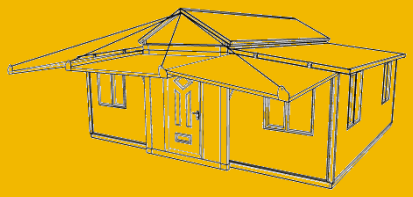
PRACTICAL

TWO SIDES EXPANDABLE MULTI PURPOSE SHELTER



Next-Gen Housing Solutions

Introduction

PRACTICAL is made of high quality sandwich panels which are used for building walls and roofs of buildings and also for building enclosures of industrial equipment, air conditioning devices, etc.

The panels used in PRACTICAL are manufactured in a continuous process of joining the insulating core with external metal plates lining.

The final product is a sandwich panel consisted of several layers. Metal lining protects against weather conditions, such as rain or snow and also performs decorative function. These panels are also resistant to corrosive factors. They keep their parameters when exposed to moisture, steam, snow, chemicals or other difficult conditions.

The core, made of PUR polyurethane foam, IPR polyisocyanurate foam, EPS expanded polystyrene boards or MWF mineral wool, guarantees thermal and acoustic insulation. When joined with the lining, it becomes a barrier protecting against fire, snow load, wind, temperature and other factors.

The sandwich panels in PRACTICAL walls has numerous benefits such:

1. Perfect insulating properties. Thermal conductivity λ of panels with polyisocyanurate foam core is 0,020 W/m*K.
2. Perfect protection against weather conditions, maintaining properties and appearance for many years. When coating is properly selected for local conditions, several years' durability of panels may be reached without any problem.
3. Leakproofness - water, snow and damp will not get inside. Perfectly finished joints ensure complete leakproofness for many years, if installation standards are followed.
4. Noise insulation. Properly selected core material can give very good noise insulation parameters. They are particularly important if insulation of outside noise, reduction of industrial noise propagation to the outside of the building or noise reduction within the building is required.
5. Fire protection properties according to the needs. Proper type of core can ensure reaching fire resistance class up to EL120 (mineral wool). This enables protection of escape routes, separation of fire compartments from each other.
6. Easy and quick installation, low construction costs, operating costs lower than in other buildings. 50 mm thick IPR foam panel has the same heat-transfer coefficient U as a 75 cm thick aerated concrete wall, 60 cm thick structural clay tile wall or a 190 cm thick brick wall.
7. Good strength parameters. Roof panels can withstand the load of snow and wind depending on their thickness and climatic zone with supports span over 3 m. Wall panels in most cases may be used with supports span of up to 6 m. This results in real savings in terms of the supporting structure and also in the costs of the entire building.

We have managed to combine all these benefits to the user with benefits to the natural environment. Entire power input in the production of the material used for thermal insulation of the

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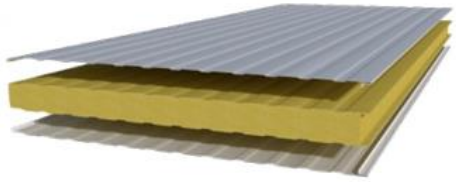
structure pays for itself after two or three years from installation, on average. Materials used in production are recyclable. Steel may be reused successfully, waste core materials can also be recycled, while production of the panels itself is not harmful to the environment.

PRACTICAL is very durable in areas with salty conditions (such as seaside regions) or high levels of industrial pollution.



TYPES OF APPLICABLE SANDWICH PANELS

Material Type : Galvanized Iron (GI)

	CORE							
Description	IPR core made of stiff polyisocyanurate foam		PUR core made of stiff polyisocyanurate foam		EPS core made of expanded polystyrene		MWF core made of mineral wool	
	thickness [mm]	modular width [mm]	thickness [mm]	modular width [mm]	thickness [mm]	modular width [mm]	thickness [mm]	modular width [mm]
Panel with hidden fastening. To be installed vertically or horizontally.	40 50 60	1000	40 50 60	1000	40 50 60	1000	40 50 60	1000

