STEICO
engineered by nature

Handling instruction

Air-injected insulation

NEW!
STEICO*timberfloc* – wood fibres and cellulose in one product

STEICO *zell*
Air-injected wood fibre insulation

STEICO *timberfloc*
Air-injected insulation from wood fibres and cellulose

STEICO *floc*
Air-injected cellulose insulation

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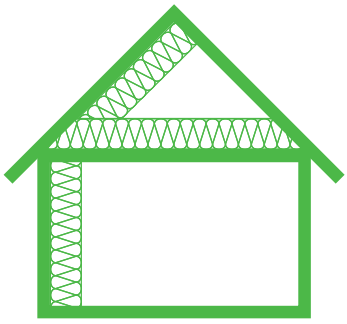
Disclaimer: This document is an adaptation of the German processing instructions for international use. It has been prepared with the greatest possible care. However, STEICO cannot guarantee the completeness and applicability of the information in individual countries. National regulations and codes of practice have priority or must be observed in addition. The current edition applies. Errors excepted.

STEICO Air-injected insulation

Advantages

- Simple and safe to install
- No offcuts, no waste, space-saving storage
- Joint-free insulation of compartments with special geometries, even installation or stiffening elements are completely encased
- Excellent flow properties and reliable compaction in the compartment
- Everything from a one-stop shop
  - Products
  - Expertise
  - Training and certification



Areas of application
Application in compartments of any size in roof, ceiling or wall

Construction site preparation

STEICO air-injected insulation may only be processed by STEICO-trained and certified specialists – enquire about free certification training from your authorised dealer.

Good preparation of the construction site is a prerequisite for the smooth processing of orders and for utilising the economic advantages of STEICO air-injected insulation.

Scheduling and bid submission

- Accurate scheduling, so that no other work is being carried out on the construction site during this period ensures an uninterrupted workflow.
- Complete planning documents must be available prior to the submission of a bid together with detailed drawings for calculating volume and material requirement as well as for detailed solutions/special partitioning, etc.

  Clarification of responsibilities:

  - Who is responsible for the preparation of the basic structure (e.g. plastering work, roofing)?
  - Who is responsible for creating and sealing the air-injection holes?
- It is recommended that all the information is submitted along with the tender.

Working heights and space requirements

- From a practical perspective scaffolding must be provided for working heights greater than 3.5 m. Country-specific safety regulations are to be observed.
- Clarify space requirements on the construction site; manoeuvring or parking space for vans/trailers and materials in the construction site area.
- As a general principle the compartments to be filled should be accessible at a distance of min. 1 m to ensure problem free air-injection.

Safety

- The construction site must be clean. The building sections must be freely accessible.
- It should be ensured that no screws or nails protrude into the injection voids as these could cause damage to the injection hose as well as prevent a smooth injection procedure.
- Recessed light fixtures and spots must be covered with a fire-safety enclosure in accordance with the manufacturer's specifications. Connections to chimneys must be carried out in accordance with the relevant fire safety regulations.
- From a work hygiene perspective it is recommended that a filtering mask (P2) should be worn when processing air-injected insulation. Suitable protective clothing should also be worn. National regulations apply.
- The machine should be checked for contaminants when starting work. Let the machine run empty and remove any contaminants (elastic bands, foil, etc.). Particularly in cellulose processing foreign matter may be present in the bales (even if during production scrupulous care was taken when sorting). Cellulose is a recycling product which may be contaminated.
- Do not inject any material lying on the floor as otherwise dirt (nails, stones, etc.) can enter the machine and cause damage to the sealing lips.

Power supply

- Country specific directives for electrical installations must be complied with.
- For three-phase current machinery 400 V, 16 A, Euro CEE plugs, 5-pin with neutral conductor, (C16 fused).
- Fusing of 220 V and min. 16 A (C16) for machines that are operated via normal household power connections.
- The connecting cables to the machine and the booster station should have a large cross-section (min. 2.5 mm^2).
- Cable lengths longer than 30 m must be avoided and cable reels must be fully unwound.
- The machine should be connected to a separate power circuit. Insufficient power output can lead to machine malfunctions and loss of performance.

