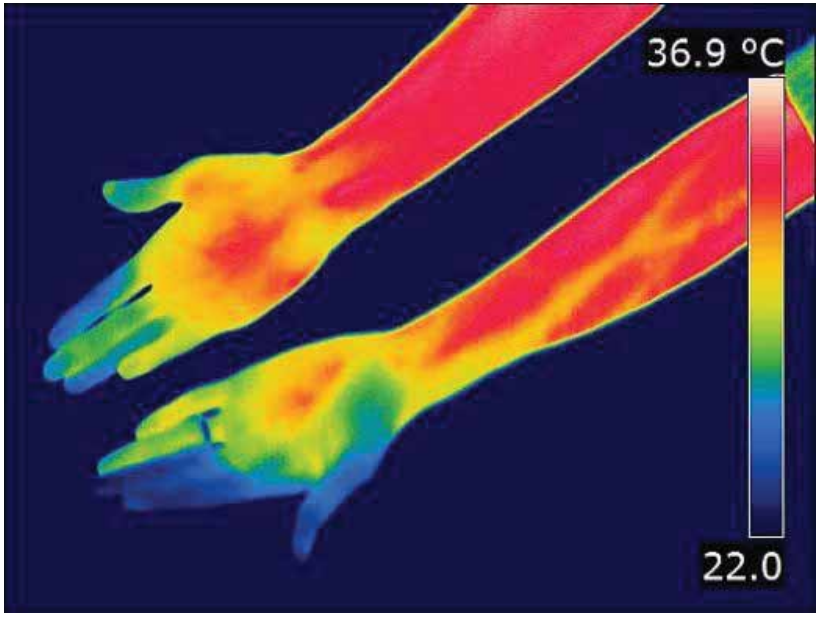
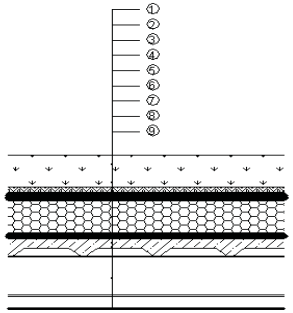
BUILDING PHYSICS

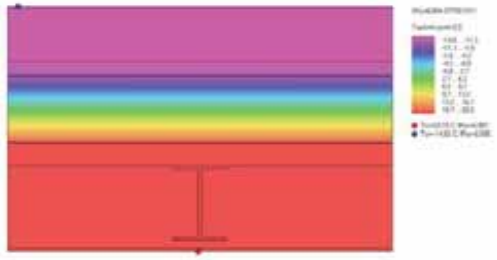


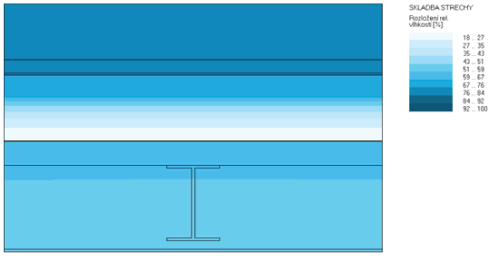
STRUCTURE OF THE ROOF
THICKNESS THERMAL INSULATION 240 mm



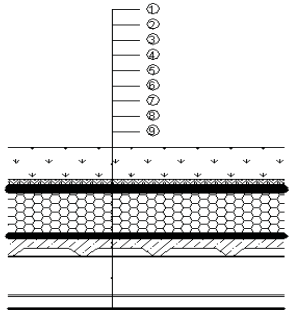
① GREENING
② MATTING
③ ASPHALT BELTS
④ CATCHMENT PLATES- THERMAL INSULATION THICKNESS 240 mm
⑤ VAPOR BARRIERS
⑥ CONCRETE SLABS THICKNESS 110 mm
⑦ TRAPEZOIC METAL SHEETS
⑧ STEEL BEAM- PROFILE IPE 270
⑨ PLASTERBOARD CEILING

U	b	L	ψ
0,124	0,9	0,117	0,007



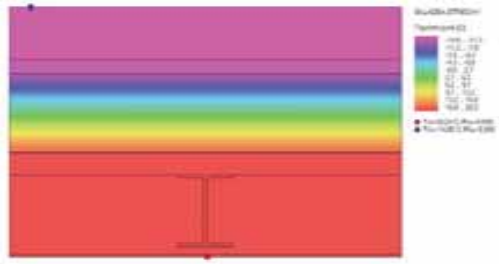


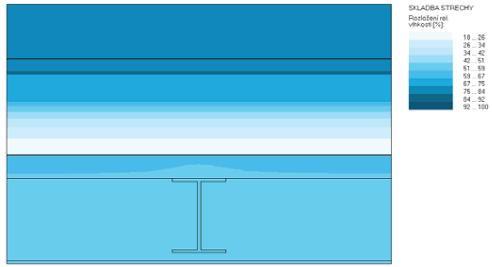
STRUCTURE OF THE ROOF
THICKNESS THERMAL INSULATION 300 mm



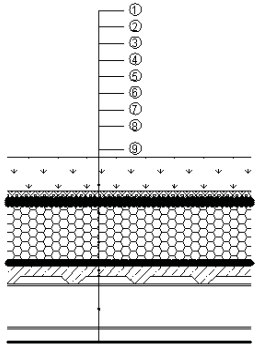
① GREENING
② MATTING
③ ASPHALT BELTS
④ CATCHMENT PLATES- THERMAL INSULATION THICKNESS 300 mm
⑤ VAPOR BARRIERS
⑥ CONCRETE SLABS THICKNESS 110 mm
⑦ TRAPEZOIC METAL SHEETS
⑧ STEEL BEAM- PROFILE IPE 270
⑨ PLASTERBOARD CEILING

U	b	L	ψ
0,101	0,95	0,095	-0,001



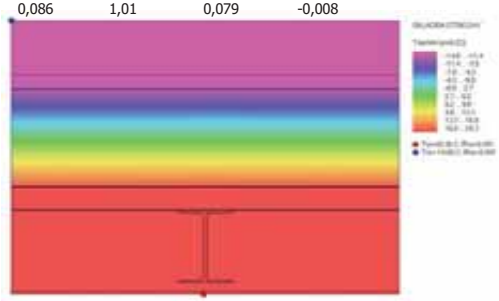


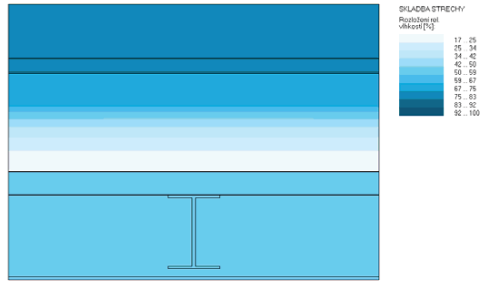
STRUCTURE OF THE ROOF
THICKNESS THERMAL INSULATION 360 mm



① GREENING
② MATTING
③ ASPHALT BELTS
④ CATCHMENT PLATES- THERMAL INSULATION THICKNESS 360 mm
⑤ VAPOR BARRIERS
⑥ CONCRETE SLABS THICKNESS 110 mm
⑦ TRAPEZOIC METAL SHEETS
⑧ STEEL BEAM- PROFILE IPE 270
⑨ PLASTERBOARD CEILING

