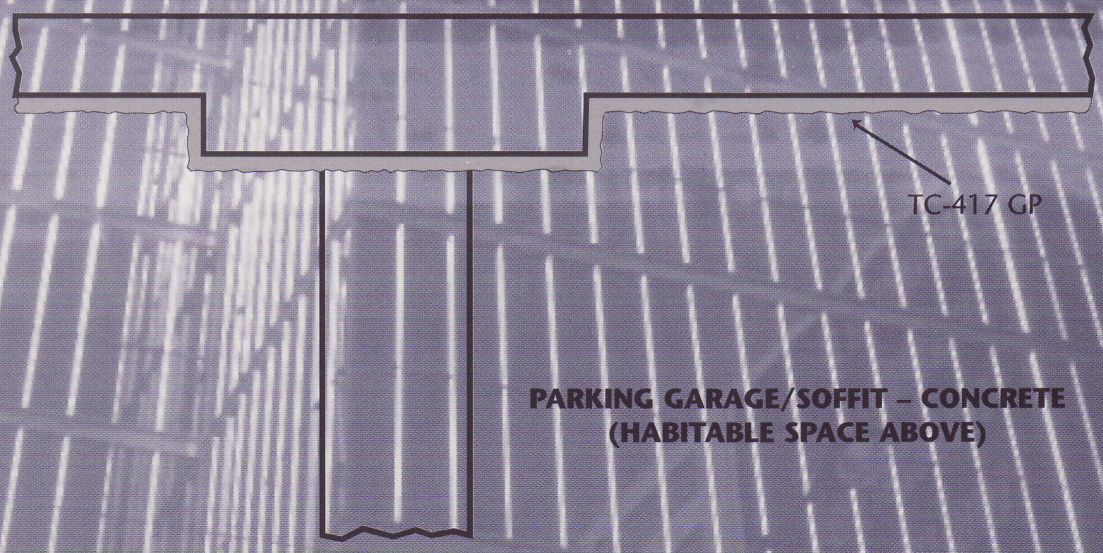
THERMACOUSTIC INDUSTRIES INTERNATIONAL LIMITED

# INSTALLATION HANDBOOK

## An Installing Contractor's Guide for the Successful Installation of THERMACOUSTIC™ Thermal and Acoustic Insulation Products




**PARKING GARAGE/SOFFIT – CONCRETE (HABITABLE SPACE ABOVE)**

Issued: 2000 06 01
Revised: 2002 02 20

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# INSTALLATION HANDBOOK

## Part 1.1: Product Description

THERMACOUSTIC products consist of white glass fibers bonded together and to the substrate with adhesives specific to the application. They provide an inorganic, non-combustible, monolithic installation on any surface configuration. Required thickness is achieved in a 'one pass' application. The products bond easily to steel, aluminum, concrete, gypsum board, wood and wood derivatives, FRP products, and rigid fiberglass and plastic insulation materials.

THERMACOUSTIC products are developed specifically to provide thermal, acoustic and limited condensation control functions for a diverse range of applications within the building construction, land transportation and marine industries.

THERMACOUSTIC products may be used in:

a) Building construction - airports, apartment buildings, auditoriums, churches, condominium buildings, ice rinks, shopping centers, swimming pools, theatres and many other residential, commercial and industrial locations;
b) Land transportation - buses, rail and rapid transit cars, acoustic shield fences or walls, railway and rapid transit stations and tunnels;
c) Marine - thermal and acoustic insulation of crew and passenger quarters and thermal insulation of temperature controlled cargo areas.

In any circumstance where one or more of high thermal value, sound attenuation, noise transmission control and high light reflectance is required, THERMACOUSTIC products provide excellent, high performance choices.

## Part 1.2: Manufacturer's Liability

This handbook is designed to assist applicators of THERMACOUSTIC products to provide quality workmanship and field installations that conform to our specifications. In addition, it contains data available to design authorities, testing agencies and general contractors allowing them to determine installed density and thickness of the product.

