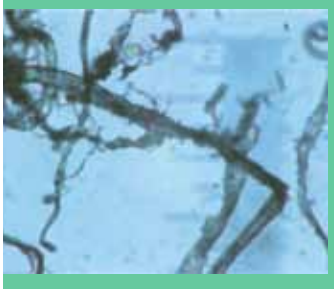
ISOCELL

TESTED QUALITY

Not only does ISOCELL cellulose insulation fulfil all legal test criteria. Research projects, tests and further investigations confirm the high quality of this insulation. Production is subject to strict external supervisory criteria.

Designation	Standard	Value
Approval		ETA - 06/0076 (A), Z-23.11 - 1236 (DE),
External quality monitoring		OiB (A), MPA NRW (DE)
Thermal conductivity (Arithmetic value for mechanical processing)	EN 10456	0,039 W / mK (EU), 0,040W /mK (DE)
Fire behaviour	EN 13501-1	100 mm / B-s2, d0 (EU) B2 according to DIN 4102 40 mm / E
Water vapour diffusion resistance	EN 12086	μ = 1 (A), μ = 1-2 (D)
Flow resistance	EN 29053	at 30 kg/m³ r = 5,3 kPa.s/m² at 50 kg/m³ r = 25,1 kPa.s/m²
Water absorption	EN 1609	at 30 kg/m³ WP = 15,20 kg/m² at 65 kg/m³ WP = 38,95 kg/m²
Spec. thermal capacity		2,11 KJ / kg K
Greenhouse potential/GWP 100		-0,8 kg CO2 equ. / kg




Safety beyond the product

WWW.ISOCELL.COM

FLOW RESISTANCE

Improvement of air-tightness by the use of ISOCELL cellulose insulating material:

The air-tightness of buildings is defined by the air change rate **(n50 value)**. This is composed of the permeability of the material employed **(n50 material)** and the leakages **(n50 unknown leakage)**.

n50 = n50 material + n50 unknown leakage < 0.6 ACH

(for passive houses <0.6 air change per hour ACH at 50 Pa)

Investigations into air permeability

Different OSB brands were investigated for their air-tightness in a Belgian study in 2011. The study showed that in most of the OSB brands tested the air leakage already constitutes a significant part of the air permeability permitted by the passive house standard. According to the study, additional measures should be considered when using OSB boards as an airtight layer in passive houses in order to keep the air leakage value of the material (n50 material) as low as possible and thus to ensure appropriate air-tightness.

Independent of the Belgian study, ISOCELL had at the same time carried out investigations together with the FIW Munich into the air-tightness of the OSB3 boards and improvements in conjunction with cellulose insulation. The results of the ISOCELL investigations are confirmed by the findings from the Belgian study.

The measurements carried out by the FIW Munich on a partition clad on both sides with 18 mm OSB3 showed the following volumetric flow at a pressure difference of 50 Pa:

160 mm air space without insulation	0,275 $m^3/(h.m^2)$
160 mm glass wool 17 kg/m^3	0,273 $m^3/(h.m^2)$
160 mm ISOCELL cellulose 58 kg/m^3	0,141 $m^3/(h.m^2)$

The ISOCELL cellulose insulation achieved almost a 50% reduction in the measured volumetric flow with the structure tested.

This percentage improvement can be apportioned to the n50 material value. According to the formula specified above, it is easier to achieve the demanded < 0.6 ACH with a lower n50 material value.

FIRE BEHAVIOUR

Improvement of fire resistance by the use of ISOCELL cellulose insulating material:

The European building material classification categorises building materials with regard to their fire behaviour. In the course of the harmonisation in 2010, the classification of the fire resistance of structural elements was carried out in accordance with ÖNORM EN 13501-2.

Classification report on the fire resistances of timber constructions:

ISOCELL is a partner in the research project 'Principles for the Evaluation of the Fire Resistance of Timber Constructions' conducted by Holzforschung Austria (Austrian Timber Research). The objective was to determine the principles and parameters for the arithmetic evaluation and classification of the fire resistance of timber structural elements on the basis of 40 large-scale fire tests.
Beside other materials, ISOCELL cellulose was also used for the fire tests at the Austrian testing bodies IBS Linz and MA 39 Vienna. As a result of the investigations, a classification report was drawn up for ISOCELL.
With this classification report, common structures are covered along with a large number of possible modifications of elements insulated with ISOCELL cellulose insulating material. Based on the results of the fire tests, further structural element classifications are possible.
As can be read in the classification report (evaluation page 11), it was found that the structural elements examined achieved at least the same fire resistance when using ISOCELL cellulose (fire behaviour B s2 d0) with a density of 50 kg/m3 as with glass wool (fire behaviour A = non-flammable) with a density of 11 kg/m³.

The results of these investigations form the basis for the evaluation of structures with cellulose insulating material (fire behaviour B) assessed at www.dataholz.com.

SOUND

Improvement of the sound insulation index by the use of ISOCELL cellulose insulating material:

"It can be assumed that the sound insulation index is better than with insulating materials in mat form merely due to the fact that hollow spaces can be filled without gaps with ISOCELL cellulose insulating material."
In order to back up this very general statement, a suspended ceiling with an insulation layer of approx. 25 cm in thickness was subjected to a comparison test by ISOCELL at the TGM in Vienna in summer 2011.