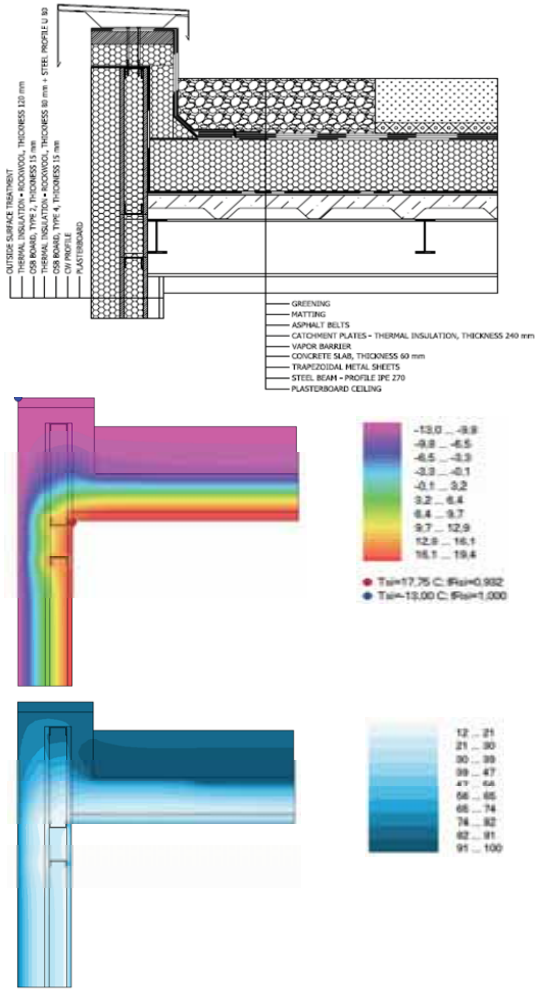
U	b	L	ψ
0,086	1,01	0,079	-0,008





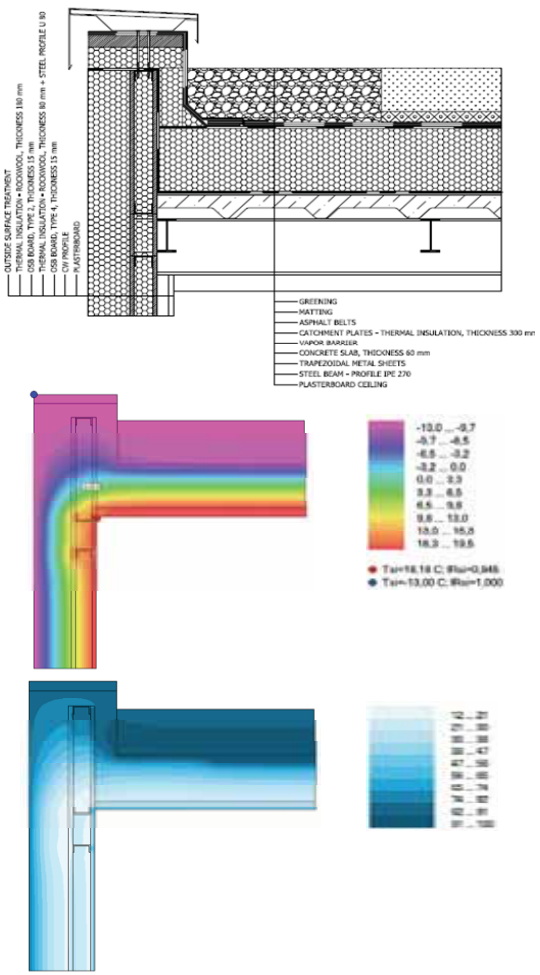
roof structure
field of temperature and humidity
growing steel house - family rules

Detail of attic
Thickness of thermal insulation: external wall 120 mm; roof structure 240 mm



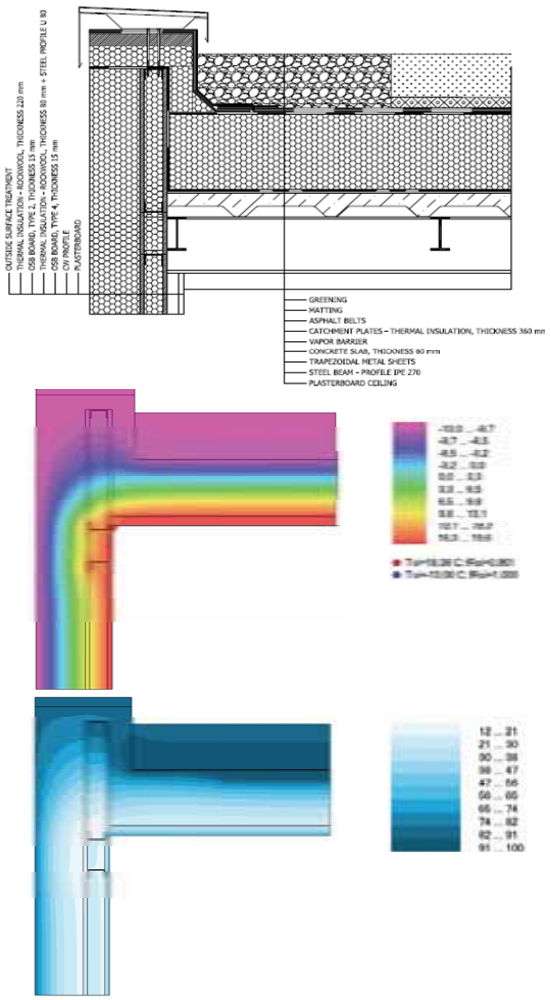
detail of attic

Detail of attic
Thickness of thermal insulation: external wall 180 mm; roof structure 300 mm



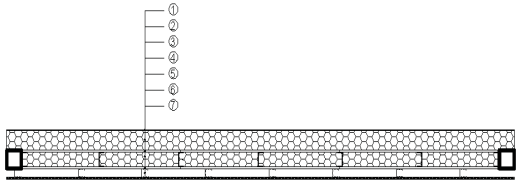
detail of attic

Detail of attic
Thickness of thermal insulation: external wall 220 mm; roof structure 360 mm



attic
field of temperature and humidity
growing steel house - family rules

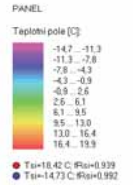
STRUCTURE OF BUILDING PANEL AND INSULATION THICKNESS 120 mm

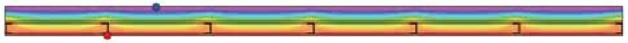


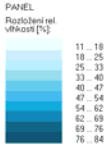
① OUTSIDE SURFACE TREATMENT
② ROCK WOOL- THICKNESS 120 mm
③ OSB BOARD TYPE 2 THICKNESS 15 mm
④ ROCK WOOL- THICKNESS 90 mm + STEEL PROFILE U 90
⑤ OSB BOARD TYPE 4 THICKNESS 15 mm
⑥ CW PROFILE
⑦ PLASTERBOARD

panel 90 + mineral wool 120 mm

compo:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	120	0,041
	2		
U=	**0,21**	W/m²K	