THERMACOUSTIC products are sold and installed by factory trained, certified contractors using approved equipment. This ensures consistent quality control and performance on an international basis.

However, because THERMACOUSTIC products are site manufactured and installed by independent contractors not under our supervision, the liability of THERMACOUSTIC INDUSTRIES INTERNATIONAL LIMITED, if any, is restricted to the replacement of material only.
In addition, although our published data reflects test results obtained from independent testing authorities, variations in field conditions, application techniques and equipment performance preclude THERMACOUSTIC INDUSTRIES INTERNATIONAL LIMITED from guaranteeing any specific density and/or coverage per designated quantity of raw materials.

For further information related to applications, test results and material safety please refer to the THERMACOUSTIC products catalogue available from THERMACOUSTIC INDUSTRIES INTERNATIONAL LIMITED or from its authorized Distributors and Sales Agents.

## Part 2.1: Spray Equipment

### 2.1.1 THERMACOUSTIC SPRAY MACHINE AND PUMP ASSEMBLY:

THERMACOUSTIC INDUSTRIES recommends equipment built by Unisul Inc. the premier manufacturer of such equipment in North America. Information concerning it is available directly from our business office, or in the case of an overseas customer, from the Area Distributor.

### 2.1.2 OTHER SPRAY MACHINES:

Some spray machines designed to install fibre-based fireproofing and some insulation blowing machines may be adapted to spray THERMACOUSTIC products, but optimum coverage and texture are difficult to obtain.

Note: No machine, other than one recommended by THERMACOUSTIC INDUSTRIES, will be approved to spray our products until it has been checked by our factory representative.

### 2.1.3 MACHINE OPERATION:

Please refer to the equipment manufacturer's 'Operator's Manual' for all information concerning operation, adjustment, maintenance, trouble-shooting and safety issues related to its use.

## Part 2.2: Spray Nozzle

### 2.2.1 THERMACOUSTIC TC-542 SPRAY NOZZLE:

Our TC-542 nozzle is designed specifically for use with THERMACOUSTIC thermal and acoustic products. Its use will ensure the correct ratio of fibre to adhesive is maintained during installation and the best surface finish is obtained. We supply nozzles directly to North American customers, while those for overseas customers are obtained from the Area Distributors.

Note: Use of any nozzle other than our TC-542 to install THERMACOUSTIC products may result in unsatisfactory coverage, density, adhesion and finish of the installed product. THERMACOUSTIC INDUSTRIES INTERNATIONAL LIMITED will not accept any liability whatsoever concerning product so installed.

## Part 3.1: Spray Site Equipment and Materials

### 3.1.1 EQUIPMENT AND MATERIALS:

Before starting installation be sure that all necessary equipment is working properly and that necessary materials are on site.

### 3.1.2 REQUIRED ITEMS:

| UNIT | QUANTITY | DETAIL |
|---|---|---|
| Spray machine | 1 | TC-540 or other approved unit |
| Spray nozzle | 1 | Use of TC-542 is mandatory overseas; other units may be approved in domestic markets |
| Spray tips | 4 | H-VVL 1502 or 1503, 1/8 NPT, (2 spare) |
| Fibre delivery hose | min. 100' (30m) | 2.5" (67mm) corrugated |
| Adhesive pump | 1 | By-pass type, 5 GPM (19L/min) @ 450 PSI (3.1mPa) |
| Adhesive line | 1 | Tested 500 PSI (3.4mPa) |
| Power supply extension(s) | as required | To meet local electrical code |
| Water hose | as required | Potable water only with adhesive |
| Miscellaneous | as required | Tool set, particulate masks, duct and masking tape, polyethylene sheeting, clean up equipment. |

## Part 3.2: Spray Site Preparation

### 3.2.1 POWER SUPPLY:

Make sure there is an adequate electrical circuit as close as possible to the spray site. Use extension cords capable of handling the required current flow without voltage drop at the machine.

