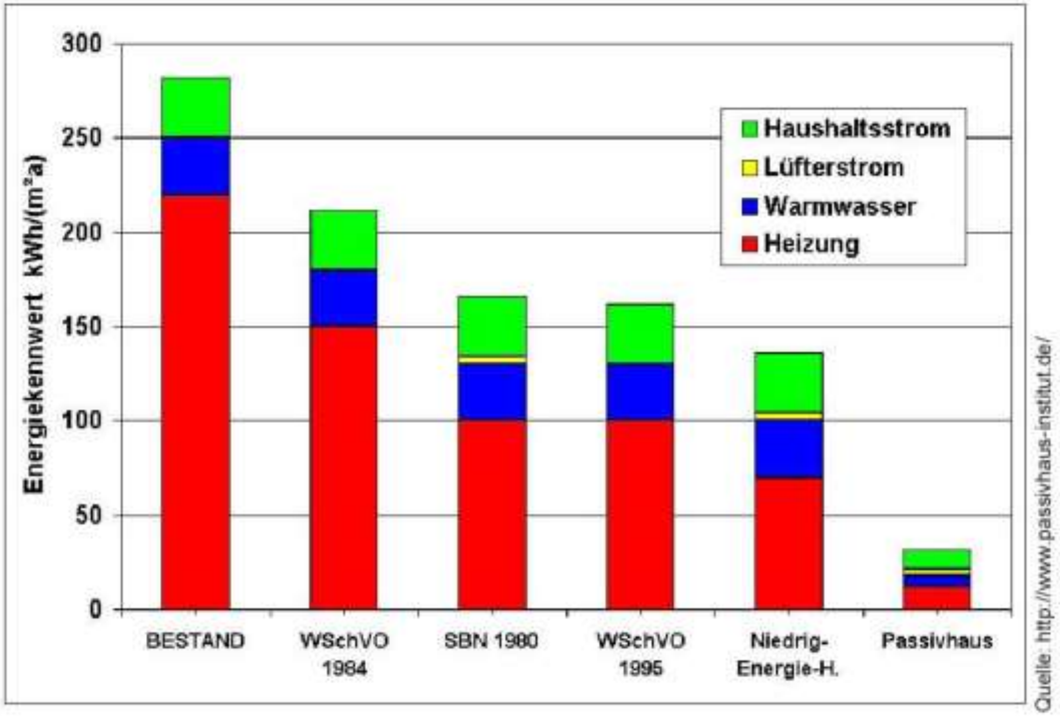
Hippie-culture the 60´s as countermovement to consumerism, escape from Vietnam-war military duty, dropouters and consume deniers in the desert, pacifism and extensive energy self-sufficient housings

Geodetic domes, Houseboats, Shelters, idiosyncratic building forms


H
G
F
VARIABLE
WINDOW/COLLECTOR
K
E
DOUBLE GLAZED
COLLECTOR
B
living
A
sleeping
D
L
C
carport

History of passive sun-energy utilisation since 1973 in Europe

• At the beginning, Europe was far behind the development of passive of sun-energy usage in USA
•1981: Austria, „Directive for increased heat insulation in national building constructions. "
• 1995: Germany „German Heat Insulation Ordinance": Calculation of energy consumption
• 1990: In Austrian Energy report: In addition to the savings capacity for space heating
• - increased heat insulation
• - Solararchitecture and site selection
- buffering of temperature variations through technical constructions and architectural procedures



Passive solar-technical components

Part 1

Passive sun-energy utilisation,Sun-windows, Windows-glazings

Definition

Precondition: positive energy balance

Passive sun-technical components: more energy is lead through their capturing (glazed) solar-collection-surface into the interior as the energy lost through heat-transmition via the entire component.

3 types:

- Sun-windows, glazes façade elements
- Sun-energy winning wallsystems, Trombé walls, walls with transparent heat-insulation
- Wintergardens, glazed buffer rooms, glazed areas

Cooperation of 5 Elements

-Collector (south-orientated solar collecting surfaces, e.g. windows, solar wall, wintergarden, sun-patio,…)

-Absorber (surface, where the radiation is tranformed into the heat, e.g. interior wall, floor,…)

-Heat accumulator (z.B. walls, floor,…)

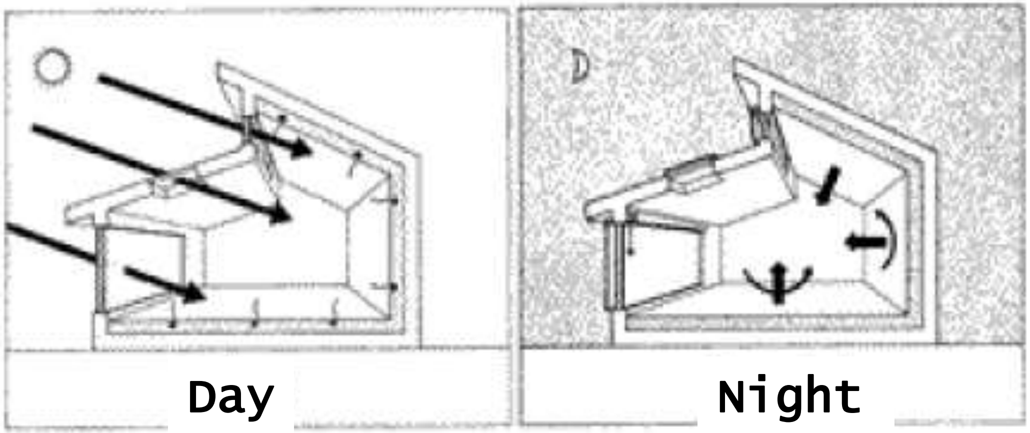
-Heat distribution (through conduction, radiation and convection)

-Regulation (ventilation opening, sun-protection, ventilators, mobile sun-protection…)

Passive use of the sun-energy

Direct gain of heat

Solar radiation falling direct through the glass surface is absorbed by the interior surface, transformed into heat and time-delayed delivered in the night and in the morning.

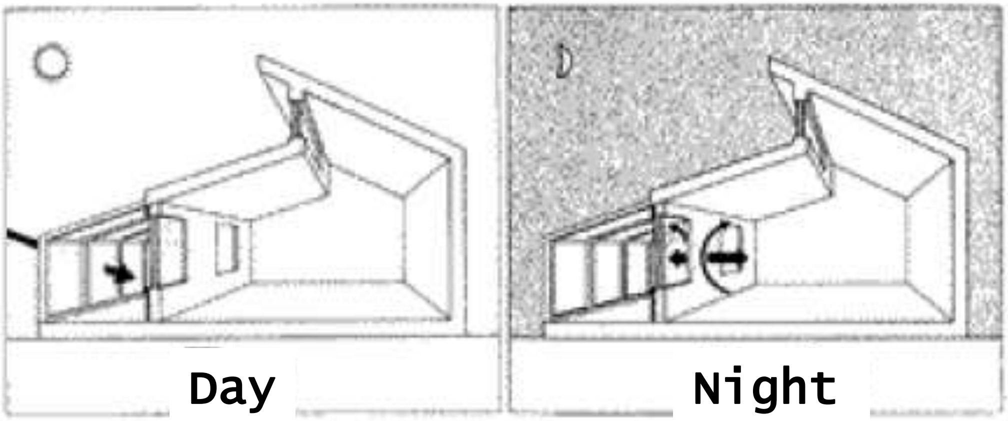


On cold sunny days, no heating is required = 100% solar coverage.

Passive use of the sun-energy

Indirect gain of heat

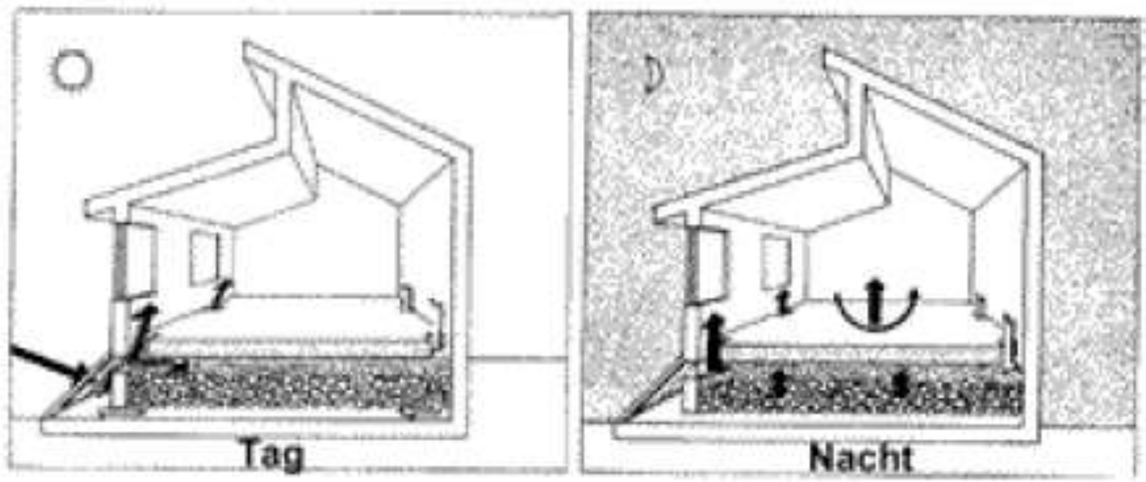
Through sun radiation, heated accumulation mass (e.g. 40-60°C on a black accumulation wall) releases at lower temperatures (e.g. 25-30°C at the inner wall) time-delayed the stored heat.



Passive use of the sun-energy

Isolated gain of heat

Sun energy is captured through indirect system, heat accumulator and room to heat are detached.



isolierter Wärmegewinn

Passive use of the sun-energy

Hybrid systems

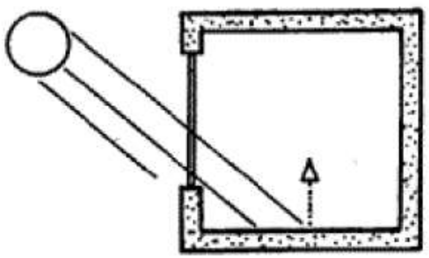
Combination between active and passive systems.

Definition of active solar system:
Facility utilizing sun energy, where the energy transport between energy converter (e.g. sun collector), heat accumulator and heat consumer is carried out with help of additional mechanical devices.

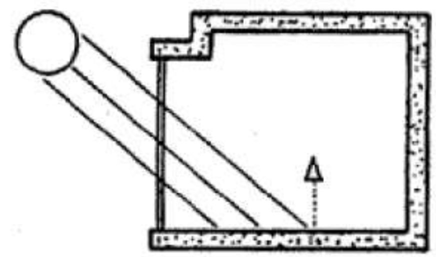
(ÖN M7700)

Components for pasive use of the sun-energy

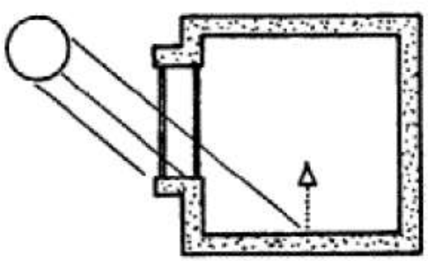
Glased facade elements / sun-windows



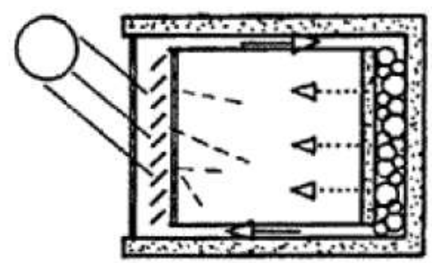
Sonnenfenster II



Erker



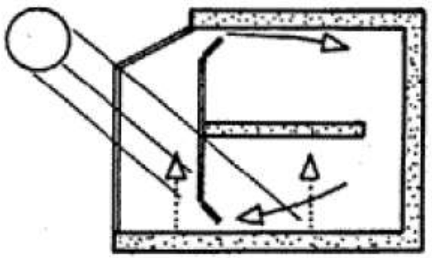
Blumenfenster



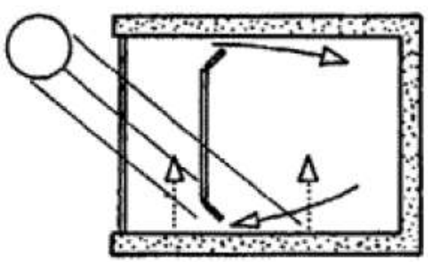
Fensterkollektor II

Components for pasive use of the sun-energy

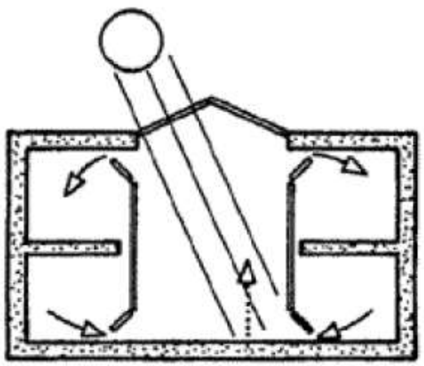
Glased buffer-rooms/ sun patios/ Verglaste Pufferräume/Sonnenveranda/glased areas, passages



Wintergarten, vorgesetzt



Wintergarten, eingebaut



glasüberdeckter Bereich II

Examples for combined systems

Project name: Wohnhausanlage Csokorgasse
Planning: Treberspurg
Location: Csokorgasse Wien
Constructor: GEWOG, Gemeinnützige Wohnungsbauges.mbH
Finished: 1999

Apartment complex Csokorgasse III

Examples for combined systems

Apartment complex ‚Am Hirschenfeld' II

Project name:
Wha am Hirschenfeld
Planning:
ARGE Reinberg, Treberspurg, Raith
Location:
Wien 21, Brünnerstraße, Empergergasse
Constructor:
GESIBA
Finished:
1996

Examples for combined systems

Apartment complex Stadlau II

Project name: Wohnhausanlage Stadlau
Planning: Arge Reinberg - Treberspurg - Raith
Location: Wien 22
Constructor: Neues Leben - Gemeinnützige Bau-, Wohn- und Siedlungsgenossen-schaft
Finished: 1991

Examples for combined systems

Apartment complex Stadlau I

Examples for combined systems

Apartment complex ‚Naturnahes Wohnen‘ II

Project name:
Wohnhausanlage
"Naturnahes Wohnen"
Planning:
Treberspurg
Location:
Wien 22
Constructor:
Demonstrativprojekt
Naturnahes Wohnen
der Gemeinde Wien
Finished: 1996

Examples for combined systems

Project name:
Haus Reznicek
Planning:
Treberspurg
Location:
St.Andrä-Wördern
Constructor:
Privat
Finished: 1992

Reconstruction Family house Reznicek I

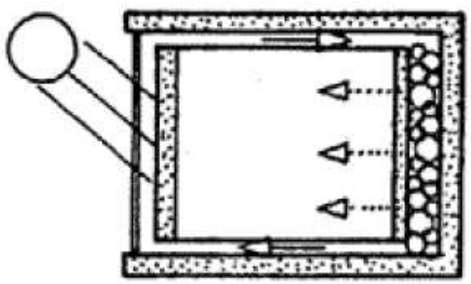
Examples for combined systems

Project name:
Haus Reznicek
Planning:
Treberspurg
Location:
St.Andrä-Wördern
Constructor:
Privat
Finished: 1992

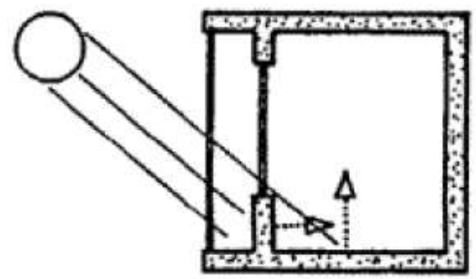
Reconstruction Family house Reznicek I

Components for pasive use of the sun-energy

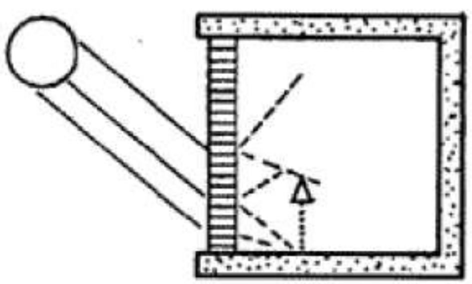
Sunenergy gaining wall systems / sun-wands



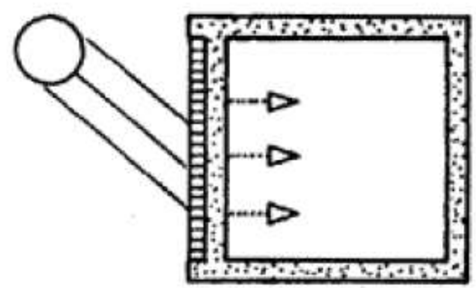
Luftkollektor/Trombéwand



doppelte Fassadenhaut I

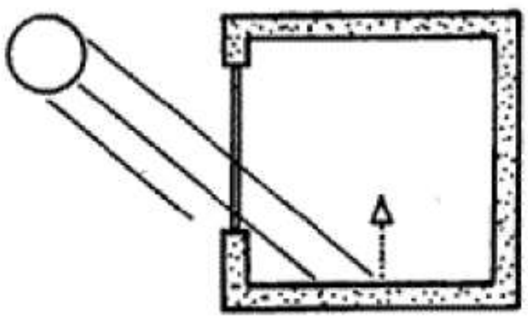


TWD zwischen Glas

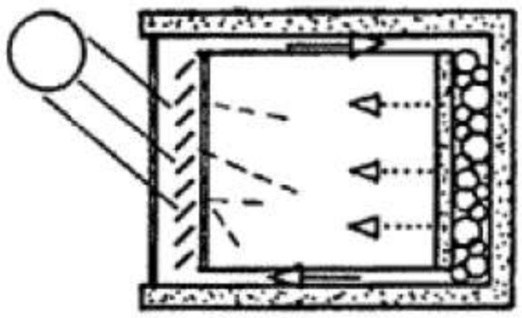


TWD vor Mauerwerk

Sun-windows + glazes facade elements



Sonnenfenster II



Fensterkollektor II

Examples for sun gazebo


Apartment complex Osramgründe II

Project name: Wohnhausanlage Osramgründe
Planning: Treberspurg, Atelier 4, E.Steiner
Location: Wohnhausanlage Wien 23, Osramgründe
Constructor: WIEN SÜD,Gemeinnützige Bau- und Wohnungsgenossenschaft
Finished: 1999

Design rules

- Orientation preferably to south, 10% loss when orientated till 20° to east and till 30° to west

- no shadowing in wintertime

- sunscreen in summertime

- adequate size to be coordinated with the inner-mass-accumulator of the building. (Danger of overheating also in the transition time; planning mistakes, liability, optionally consult building physics + simulation)

- total surface of the sun-window: 25-50% of the inner space which is in the influence of the sun-window

Dimensioning rules

-appropriate heat insulation of the glazing

-flexible heat insulation through mobile heat absorbing shutters for the night-time (by bad glazing insulation)

-appropriate heat insulation of the framework

-possibly large, contiguous glasplanes due to thermal bridges of the border junctions

Heat transmitting mechanisms

-radiation
-conduction
-convection

Heat insulation of the glazing

I. Thermal transmittance U-Value (W/m²K)
is the rate of transfer of heat (in watts) through one square metre of a structure divided by the difference in temperature across the structure. It is expressed in watts per square metre per kelvin, or W/m²K. Well-insulated parts of a building have a low thermal transmittance whereas poorly-insulated parts of a building have a high thermal transmittance.

II. Window solar factor g-Value (%)
is a measure of the amount of heat gain from sunlight. The solar factor is expressed as a number between 0 and 1. A lower solar factor means less heat gain.

