

INSULATION JUST GOT BETTER

ArmaGel HT

Flexible aerogel blanket for
high-temperature applications

Application Manual

www.armacell.com/armagel



About Aerogel

Our vision has always been to create innovative technical insulation solutions and components to conserve energy and make a difference around the world. With aerogel that vision is now a reality. Say hello to the future of insulation today. ArmaGel. Insulation just got better.

Welcome to the next generation of aerogel blanket technology. Flexible and bendable. Environmentally safe. Superior thermal performance. Hot conditions up to 650 °C (1200 °F) is no sweat. **ArmaGel HT is the reliable solution for high-temperature applications.**

High-temperature



Flexible



Hydrophobic





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BEFORE YOU START

PERSONAL PROTECTIVE EQUIPMENT (PPE) AND SAFETY CONSIDERATIONS

- ArmaGel HT will produce some amounts of dust particles - for your comfort some PPE measures are recommended.

1. Working with ArmaGel HT

ArmaGel HT will produce some amounts of dust and fibres during handling and cutting which must be managed in accordance with local regulations. See ArmaGel safety data sheet at www.armacell.com/armagel. For worker comfort we recommend the PPE shown below.



Figure 1: PPE equipment.

2. Material Handling and Storage

ArmaGel HT rolls must always be laid / stacked sideways, never on end and always stored under cover and in dry conditions.

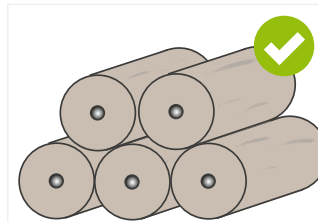


Figure 2: Correct storage conditions.

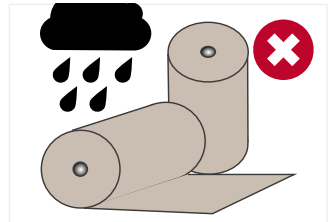


Figure 3: Incorrect storage conditions.



PREPARATION

OFFSITE PREPARATION: SAVE TIME & MATERIALS

3. Prefabrication and Preparation in the Workshop

Prefabrication in the workshop saves time on site and reduces material wastage.



Figure 4: Prefabrication cutting in the workshop.

RECOMMENDED TOOLS:

- Retractable craft (Stanley) type knife
- Ceramic knife
- Electric / battery operated shears
- Heavy duty scissors
- Straight edge
- Set square
- Dividers and callipers
- Tape measure
- Marker pens
- Pliers

Simple tools are required for measuring, marking and cutting.



Figure 5: Recommended tools for application of ArmaGel HT



Prefabricated parts for straights and fittings can be prepared and palletised. Protect from adverse weather.

Figure 6: Prefabricated parts ready to transport to jobsite.

SITE REQUIREMENTS

WEATHER AND EQUIPMENT CONDITIONS

- Ensure that the jobsite conditions are optimal
- Protect the insulation from adverse weather

4. Weather and Equipment Conditions

Before starting installation of ArmaGel HT ensure that piping installation is complete, pressure tested, clean and dry.



Figure 7: Ensure that piping is clean, dry and free from ice.



Figure 8: Do not apply to unprepared or damaged piping.

Enclosures / tenting may be required if rain or bad weather is expected during installation.



Figure 9: If adverse weather is likely, provide cover for work areas. Prevent insulation becoming wet.

Do not install ArmaGel HT if weather conditions are unsuitable (eg. rain, condensing fog, snowfall, ...).



KEY APPLICATION DETAILS

ESSENTIAL TECHNIQUES:

- Accurate circumference measurement ensures tightly-closed seams
- Wrap ArmaGel HT tightly to avoid gaps or voids

5. Key Application Details to Ensure Correct Installation

1. Measure circumference of pipe using a strip of ArmaGel HT to ensure accurate tight longitudinal butt or overlap seam (25-50 mm overlap). Either jointing method is acceptable.



Figure 10: Circumference measurement.



Figure 11:
Longitudinal tightly butted seam.



Figure 12:
Longitudinal overlapped seam.

2. Wrap ArmaGel HT tightly around pipe to avoid gaps or voids.

KEY APPLICATION DETAILS

KEY APPLICATION DETAILS

- Ensure that the longitudinal seam is closed evenly and tightly secured without gaps
- ArmaGel HT must always be secured with wire, bands or pins

3. Longitudinal seams shall be tightly closed. Bring first part of edges together and secure with wire. Continue to bring longitudinal edge together and secure with wire every 200 mm (8 in.) so that the seam is tight, without gaps and evenly secured.