IPR (PIR) AND PUR SANDWICH PANELS

BENEFITS

IPR and PUR sandwich panels have polyurethane-based foam cores. PUR/IPR foam is a material with excellent insulating and thermal properties, which is reflected by thermal conductivity rating.	**λ = 0,020 W/m*K (IPR)** **λ = 0,022 W/m*K (PUR)**
This foam is a good noise insulation material. Specific acoustic resistance coefficient:	Rw= 25-27 dB
acoustic absorption coefficient:	aw = 0,15
The IPR/PUR sandwich panels are non-flammable due to the properties of PUR and IPR foam.	B - Flash resistant
Panels with foam core give very good results in burning behavior tests, depending on foam type and thickness their fire resistance class is	EI 15 (PUR) EI 30 (IPR)

Panels are manufactured in accordance with PN-EN 14509:2010 and have the CE mark.

PANELS WITH EPS CORE

BENEFITS

The core of EPS sandwich panels is made of expanded polystyrene boards. Expanded polystyrene has very good insulating and thermal properties, which is reflected by thermal conductivity rating	**λ = 0,040 W/m*K**
Noise insulation properties of sandwich panels with EPS core are also good. Weighted average specific acoustic resistance coefficient:	Rw= 23-24 dB
Burning behaviour of EPS sandwich panels allows to classify them as	fire retardant
Panels with EPS core reach fire resistance class	E 60 / EW 60

PANELS WITH MWF CORE

BENEFITS

The core of MWF sandwich panels is mineral wool (stone wool). MWF has good insulating and thermal properties, which is reflected by thermal conductivity rating	**λ = 0,040 W/m*K**
MWF panels have very good noise insulation properties. Weighted average specific acoustic resistance coefficient:	Rw= 31 dB*
acoustic absorption coefficient:	aw = 0,1
Burning behaviour of sandwich panels with mineral wool core allows to classify the product as	A1-A2* Non-flammable
Results of fire resistance tests with MWF panels are very good. Depending on core thickness their fire resistance class is	EI 60 / EI 120*

TECHNICAL DATASHEET

SECTION PROPERTIES (PER METER WIDTH) BASE METAL: STEEL

Thickness (T) (mm)	Cover Width (mm)	Nominal Weight (kg/m^2)	Area (cm^2)	Full Sect. Ix (cm^4)	Elastic Modulus (E)(kN/cm^2)	Top in Compression				Bottom in Compression			
						Ixet (cm^4)	Sx-Top (cm^3)	Sx-Bot (cm^3)	Ma $_{bx}$ (kNm)	Ixeb (cm^4)	Sx-Top (cm^3)	Sx-Bot (cm^3)	Ma $_{bx}$ (kNm)
0.40	1000	3.83	4.84	14.66	20300	11.20	3.40	9.03	0.46	10.82	4.45	5.12	0.60
0.50	1000	4.79	6.05	18.32	20300	15.66	4.95	11.28	0.67	14.18	5.65	6.95	0.77

ALLOWABLE UNIFORM LOADS (KN/M2): BASE METAL : STEEL

Nominal Thickness (T) (mm)	No. of Spans	Load Case	Span (m)								
			1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
0.40	1	D + L	3.68	2.36	1.64	1.20	0.92	0.73	0.59	0.49	0.41
		WS	4.80	3.07	2.13	1.57	1.20	0.95	0.77	0.61	0.47
	2	D + L	4.00	2.71	1.95	1.47	1.14	0.91	0.74	0.62	0.52
		WS	3.28	2.18	1.55	1.15	0.89	0.71	0.58	0.48	0.40
	3	D + L	4.69	3.24	2.35	1.78	1.39	1.12	0.91	0.76	0.64
		WS	3.92	2.64	1.89	1.42	1.10	0.88	0.71	0.59	0.50
0.50	1	D + L	5.36	3.43	2.38	1.75	1.34	1.06	0.86	0.71	0.59
		WS	6.16	3.94	2.74	2.01	1.54	1.22	0.99	0.76	0.59
	2	D + L	5.64	3.72	2.63	1.95	1.50	1.19	0.97	0.80	0.68
		WS	5.01	3.28	2.31	1.71	1.32	1.04	0.85	0.70	0.59
	3	D + L	6.82	4.54	3.23	2.41	1.86	1.48	1.21	1.00	0.84
		WS	6.10	4.03	2.85	2.12	1.63	1.30	1.05	0.87	0.74