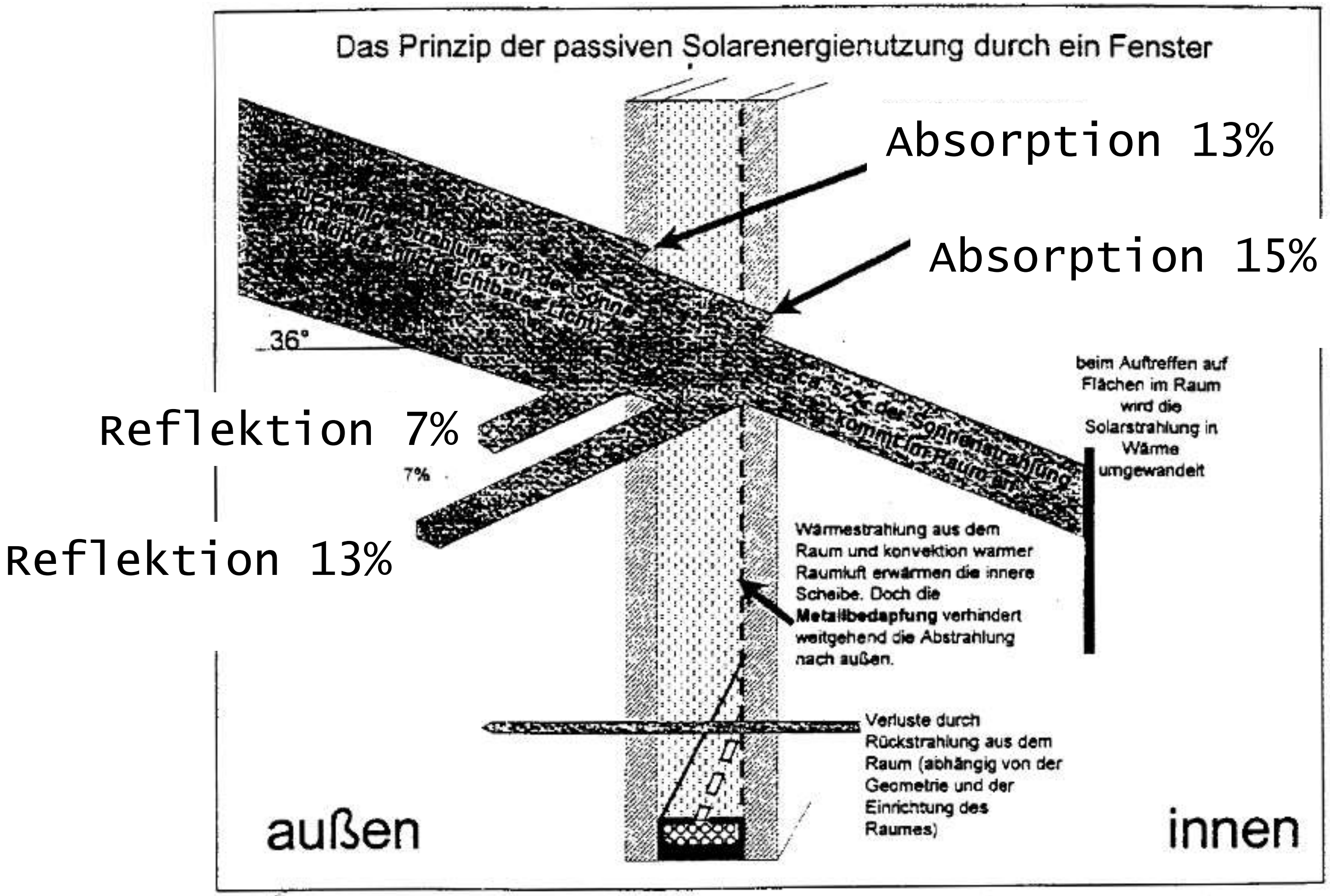
Example Glastypes

Verglas.art	Füllgas	Aufbau	k-Wert [W/m2K]	g-Wert [%]	Preis [€/m2]	k-äqu SÜD [W/m2K]	k-äqu O/W [W/m2K]	k-äqu NORI [W/m2K]	Preis [ATS/m2]
2-fach Glas									
Standard	Luft	4/16/4	3,0	76	23	1,18	1,94	2,24	320
Interpane:									
iplus neutr.R	Argon	4/16/4	1,1	58	41	-0,29	0,29	0,52	560
iplus 2R	Argon	4/16/4	1,0	48	44	-0,15	0,33	0,52	600
iplus 2C	Krypton	4/12/4	0,9	46	61	-0,20	0,26	0,44	840
iplus C	Krypton	4/12/4	1,0	58	58	-0,39	0,19	0,42	800
Petschenig glastec:									
Uniplus 1,1	Argon	4/16/4	1,1	58	41	-0,29	0,29	0,52	560
Unitop 1,1	**Argon**	**4/16/4**	**1,1**	**63**	**55**	**-0,41**	**0,22**	**0,47**	**750**
Uniplus 1,0	Argon	4/16/4	1,0	54	58	-0,33	0,21	0,42	800
Uniplus 0,9	Krypton	4/10/4	0,9	58	65	-0,49	0,09	0,32	900
Eckelt Glas:									
Climaplus N	Argon	4/16/4	1,1	58	40	-0,29	0,29	0,52	550
Climaplus ultra 1.0	Argon	4/16/4	1,0	51	42	-0,22	0,29	0,49	580
Mayer Glastechnik:									
MGTherm 1,1	**Argon**	**4/16/4**	**1,1**	**58**	**31**	**-0,29**	**0,29**	**0,52**	**420**
MGTh.1,1N	**Argon**	**4/16/4**	**1,1**	**63**	**39**	**-0,41**	**0,22**	**0,47**	**540**
MGTherm 1,0	**Arg/Krypt.**	**4/16/4**	**1,0**	**58**	**55**	**-0,39**	**0,19**	**0,42**	**756**
MGTherm 0,9	Krypton	4/10/4	0,9	51	61	-0,32	0,19	0,39	840

Example Glastypes

Verglas.art	Füllgas	Aufbau	k-Wert [W/m2K]	g-Wert [%]	Preis [€/m2]	k-äqu SÜD [W/m2K]	k-äqu O/W [W/m2K]	k-äqu NORI [W/m2K]	Preis [ATS/m2]
3-fach Glas									
Interpane:									
iplus 3	Argon	4/12/4/12/4	0,7	45	65	-0,38	0,07	0,25	900
iplus 3X	Xenon	4/8/4/8/4	0,4	42	211	-0,61	-0,19	-0,02	2900
iplus 3C	Krypton	4/12/4/12/4	0,5	42	109	-0,51	-0,09	0,08	1500
Petschenig glastec:									
Uniplus 0,7	Krypton	4/8/4/8/4	0,7	45	102	-0,38	0,07	0,25	1400
Uniplus 0,6	Argon	4/16/4/16/4	0,6	45	74	-0,48	-0,03	0,15	1020
Unitop 0,6	**Argon**	**4/16/4/16/4**	**0,6**	**55**	**87**	**-0,72**	**-0,17**	**0,05**	**1200**
Unitop 0,5	**Krypton**	**4/10/4/10/4**	**0,5**	**55**	**116**	**-0,82**	**-0,27**	**-0,05**	**1600**
Eckelt Glas:									
Climatop	Krypton	4/8/4/8/4	0,7	45	131	-0,38	0,07	0,25	1800
Climat.Solar	**Krypton**	**4/10/4/10/4**	**0,6**	**60**	**203**	**-0,84**	**-0,24**	**0,00**	**2800**
Mayer Glastechnik:									
MGTherm 0,7	Argon	4/14/6/14/4	0,7	45	48	-0,38	0,07	0,25	654
MGTh.0,6N	**Argon**	**4/16/4/16/4**	**0,6**	**55**	**57**	**-0,72**	**-0,17**	**0,05**	**780**
MGTherm 0,5	Krypton	4/10/6/10/4	0,5	45	110	-0,58	-0,13	0,05	1518
Glas mit Folien									

Strahlungsdurchtritt von einem Standardwärmeschutzglas



New Products for Sun-windows

Photochromic Glass: Das Glas verdunkelt sich automatisch bei steigender Sonneneinstrahlung (z.B. Gläser von Sonnenbrillen).

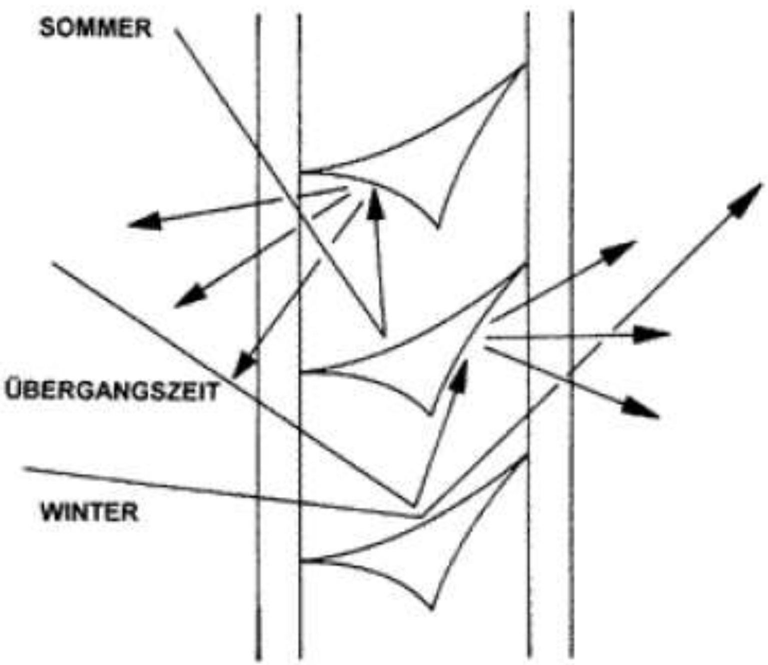
Thermotropic Glass: Bei Temperaturerhöhung geht das Glaselement durch eine ungiftige Masse im Scheibenzwischenraum in einen diffustransparenten Zustand über.

Elekctrochromatic Glass: Eine Verdunklung oder Verfärbung wird über Ionenwanderung in der Beschichtung elektrisch gesteuert.

Liquid crystal compound plates: Eine trübe Flüssigkristallschicht zwischen den Scheiben wird durch elektrische Impulse in ihrer Struktur so geordnet, dass sie transparent oder opak wird.

New Products for Sun-windows

Insulated Glass with fix arranged mirror profiles in the interspace

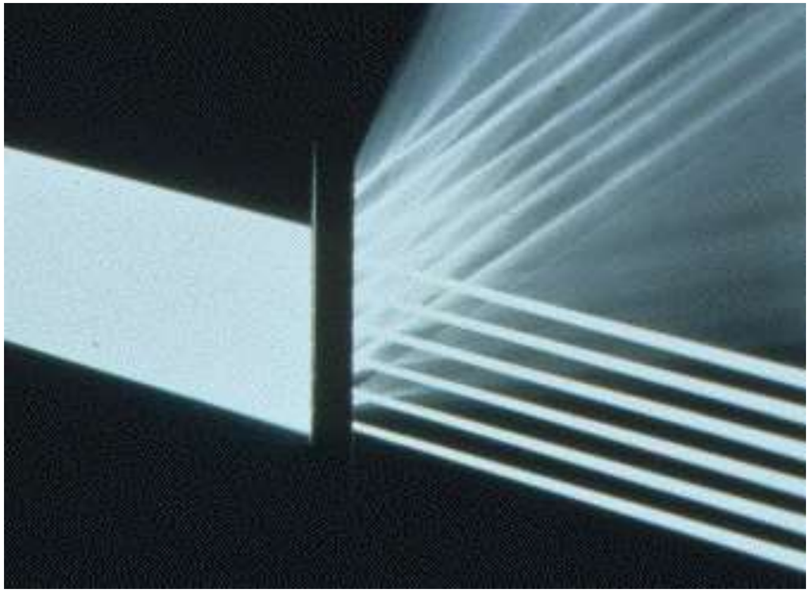


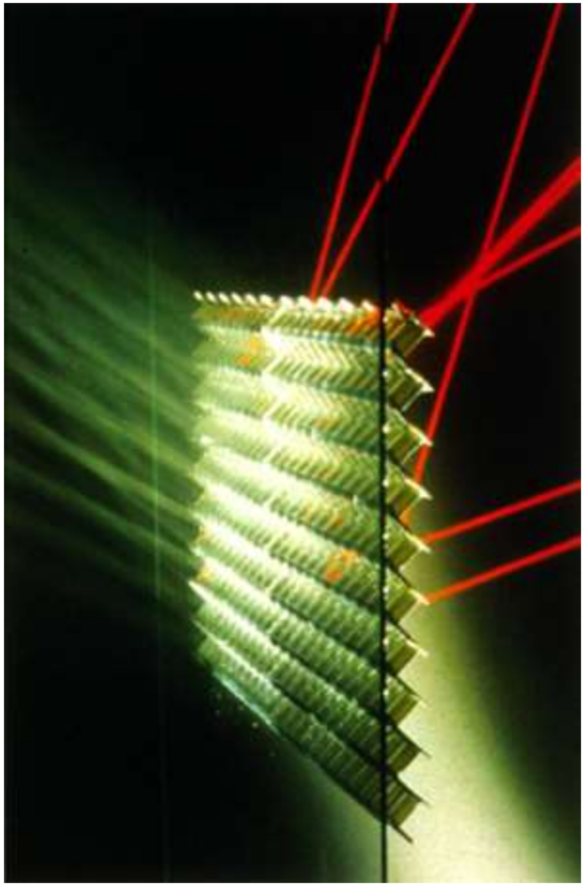
Okasolar-Grafik

Okasolar-Bild

New Products for Sun-windows

Insulated Glass with fix arranged mirror profiles in the interspace



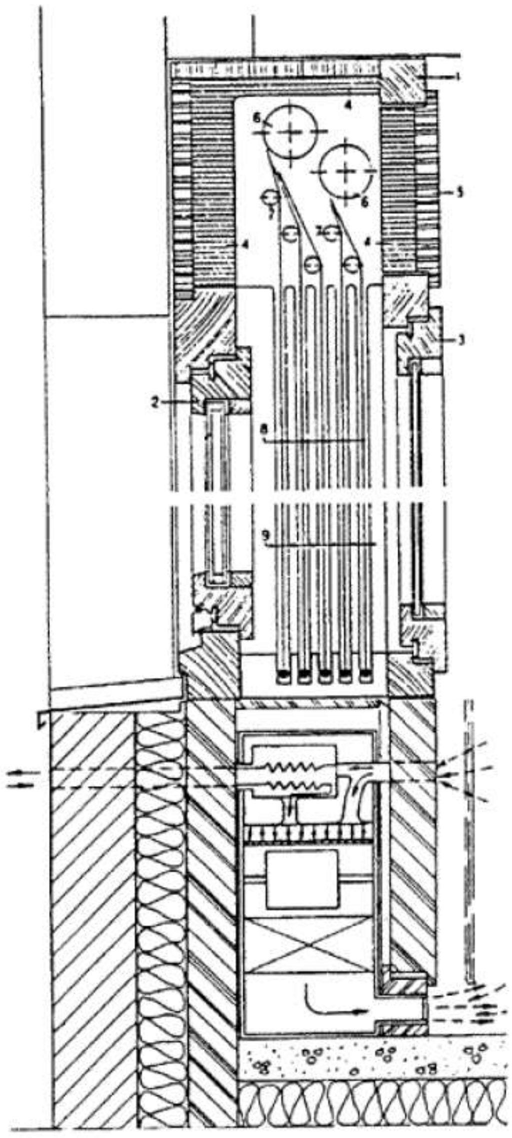


Example of Sun-window

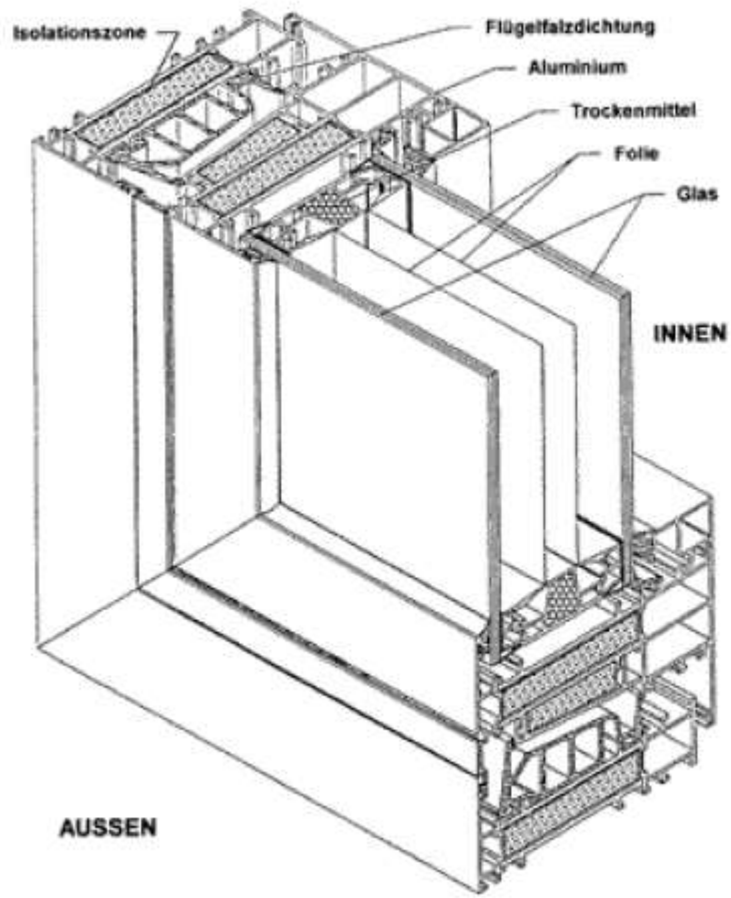
Project name:
Wohnhausanlage
"Naturnahes Wohnen"
Planning:
Treberspurg
Location:
Wien 22
Constructor:
Demonstrativprojekt
Naturnahes Wohnen
der Gemeinde Wien
Finished: 1996

High-performance Window

Toptherm window



High-performance Window



HIT-Fenster

Passive solar-technical components

Part 2:

Sun walls, transparent thermal insulation, solar cellular comb walls, winter gardens

Sun walls

… equates the process of indirect heat gain

Structure of Sun walls

-transparent cover ca. 10 cm in front of the accumulator wall

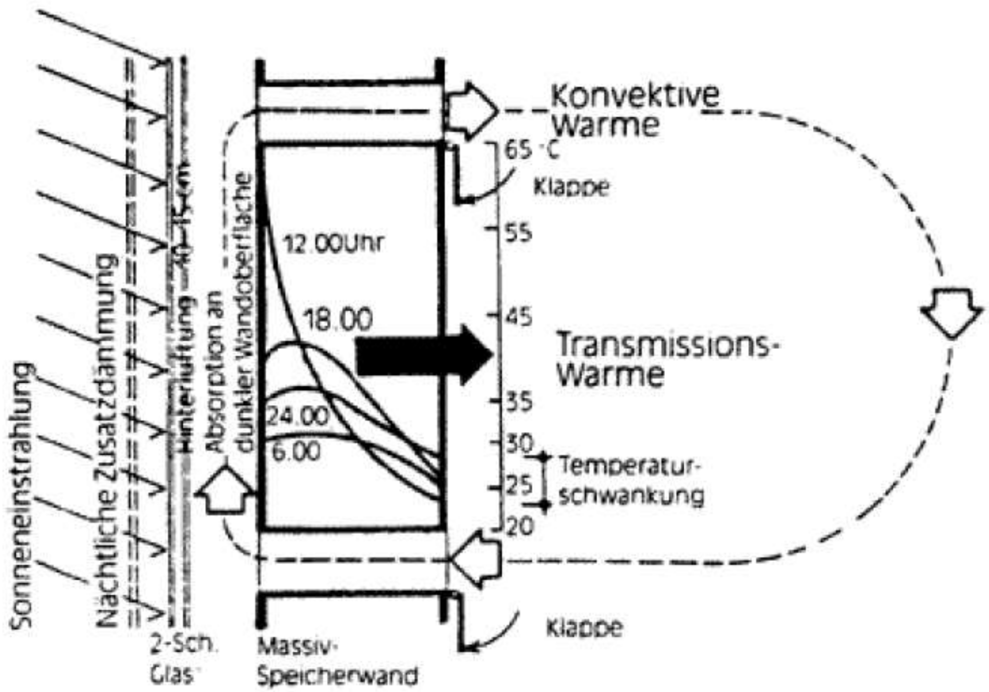
-accumulator wall in appropriate thickness, with dark surface