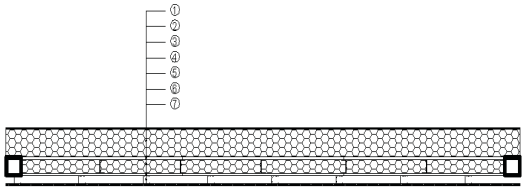






L=	**0,607**	W/mK
b=	3,02	m
U=L/b=	0,20	W/m²K
ψ=	**-0,016**	W/mK

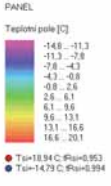
STRUCTURE OF BUILDING PANEL AND INSULATION THICKNESS 180 mm

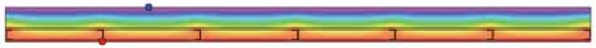


① OUTSIDE SURFACE TREATMENT
② ROCK WOOL- THICKNESS 120 mm
③ OSB BOARD TYPE 2 THICKNESS 15 mm
④ ROCK WOOL- THICKNESS 90 mm + STEEL PROFILE U 90
⑤ OSB BOARD TYPE 4 THICKNESS 15 mm
⑥ CW PROFILE
⑦ PLASTERBOARD

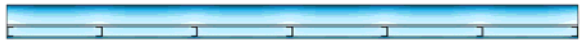
panel 90 + mineral wool 180 mm

compo:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	180	0,041
	2		
U=	**0,16**	W/m²K	

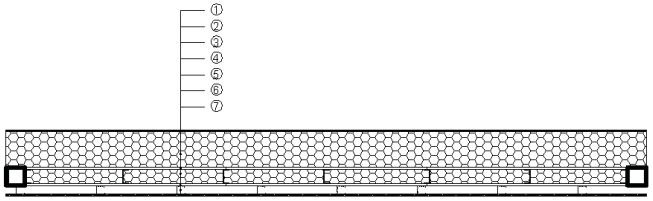




L=	**0,466**	W/mK
b=	3,14	m
U=L/b=	0,15	W/m²K
ψ=	**-0,031**	W/mK



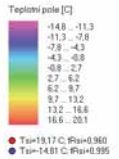
STRUCTURE OF BUILDING PANEL AND INSULATION THICKNESS 220 mm

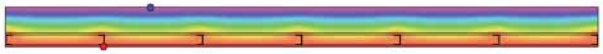


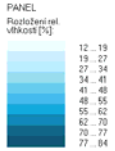
① OUTSIDE SURFACE TREATMENT
② ROCK WOOL- THICKNESS 120 mm
③ OSB BOARD TYPE 2 THICKNESS 15 mm
④ ROCK WOOL- THICKNESS 90 mm + STEEL PROFILE U 90
⑤ OSB BOARD TYPE 4 THICKNESS 15 mm
⑥ CW PROFILE
⑦ PLASTERBOARD

panel 90 + mineral wool 220 mm

compo:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	220	0,041
	2		
U=	**0,14**	W/m²K	

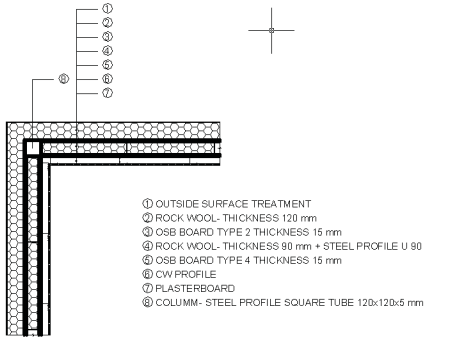






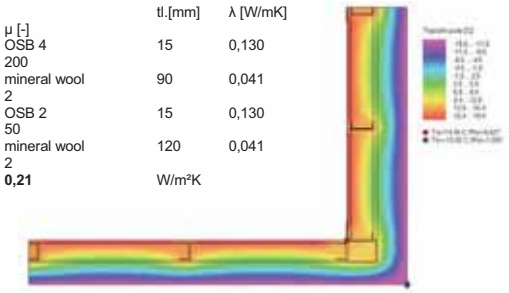
L=	**0,405**	W/mK
b=	3,22	m
U=L/b=	0,13	W/m²K
ψ=	**-0,038**	W/mK

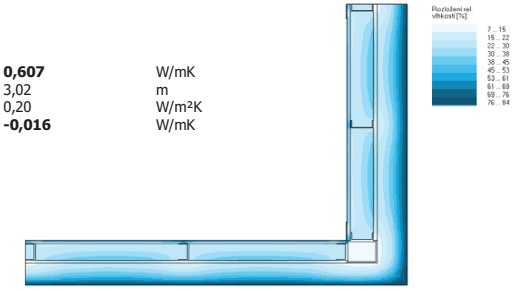
DETAIL OF THE CORNER U 90 + THERMAL INSULATION 120 mm



panel 90 + mineral wool 120 mm

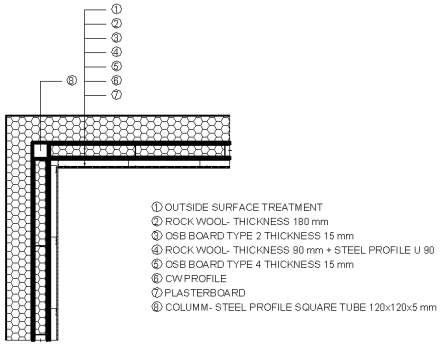
compo:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	120	0,041
	2		
U=	**0,21**	W/m²K	





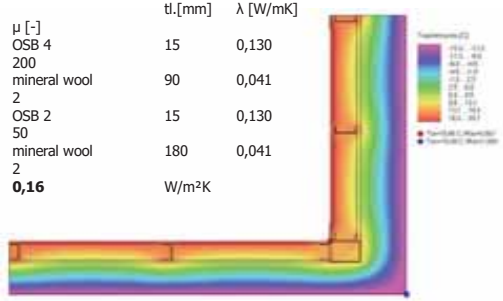
L=	**0,607**	W/mK
b=	3,02	m
U=L/b=	0,20	W/m²K
ψ=	**-0,016**	W/mK

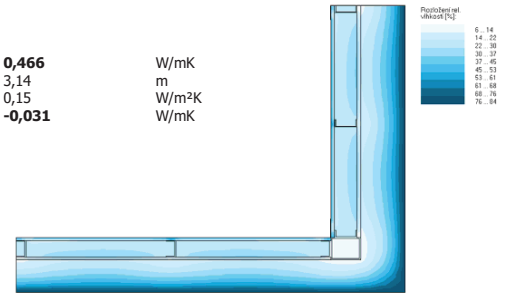
DETAIL OF THE CORNER U 90 + THERMAL INSULATION 180 mm



panel 90 + mineral wool 180 mm

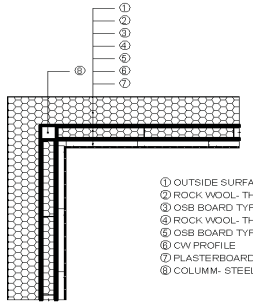
compo:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	180	0,041
	2		
U=	**0,16**	W/m²K	