Note: The STEICO handling instructions correspond to the state of the art and will be adapted if necessary. At an intensive training on the construction site (site supervision), the work instructions and information can be put into practice. In the event of discrepancies that can be traced back to the air-injected insulation material, the work must be stopped and the local trading partner or the STEICO SE contact person must be informed. STEICO SE is not liable for processing errors..

Compartments to be air-injected

- The compartments to be filled must each be closed. The following requirements must be observed:
  - Separations must be in place
  - No increase in compartment depth using cross battens as the compartments would then no longer be completely closed
  - In the pitched roof a blocking in the ridge is necessary
- Any remaining joints must not be wider than 1 cm. Larger joints can be sealed with e.g. STEICO*flex*.
- When using STEICO*timberfloc* and STEICO*floc* in walls > 3.0 m bulkheads must be used. For STEICO*zell* the maximum height is 3.5 m. To avoid settling, crossbars can also be attached to the planking inside the compartment as anti-slip protection – e.g. approximately every metre on the left and right with a 40/60 cross-section.
- All installation parts, such as bulkheads, changeovers, cross or diagonal braces must be labelled on the outside of the planking. The same applies to cable harnesses and ventilation ducts that are installed in the compartments.
- Compartments < 0.25 m² should be insulated with STEICO*flex* before closing the planking.
- Compartments < 10 cm wide and or < 10 cm insulation thickness should also be insulated with STEICO*flex* beforehand.
- Water pipes (hot and cold) in the compartments must be insulated to prevent condensation.
- Continuous, homogeneous filling guarantees permanent slump resistance.
- For roof pitches of 70° or more bulkheads must be installed every 3 m. Roof pitches below 70° do not require bulkheads but must be checked by the planner.

The planking must be sufficiently pressure-resistant and designed for air-injection

- If planking is executed with STEICO wood fibre boards, we recommend a board thickness of min. 35 mm. In addition, the staggered joint offset should be at least 250 mm and no two board joints in a row in one compartment. Otherwise additional measures may be necessary.
- Ensure that panelling and vapour barriers are fastened in accordance with manufacturers specifications.
- Max. width: The width of the compartments must not exceed 85 cm. Otherwise they must be air-injected using the '2-hose technique'. The injection needle can be used as an alternative (see page 9).
- Finishing boards (e.g. gypsum plasterboards) that are fixed directly to the rafters / studs without a substructure must be temporarily secured with battens during the air-injection process to prevent deformation or breaking out. Even with bend-proof panelling, weakened areas, such as around openings, must be additionally secured.

Use of sealing membranes and boards

Important criteria such as moisture protection, fire protection, thermal insulation and wind and air tightness must be observed and fulfilled.

Wind and air tightness are not provided by STEICO's air-injected insulation.

Sealing membranes

- Only sealing membranes should be used that are approved for air-injected insulation by the manufacturer, e.g. STEICO*multi membra 5* and STEICO*multi renova*.
- The distance between clamps used for fixing the vapour barrier should be max. 10 cm.
- The use of STEICO*hardboard* strips or an additional batten along the rafter is recommended as an alternative.
- If the membrane is laid laterally it is advisable to provide additional reinforcement to the overlap with pieces of STEICO*multi tape* arranged at right angles. Alternatively, here an additional batten may also be fitted along the overlap for mechanical protection.
- The distance between the battens of the supporting structure should be max. 42 cm.
- STEICO recommends checking and documenting the machine settings and the required raw densities on the construction site with selected test compartments for every new application.

Plasterboards

- Plaster baseboards must not be plastered or sealed prior to air injection. This can cause the plaster to crack or flake off.

Using gypsum boards / cement fibreboards

- Direct planking with gypsum board or cement fibre panels should not be used. Otherwise reinforcement with temporary battens is required as an additional measure.

Additional venting of sealed compartments

- When air-injecting compartments with double-sided air-tight planking such as OSB, sufficient air ventilation must be ensured (ventilated lances, nozzles or adding ventilation holes). A mechanical ventilation system can be used to ensure ‘pressure relief’ in the compartment.