### 3.2.2 WATER:

Use only potable water to mix with adhesive.

### 3.2.3 LIGHTING:

Provide lighting levels sufficient for adequate sprayer control of thickness and texture of application.

### 3.2.4 VENTILATION:

When spraying in enclosed or confined areas with poor natural ventilation such as basements, stairwells or small rooms, additional air circulation must be provided. Inadequate air circulation can result in a poor work environment for the sprayer. In addition, installed product will not dry in a saturated atmosphere.

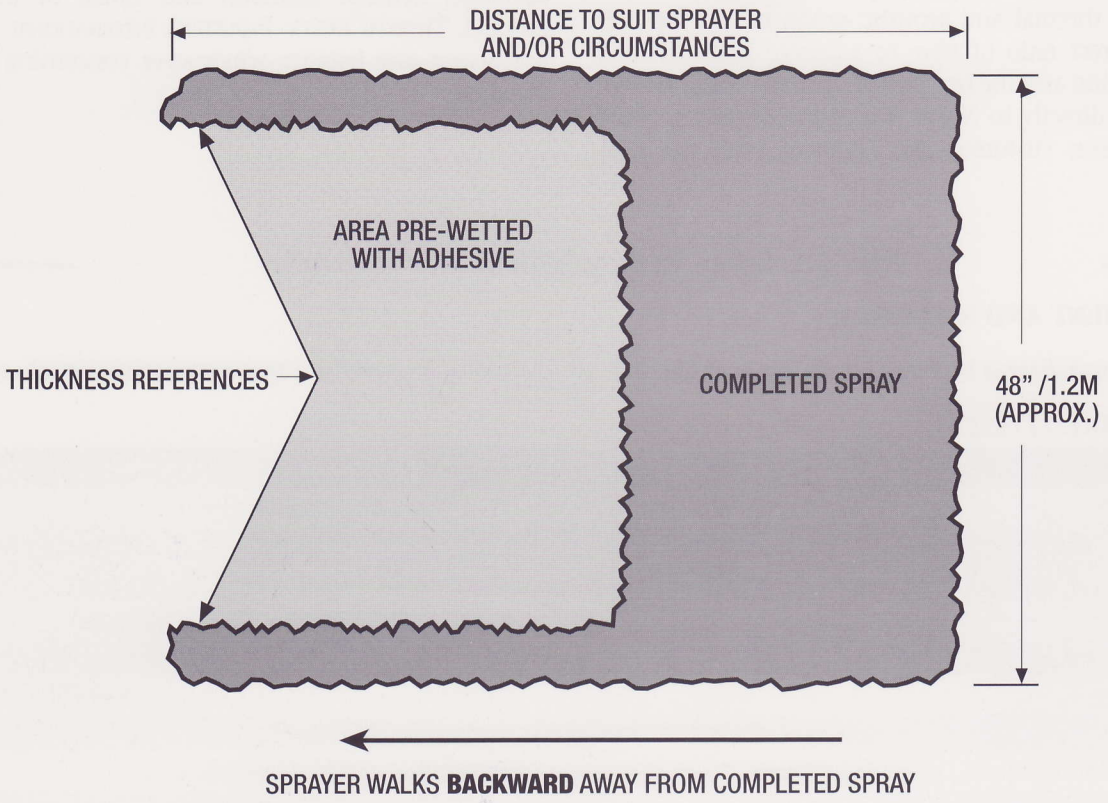
## Part 3.3: Product Application

### 3.3.1 SAFETY PRECAUTIONS:

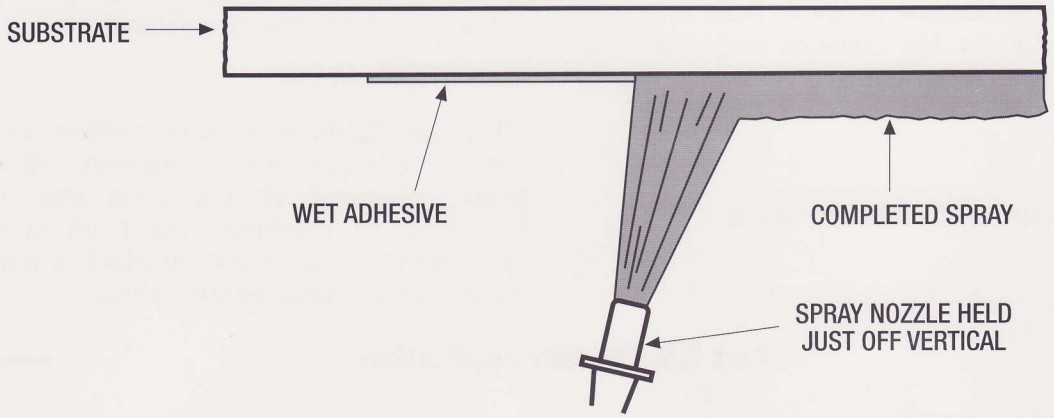
We recommend that a non-toxic particulate mask be worn at all times when any THERMACOUSTIC product is being handled and installed. Although glass fibre is no longer considered to be a carcinogen by IARC and other health authorities, loose fibers should not be inhaled as they can cause nose and throat irritation.

## Following 2 diagrams show technique for overhead spray

a)

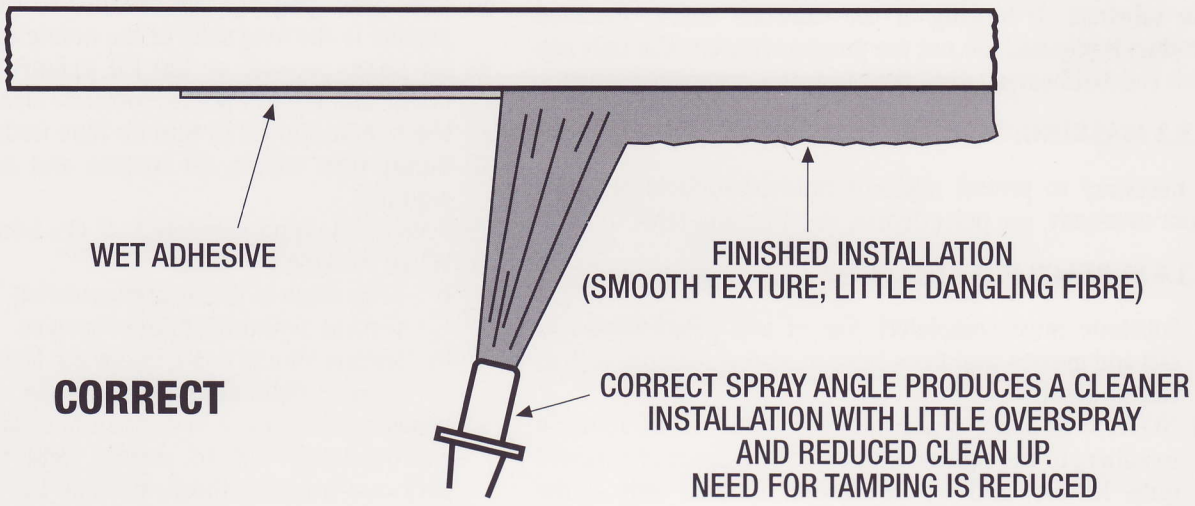



b)