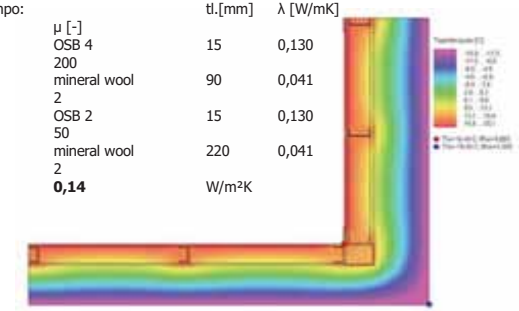
L=	**0,466**	W/mK
b=	3,14	m
U=L/b=	0,15	W/m²K
ψ=	**-0,031**	W/mK

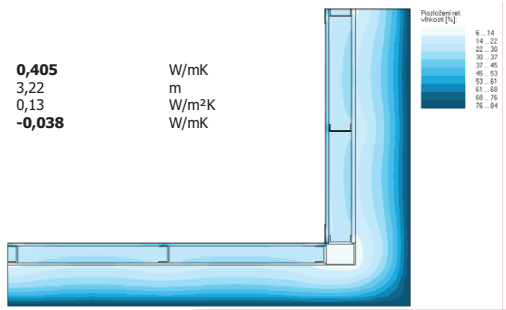
DETAIL OF THE CORNER U 90 + THERMAL INSULATION 220 mm



panel 90 + mineral wool 220 mm

compo:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	220	0,041
	2		
U=	**0,14**	W/m²K	

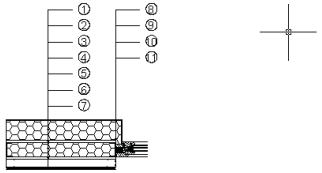




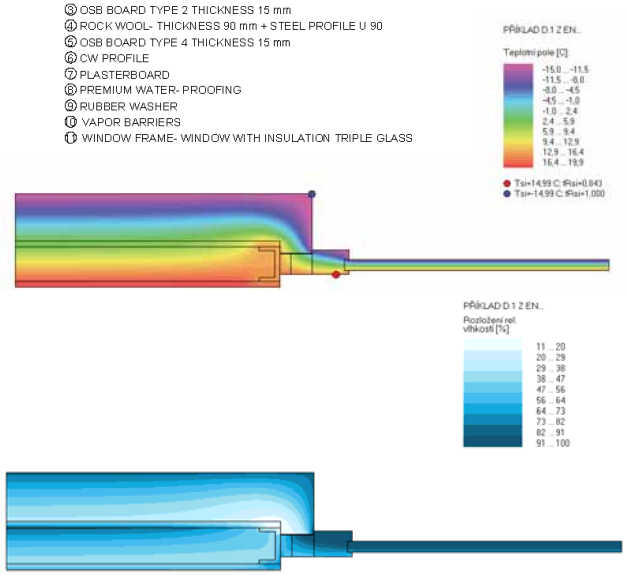
L=	**0,405**	W/mK
b=	3,22	m
U=L/b=	0,13	W/m²K
ψ=	**-0,038**	W/mK

wall corner
field of temperature and humidity
growing steel house - family rules

DETAIL OF CONNECTION OF THE WINDOW THICKNESS OF THE THERMAL INSULATION 120 mm



① OUTSIDE SURFACE TREATMENT
② ROCK WOOL- THICKNESS 120 mm
③ OSB BOARD TYPE 2 THICKNESS 15 mm
④ ROCK WOOL- THICKNESS 90 mm + STEEL PROFILE U 90
⑤ OSB BOARD TYPE 4 THICKNESS 15 mm
⑥ CW PROFILE
⑦ PLASTERBOARD
⑧ PREMIUM WATER- PROOFING
⑨ RUBBER WASHER
⑩ VAPOR BARRIERS
⑪ WINDOW FRAME- WINDOW WITH INSULATION TRIPLE GLASS

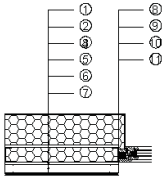


panel 90 + mineral wool 120 mm

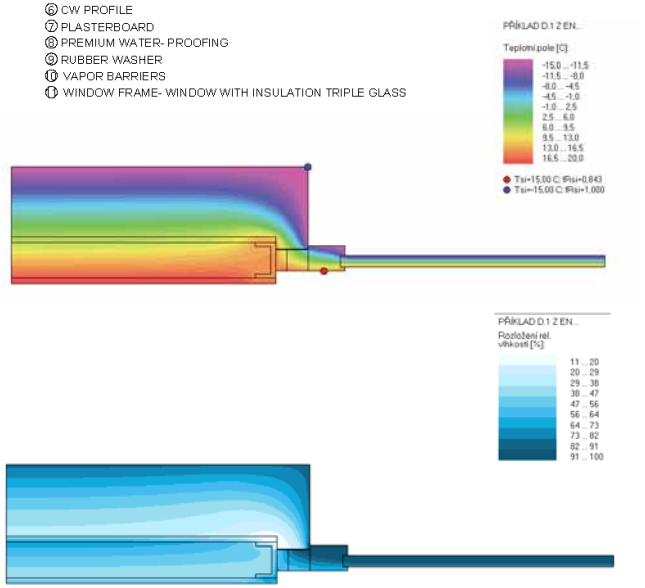
skladba:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	120	0,041
	2		
U=	**0,21**	W/m²K	

window		
L=	**0,758**	W/mK
U_1=	0,2064	W/m²K
b_1=	0,16	m
U_2=	0,90	W/m²K
b_2=	0,56	m
ψ=	**0,081**	W/mK

DETAIL OF CONNECTION OF THE WINDOW THICKNESS OF THE THERMAL INSULATION 180 mm



① OUTSIDE SURFACE TREATMENT
② ROCK WOOL- THICKNESS 180 mm
③ OSB BOARD TYPE 2 THICKNESS 15 mm
④ ROCK WOOL- THICKNESS 90 mm + STEEL PROFILE U 90
⑤ OSB BOARD TYPE 4 THICKNESS 15 mm
⑥ CW PROFILE
⑦ PLASTERBOARD
⑧ PREMIUM WATER- PROOFING
⑨ RUBBER WASHER
⑩ VAPOR BARRIERS
⑪ WINDOW FRAME- WINDOW WITH INSULATION TRIPLE GLASS