Compaction

	STEICO*timberfloc*					**STEICO*zell***					**STEICO*floc***				
	Compaction density table in accordance with. ETA-23/0465					Compaction density table in accordance with ETA-12/0011					Compaction density table in accordance with ETA-16/0141				
Component insulation thickness [cm]	up to 16	17-22	23-28	29-34	35-40	up to 16	17-22	23-28	29-34	35-40	up to 16	17-22	23-28	29-34	35-40
	Minimum raw density [kg/m³]					Minimum raw density [kg/m³]					Minimum raw density [kg/m³]				
Injection freely onto ceiling	32	32	32	32	32	32	32	32	32	32	30	32	34	34	34
Injection into intermediate floor	42	42	42	42	42	35	35	35	35	35	38	40	43	44	48
Injection into suspended ceiling															
Injection into top floor ceiling															
Injection into roof up to 20° pitch															
Injection into roof 20-60° pitch											43	45	47	49	51
Injection into roof over 60° pitch											47	50	52	55	57
Injection into wall															

The prerequisite for slump resistance is the quantity injected as specified in the compaction density table and the uniform distribution of STEICO*timberfloc* in the compartment.

It is essential to check the filled compartments on the construction site to meet the high quality requirements.

If the product is injected freely onto a top floor ceiling, the heat transfer resistance of components is calculated as follows:

Installed thickness = nominal thickness + 13 %

Tip: For the preliminary calculation of material quantities of STEICOzell 40 kg/m³

The prerequisite for slump resistance is the quantity injected as specified in the compaction density table and the uniform distribution of STEICO*zell* in the compartment.

For prefabricated components and subsequent transport, 7 kg/m³ of material must be added. It is essential to check the filled compartments on the construction site to meet the high quality requirements.

If the product is injected freely onto a top floor ceiling, the heat transfer resistance of components is calculated as follows:

Installed thickness = nominal thickness + 15%

With compacted air injection >24 cm STEICO*zell* it is recommended that the injection is carried out with an air-injection needle

The prerequisite for slump resistance is the quantity injected as specified in the compaction density table and the uniform distribution of STEICO*floc* in the compartment.

A material quantity of 5 kg/m³ must be added in the case of prefabricated components and subsequent transport. It is essential to check the filled compartments on the construction site to meet the high quality requirements.

If the product is injected freely onto a top floor ceiling, the heat transfer resistance of components is calculated as follows:

Installed thickness = nominal thickness + 10%

Notes on the characteristics of insulation materials

- The greater the air permeability of the cavity, the lower the raw density
- The less the air permeability of the compartment (e.g. DWD, OSB), the more difficult it is to meet the recommended raw density (the air has to escape, e.g. with additional discharge of the air blown in)
- The smaller the compartment, the higher the raw density (in a narrow cavity reduce air and material, otherwise the hose gets blocked)
- The density rises as filling increases
- The raw density is always lowest at the end of the compartment
- The raw density is always highest at the injection hole
- At the end of the compartment only blow with air so that the preceding material can be compacted into the corners
- Then fill in the remainder

Testing slump resistance

Checking machine technology

- In general the performance of the air-injection machine and booster station plus their air filters must be checked before each use (see operating instructions)
- Checking the injection raw density with the test unit 0.1 m³ of X-Floc®
  - Weigh empty unit
  - Fill unit
  - Weigh filled unit
    - » Filled unit – empty unit = content
    - » Content × 10 = raw density in kg/m³