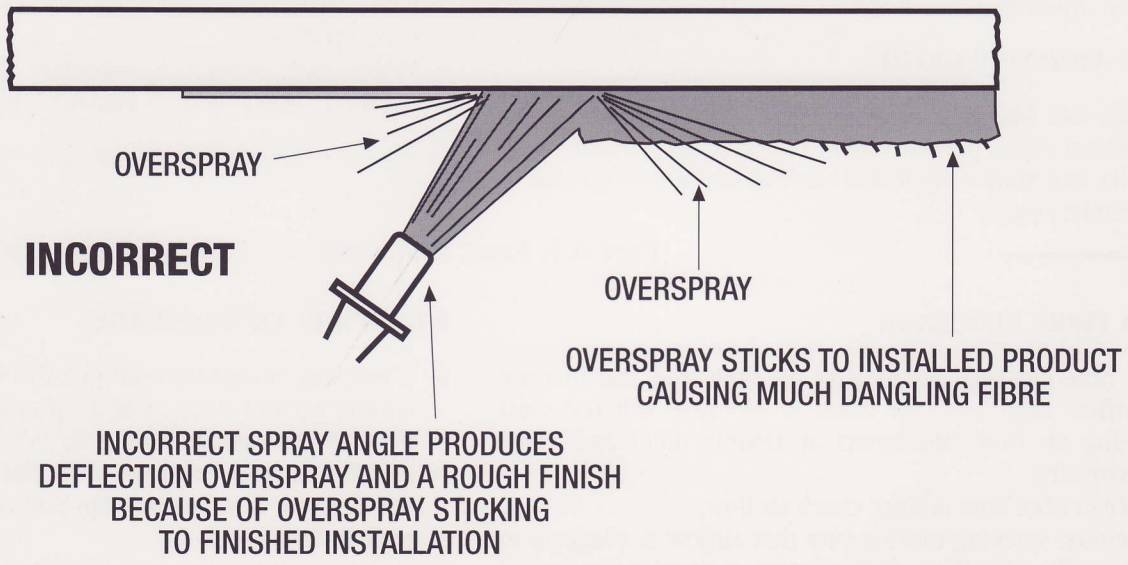


**Following 2 diagrams show Correct and Incorrect spray angles**

c)




d)



## Part 3.3: Product Application (continued)

### 3.3.2 APPLICATION TEMPERATURE:

THERMACOUSTIC products shall not be installed when ambient air and substrate temperatures are below 39 F (40C) during application and complete drying of the product through to the substrate. If heating of the substrate and/or installed product is required, do not use propane heaters. Use only dry heat (vented heaters) until the product is completely dried.

### 3.3.3 MASKING:

If necessary to protect adjacent finished surfaces or lights from overspray, use polyethylene sheeting and tape.

### 3.3.4 SURFACE PREPARATION:

a) Substrate must completely free of any petroleum-based oils and greases, and from loose or scaling material such as rust or paint;
b) NOTE: If in doubt concerning the ability of the adhesive to adhere to the substrate, spray a small patch of adhesive only, let dry, and try to remove. Proceed only if the adhesive is adhered firmly;
c) Raw wood and all painted surfaces should be pre-sprayed with THERMACOUSTIC adhesive or conventional primers and allowed to dry thoroughly. Apply adhesive using the TC-542 nozzle and pump pressure of about 120 psi (0.8mPa). If more convenient, a wand type sprayer may be used to apply the adhesive coat. Follow the manufacturer's recommendations for its use. Prime coating helps to seal the substrate surface, thereby reducing leaching/staining and improving fibre bond.

### 3.3.5 ADHESIVE RATIO:

a) Mix one bucket of THERMACOUSTIC adhesive with correct ratio of clean, potable water as directed on product label;
b) Mix and store only in non-ferrous containers (plastic or stainless steel);
c) Make sure adhesive is thoroughly mixed before use, and is kept agitated during use.