UV EFFECT

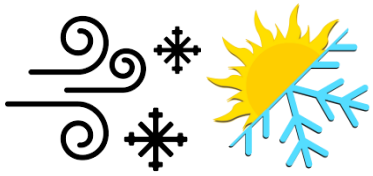
In natural conditions paint coats are subject to degradation caused, beside chemicals, by destructive effect of ultraviolet radiation.
Paint coats resistance to ultraviolet radiation mainly depends on the type of used membrane forming substances as well as special
additives - photo stabilisers.
Solar radiation reaching the earth includes:

- ✓ infrared radiation with wavelength range from 700 to 4000 nm,
- ✓ visible light with wavelength range from 400 to 700 nm,
- ✓ UV-A radiation with wavelength range from 315 to 400 nm,
- ✓ UV-B radiation with wavelength range from 280 to 315 nm,
- ✓ UV-C radiation with wavelength range from 100 to 280 nm (absorbed by the atmosphere).

Photodegradation of polymers, including membrane forming substances of paint coats, consists in inducing reactions of radicals leading
to shortening of the polymer chain. This process is a direct effect of absorbing radiation quanta by polymer functional groups.
The effect of radiation depends on the length of the lightwave and its intensity.

WIND / SNOW LOAD RESISTANCE

Snow Load: 90 kg/m2; Wind Load: 100 km/hour;
1st Degree Earthquake Conditions (Loads TS 498)



LINING TYPES AND COLOURS

Standard RAL Colors. Special colors on request; Minimum order

applied.

STEEL CARCASS STRUCTURE

HIGH TENSILE STRENGTH STRUCTURAL STEEL

Steel Grade	**: S355J2+ Steel**
Standard	: EN10025-2
Nearest Equivalent	: DIN 17100 ST52-3; ASTM A572-50; JIS G3106 SM490; JIS 3101 SS490 ABS EH36; LRS EH36; BS4360 Grade50D; BS4360 Gr50DD
Characteristic	: S355J2+ is welder-friendly, low carbon, high tensile strength structural steel, can be readily welded to other weldable steel. For its low carbon equivalent, it possesses good cold-forming properties. It is produced by fully killed steel process and supplied in a normalized or controlled rolling condition.
Specs	: 3x490x2300mm - 3x300x5600mm

The cross-members consist of bent profiles welded to the longitudinal beams and there are also some side-wing profiles to support the floor. The side rail profiles are manufactured from standardized U-beams. All parts are produced from a S355-steel grade. In the lightweight solution the hot-rolled I-beam has been replaced by a laser-cut and welded longitudinal I-beam manufactured from AHSS. Upgrading the traditional chassis by introducing AHSS allows the thickness of all major structural parts to be reduced and the weight of the chassis is thereby reduced by about 1,500 kg.

TYPICAL MECHANICAL PROPERTIES

Test type			Tensile and hardness test (at room temperature)						Impact test (KV)		
			Yield (Re)	0.2 % proof	UTS (Rm)	Elong (A)	R of A (Z)	Hardness	Room Temp	0°C	-20°C
Variation	Sample dia	Unit	*N/mm2*	*N/mm2*	*N/mm2*	*%*	*%*	*HB*	J	J	J
S355J2 +N	> 16 ≤ 40mm	Min	345		470	22					27
		Max			630						
S355J2 +N	> 100 ≤ 150mm	Min	295		450	18					27
		Max			600						
S355J2G3	> 250 ≤ 500mm	Min	265		400	23					25
		Max									
S355 +C	> 16 ≤ 40mm	Min	350		530	8					
		Max			850						

Physical Properties

Density lb/in³	0.0975
Thermal Conductivity, Btu-in/hr-ft²-°F	1160
Electrical Resistivity, Ω-cm	3.99e-006
Specific Gravity	2.7
Melting Point (Deg F)	1090
Modules of Elasticity in Tension	10
Modules of elasticity in Torsion	3.8

Mechanical Properties

Ultimate Tensile Strength	45,000
Tensile Yield Strength	40,000
Elongation at Break	12%
Hardness, Rockwell B	60
Modules of Elasticity, ksi	10,000

	Original design a)
Steel Grade	S355
Weight, m [kg/m]	42
Bending Moment Capacity, M [kNm]	286
Moment of Inertia, I [m⁴]	140 E–06
Section Modulus, W [m³]	72E–05
Weight Reduction, WR [%]	–

DESIGN

Prefabricated building designs are often a result of experience and knowledge achieved over the years by the producing companies, and the know-how of the end users. Good solutions are in general also applicable for lightweight buildings produced in high strength steels. However, advanced high strength steel, (AHSS) enables new solutions, but may also call for design changes in order to utilize the higher strength.