-ventilation openings with control valves, for transporting the warm air from the facade interspace to the interior

-adjustable sunscreen

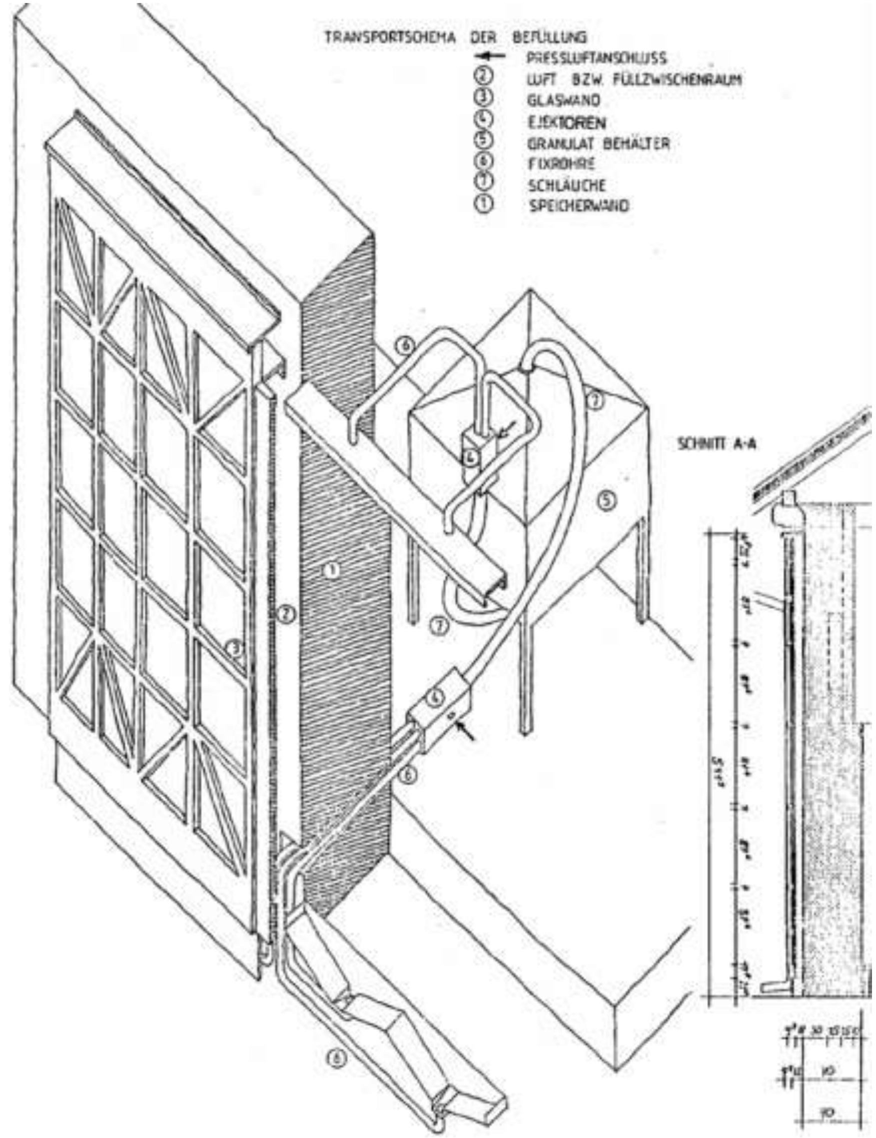
-flexible thermal insulation for night insulation

Trombé- or Sun wall



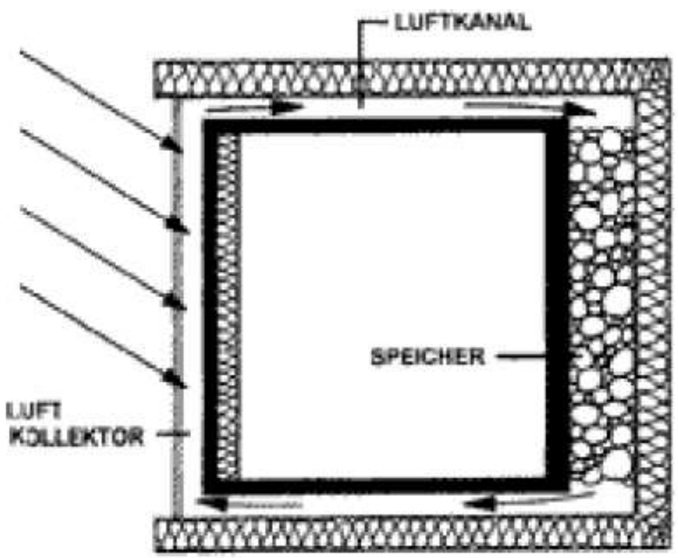
Funktionsschema Trombé- oder Sonnenwand
– mit Luftkonvektion
– Temperaturverlauf ohne Ventilationsklappen

Sun wall with time variable thermal insulation

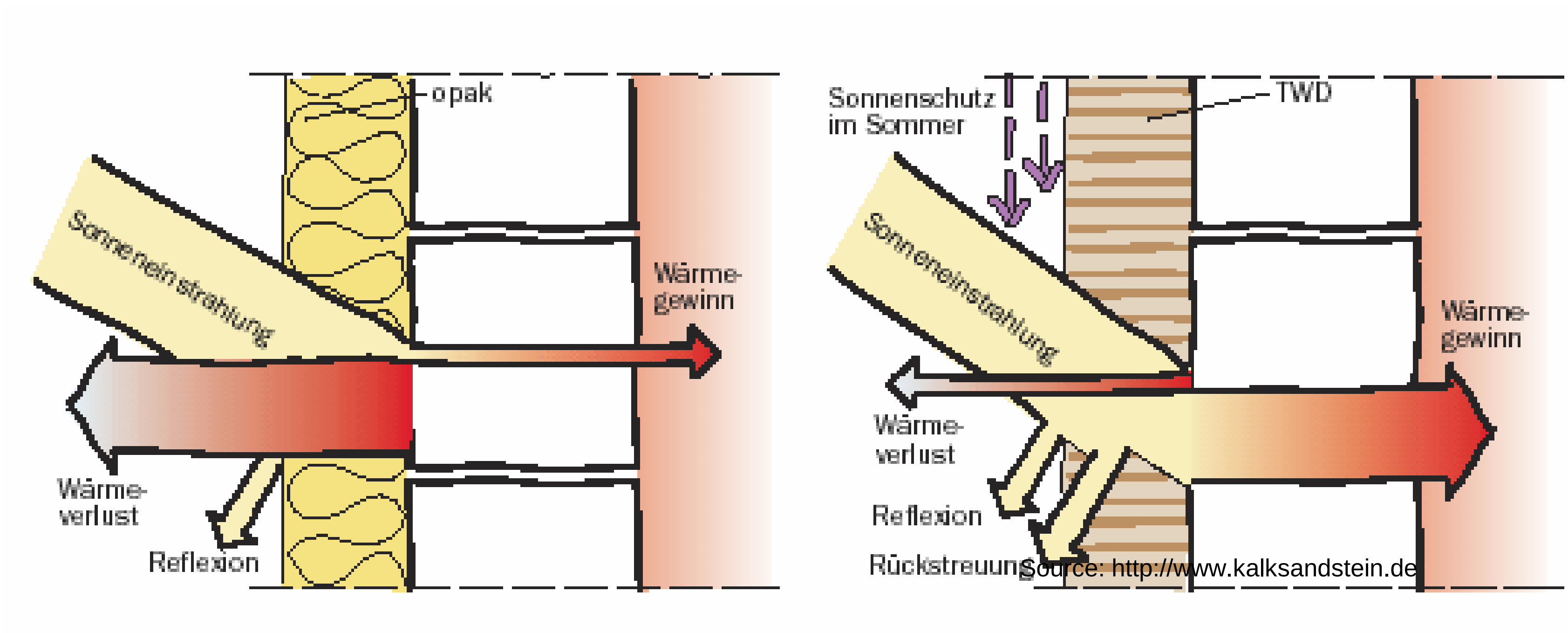


Ventilation collector wall

…in structure similar to Trombéwall, but the warm air from the black absorber wall is transported to the accumulator in the interior via ducts.



Principle of transparent thermal insulation (TTI)



Source: http://www.kalksandstein.de

Sun wall with TTI

OKALUX capillary material is located between two glass panels. Principle is similar to Trombéwall: sunrays travel through the transparent thermal insulation to the black wall surface.

Values up to 860 W/m2 performance in winter.

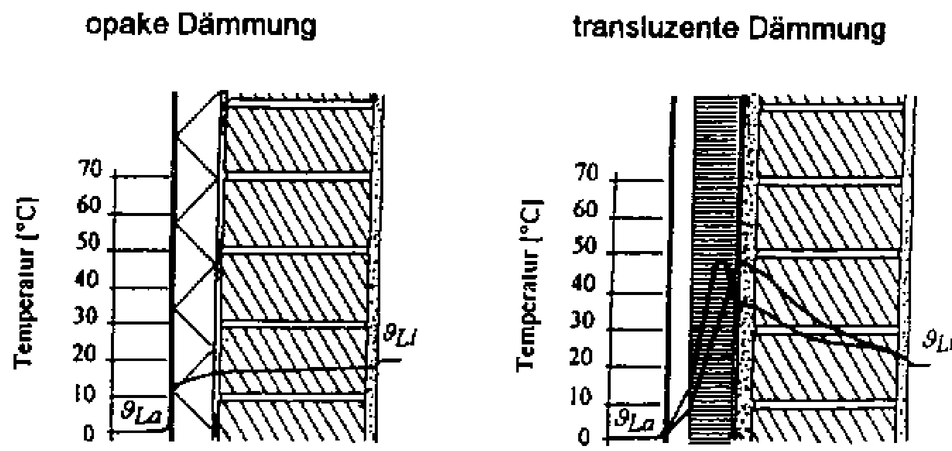
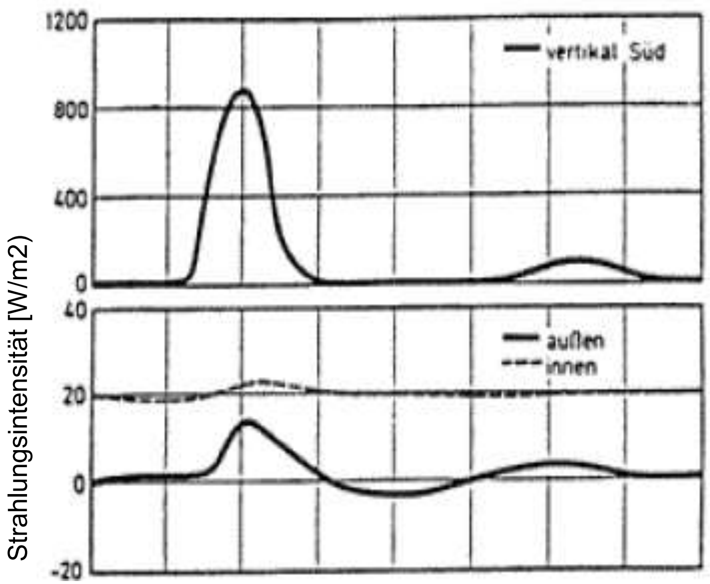
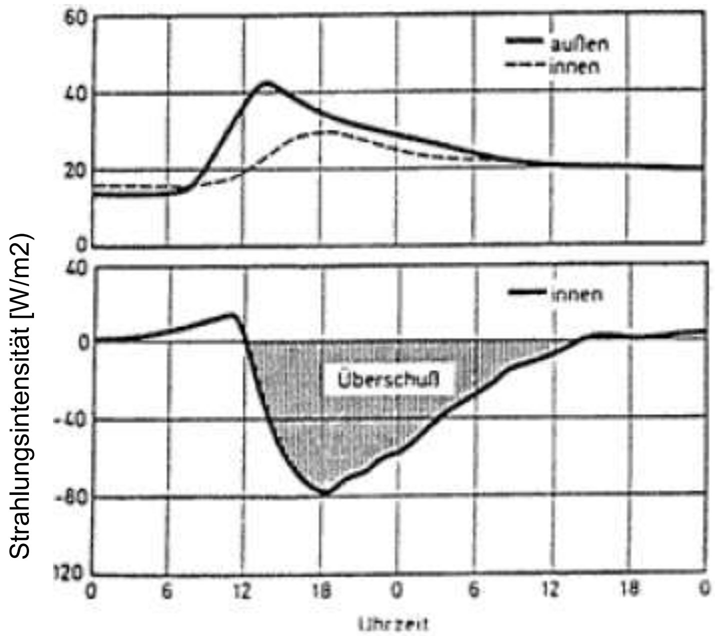


Abb. 7.20: Schema der Funktion der transparenten Wärmedämmung – TWD bei besonnten Wänden

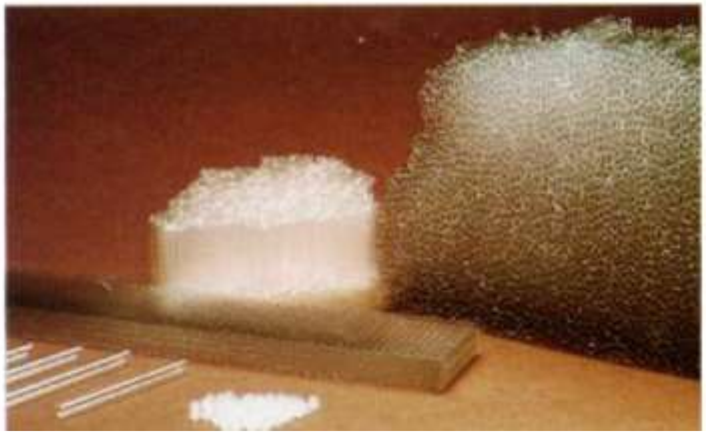
Temperature timeflow and the heat flow density of south wall with TTI

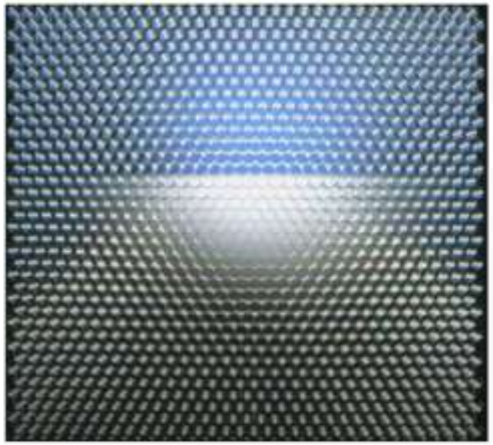




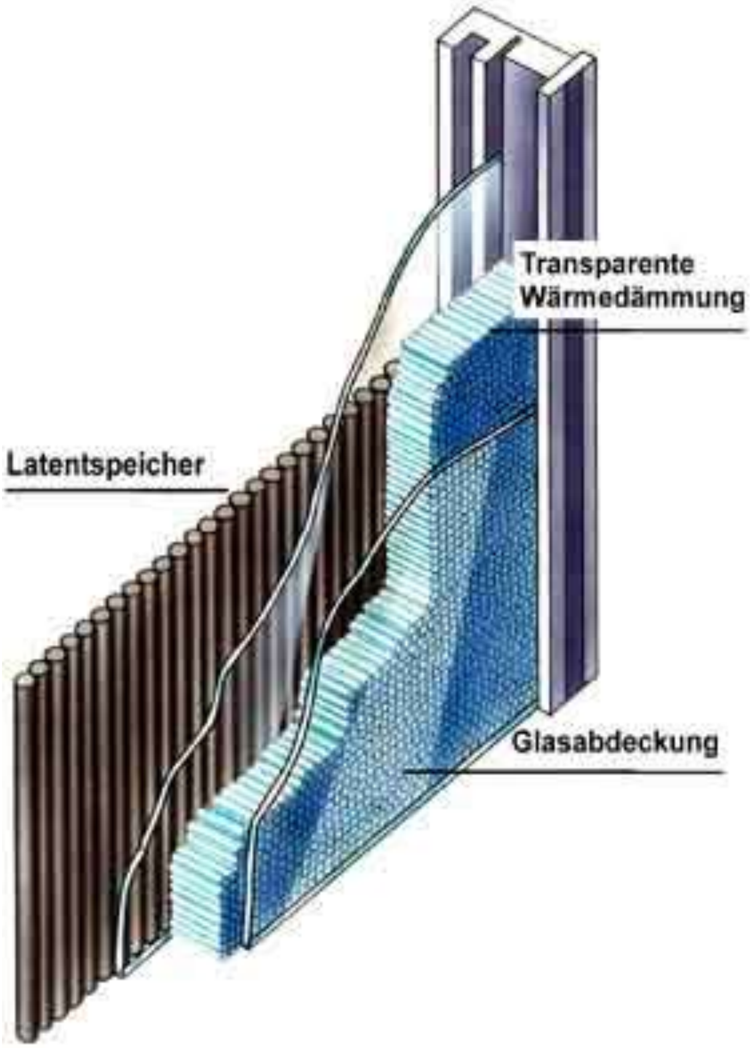
Miscellaneous TTI Materials

"Kapipane"