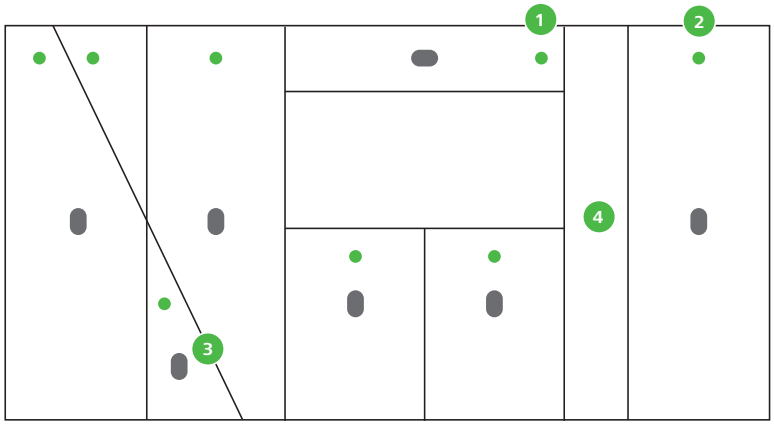
Determining raw density

- Checking raw density in the panels:
  - Determine volume for 2-3 panels
  - Compare with the quantity injected (kg)
  - This procedure should be carried out on each storey, as the height difference can also change the pressure conditions of the air-injection machine
- The requisite compaction values are summarised in the tables on page 7
- As per approval a calculated determination is necessary (see Building Certification page 14). This should be prepared on completion of the insulation work. Attach the original invoice and a copy for your records

Photos: X-FLOC©

The density test set using the piercing tube is only suitable for guidance on the raw density injected.
At least 3 samples per panel give a raw density tendency

Air-injection openings



Key

1 On narrow, horizontal compartments drill in centre right position (up to a height of 50 cm)
2 The air-injection openings should be located centrally, 10–12 cm from the top
3 In the case of wind braces do not place the air-injection openings centrally, but at the highest point
4 Panels < 10 cm should be filled beforehand with flexible STEICO*flex* insulating batts

Application by hose

- Air-injection openings should have a diameter of 105 mm or 120 mm (see STEICO Plugs)
- For air-injection into ceilings, the openings should be positioned about 30 cm away from walls

Application by air-injection needle

- Injection openings for air-injection needles should have an oval shape. (see page 9)

Air-injection tools

Air-injection hose

Filling using an air-injection hose is probably the best-known method. A distinction is made between transport hoses and air-injection hoses

- **A transport hose** is made from flexible PU/PVC and is smooth inside. It is basically used to convey the material from the air-injection machine to the air-injection hose
- **The more rigid air-injection hose** is made from wear-resistant durable PE and is rough and grooved inside. Its rigidity makes it easier to guide into the compartments and the grooved interior additionally loosens up the fibres and distributes them more effectively in the compartment

With the hose method it should also be noted that the different flow properties of cellulose and wood fibre call for different air-injection handling techniques. The same applies to setting the ratio between air and material.

Air-injection needle

An air-injection needle is a bent tube with a pointed tip for easy insertion and compaction in the compartment.

When filling walls, ceilings and roofs where there is stable planking an oval air-injection opening for the air-injection needle is recommended. The drill hole diameter depends on the diameter of the needle used. The diameter of the drill bit should be at least 15-20 mm larger.

This method requires experience and assumes familiarity in working with air-injected insulation.

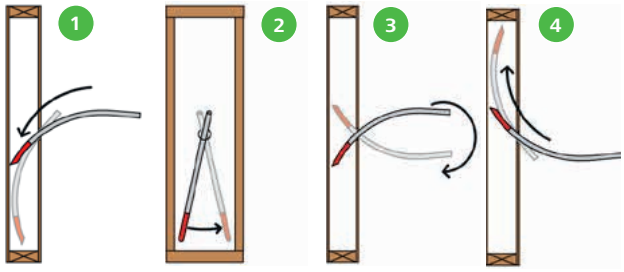
Advantages

- A fast, simple alternative to 2-hose technology, cavities >85 cm can be insulated.
- A higher raw density can be introduced (prefabrication).
- For additional redensification the needle can be inserted into already filled compartments if the necessary raw density has not been achieved at the first filling.
- Ideally suited for ensuring insulation filling in the upper areas of roof and ceiling constructions with high compartment thicknesses.

Drilling oval injection openings

1 Circular drilling
2 Inclined drilling
3 Oblong hole

Air-injection as exemplified by a wall



1 Insert air-injection needle
2 Swivel air-injection needle
3 Pull out air-injection needle and turn upwards
4 Fill upper area by swivelling

Air-injection aid / sealing sponge

A sealing sponge is recommended when filling with a hose or air-injection needle.