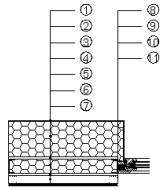


panel 90 + mineral wool 180 mm

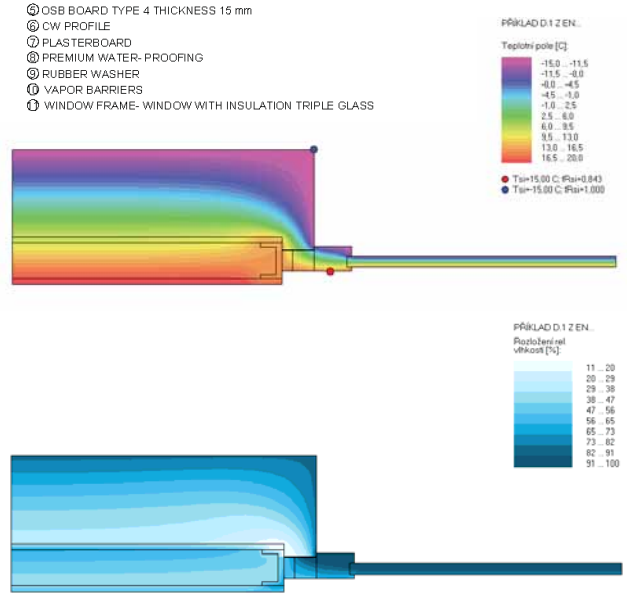
skladba:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	180	0,041
	2		
U=	**0,16**	W/m²K	

window		
L=	**0,739**	W/mK
U_1=	0,1584	W/m²K
b_1=	0,56	m
U_2=	0,90	W/m²K
b_2=	0,56	m
ψ=	**0,089**	W/mK

DETAIL OF CONNECTION OF THE WINDOW THICKNESS OF THE THERMAL INSULATION 220 mm



① OUTSIDE SURFACE TREATMENT
② ROCK WOOL- THICKNESS 220 mm
③ OSB BOARD TYPE 2 THICKNESS 15 mm
④ ROCK WOOL- THICKNESS 90 mm + STEEL PROFILE U 90
⑤ OSB BOARD TYPE 4 THICKNESS 15 mm
⑥ CW PROFILE
⑦ PLASTERBOARD
⑧ PREMIUM WATER- PROOFING
⑨ RUBBER WASHER
⑩ VAPOR BARRIERS
⑪ WINDOW FRAME- WINDOW WITH INSULATION TRIPLE GLASS

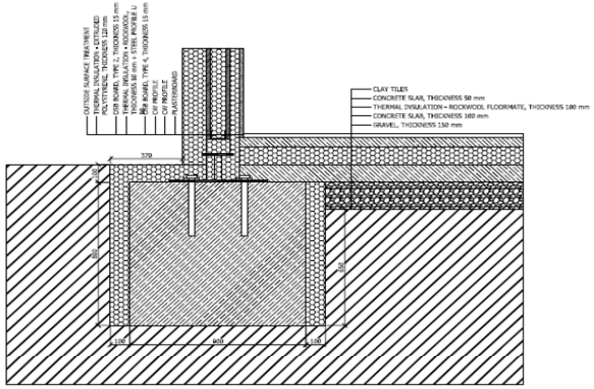


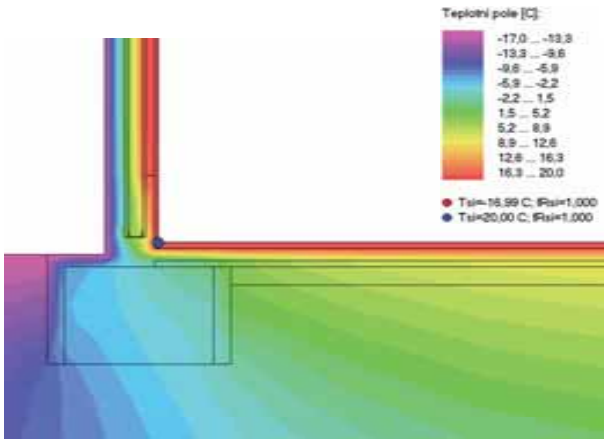
panel 90 + mineral wool 220 mm

skladba:		tl.[mm]	λ [W/mK]
	μ [-]		
	OSB 4	15	0,130
	200		
	mineral wool	90	0,041
	2		
	OSB 2	15	0,130
	50		
	mineral wool	220	0,041
	2		
U=	**0,14**	W/m²K	

window		
L=	**0,731**	W/mK
U_1=	0,1376	W/m²K
b_1=	0,56	m
U_2=	0,90	W/m²K
b_2=	0,56	m
ψ=	**0,093**	W/mK

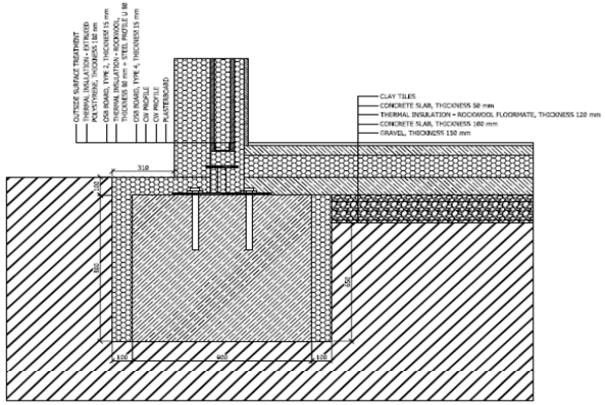
Detail of placing on the foundation
Thickness of thermal insulation: external wall 120 mm; floor structure 100 mm

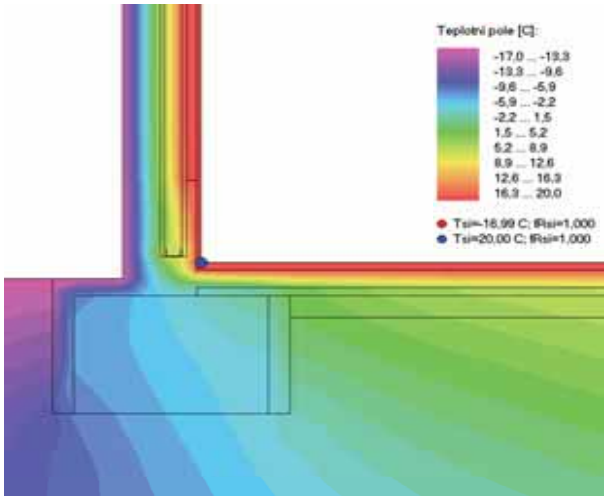




foundation

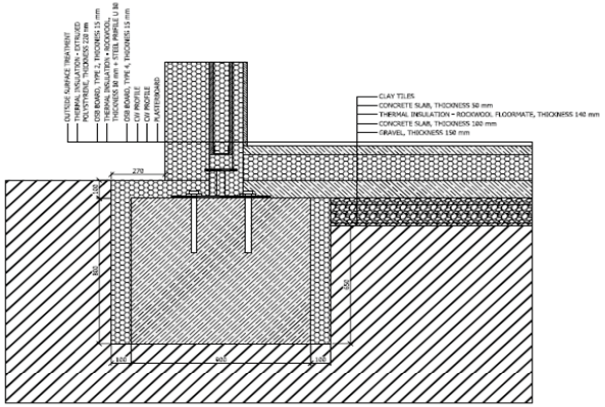
Detail of placing on the foundation
Thickness of thermal insulation: external wall 180 mm; floor structure 120 mm