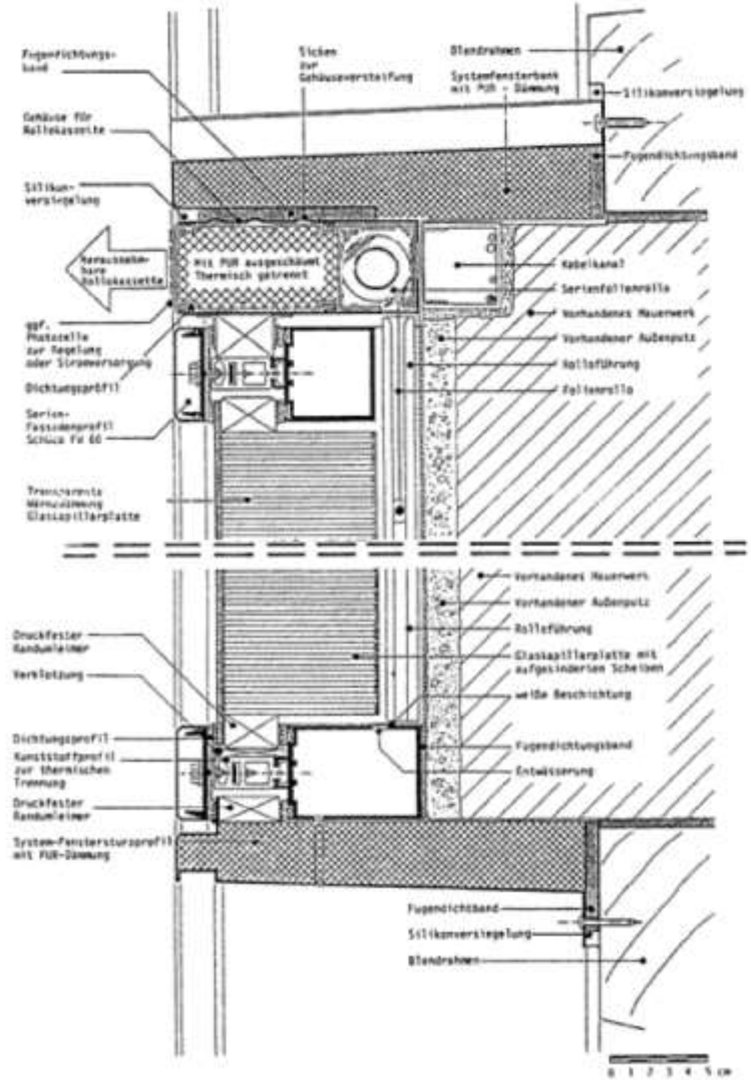




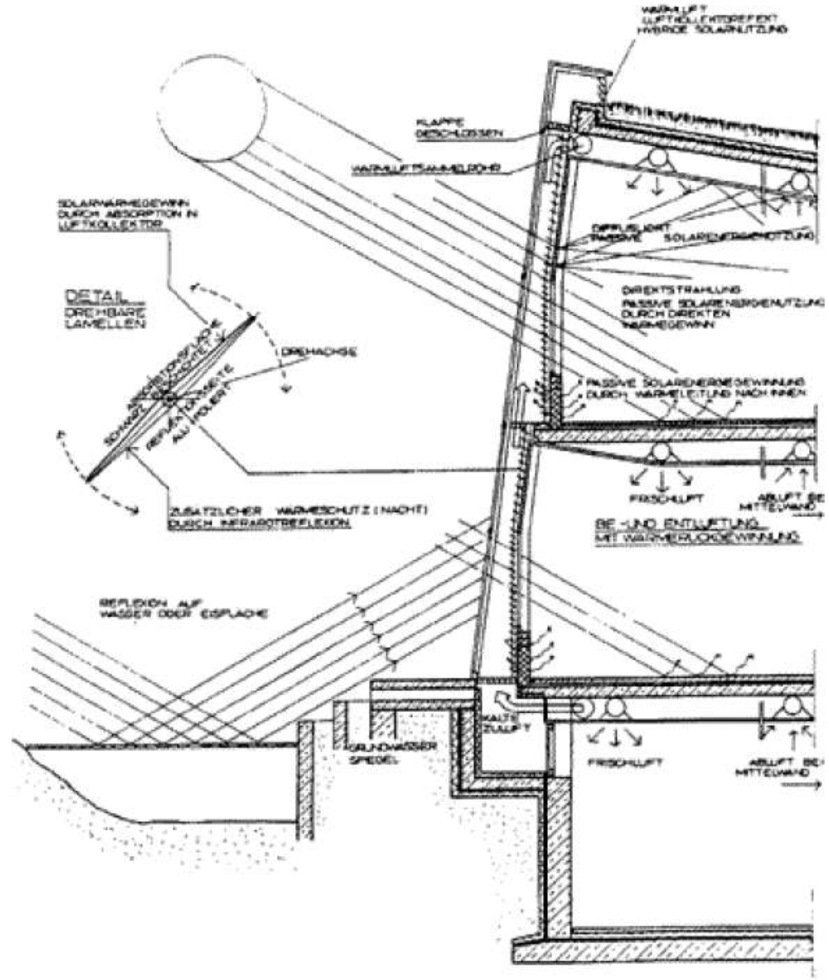
Design of TTI



TTI Parapet-collector detail



Examples of TTI



Examples of TTI

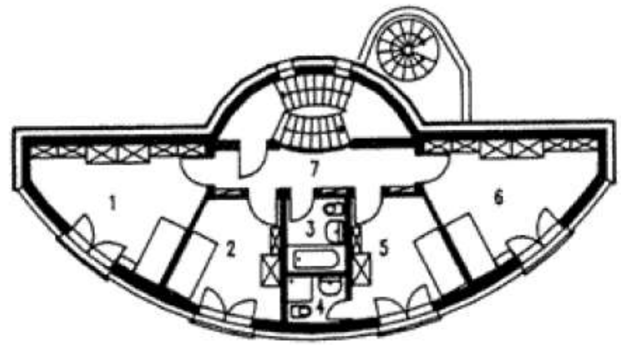
energieautarkes Solarhaus, Freiburg (Deutschland)

Project name:
Energy self-sufficient Solarhouse
Planning:
Dieter Möller
Location:
Freiburg
Constructorschaft:
Fraunhofer ISE
Finished:
1992

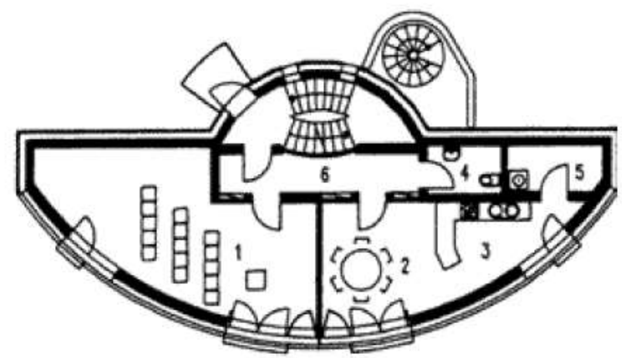
Examples of TTI

		Heizenergiebedarf (kWh / a)
	TWD: Ost-,Süd- und Westfassade 10 x 10 x 5 m³	444
	TWD: Ost-,Süd- und Westfassade 12,5 x 8 x 5 m³	359
	TWD: Ost-,Süd- und Westfassade 16 x 6,25 x 5 m³	294
	TWD: Halbkreis r = 8 m, h = 5 m	304
	TWD: Kreissegment 148 r = 9,85 m, h = 5 m	249

Vergleich - Grundrißform



Obergeschoss



Erdgeschoss

Examples of TTI

Examples of TTI

Examples of TTI

Wohnanlage “Heimat” in Villach

Project name:
Housing estate "Heimat"
Planning: Horst Aichernig
Location: Villach
TTI: STO Therm Solar
www.sto.de

Examples of TTI

Examples of TTI

Examples of TTI

Haus Kilian, Stuttgart I

Project name:
House Kilian,
Planning: Kilian + Hagmann,
Stuttgart Location: Stuttgart

Finished: 1995

Examples of TTI

Haus Kilian, Stuttgart II

Examples of TTI

Haus Kilian, Stuttgart III

Haus Kilian, Stuttgart IV

Examples of TTI

Doppelfamilienhaus Stadlin/Bertschi in Zug (CH)

Project name:
House Stadlin/Bertschi
Planning:
Artevetro Architecten AG Liestal
Location: Zug (CH)
TTI-Solar wall with Profilglass
Finished: 1994

Examples of TTI

Mehrfamilienhaus Sonnenäckerweg, Freiburg II

Project name:
Multi family house Sonnenäckerweg
Planning: Architkturbüro Rolf Disch
Location: Sonnenäckerweg Freiburg (D)
Reconstructed: 1989

Examples of TTI

Mehrfamilienhaus Sonnenäckerweg, Freiburg I

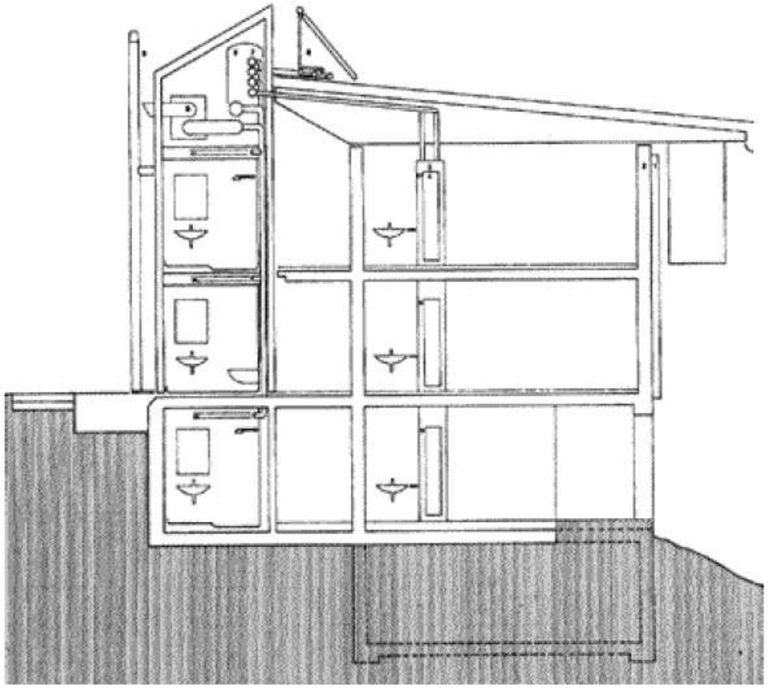
Examples of TTI

Jugendbildungsstätte Windberg I

Project name:
Jugendbildungsstätte Windberg
Planning:
Thomas Herzog
Location:
Windberg, Germany
Constructor: Prämonstratenser-abtei Windberg
Function: youth hostel
Finished: 1991
Energy concept: south orientation, absorber mass, TTI, Solar collectors

Examples of TTI

Jugendbildungsstätte Windberg II



Jugendbildungsstätte Windberg V

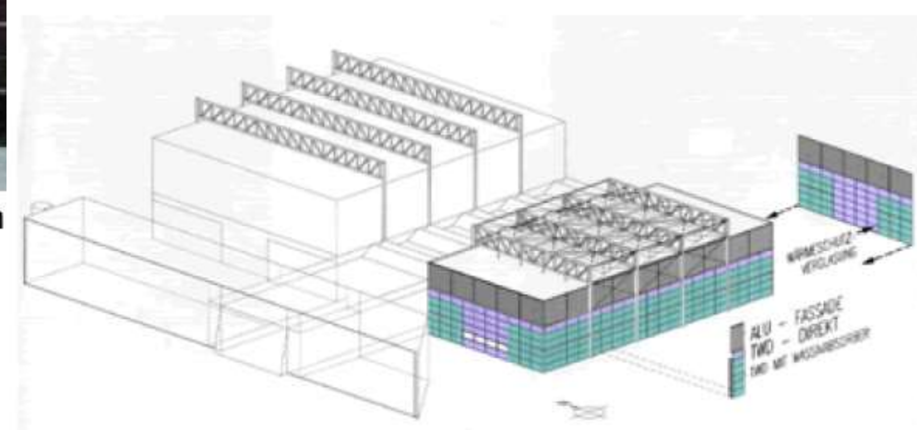
Examples of TTI

Crew-Training-Complex NB-Halle, Köln I

Location: Köln, Linder Höhe, Germany
Constructor: Deutsche Forschungsanstalt für Luft- und Raumfahrt (DLR), Köln
Finished: 1993
Energy concept: TTI-Solar wall and Lichtwall