### 3.3.6 START UP AND SPRAY PROCEDURE:

a) Make sure spray tips are installed so that spray fans are parallel to the long sides of the nozzle aperture.
b) Set pump pressure at 120 PSI (0.8mPa), turn on tap at nozzle and pre-wet porous substrate areas with adhesive;
c) Use remote control to turn on fibre feed;
d) Adjust fibre supply, air by-pass and machine speed as required;
e) Keep nozzle approximately 3 - 5' (1 - 1.5m) from substrate;
f) When working overhead:
   i) Keep angle of nozzle approximately 10 - 20º off vertical, pointing ahead of sprayer;
   ii) Sprayer should move backward, laying up fibre in tight, even passes;
g) When working on a vertical surface, keep the nozzle at approximately 70º to surface, and work upward or backward from the finish material. Lay up in tight, even passes;
h) All applications should be completed in a single pass. "Layering" is **not** recommended;
i) An overhead horizontal application **shall not** exceed 5" (125mm) without mechanical support;
j) A vertical application **shall not** exceed 7" (175mm) without mechanical support;
k) When each section is complete and tamping is required, allow some curing of THERMACOUSTIC fibre and then lightly board tamp to produce a flat surface and then overspray with adhesive;
l) When each section is complete and tamping is not required, overspray with adhesive immediately.

## Part 4.1: Fault Diagnosis

### 4.1.1 FIBRE BLOCKAGE

a) If fibre blockage occurs shut off fibre feed and increase airflow until blockage clears. If blockage will not clear using air flow, disconnect at trouble point and clean manually;
b) When fibre hose is clear, check air flow;
c) Resume spraying making sure that airflow is adequate to move the fibre through the system to provide the desired finish.

### 4.1.2 REASONS FOR BLOCKAGE:

a) Fibre shredding or "carding" system not breaking up fibre properly;
b) Low blower pressure and/or air volume or air leaks in the system.

### 4.1.3 SPRAY TIP BLOCKAGE:

a) If blockage occurs turn off adhesive flow at spray nozzle, remove tip and clean using air pressure or a soft wire. Do not clean tips using welding tip cleaners;
b) NOTE: Our late model spray nozzles have filters inserted in the spray tips. Remove tip, pull out screen, clean and replace;
c) Earlier spray nozzles may have an external filter at the shut off valve. Remove screen and clean;
d) If there is a pick up screen at the pump check and clean;
e) NOTE: To reduce the possibility of fibre entering the adhesive and causing tip blockage keep the barrel(s) covered and as far from the spray machine as possible.

## Part 4.1: Fault Diagnosis (Continued)

### 4.1.4 SPRAY TIP REPLACEMENT:

a) Remove worn tip and discard;
b) Examine inserted filter (if so equipped) for fibre build up and clean if possible. A badly blocked filter or one with a damaged screen should be replaced;
c) Wrap tip threads with Teflon tape, insert and tighten enough to prevent leakage. Do not over tighten;
d) Make sure that spray fan is parallel to long flat sides of discharge tube.

### 4.1.5 FIBRE DRIFT-DOWN:

a) Some fibre will "bounce back" from the substrate and drift to the floor;
b) Some fibre will escape being wetted as it exits the spray nozzle and will also drift to the floor;
c) In total, this fibre should consist of a light dust coat on the floor surrounding the sprayer. NOTE: Coverage estimates provided by THERMACOUSTIC INDUSTRIES include the normal quantity of fibre lost in this manner;
d) If fibre drift-down is excessive:
   i) Check adhesive fan pattern; if too narrow, tips are worn and should be replaced (see 4.1.4 above);
   ii) Check adhesive flow; if too low, fibre is not sufficiently wetted and some will fail to adhere to substrate;
   iii) Check air flow; too much air flow will cause fibre to bounce off substrate;
   iv) Too little air flow may cause wetted fibre to fall before it reaches the substrate, or may cause it to adhere poorly;

### 4.1.6 ADHESIVE DELIVERY PRESSURE:

a) Adhesive delivery pressure can affect material consumption and ease of application as follows:
   i) Pressure too high:
      • "Overwetting" of the fibre causing fibre fall out from the substrate;
      • Installation density greater than recommended, resulting in loss of coverage;
      • Excessive use of adhesive;
   ii) Pressure too low:
      • Fibre is not carried forward from the nozzle with sufficient force to adhere properly to the substrate and itself;
      • Installed density below recommendations;
      • Excessive fibre drift-down.