Figure 13:
Start to bring together longitudinal seam and secure with wire.



Figure 14:
Continue to make seam, closing gaps.

4. Each layer of ArmaGel HT (or the final layer of a continuous wrap) must always be secured to the substrate using 1 mm diameter stainless steel wires, 19 mm (3/4 in.) stainless-steel bands and/or stick pins for larger diameters. Maximum separation of wires shall be 200 mm (8 in.) and maximum separation of band centres shall be 300 mm (12 in.).



Figure 15:
Secure with wire.

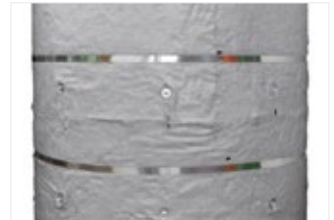


Figure 16:
Secure with bands or stick pins.



KEY APPLICATION DETAILS

KEY APPLICATION DETAILS

- The longitudinal seam shall always be at the side
- Gaps must be avoided at circumferential joints and longitudinal seams
- Stagger all joints and seams

5. Always rotate the longitudinal seam to the side, never at the top.



Figure 17: Rotate longitudinal seam to side.



Figure 18: The longitudinal seam shall not be at the top.

6. Circumferential butt joints shall be pushed tightly together to avoid gaps.

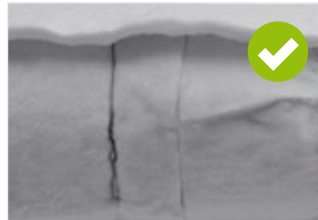


Figure 19: Tightly butt circumferential joints.

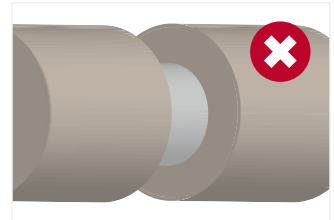


Figure 20: Do not leave gaps in circumferential joints.

7. Joints and seams shall be staggered minimum 100 mm (4 in.) circumferentially, longitudinally and between layers.



Figures 21, 22, 23: Stagger longitudinal seams between layers.



KEY APPLICATION DETAILS

KEY APPLICATION DETAILS

- Continuous wrap application saves time
- Jacket or cladding is required when installed outdoors and is recommended indoors

8. ArmaGel HT may also be applied in multiple layers as a continuous wrap.



Figure 24: Ensure starting point is in line with axis of pipe. Tape or adhesive may be required to help hold the axial position.



Figure 25: Continue to wrap around the pipe to achieve the required quantity of layers. End the wrap with the longitudinal edge in line with, or overlapped with, the inner layer starting point.

9. ArmaGel HT shall always be protected by a jacketing / cladding when installed outdoors. This is also recommended for indoor applications.

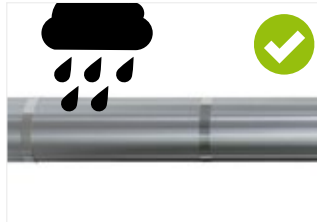


Figure 26: Apply jacketing or cladding.



Figure 27: Do not leave insulation unprotected.



KEY APPLICATION DETAILS

KEY APPLICATION DETAILS:

- Leave no gaps
- > 250 °C (480 °F), do not use organic adhesives or tapes
- > 400 °C (752 °F), intermediate layer of metallic foil required

6. High Temperature Applications

ArmaGel HT is suitable for high-temperature applications up to 650 °C (1,200 °F). All high-temperature insulation materials have the potential to self-heat and / or display exothermic behaviour when first in contact with temperatures near their maximum range - this is normal.

To manage this self-heating behaviour within an acceptable range as defined by ASTM standards C411 and ASTM C1728, the installation instructions must be adhered to:

- Avoid gaps in the insulation.
- For applications > 250 °C (480 °F), do not use organic adhesives or tapes.
- For applications >400 °C (752 °F) apply a continuous layer of metallic foil (minimum thickness 0.05 mm/ 0.002 in.) between the final two layers of the ArmaGel HT insulation system, taking care not to leave any gaps.
- With valve and flange applications, pack all void spaces with ArmaGel HT to prevent a chimney effect occurring.

APPLICATION DETAILS

APPLICATION DETAILS:

- Spiral wrapping small-bore pipes or irregular shapes

7. Spiral Bandaging of Small-bore Pipes



Figure 28:
Wrap 50 or 100 mm wide strips of ArmaGel HT around pipe. Material can either be close butted or overlapped by 50%.