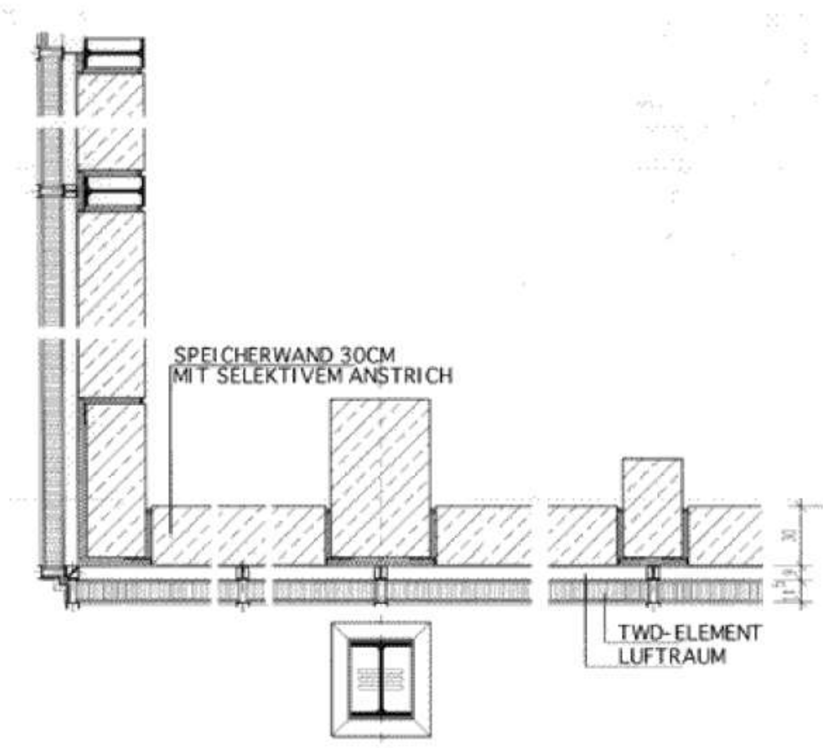
Examples of TTI

Crew-Training-Complex NB-Halle, Köln

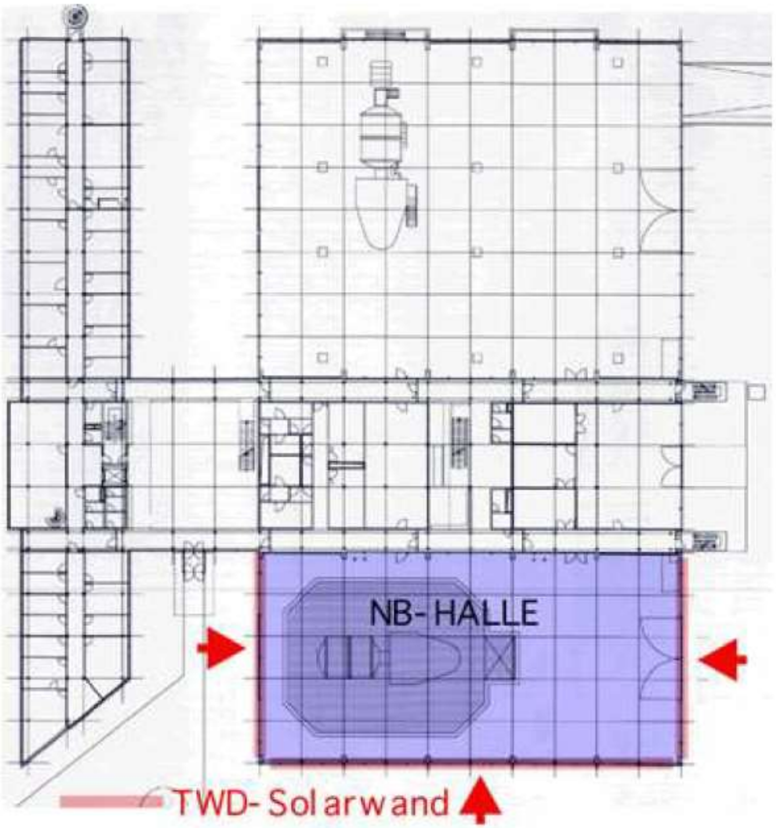


Crew-Training-Complex NB-Halle, Köln III

Examples of TTI



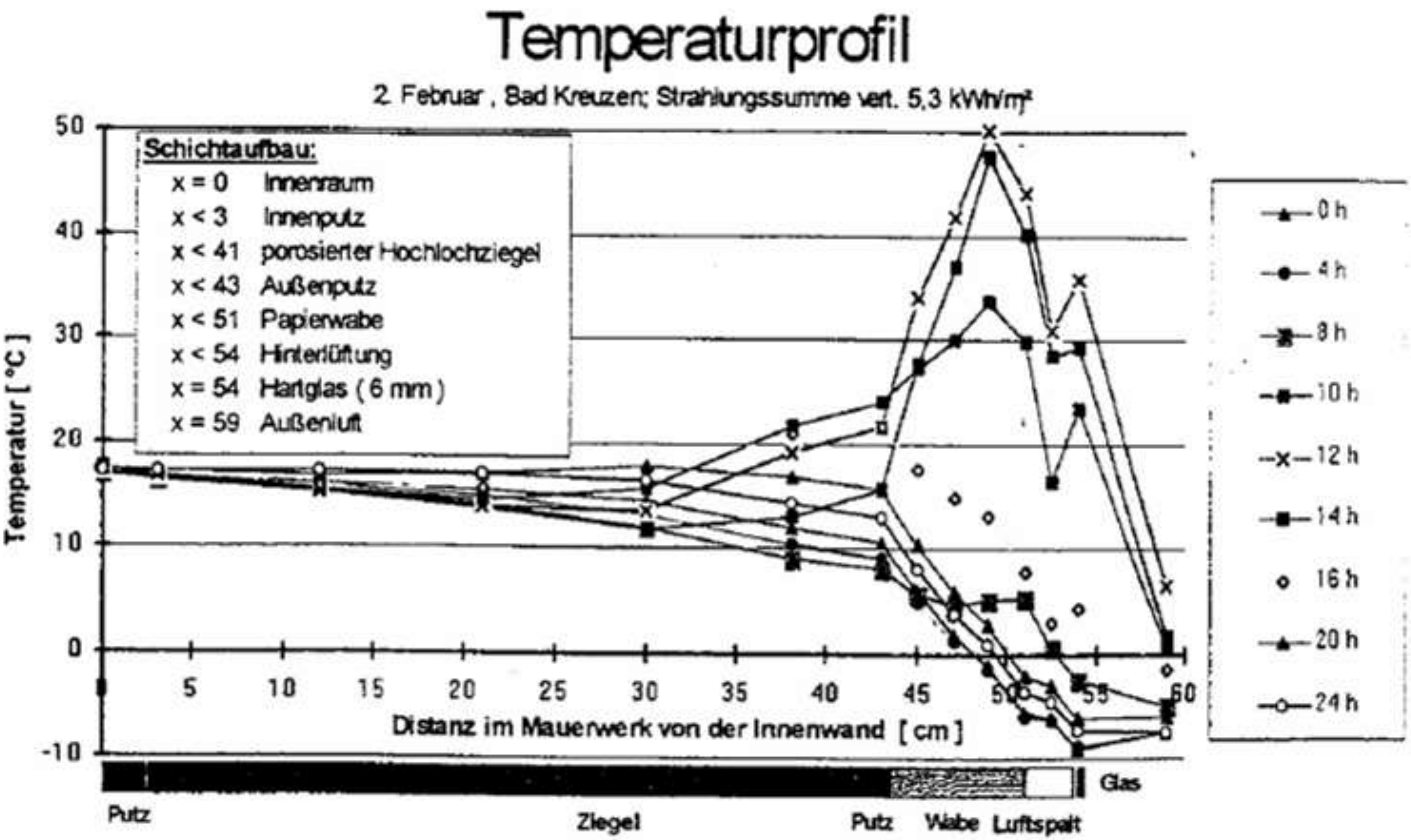
Crew-Training-Complex NB-Halle, Köln IV



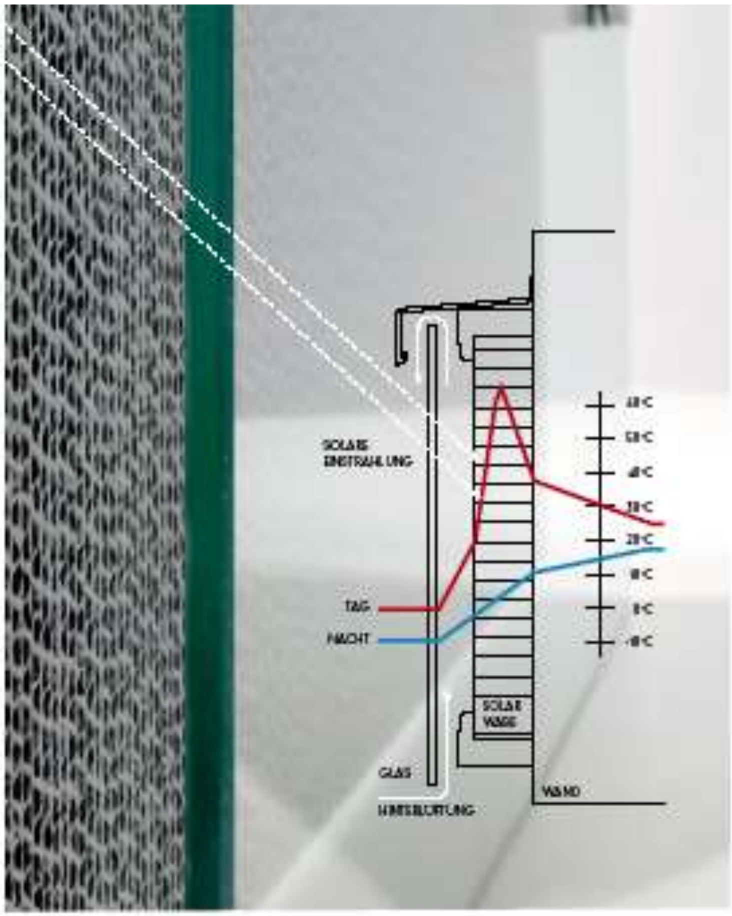
Crew-Training-Complex NB-Halle, Köln V

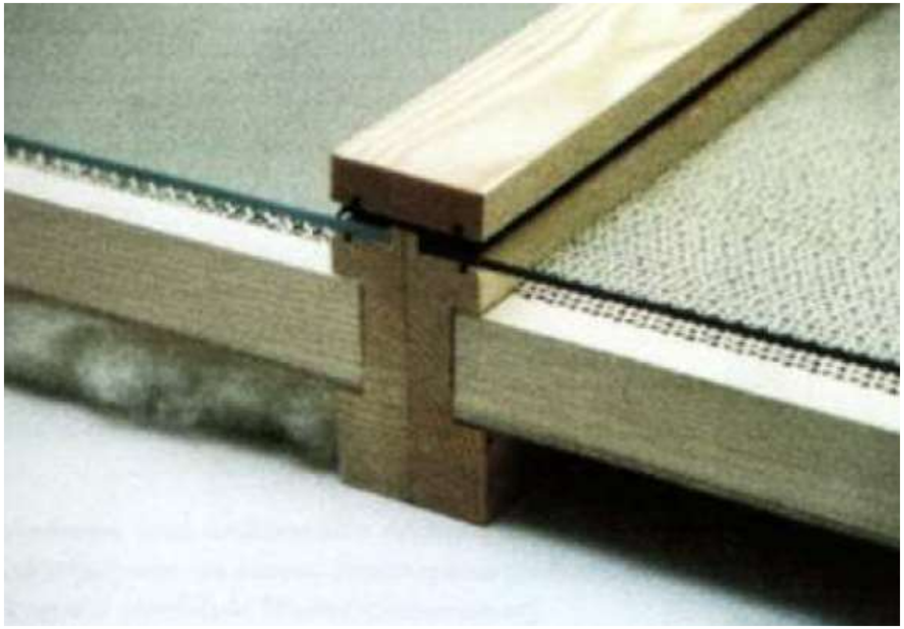
Solar cellular-comb walls

Cellular-comb wall



Cellular comb wall





Examples of Cellular comb wall

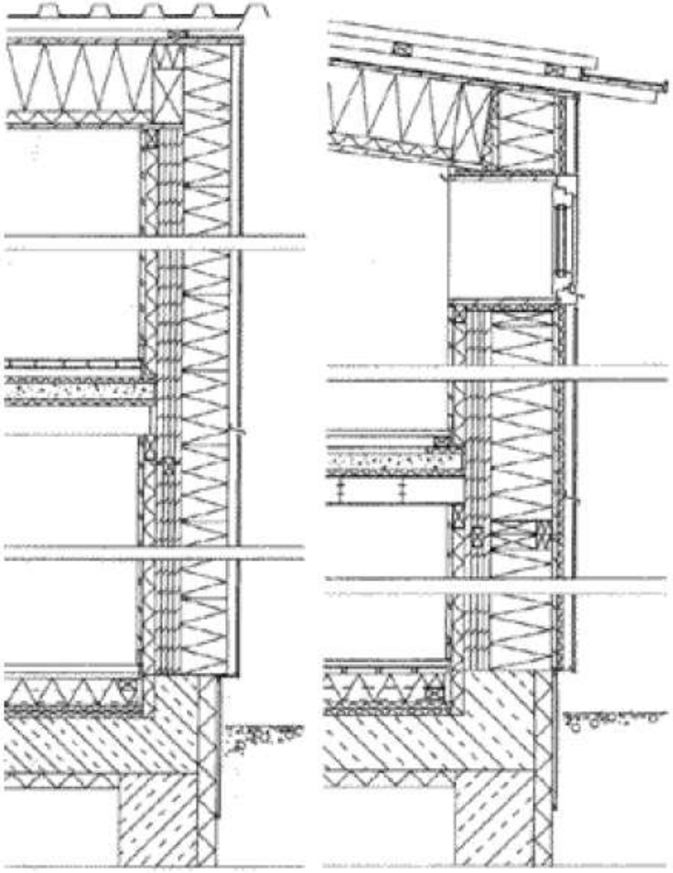

Doppelwohnhaus in Bregenz II

Project name:
DoppelwohnHouse in Bregenz
Planning:
Walter Unterrainer
Location: Bregenz, Austria
energysystem Aschauer
Finished: 1996

Examples of Cellular comb wall

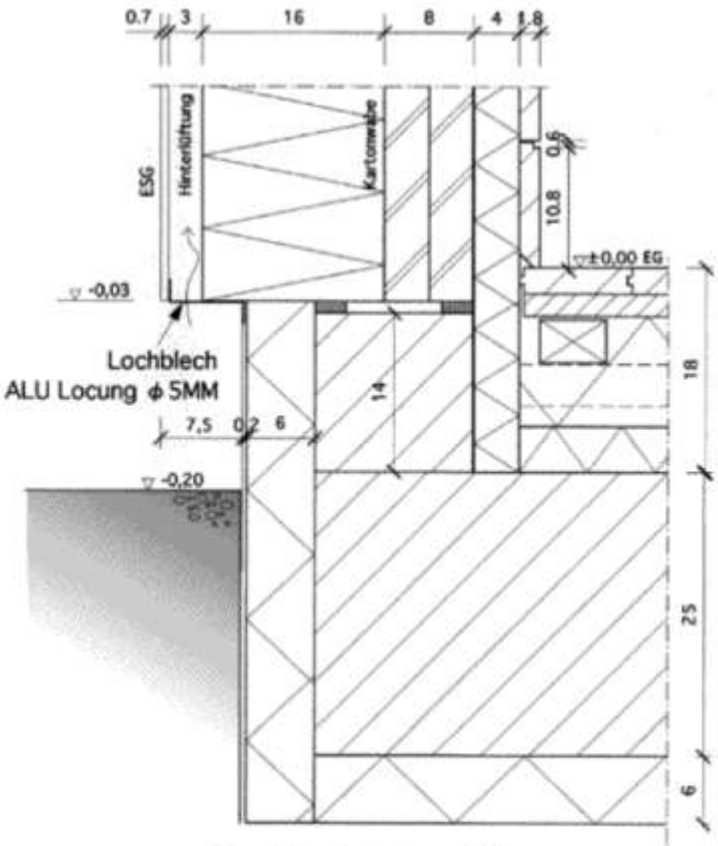
Doppelwohnhaus in Bregenz I

Examples of Cellular comb wall



Doppelwohnhaus in Bregenz - Detail

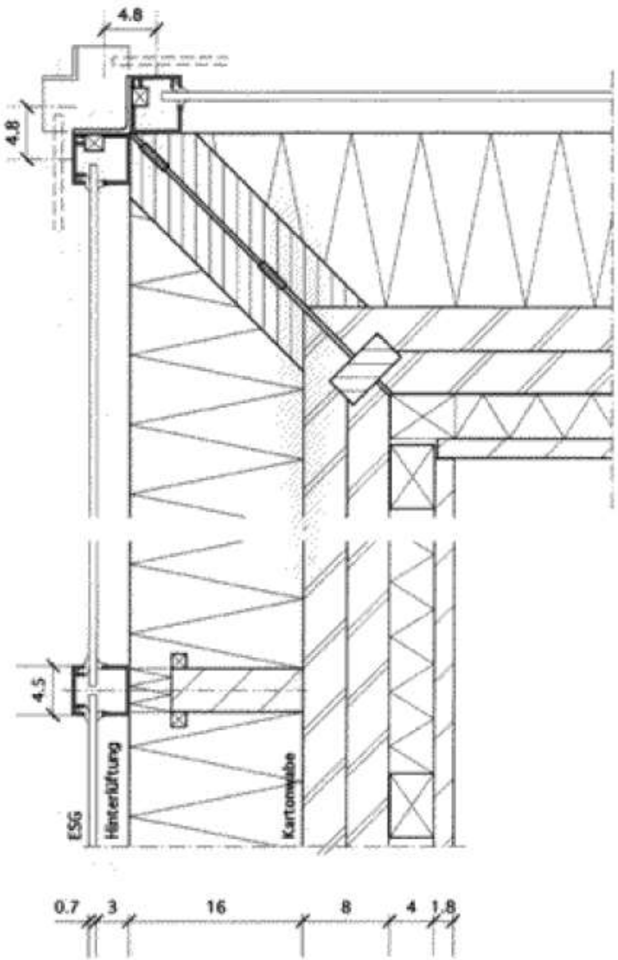
Examples of Cellular comb wall



Haus Ratz in Lauterach III

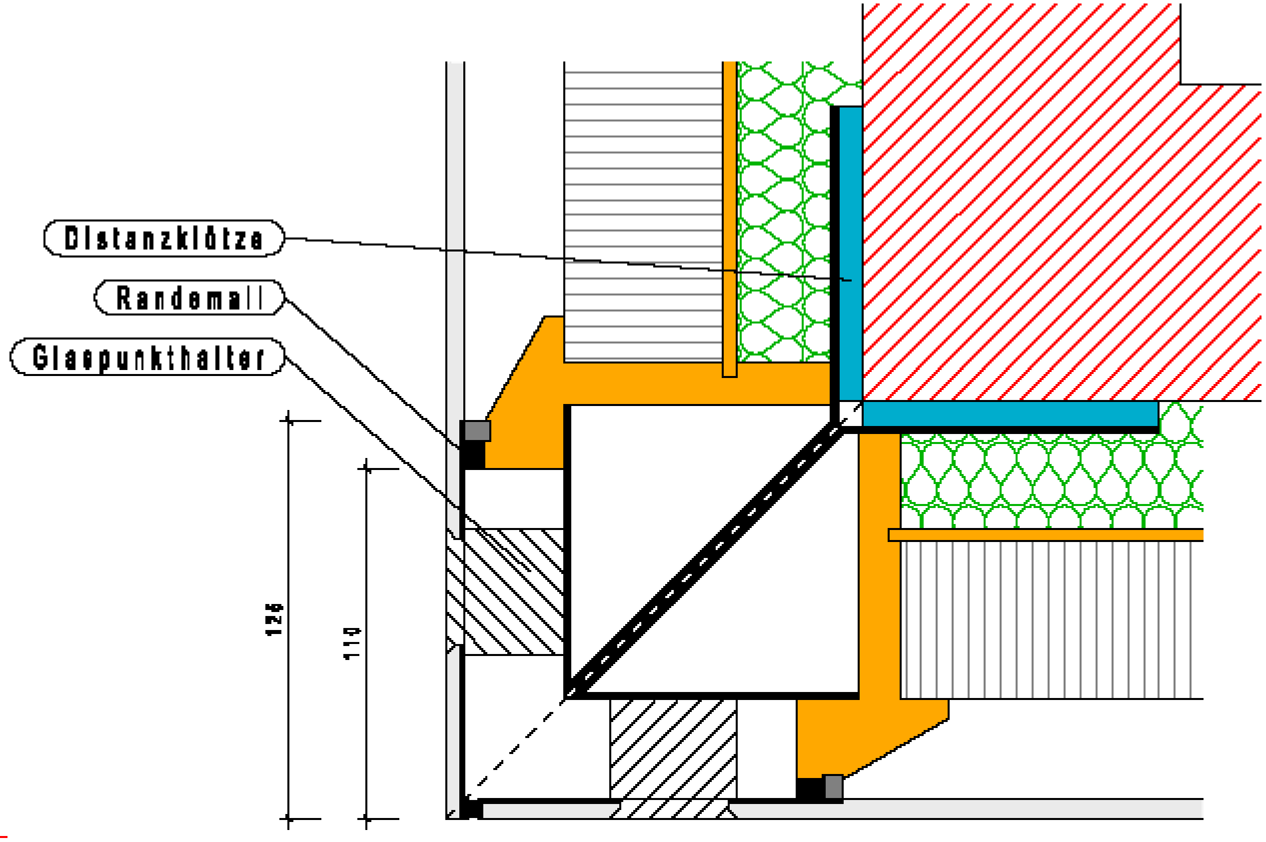
Project name:
House Ratz in Lauterach
Planning:
Walter Unterrainer Location: Lauterach, Austria
Finished: 1998

Examples of Cellular comb wall

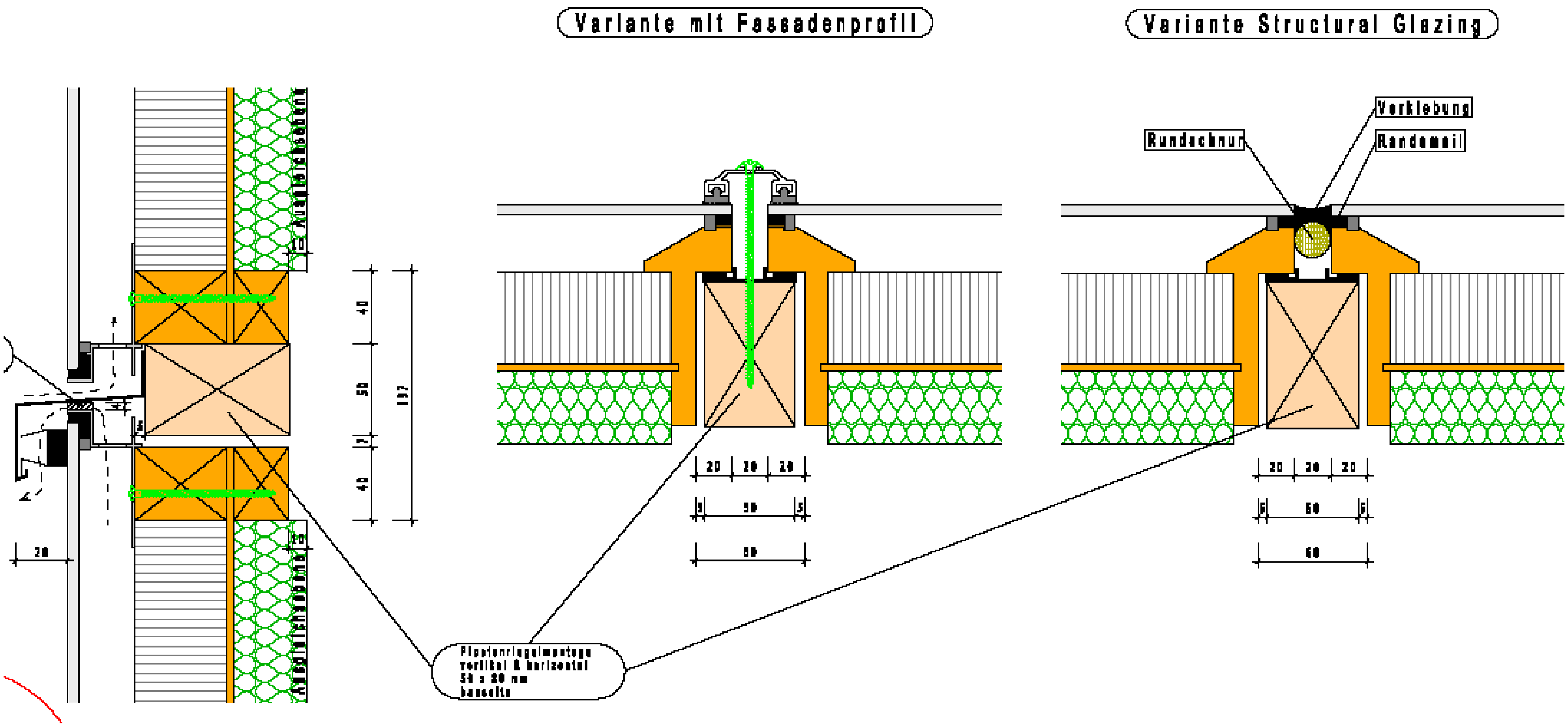


Haus Ratz in Lauterach IV

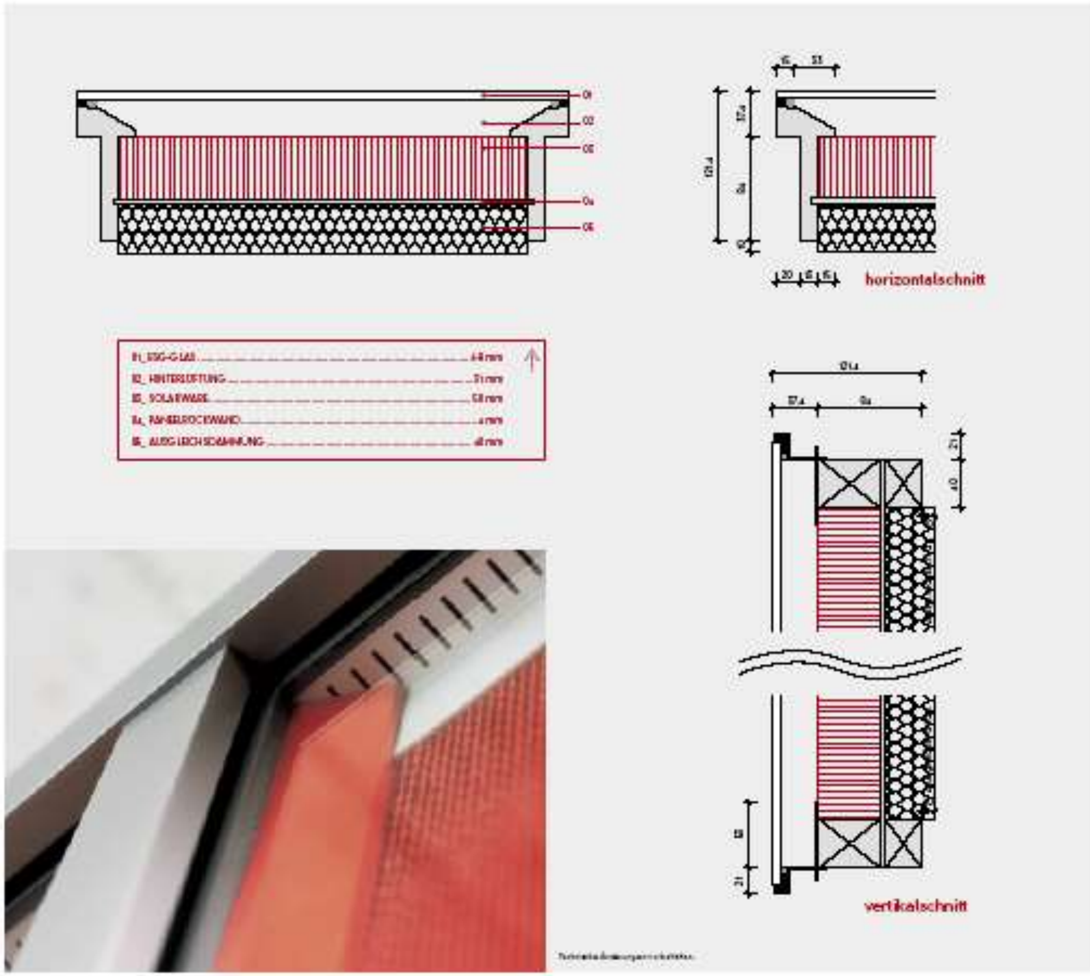
Instalation



Instalation



Instalation



Office refurbishment LEG Erfurt

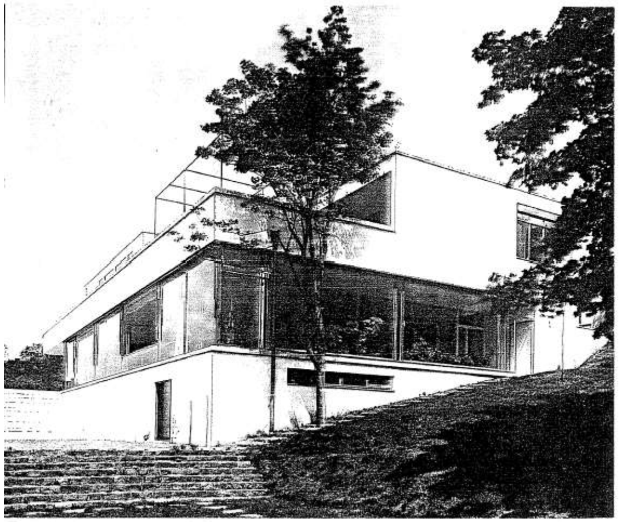
Facade assembly: 2002
Constructor: LEG Thüringen
Architect: Zill und Lippe, LEG
Building type: office, 6 storey
Material: ferroconcrete frame constr.
Solar facade: 2.000 m²
Features:
4.200 m² of facade build in 3 weeks,
transport of solar walls over 500 km