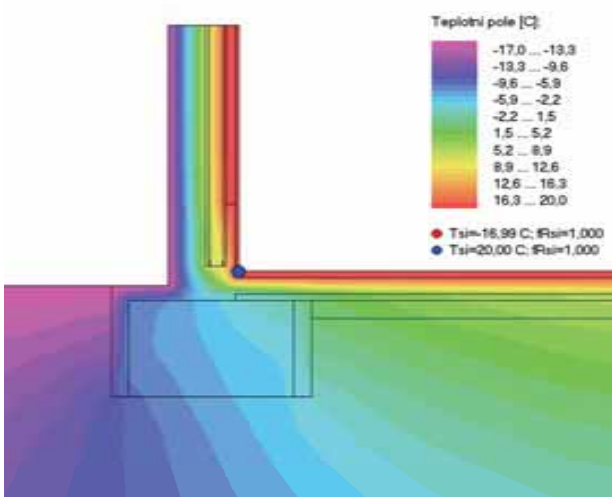


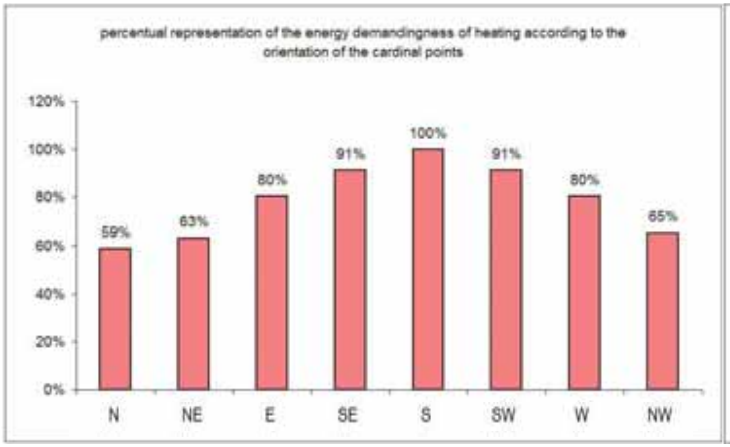


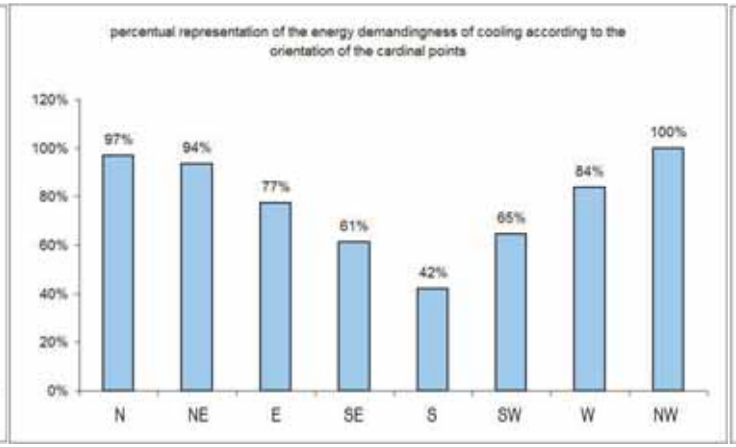
foundation

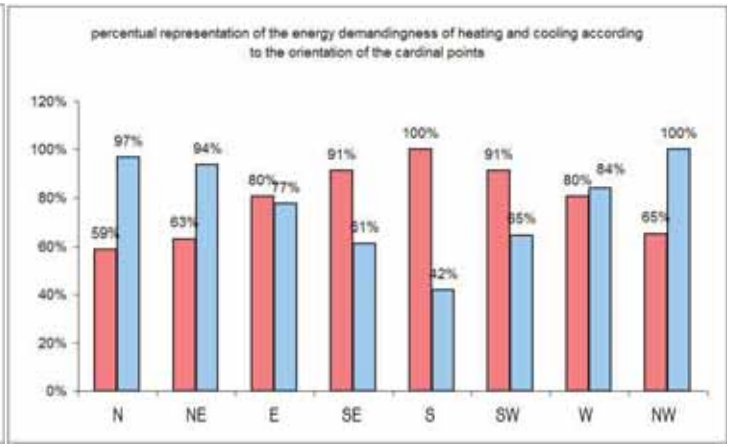
Detail of placing on the foundation
Thickness of thermal insulation: external wall 220 mm; floor structure 140 mm