Figure 29:
Spiral wrap with wire to hold ArmaGel HT in place.



APPLICATION DETAILS

APPLICATION DETAILS:

- Building up ArmaGel HT at flanges

8. Flanges



Figure 30:
Insulate close to flange, note clearance for bolt removal may be required.



Figure 31:
Wrap 50 mm (2 in.) wide strips of ArmaGel HT to build up insulation to clear flange (or adjust width to be equal to total insulation thickness if > 50 mm).



Figure 32:
Wrap to same thickness as ArmaGel HT on pipe.



Figure 33:
Wire in place.



APPLICATION DETAILS

APPLICATION DETAILS:

- Segmented / gored Elbows / bends
- Alternative "reverse-gore" Elbows / bends

9. Elbows / Bends

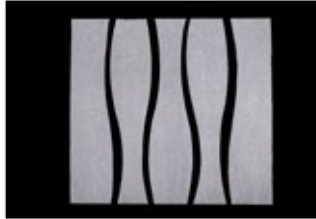


Figure 34:
Cut gores to suit exact circumference of pipe. Remember to allow a half starter / finisher piece.



Figure 35:
Ensure all joints are closely butted without gaps and that they fit the pipe tightly without voids.



Figure 36:
Wire each gore in place allowing movement for final adjustment.



Figure 37:
Push all gores together to ensure there are no gaps at joints and tighten wires.



Figure 38:
Form diamond-shaped cut out reverse gores in ArmaGel HT sheet.



Figure 39:
Position cut outs on inside throat of bend with longitudinal joint on outside of bend.



APPLICATION DETAILS



Figure 40:
Push all gores together to ensure there are no gaps at joints or voids.



Figure 41:
Tighten wires.

APPLICATION DETAILS:

- Concentric reducers

10. Reducers



Figure 42:
Measure both circumferences over the weld.



Figure 43:
Cut radiused strip.



Figure 44:
Fit around reducer and wire in place.



Figure 45:
Butt pipe insulation tightly up to reducer.

APPLICATION DETAILS

APPLICATION DETAILS:

- Equal Tees are insulated in two stages

11. Tee Pieces



Figure 46:
Insulate main pipe around branch.



Figure 47:
Cut shaped piece for branch.



Figure 48:
Install branch piece.



Figure 49:
Wire into place.



APPLICATION DETAILS

APPLICATION DETAILS:

- Cut two-part oblique angled offset Tee

12. Offset Tee Oblique Angles



Figure 50:
Create cut out for oblique angled branch.



Figure 51:
Wrap around pipe and wire in place.



Figure 52:
Cut material to fit the oblique angled branch.



Figure 53:
Install oblique angled branch and wire into place ensuring that all joints are tight without gaps.



APPLICATION DETAILS

APPLICATION DETAILS:

- Wrap valve and ensure that any voids are filled

13. Valves



Figure 54:
Wrap strips of ArmaGel HT around the pipe until the insulation exceeds the outside diameter of the flange.



Figure 55:
Pack ArmaGel HT around body of valve to prevent voids.



Figure 56:
Wrap ArmaGel HT around flanges.



Figure 57:
Wrap around flanges to enclose valve and wire in place.



Figure 58:
Wrap valve stem.



Figure 59:
Wire into place.



APPLICATION DETAILS

APPLICATION DETAILS:

- Vessels / equipment to be insulated with staggered sheets and segments of ArmaGel HT

14. Vessels / Equipment



Figure 60:
Insulate from the vessel head weld line. Hold ArmaGel HT sheet with insulation stick pins, staggering all joints, then band each layer to vessel.



Figure 61:
Apply closely-butted segments and fix using insulation stick pins and bands.



Figure 62:
Joints in subsequent layers should be staggered.

All data and technical information are based on results achieved under the specific conditions defined according to the testing standards referenced. It is the customer's responsibility to verify if the product is suitable for the intended application. The responsibility for professional and correct installation and compliance with relevant building regulations lies with the customer. Armacell takes every precaution to ensure the accuracy of the data provided in this document and all statements, technical information and recommendations contained within are believed to be correct at the time of publication. By ordering/receiving product you accept **the Armacell General Terms and Conditions of Sale** applicable in the region. Please request a copy if you have not received these.

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ABOUT ARMACELL

As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With 3,000 employees and 27 production plants in 17 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.

For more information, please visit:
www.armacell.com/armagel


MAKING A DIFFERENCE AROUND THE WORLD