Winter-gardens

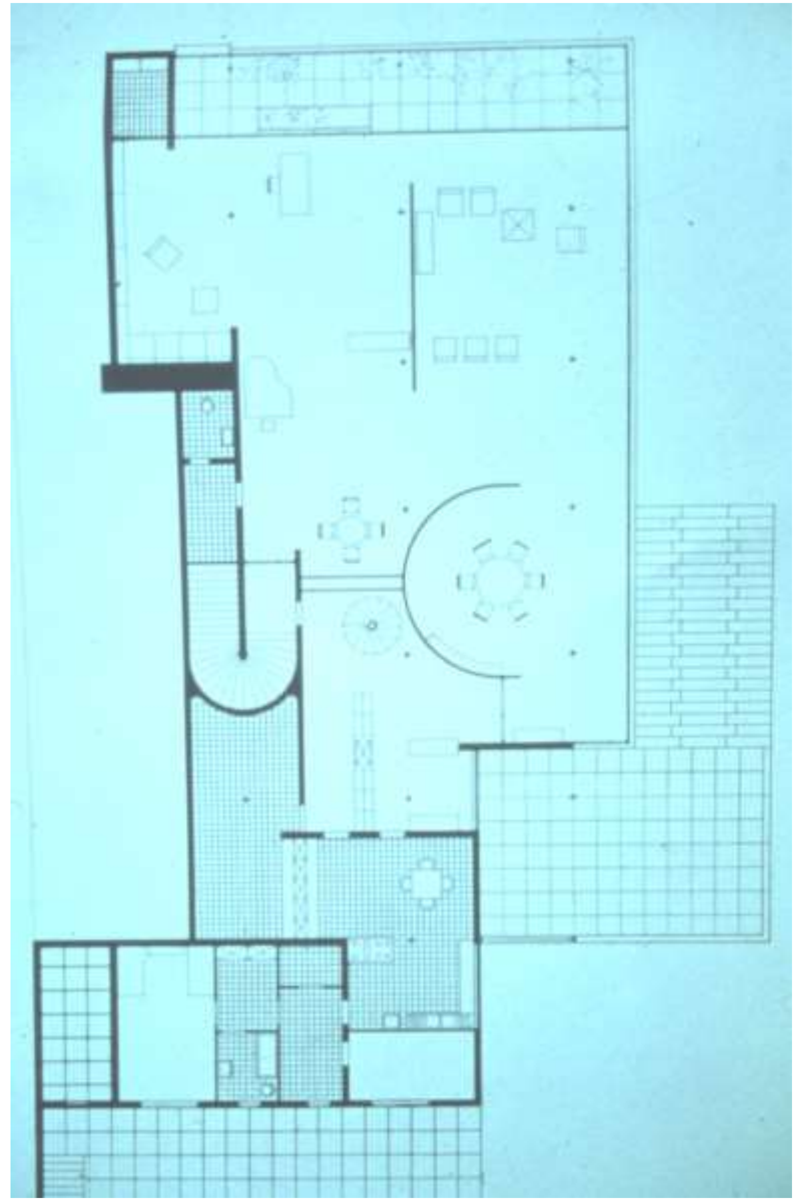
Winter-garden is a unheated buffer room detached from living room

Palm house in Schönbrunn

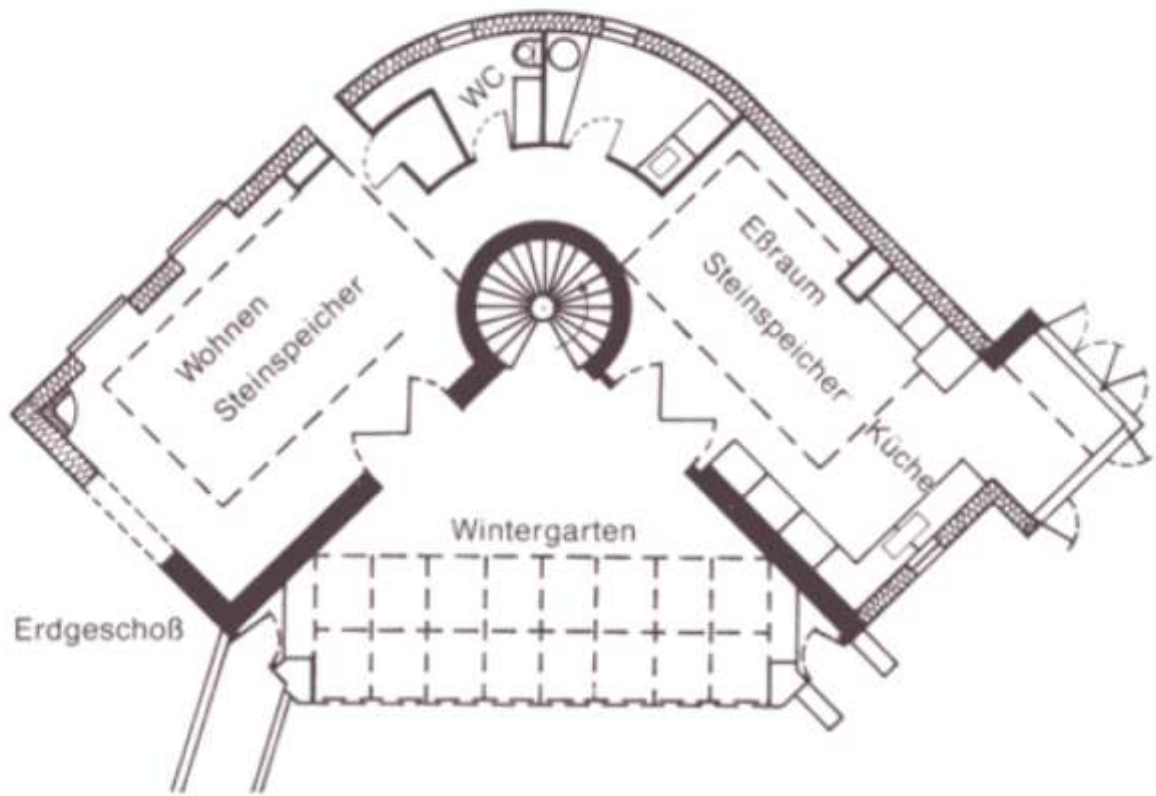
Glass fronts in La Coruna, Spanien

Mies v.d.Rohe, Villa Tugendhat (Brünn)



Balcomb-House in New Mexico
Groundfloor
(Source: Der Wintergarten)



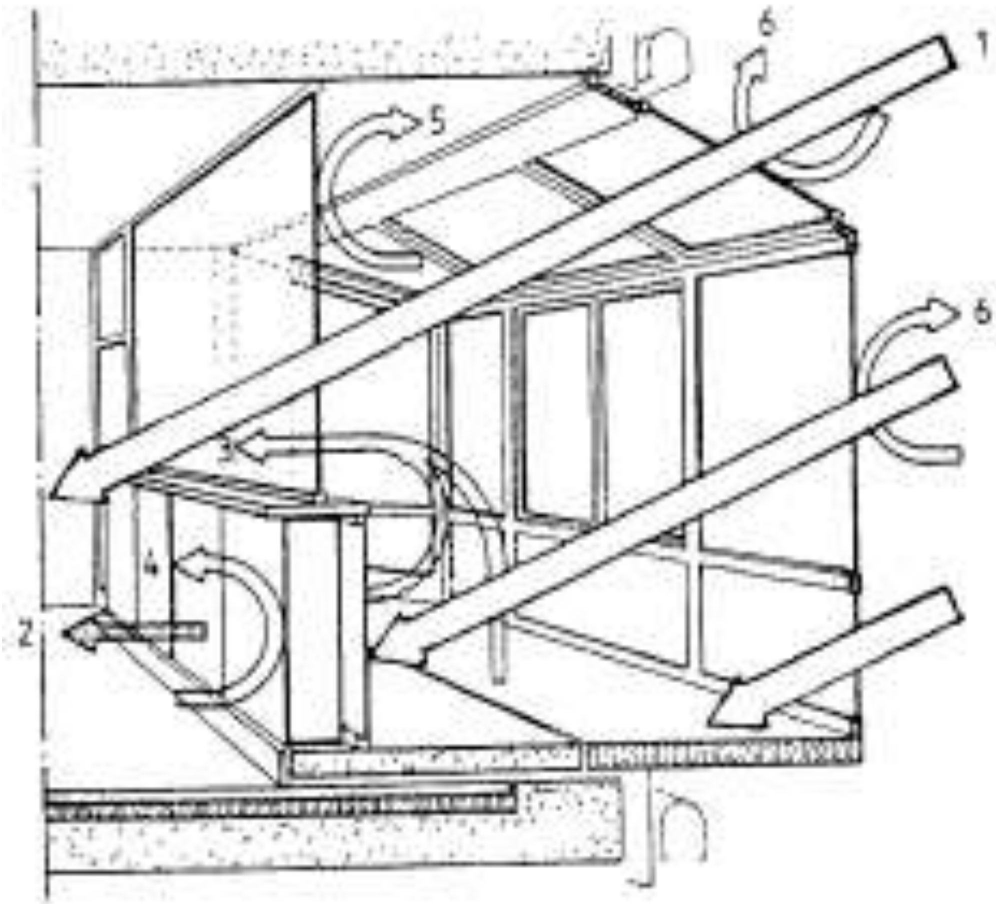
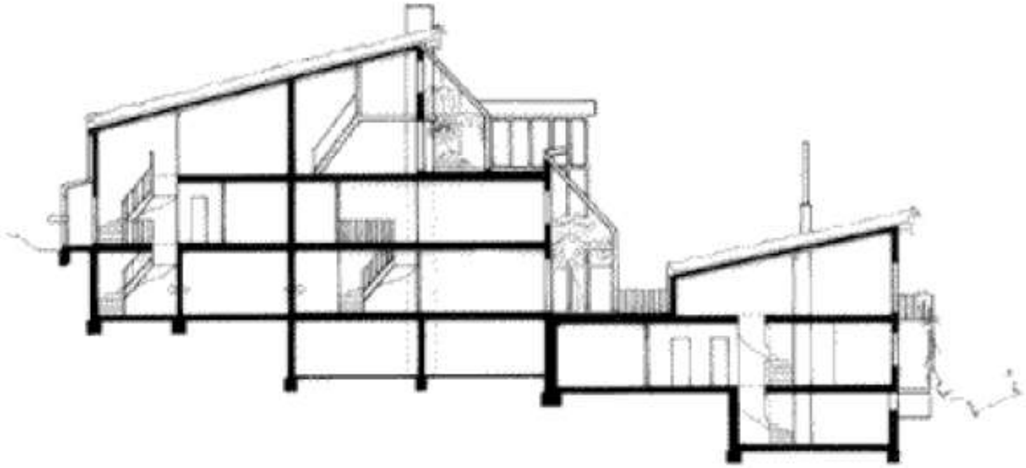


Abb. 7.12: Die Mechanismen der Wärmetransmission vom Wintergarten ins Hausinnere

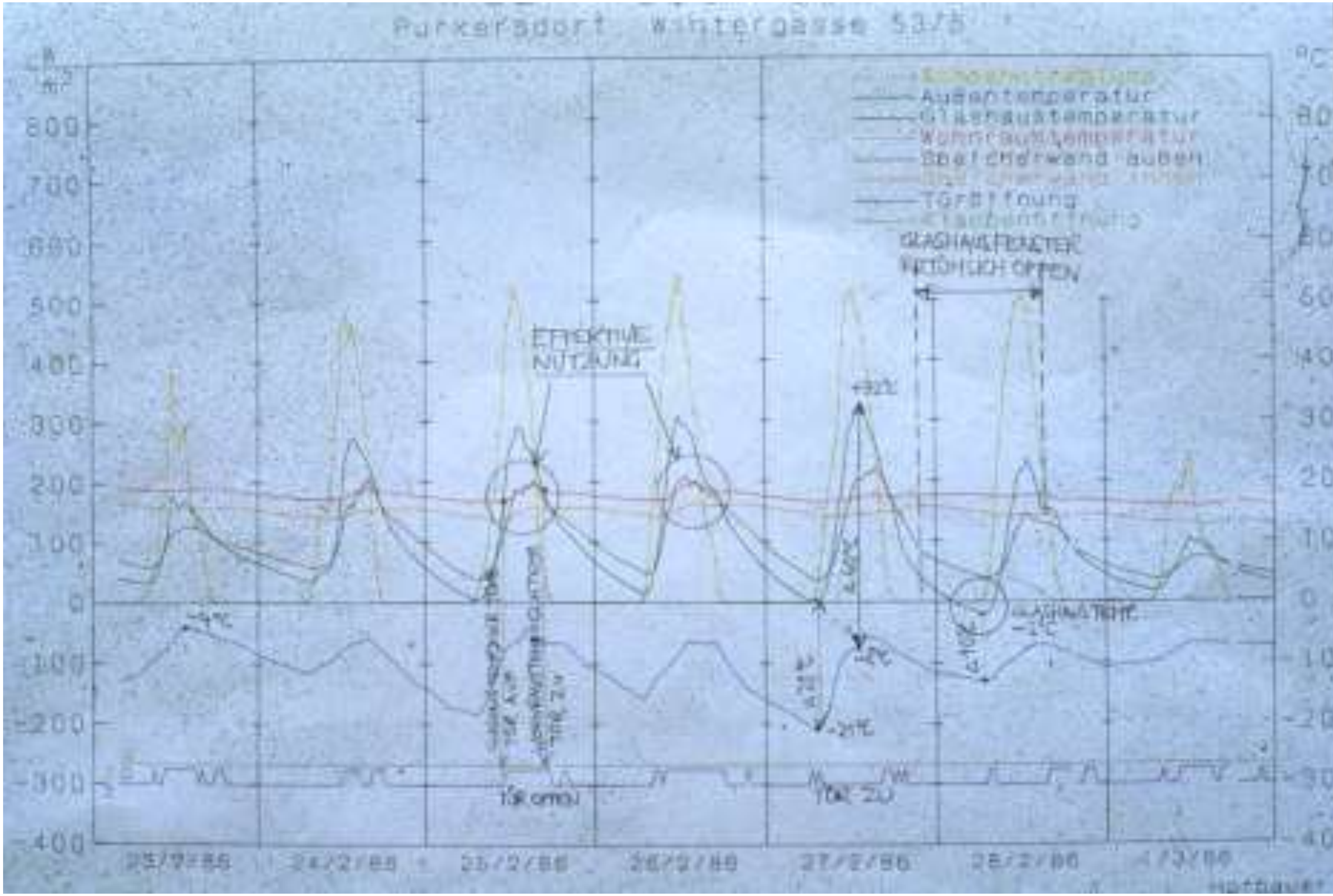
1 Direkt in den Wintergarten eindringende Sonnenstrahlung
2 Von der Zwischenwand übertragene Energie
3 Gewinn dank der Erwärmung der Pufferzone und der konvektiven Wärmeübergabe
4 Konvektion an der Oberfläche
5 Wärmeverluste
6 Wärmeverluste gegen außen

Multi-family house in Purkersdorf (Austria), Wintergasse 53, Georg W. Reinberg (1983-84)



Winter-garden (Purkersdorf)

Project name: Residential complex Wintergasse 53
Planning: Reinberg
Location: NÖ, Purkersdorf, Wintergasse 53
Constructor: Verein Projekt Alternatives Wohnen
Function: Ecological project for 10 families with Ökologisches Wohnprojekt für 10 Familien with community center
Finished: 1984
(Source: Reinberg)

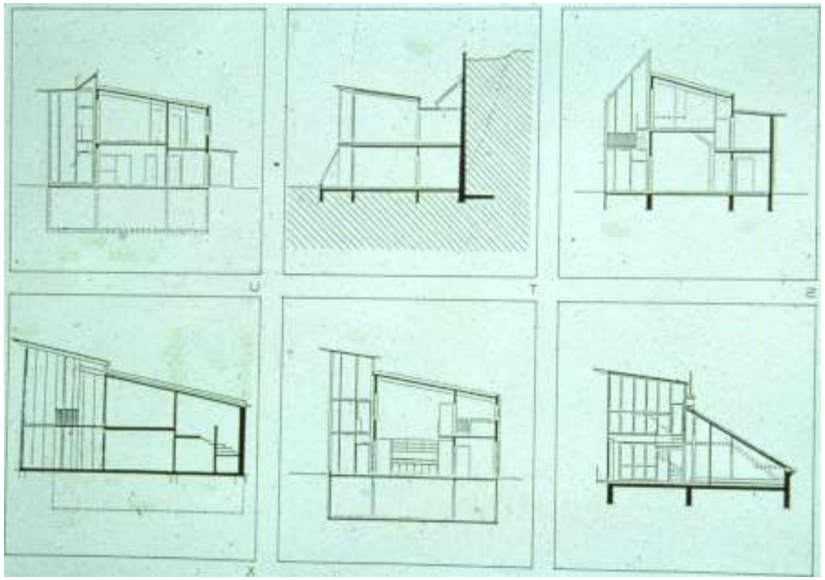


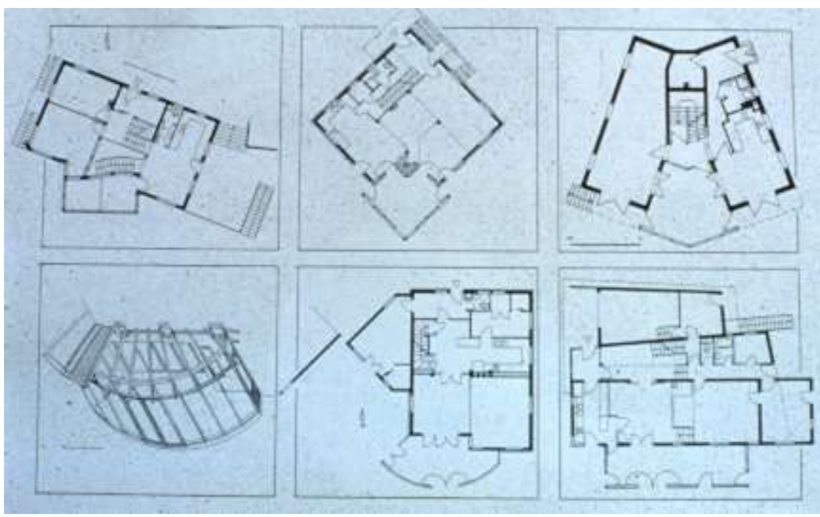
Purkersdorf Wintergasse 53/5
Außentemperatur
Glashaustemperatur
Speicherwand außen
Türöffnung
EFFEKTIVE NUTZUNG
TÜR OFFEN
TÜR ZU
23/2/86
24/2/86
25/2/86
26/2/86
27/2/86
28/2/86
1/3/86

Residential housing Wintergasse

Project name: Residential complex Wintergasse 75-77
Planning: Arge Reinberg - Treberspurg
Location: NÖ, Purkersdorf, Wintergasse 75-77
Constructor: Verein Wohnprojekt Purkersdorf
Function: Project for 7 families and community house
Finished: 1987
Energy index: 30 kWh/m²a
Building costs: 11 000 ÖS/m²