When working with a air-injection needle in combination with mash-reinforced membranes (e.g. STEICO*multi membra 5*), a sealing sponge is generally not required, as the membrane takes over the sealing function.

In this case the membrane is penetrated with the tip at a suitable point. When filling make sure that the membrane is not torn any further.

Air-injection lances and telescopic air-injection lances

The vented air-injection lance is recommended for the prefabrication of horizontal elements. To guarantee effective handling there must be sufficient space for a proper handling of the lance.

Advantages

- Time-saving, easy to handle
- Uniform distribution and compaction of insulation in the compartment
- Higher compaction is possible with STEICO*zell*, as the lance permits even better re-compacting (min. 42 kg/m³)
- Easy to operate and control
- Smooth lance surface minimises adhesion of insulation material
- Low load on the planking due to venting (passive/active)
- The air-injection openings can be drilled with a drill bit approx. 85 mm in sole plate or head runner

Ventilated rotating nozzles

It is advisable to use a ventilated rotating nozzle for very small or airtight structures (e.g. below windows and in jamb walls).

The rotating nozzle method allows rapid and dust-free filling of the compartment. The building elements are not affected by the high volume of air during the injection process.

Ventilated rotary nozzles can be used to fill stud-wall structures with STEICO*zell* or STEICO*timberfloc* (both max. cavity height 150 cm) or STEICO*floc*.

The use of a rotary nozzle to process cellulose requires a high level of experience (machine setting).

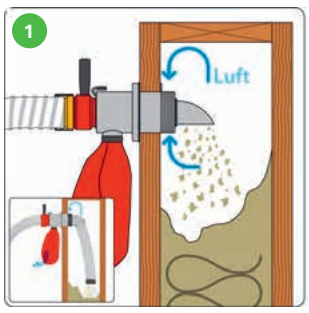
Homogeneous filling of the compartment often depends on the surface quality of the planking. Special constructions should be tested in advance on a sample wall.

It is important that any obstacles in the compartment are clearly marked on the outside of the planking.

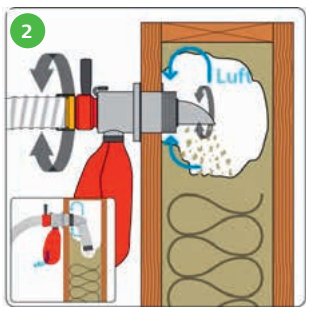
The density rises as filling increases: The lowest density is always at the point where the filling starts. The highest density is always at the air-injection hole. (This means that the air-injection raw density is not homogeneous.)

N.B.: With STEICO*zell* the maximum filling height with a rotary nozzle is 1.50 m.

Filling



The ventilated rotary nozzle is inserted into a precisely fitting air-injection opening made with a hole saw. The element is filled...



...until the area of the nozzle outlet is reached. This is evident from the increasing pressure noise.

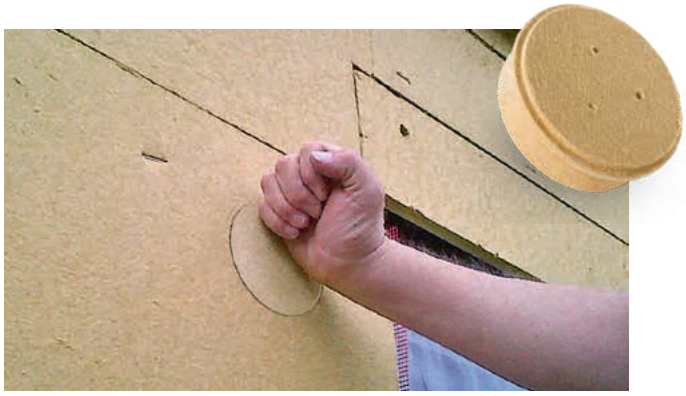
The nozzle outlet is now turned alternately towards the two corners of the compartment. This achieves optimum compaction in the upper compartment.