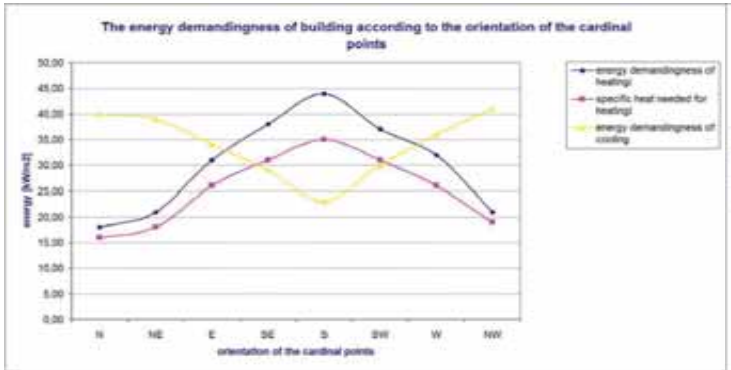


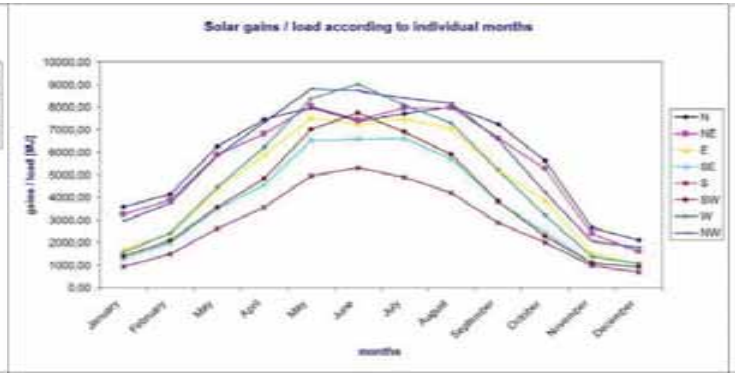


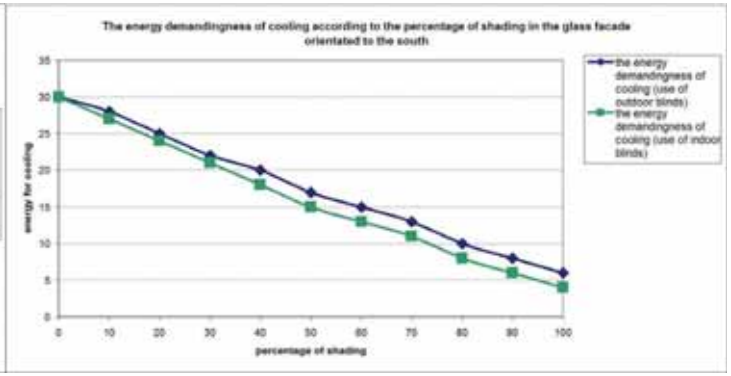










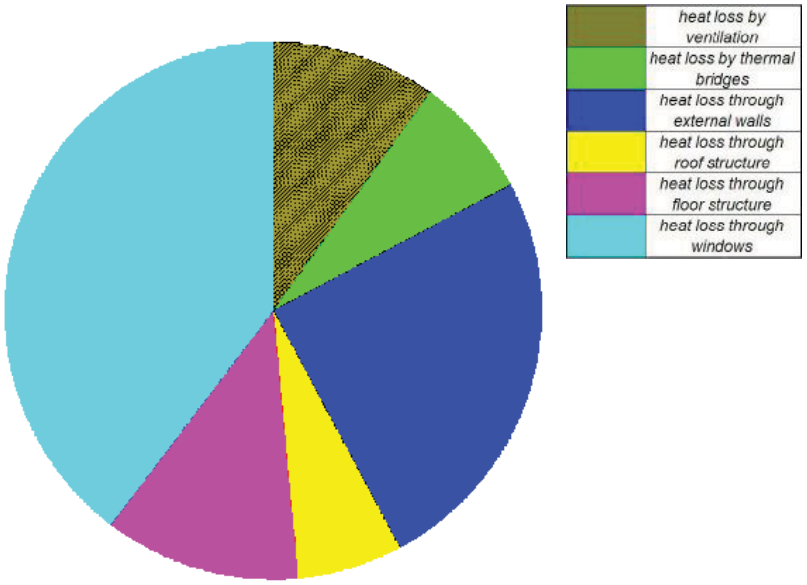


The energy demandingness of building according to the orientation of the cardinal points								
orientation of the main entrance	*N*	*NE*	*E*	*SE*	*S*	*SW*	*W*	*NW*
energy demandingness of heating	18,00	21,00	31,00	38,00	44,00	37,00	32,00	21,00
specific heat needed for heating	16,00	18,00	26,00	31,00	35,00	31,00	26,00	19,00
the total annual need for heat [GJ]	7,30	8,33	12,10	14,54	16,60	14,34	12,43	8,82
energy demandingness of cooling	40,00	39,00	34,00	29,00	23,00	30,00	36,00	41,00

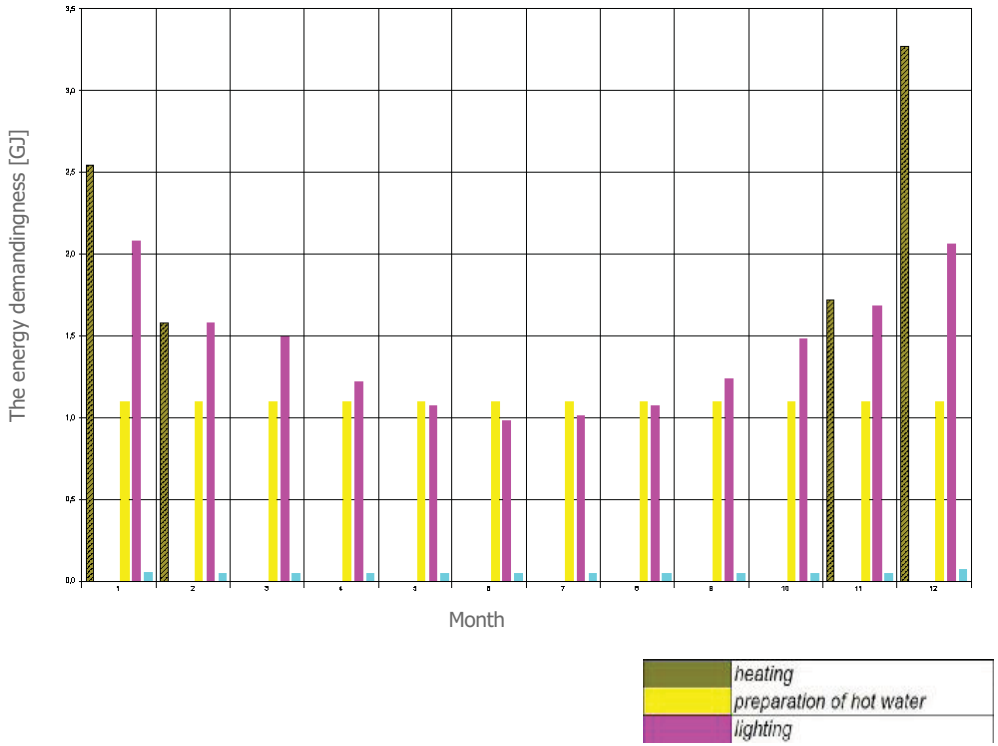
Solar gains for the individual months according to the orientation of the cardinal points								
orientation of the main entrance	*N*	*NE*	*E*	*SE*	*S*	*SW*	*W*	*NW*
January	3583,30	3255,40	1712,10	1294,70	921,60	1379,50	1562,00	2948,60
February	4135,20	3876,60	2373,10	1974,60	1484,40	2069,60	2407,70	3747,80
May	6249,20	5884,40	4357,60	3485,10	2614,70	3557,00	4450,40	5844,50
April	7438,00	6817,80	5859,90	4546,70	3572,30	4823,40	6213,20	7318,20
May	7983,80	8037,00	7520,00	6517,40	4950,20	7000,60	8379,10	8800,00
June	7360,80	7425,70	7230,60	6567,50	5307,80	7738,00	9018,40	8708,20
July	7699,10	7952,80	7481,10	6608,50	4896,70	6887,10	8079,70	8399,30
August	8011,80	7970,60	7055,60	5699,60	4200,30	5896,40	7282,40	8167,30
September	7256,50	6626,70	5199,70	3793,30	2877,00	3829,40	5213,50	6550,90
October	5626,40	5264,40	3862,50	2436,90	2009,60	2285,70	3214,00	4218,10
November	2646,70	2383,40	1519,40	1094,30	972,20	1082,10	1372,30	2035,50
December	2102,70	1589,30	1046,90	883,30	685,10	936,90	1069,50	1785,90
Summary [MJ]	**70093,50**	**67084,10**	**55218,50**	**44901,90**	**34491,90**	**47485,70**	**58262,20**	**68524,30**