Residential housing
Wintergasse





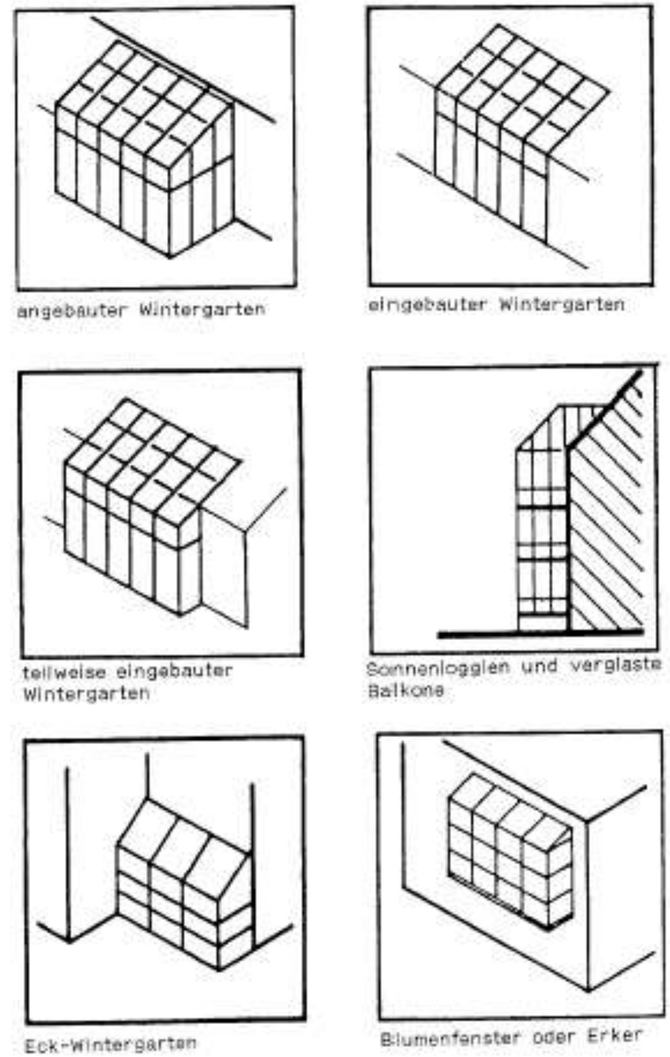


Abb. 7.13: Wintergartentypen

Attached Winter-gardens

House in Sulz

Austria

Corner-Winter gardens

House in Tulbing

Austria

Source: Reinberg

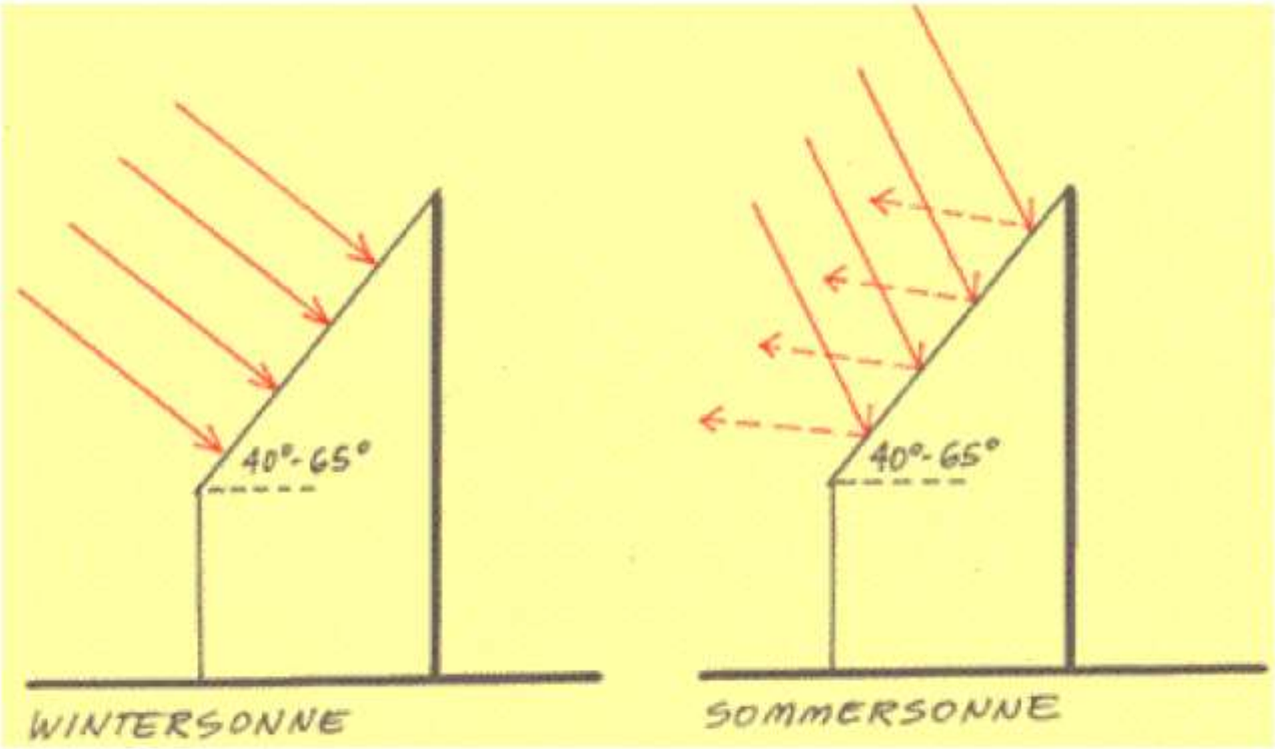
Planning rules for Winter-gardens

The orientation of the vertical glazed surfaces should be south, or south-east/south-west.

Guideline values :

-Orientation 30° south-east or 30° south-west: Solar earnings – 5%
-Orientation 40° south-east or 40° south-west:
Solar earnings – 10%
-Orientation 60° east or 60° west:
Solar earnings – 20%

Radiation of inclined glass roofs

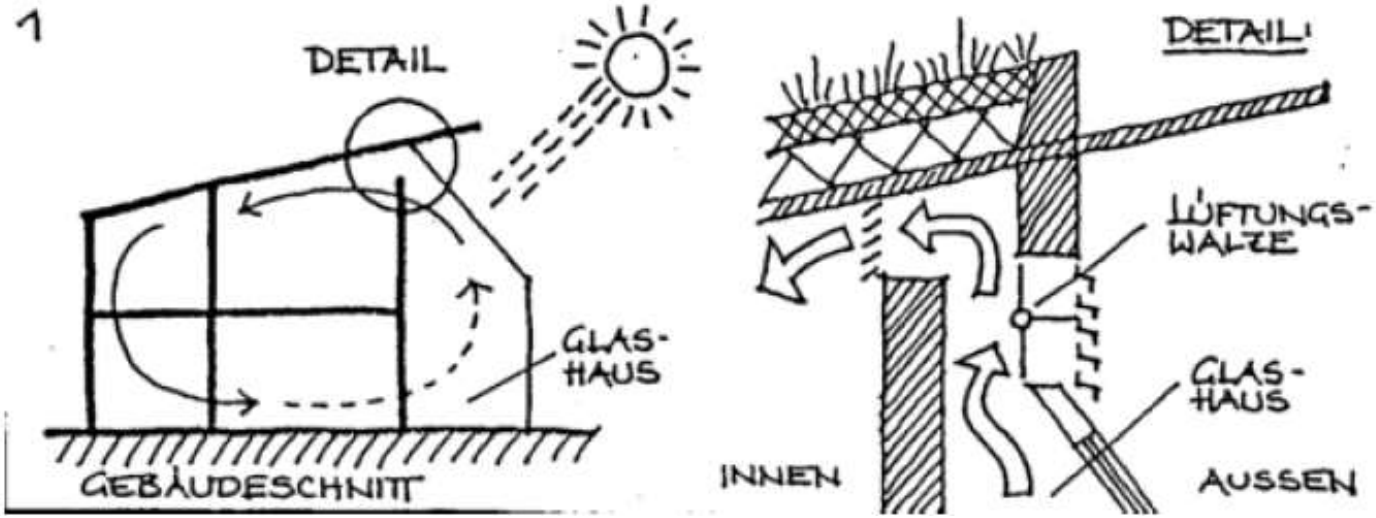


Winter **Summer**

Stadlau

Wien 22 (Austria) - ARGE Reinberg, Treberspurg, Raith (1989-91)

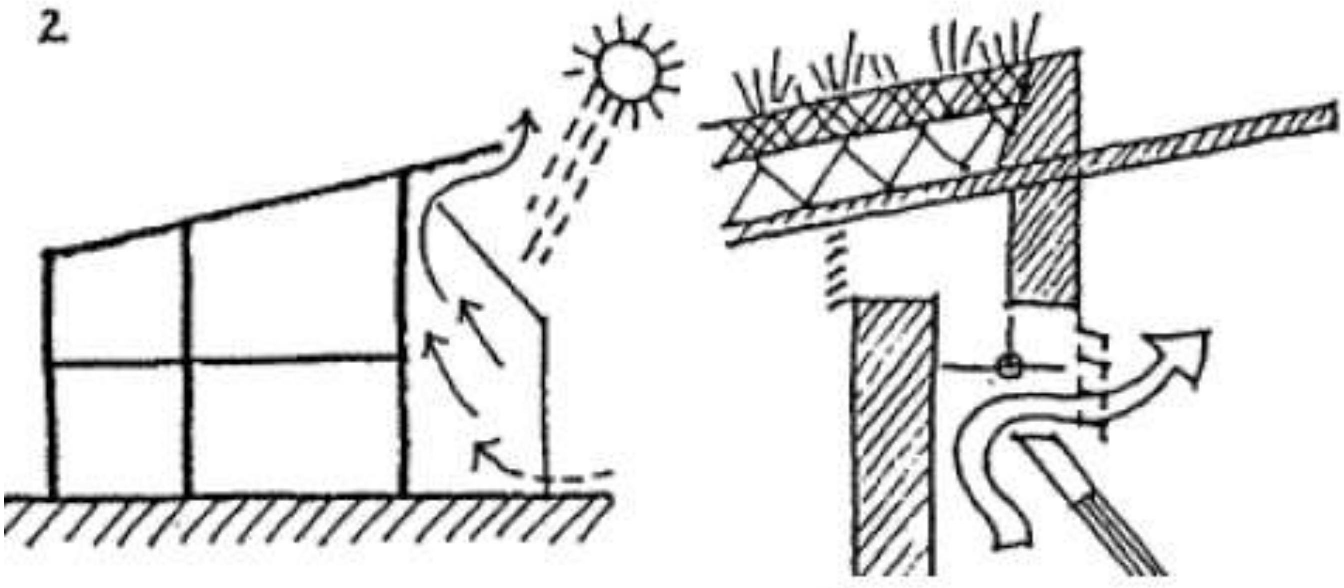
Planning: Arge Reinberg - Treberspurg - Raith
Location: Vienna XXII
Constructor: Neues Leben - Gemeinnützige Bau-, Wohn- und Siedlungsgenossenschaft
Project data: 10 terraced houses and one community center,
Area: 1.251 m²
Finished: 1991
Energy index: 70 kWh/m²a
Building costs: 12 000 ÖS/m²



1. Function: Energy earning

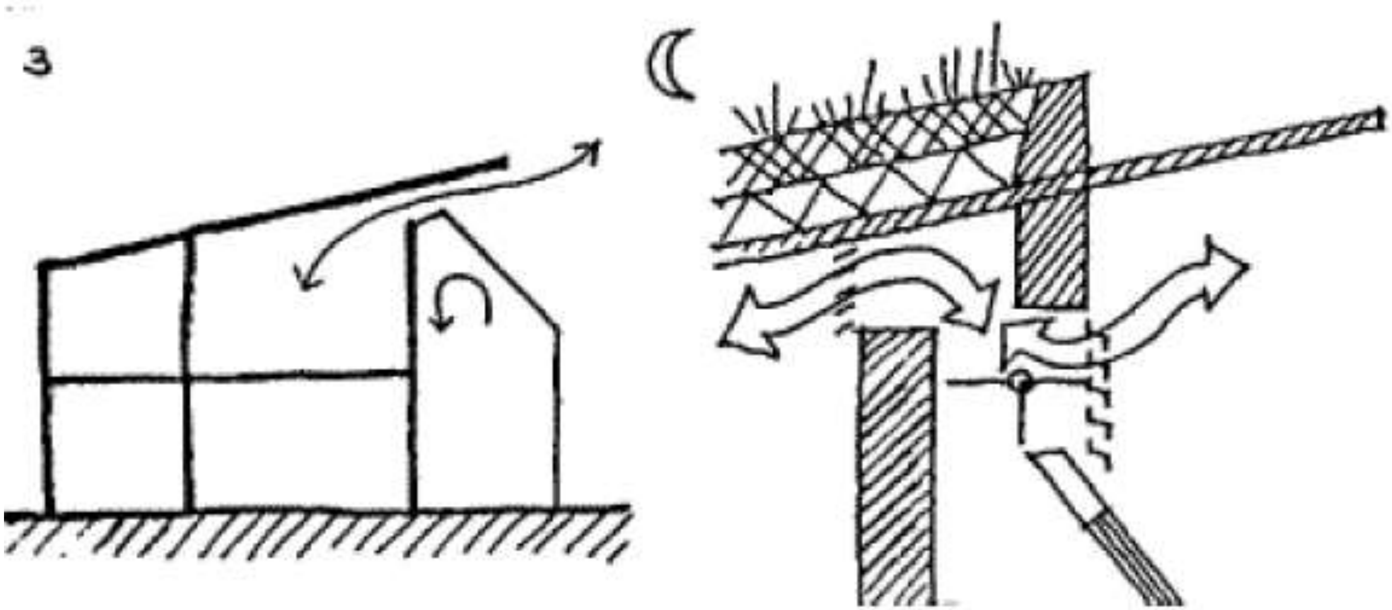
When the temperature in glass house is approx. 2°C higher than in the living room, the ventilation barrel opens a connection between the glass house and the house interior. (in winter up to a temperature of 26°C, in summer max up to 20°C).

Source: ARGE Reinberg, Treberspurg, Raith



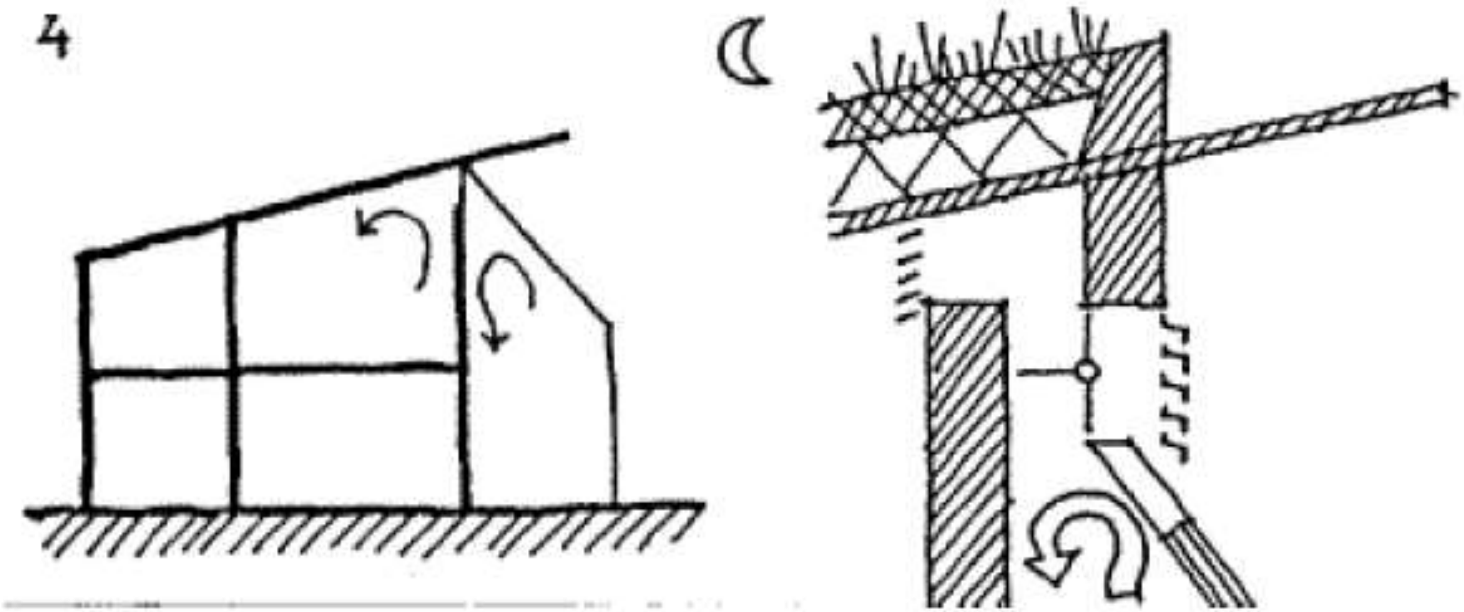
2. Function: Protection against extreme overheating and ventilation:
When the temperature in glass house becomes higher than the one in living space.

Source: ARGE Reinberg, Treberspurg, Raith



3. Function: Ventilation of the Bedroom
This function is not automated, has to be operated manually.

Source: ARGE Reinberg, Treberspurg, Raith

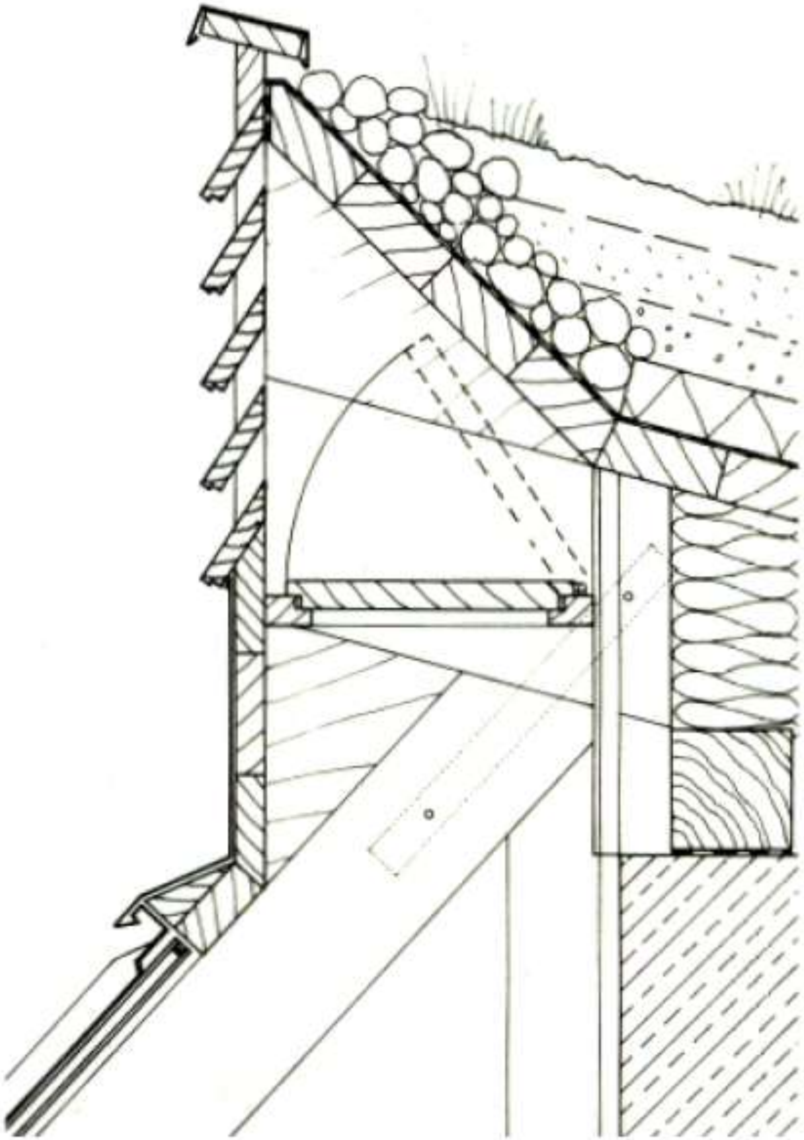


4. Function: The Glasshouse is separated from the house.

This function is not automated, has to be operated manually.