Drill bits/hole saws

Type	Description/Application	Drill hole Ø [mm]	Use
Centre drill	• Centre drill suitable for drill bit BK 75 / 105 / 121 • Quick change between drill bits of different diameter • Easy removal of drill core • Clamping shaft diameter 10 mm		Suitable for drill bit BK 75/105/121
Drill bit BK 75/105/121	• Wet and dry process wood fibre insulation board • Solid wood, LVL, OSB, chipboard, coated wooden board, gypsum plasterboard, etc.	75 105 121	Hard wood-based board, wet and dry process wood fibre-board
Drill bit BK dry (no centre drill needed)	• Dry process wood fibre insulation board • The drill core can be reused as a blanking plug • With practical ejection system	106,5	Dry process boards

Sealing the air-injection holes

To seal the air-injection holes we recommend STEICO*multi tape P* stickers for the inner planking (e.g. OSB boards or membranes) or STEICO *Plugs* from wood fibre for air-injection openings in wood fibre insulation boards. STEICO system accessories coordinate perfectly with STEICO insulating and construction materials, thus ensuring a long-lasting solution.



Delivery form of STEICO*multi tape P*

Length [m]	Width [mm]	Stickers [mm]	Number/roll [Stickers]	Number/pack [Pcs]
40	200	180*180	222	1

Supplied on rolls with punched stickers

Delivery forms of STEICO *Plugs*

Thickness [mm]	Diameter [mm]	Number/pack. [Pcs]
35	50	100
	68	100
	105	60
	120	50

Free injection in an open space

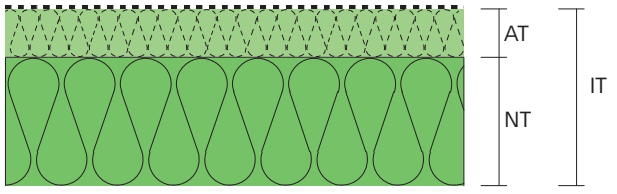
- The surface to be injected must be cleaned and bulky items must be removed.
- Openings between rafters and masonry should be sealed with adhesive tape, membrane or positioning boards so that the insulating material cannot escape to the outside
- Walkways to rooftop escape hatches, chimneys, ventilation pipes, antenna distributors etc. must be charged as a separate service on site and completed before the insulation work begins
- If necessary loft stairs can be partitioned off.
- Ventilation shafts must be protected to prevent the ingress of the insulating material.
- Recessed light fixtures and spots must be covered with a fire-protection enclosure in accordance with the manufacturer's specifications.
- Connections to chimneys should be made in accordance with the relevant fire safety requirements. Electrical junction boxes should not be within the insulation.
- The insulation should be protected from excessive exposure to wind in the roof space.
- With STEICO*floc* the surface may be sprayed with water. After drying it forms a cardboard-like surface which prevents the flakes from swirling up.
- Surface treatment is not required for STEICO*timberfloc* and STEICO*zell* (auto fibre interlocking).
- To reduce dust formation the airflow rate should be reduced and the end of the hose directed inside the insulating material if possible.

Calculation tables:

STEICO*timberfloc* according to ETA 23/0465				
Installed Thickness (IT) = nominal Thickness (NT) + 13 % additional thickness (AT)				
Density [kg/m³] 32		Thermal conductivity [W/m·K] $\lambda_D = 0{,}039$		
Installed Thickness [cm]	Material U-value [W/(m²·K)]	R-value [(m²·K)/W]	Weight [kg/m²]	Numbers of bags (15 kg) per 10 m²
12	0,37	2,70	3,84	2,6
16	0,28	3,60	5,12	3,4
20	0,22	4,50	6,40	4,3
24	0,18	5,40	7,68	5,1
28	0,16	6,35	8,96	6,0
32	0,14	7,25	10,24	6,8
36	0,12	8,15	11,52	7,7
40	0,11	9,05	12,80	8,5
44	0,10	9,95	14,08	9,4
48	0,09	10,85	15,36	10,2
52	0,08	11,75	16,64	11,1
56	0,08	12,70	17,92	11,9
60	0,07	13,60	19,20	12,8
64	0,07	14,50	20,48	13,7