Object	weighted difference level R_W (C;C_{tr}) in dB
Timber joist floor, hollow space about 220 mm thick	
220 mm without insulation	45 (-2;-6) dB
120 mm air layer + 100 mm mineral wool inlay	46 (-3;-7) dB
220 mm mineral wool inlay	49 (-2;-6) dB
120 mm ISOCELL cellulose insulating material + 100 mm mineral wool inlay	50 (-1;-5) dB
220 mm ISOCELL cellulose insulating material 45 kg/m³	51 (-2;-4) dB

A change of the sound level by **1 dB** is subjectively perceived as barely noticeable, while a change of **3 dB** is clearly noticeable.

Explanation of R_W (C ; C_{tr}) = 51 (-2;-4) dB

R_W (weighted difference level)
the higher the **R_W Wert**, the better the sound insulation.

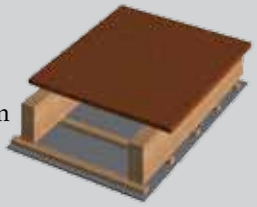
C values (spectrum adaptation values)
provide information about the sound insulation in the respective frequency range and are subtracted from the **R_W Wert**.
(the smaller the **C Werte** the better!)

C (high frequencies) e.g. HVACR systems
51-2 = 49 dB

C_{tr} (low frequencies) e.g. traffic noises
51-4 = 47 dB

Tested ceiling structure:

- 22 mm chipboard, screwed
- 220 mm timber beams 220/65, e = 65 cm
- 24 mm timber lathing, e = 62,5 cm
- 12,5 mm gypsum plasterboard



EXCERPT FROM THE AVAILABLE TEST REPORTS

Approvals and general tests

Testing body	Contents	Test report no.:
MFPA Leibzig	Determination of the specific thermal capacity	P 4.1 / 08 - 341
OIB	European Technical Approval	ETA - 06 / 0076
DIBt	General Building Authority Approval, Germany	Z-23.11-1236
MPA NPW.	Determination of the thermal conductivity	R - 4200002067 11-01

Fire behaviour tests

Testing body	Contents	Test report no.:
MA 39 (Municipal authorities of the city of Vienna)	Approval in accordance with the OIB guideline 'Flammable insulating materials for thermal and/or sound insulation'	MA 39- VFA 0417a/97
MA 39 (Municipal authorities of the city of Vienna)	Flammability and thermal conductivity of cellulose	MA 39- VFA 1228.05-.06/98
IBS Linz	Room-enclosing supporting timber frame construction REI 90	4102112
EMPA	Determination of the Swiss fire index	447327
VKF AEAI	Assessment of fire index	Z 17898
MA 39 (Municipal authorities of the city of Vienna)	Flammability of cellulose insulating material in accordance with ÖNORM EN 13823	MA 39- VFA 2005-0451.02
MA 39 (Municipal authorities of the city of Vienna)	Flammability of cellulose insulating material in accordance with ÖNORM EN ISO 11925-2	MA 39- VFA 2005-1315.03
Holzforschung Austria	Fire resistances in accordance with ÖNORM EN 13501-2 for roof and floor systems in timber frame design	456 / 2011-BB

Sound tests

Testing body	Contents	Test report no.:
Techn. Trades Museum, Vienna	Sound insulation of lightweight exterior walls with and without hollow space insulation	8599/WS
Thermal and Sound Insulation Technology	Estimation of the sound insulation of roof and wall structures	9334/WS
MA 39 (Municipal authorities of the city of Vienna)	Determination of flow resistance	MA- VFA 19991918.01
MA 39 (Municipal authorities of the city of Vienna)	Measurement of the sound absorption coefficient of absorption panels made of cellulose	MA 39- VFA 2000-1777.01
TGM	Airborne sound insulation of a gypsum plasterboard metal-frame wall with cellulose insulating material	TGM-VA WS 10425
TGM	Airborne sound insulation of a timber frame wall in various designs	TGM- VA AB 11489
TGM	Impact or airborne sound insulation of a timber beam ceiling	TGM-VA AB 11961

Tests concerning building biology

Testing body	Contents	Test report no.:
IBO	Determination of the resistance of cellulose insulating materials to insect damage in accordance with ISO 3998	
Clinical dept. for occupational medicine	Expert's report on occupational medicine and toxicology	
Republic of Austria	Austrian environmental label	PA - NR. VKI 689
BAM	Resistance to mould infestation based on DIN IEC 68 parts 2 - 10, April 1991	IV .1 / 7834
IBO	Heavy metal investigation	200401681
Ecolabor	Determination of the corrosion potential	ECO - P06010-06019
BAM	BAM laboratory method based on DIN EN 117:2005 (resistance to termites)	IV.1 / 8319

TECHNICAL ADVICE

The following employees will be pleased to advise you on building physics, standards, guidelines and questions about the application of our products:

DI (FH) BERNHARD HÜTTENEDER
Head of Technical Dept, R & D

Tel. +43 (0) 6216 4108 DW 607
e-mail: bernhard.huetteneder@isocell.at

DI (FH) CHRISTIAN NÖHAMMER
Technical advice

Telefon: +43 (0) 6216 4108 DW 622
e-mail: christian.noehammer@isocell.at

CHRISTIAN POHN, BSC
Technical advice

Telefon: +43 (0) 6216 4108 DW 42
e-mail: christian.pohn@isocell.at

DI (FH) JOSEF PUTZHAMMER
Technical advice

Telefon: +43 (0) 6216 4108 DW 616
e-mail: josef.putzhammer@isocell.at

ISOCELL GMBH | A-5202 NEUMARKT AM WALLERSEE | GEWERBESTRASSE 9 | TELEFONE: +43 6216 4108
FAX: +43 6216 7979 | E-MAIL: OFFICE@ISOCELL.AT | INTERNET: WWW.ISOCELL.COM