A common structure carcass consists of longitudinal main beams manufactured from either standardized hot rolled profiles or welded I-beams and a number of cross-member profiles. For the cross-members, solutions with open profiles, tubes or box-section profiles can be found. Depending on the type of the structure, floor members and different support profiles can also be attached to the carcass.

INTERNAL DIVISION OPTIONS

1 **Open Space Style without (WC+Bath)**

Warehouse, Worship house, Restaurant, Class Room, Healthcare Station, Storage Area, Camp, etc.

2 **Twin Lockable Open Space without (WC+Bath)**

Accommodation Flats, Twin Office, Command Control HQs, Meeting Rooms, Storage Area, etc.

3 **Open Space with (WC+Bath)**

Accommodation Hall, Restaurant, Open Office, Command Control HQs, Meeting Hall, etc.

4 **1 Big 1 Medium Space with (WC+Bath) & Kitchen**

Accommodation House, Hostel, Office, Command Control HQs, Seaside chalet , etc.

5 **1 Big 1 Small Space with (WC+Bath) & Kitchen**

Accommodation House, Restaurant, Open Office, Command Control HQs, Seaside chalet, etc.

6 **Twin Flat Space with Two (WC+Bath) & Kitchen**

Accommodation House, Office, Command Control HQs, Seaside chalet, etc.

7 **4 Room Space with (WC+Bath)**

Accommodation House, Restaurant, Office, Command Control HQs, Seaside chalet, etc.

1 Big 1 Small Space with (WC+Bath) & Kitchen

Features

Extremely Solid, Robust, Durable Construction,
Shelter can be deployed by 2 people in as little as 12 Minutes,
Easy, Intuitive Deployment Process,
Multiple shelters can be joined to create scalable complexes,
Shelter can be used for Triage, Incident Command, Emergency, Clinic, Housing, Refugee Camp, Military Camp, Rehab, etc.
Maximum Inherent Insulation Value and Clean Workspace,
Superior Combination of Capabilities, Support Units and Colors,
Turn-key systems with a wide range of accessories,

Specifications

- ✓ Heat, Fire and Sound Insulation
- ✓ Air Tightness
- ✓ Durability and Durability
- ✓ Low Maintenance / Cleaning Requirements
- ✓ Chemical and Biological Resistance
- ✓ Structural Light Material
- ✓ Resistance to Weather Conditions
- ✓ Easy Maintenance
- ✓ Heat Resistance
- ✓ Corrosion Resistance and Non-Rusting
- ✓ 99.9% Anti-Microbial Surface Hygiene

PRACTICAL APPLICATIONS

Military

Military Base Camps
Military Command Control Shelters
Military Field Role 1 & Role 2 Hospital Shelters,
Military Accommodation Shelters,
Military Catering Shelters,
Military Equipment Storage Shelters,
Military Operational Offices Shelters,
Military Maintenance Workshops Shelters.

Government & Aid

Governmental, Humanitarian and Aid Relief

Refugee Camps
Basic Clinics & Hospitals Shelters,
Worship Houses Shelters,
Equipment Storage Shelters,
Catering Shelters,
Social Meeting Shelters,

Commercial

Commercial, Touristic and Personal Private

Living Quarters Shelters,
Seaside Chalet Shelters,
Mountain Cottage Shelters,
Activity Camps Shelters,
Restaurants and Catering Shelters,
Worship Houses Shelters,
Equipment Storage Shelters,
Operational Offices Shelters,

LOGISTICS

Can be Shipped in 20` or 40` Containers
Via Truck, Trailer, Train and Ship