STEICO*zell* according to ETA 12/0011				
Installed Thickness (IT) = nominal Thickness (NT) + 15 % additional thickness (AT)				
Density [kg/m³] 32		Thermal conductivity [W/m·K] $\lambda_D = 0{,}038$		
Installed Thickness [cm]	Material U-value [W/(m²·K)]	R-value [(m²·K)/W]	Weight [kg/m²]	Numbers of bags (15 kg) per 10 m²
12	0,36	2,75	3,84	2,6
16	0,27	3,65	5,12	3,4
20	0,22	4,60	6,40	4,3
24	0,18	5,50	7,68	5,1
28	0,16	6,40	8,96	6,0
32	0,14	7,30	10,24	6,8
36	0,12	8,25	11,52	7,7
40	0,11	9,15	12,80	8,5
44	0,10	10,05	14,08	9,4
48	0,09	11,00	15,36	10,2
52	0,08	11,90	16,64	11,1
56	0,08	12,80	17,92	11,9
60	0,07	13,75	19,20	12,8
64	0,07	14,65	20,48	13,7

STEICO*floc* according to ETA 16/0141				
Installed Thickness (IT) = nominal Thickness (NT) + 10 % additional thickness (AT)				
Density [kg/m³] 30 - 34		Thermal conductivity [W/m·K] $\lambda_D = 0{,}038$		
Installed Thickness [cm]	Material U-value [W/(m²·K)]	R-value [(m²·K)/W]	Weight [kg/m²]	Numbers of bags (15 kg) per 10 m²
12	0,35	2,85	3,60	2,4
16	0,26	3,80	4,80	3,2
20	0,21	4,75	6,40	4,3
24	0,18	5,70	8,16	5,4
28	0,15	6,65	9,52	6,3
32	0,13	7,65	10,88	7,3
36	0,12	8,60	12,24	8,2
40	0,11	9,55	13,60	9,1
44	0,10	10,50	14,96	10,0
48	0,09	11,45	16,32	10,9
52	0,08	12,40	17,68	11,8
56	0,08	13,35	19,04	12,7
60	0,07	14,35	20,40	13,6
64	0,07	15,30	21,76	14,5



AT = additional thickness; NT = nominal thickness; IT = Installed thickness

Please sign and return.

Building Certification for STEICO Air-Injected Insulation

Executing company / STEICO specialist company

..... Company

..... Contact

..... Street, house number

..... Postal code, town

..... Telephone

..... E-mail

Construction project

..... Property

..... Client / building contractor

..... Street, house number

..... Postal code, town

..... Telephone

..... E-mail

Air-injected insulation used

☐ STEICO*timberfloc* .....
EN 13501-1, class E Production date
λ_D 0,039 W(m*K) according to ETA-23/0465 .....

☐ STEICO*zell*
EN 13501-1, class E Production date
λ_D 0,038 W(m*K) according to ETA-12/0011 .....

☐ STEICO*floc* .....
EN 13501-1, class E Production date
λ_D 0,038 W(m*K) according to ETA-16/0141

Compaction values achieved in the components

Component (roof, ceiling, wall, top floor ceiling, etc.)	Measured component thickness [cm]	Insulation area minus solid wood content [m²]	Quantity processed [kg]	Raw density calculated [kg/m³]	Raw density target [kg/m³]

The construction site was implemented in accordance with European Technical Approval as well as the STEICO handling instructions of STEICO air-injected insulation.

..... Place, date

..... Signature/stamp of implementing company/STEICO specialist company

..... Place, date

..... Signature/stamp of client/building contractor

Notes

Notes

STEICO
SOCIETAS EUROPAEA

Responsible for content

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The contents of this document have been prepared with the utmost care. However, applicable regulations can change. STEICO accepts no liability for the accuracy, completeness, or current applicability of the content. Application areas may vary in the detailing. Always verify the suitability of our products for the specific intended use.

The contents of this document have been prepared in consideration of European product standards and provide a general overview of component structures, construction methods, and installation. National applicable regulations have not been considered. Before using our products, please verify that the applicable national regulations for the specific area of use are followed.

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