Source: ARGE Reinberg, Treberspurg, Raith

Summer ventilation



Source: Georg Reinberg

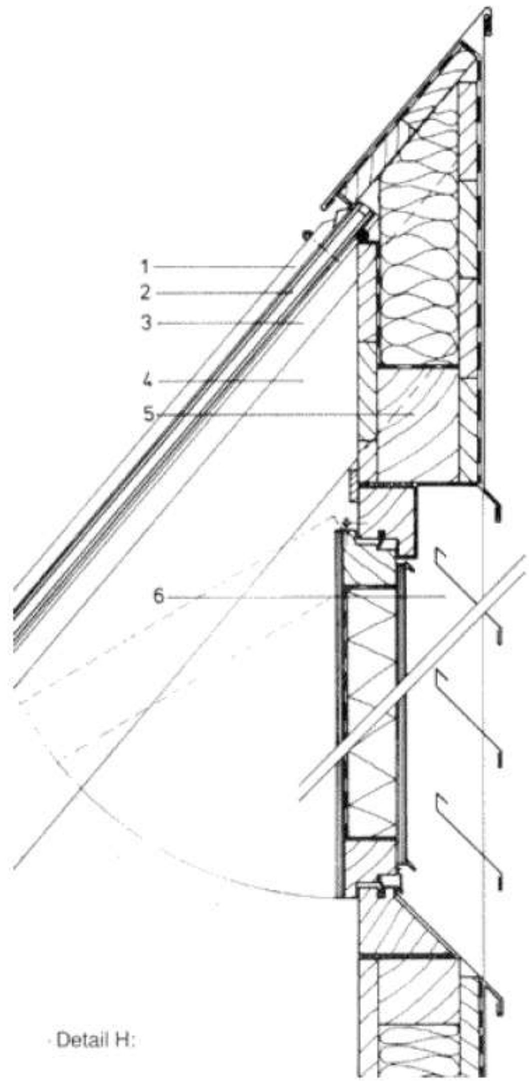
Attached Winter-garden

House in Annaberg (Austria)

Source: Georg Reinberg

Roof ridge for inclined glazing

Source: ARGE Reinberg, Treberspurg



House Sagberggasse (Austria)

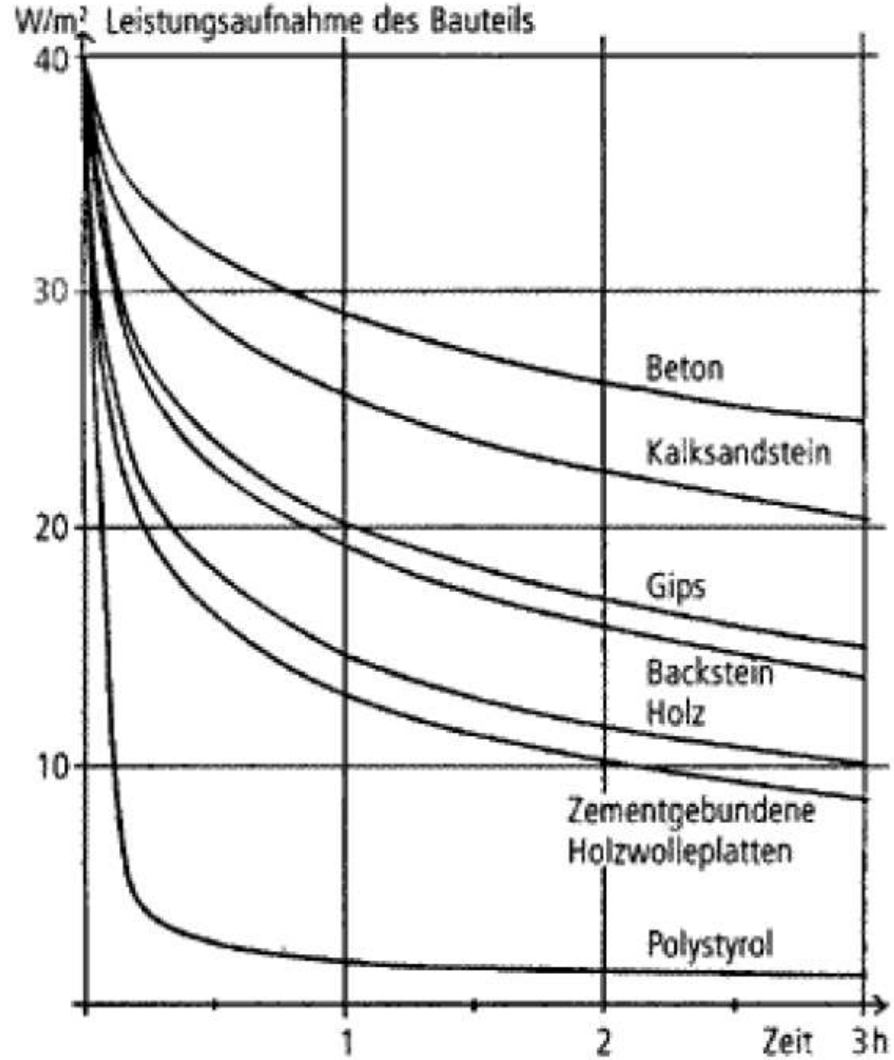
Lüftungsklappen Source: ARGE Reinberg, Treberspurg

Internal sunscreen

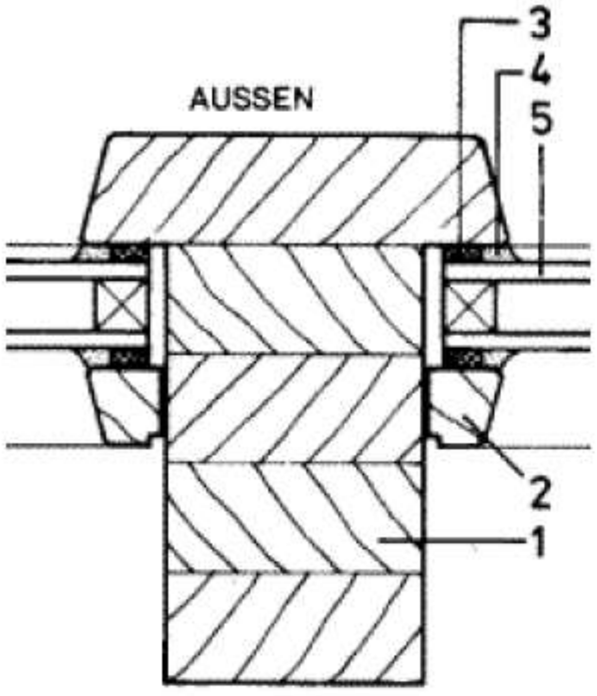
Single-family house Kroitzsch

Source: Treberspurg

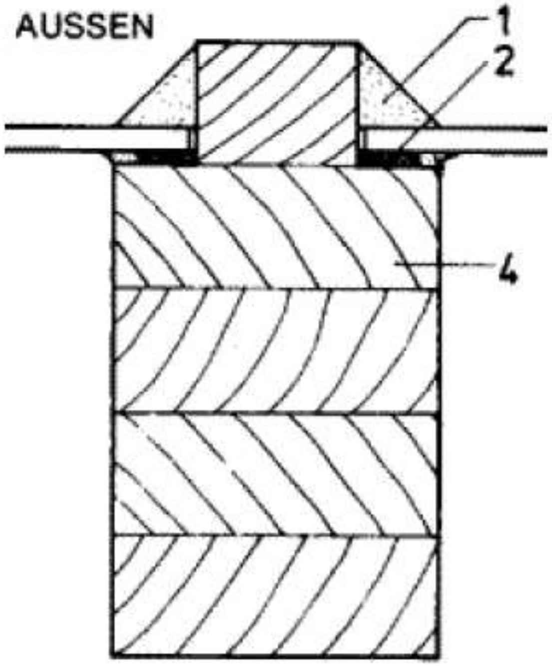
Time dependent energy accumulation of building materials



Details

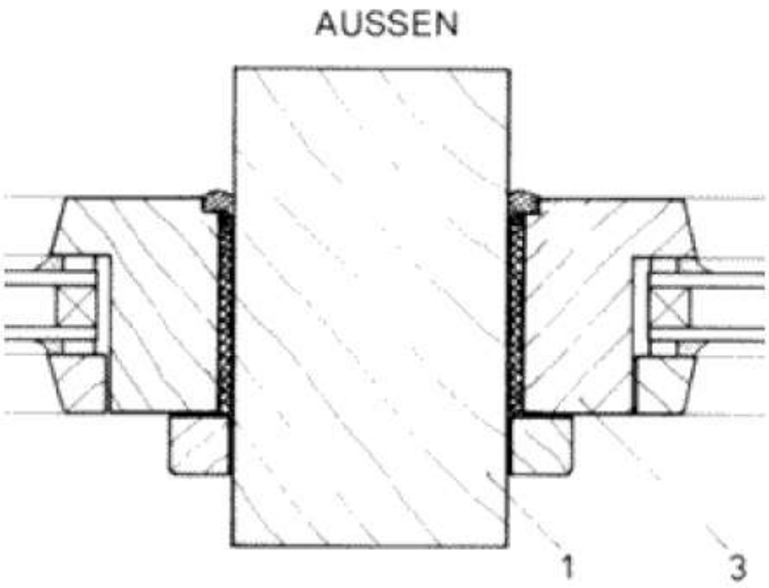


Detail Glashaussteher I

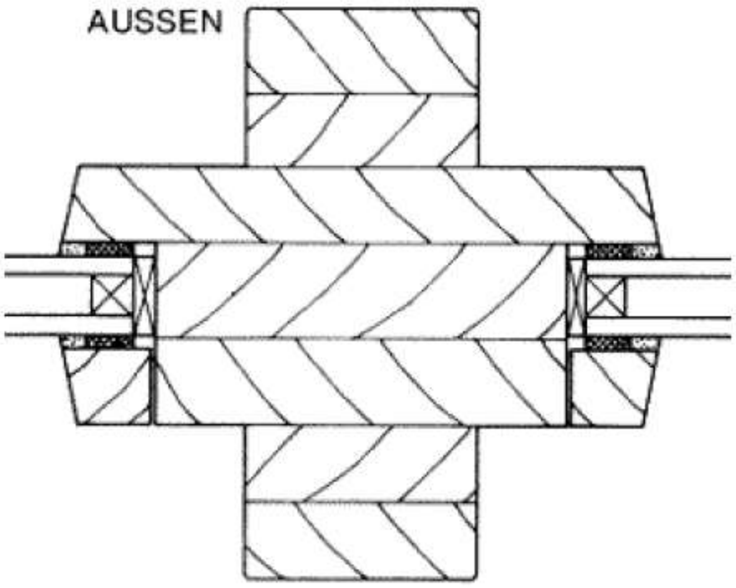


Detail Glashaussteher II

Details

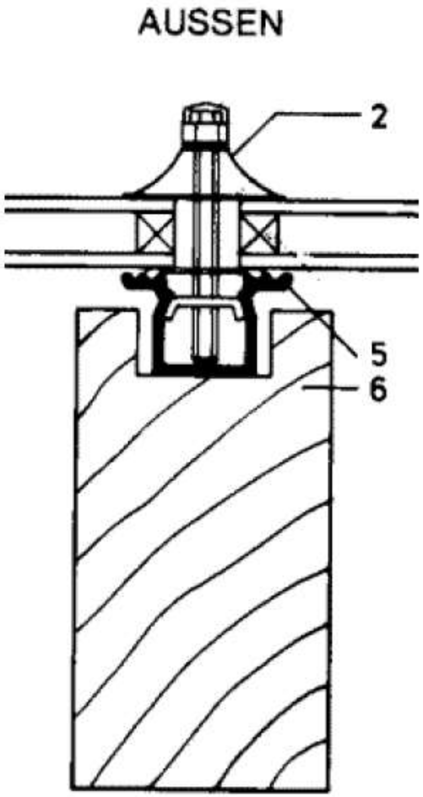


Detail Glashaussteher III

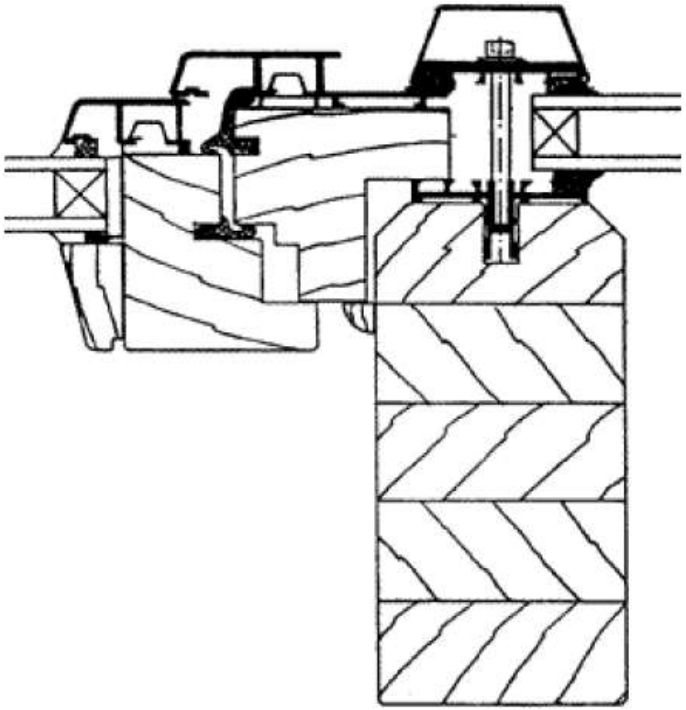


Detail Glashaussteher IV

Details

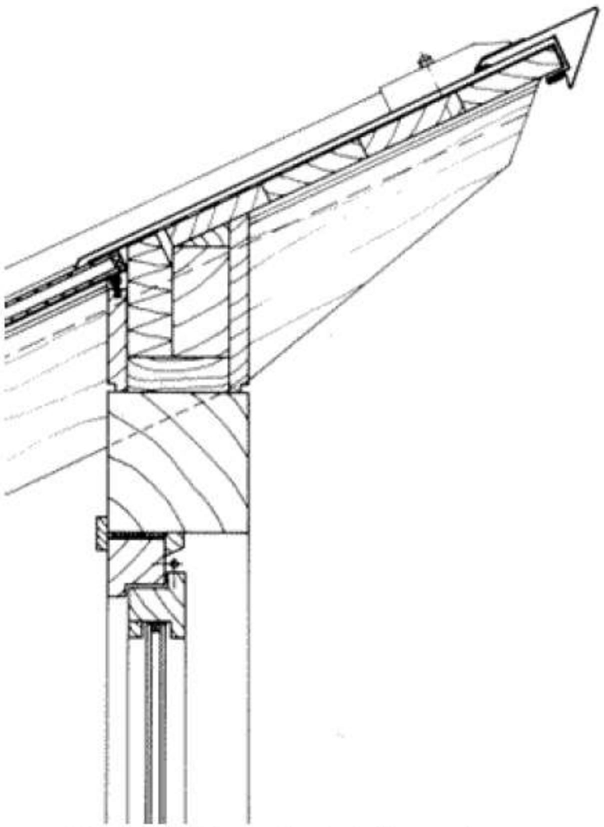


Schrägverglasung mit Metallprofil I

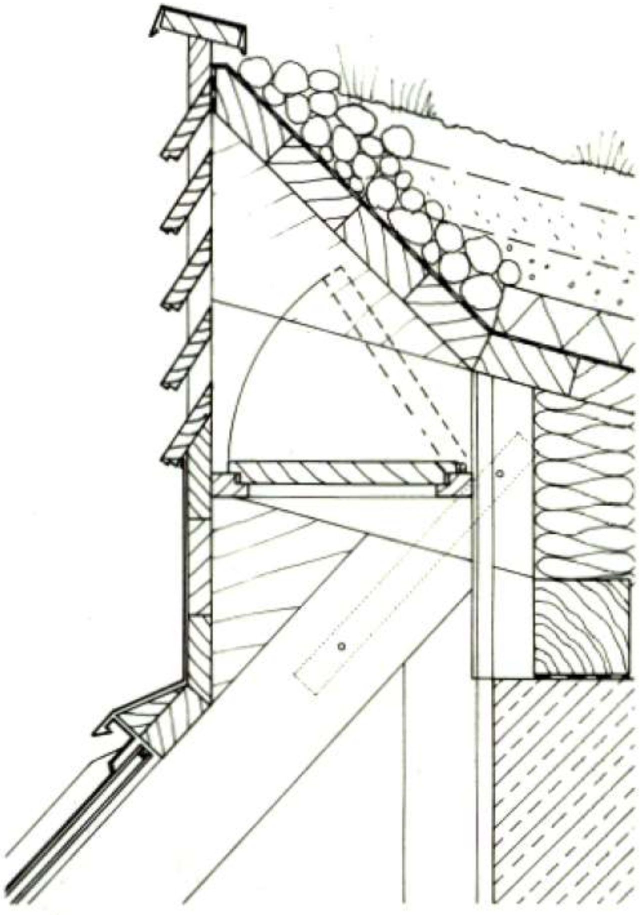


Schrägverglasung mit Metallprofil II

Details

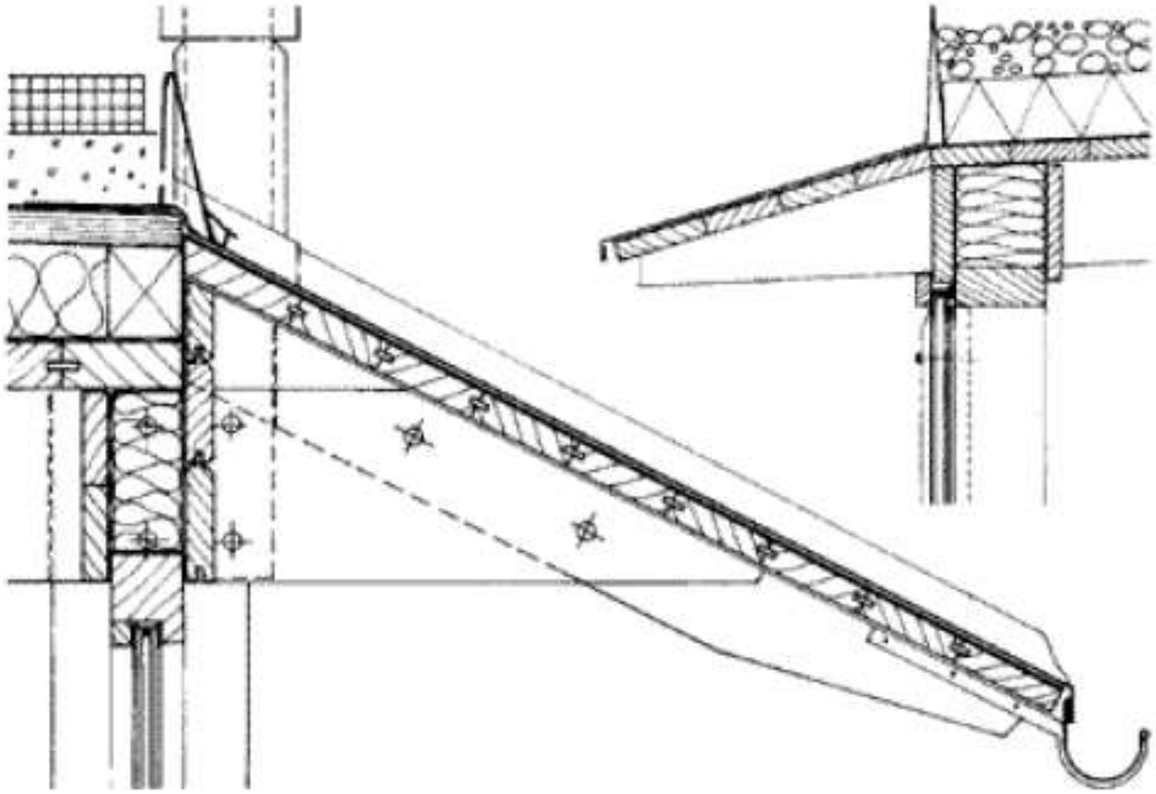


Firstausbildung für Schrägverglasung



Firstausbildung

Details



Traufenausbildung für opakes Dach

House Hafner

Planning: Treberspurg
Location: Wien 19, Langackerg.
Constructor: Privat
Function: Single-family house
Finished: 1990

Singe family house Ludwig

Source: Treberspurg

Residential area “Naturnahes Wohnen”

Planning: Treberspurg
Location: Wien 22 - Wulzendorfstraße
Constructor: Demonstrativprojekt Naturnahes Wohnen der Gemeinde Wien
Finished: 1996
Energy index: 40 kWh/m²a
Building costs: 17 000 ÖS/m²

Project Perchtoldsdorf

Planning: Treberspurg, Wolfert
Location: Perchtoldsdorf - Markfeldgasse 4
Constructor: Miteigentümer-gemeinschaft energysparhäuser Perchtoldsdorf
Function: 5 terraced houses
Finished: 1996
Energy index: 45 kWh/m²a
Building costs: 15 000 ÖS/m²