The energy demandingness of cooling according to the percentage of shading in the glass facade orientated to the south											
the percentage of shading [%]	0,00	10,00	20,00	30,00	40,00	50,00	60,00	70,00	80,00	90,00	100,00
the energy demandingness of cooling (use of outdoor blinds) [kWh/m^2]	30,00	28,00	25,00	22,00	20,00	17,00	15,00	13,00	10,00	8,00	6,00
the energy demandingness of cooling (use of indoor blinds) [kWh/m^2]	30,00	27,00	24,00	21,00	18,00	15,00	13,00	11,00	8,00	6,00	4,00

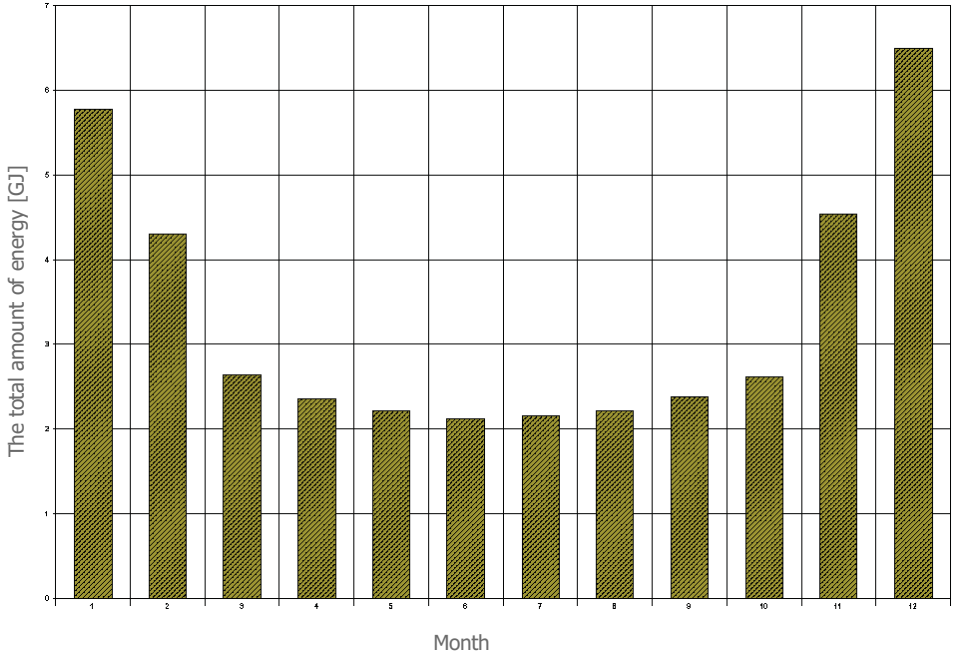
Specific heat loss of the building



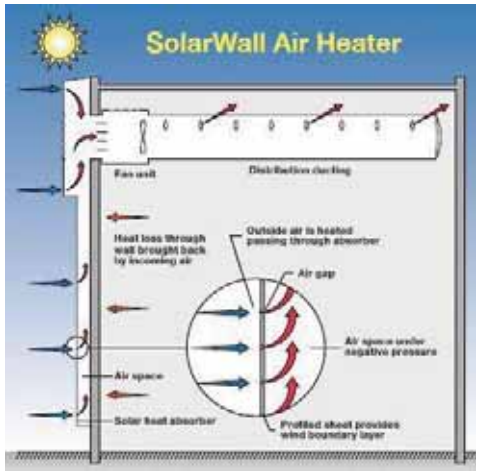
The energy demandingness supplied into the building monthly



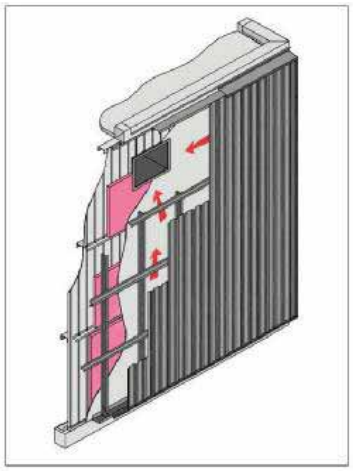
The total amount of energy supplied into the building monthly



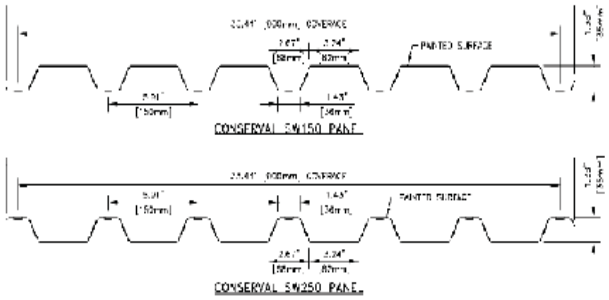
graphs supplied energy
growing steel house - family rules



SolarWall® system integrated into a wall and connected to interior fan



SolarWall® system mounted over metal wall



SolarWall® profiles

SolarWall®

The SolarWall® technology is a solar air heating system that uses solar energy as fuel to heat or ventilate indoor spaces in new or retrofit construction.Perforated collector panels are installed several inches from an appropriate wall, creating an air cavity. Sunlight heats the solar collector surface and ventilation fans create a negative pressure in the air cavity, drawing in solar heated air through the perforations in the panel. A connection to an HVAC intake allows air to be preheated before entering the air handler, reducing the load on the conventional heater. Heated air is then distributed into the building through the existing HVAC system or alternately, with separate air makeup fans and perforated ducting.

PREPARATORY WORK
Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer. Verify that site conditions are acceptable for installation. Do not proceed with installation until unacceptable conditions are corrected.

METHODS
The SolarWall system is generally installed in a manner similar to that of other metal facades except that it is attached 150 - 250 mm (6" - 10") from the wall to create the cavity for collecting the solar heated air. It can be installed over or around existing wall openings, and if installed over masonry, the clip and support system can usually be fastened anywhere on the wall. If the main wall is a metal wall with support bars or girts spaced 1.2 - 1.8 m (4' - 6') apart, the supports for the solar wall panels must be connected to the structural supports and not to the metal sheets. Panels can be mounted with corrugations positioned vertically or horizontally on walls and facias, and positioned vertically on roofs. If required, additional fans and air distribution equipment can be installed using standard practices. Installation manuals and project-specific installation drawings are available. BUILDING CODES Installation must comply with the requirements of all applicable local, state and federal code jurisdictions.

ENVIRONMENTAL CONSIDERATIONS
SolarWall is a renewable energy system
that has significant environmental benefits: • Each SolarWall system supplies 1.5 - 3.5 GJ/m2 (1.5 - 3.5 therms/ft2) of heat per year using solar energy • Delivers solar collection efficiencies as high as 80% • Reduces annual CO2 production by 200 kg/m2 (40 psf) of collector when displacing natural gas heating • SolarWall metal components contain recycled material and are recyclable at the end of their life cycles • Solar collectors heat fresh air to improve indoor air quality Project with SolarWall technology may qualify for up to 6 LEED credits in "Renewable Energy," "Optimizing Energy Performance", "Improved Ventilation" and other LEED categories.

wall
integration of solarwall system
growing steel house - family rules