### 4.1.7 SPRAY MACHINE AND DELIVERY HOSE:

a) All machines operate somewhat differently, so be sure to follow manufacturer's recommendations for maintenance. However, the following information applies, in general, to all machines:
   i) If feeder seals are damaged or worn, leakage results that causes bridging in the shredder area and reduces air pressure and volume through the hose. This adversely affects consistent fibre flow through the hose and rate and smoothness of delivery;
   ii) If fibre blows back into the hopper from the shredder or feeder, the feeder seals must be replaced;
b) Damaged or leaking hoses can cause the following problems:
   i) If hose is wire reinforced, exposed wire inside can cause blockage of the hose or balling of the fibre and erratic delivery;
   ii) Misshapen or kinked hoses restrict air flow, causing symptoms similar to those described under section 4.1.5 d) iv) above;
   iii) Leaking hoses will cause loss of air pressure and volume resulting in symptoms as described in ii) above.

## Part 4.2: Application Guidelines

NOTE: Diagrams a) - d) on page 5 demonstrate correct and incorrect spray procedures. When correct procedures are followed, fall-down, overspray and clean-up are reduced and finished appearance is improved.

### 4.2.1 BEFORE SPRAYING:

a) Check adhesive tips for correct alignment; the fan patterns must be parallel to the long sides of the nozzle aperture. Incorrect alignment will misdirect the liquid fan, resulting in improper wetting of the fibre;
b) Check adhesive tips for wear which is indicated by an irregular fan pattern. Worn tips will cause over-wetting of the fibre resulting in excessive adhesive consumption and possible fibre delamination from the substrate;
c) Substrate surfaces must be properly prepared as required. Use the appropriate cleaning method to deal with conditions listed below:
   i) Unfinished wood - seal with adhesive coat and let dry. Otherwise, colour may bleed through to the surface of the installed TC-417 GP;
   ii) Galvanized steel - make sure the surface is free of petroleum-based oils, or any other coating that is incompatible with water-based adhesive;
   iii) Rusted steel - remove loose rust and seal surface with adhesive coat. Otherwise, surface staining of the installation is likely;
   iv) Porous concrete - seal with adhesive coat and let dry;
   v) Oil-contaminated concrete - in some areas oil-based form release agents are used. All traces must be removed before TC-417 GP is applied;

## Part 4.2: Application Guidelines (Continued)

vi) Previously painted surfaces - make sure the paint is well adhered to the substrate.

d) Always move backward when spraying. Keep the spray area to a width of approximately 4 ft. (1.2m) or as can be comfortably covered without stepping from side to side and without moving the spray nozzle off the vertical in that plane. The spray operator should generally move backward in a straight line (see "Spray pattern" diagrams on page 5);

e) Pre-wet concrete or other porous surface (unless already sealed) with adhesive mix. Depending on ambient temperature, do not pre-wet an area larger than can be covered within 15 - 20 minutes;

f) Once a pre-wet area is covered, overspray immediately with adhesive. If tamping is required, wait until the surface is just slightly damp, tamp and overspray with adhesive;

g) Correct spray nozzle angle is crucial to producing a good finish. Incorrect nozzle angle results in overspray rebounding from the finished surface and in fibre drop out.

## Part 4.3: Low Temperature Precautions - General

### 4.3.1 PREVENTING BOND FAILURE:

a) Ambient temperature within the building, together with temperature of the substrate and the installed TC-417 GP must not be below 4ºC (40ºF) during application and until the material is dried through to the substrate. Drying must be monitored carefully, and note must be taken of the extended period required by colder weather and thick installations;

b) Poor ventilation will extend drying time. As air becomes saturated with moisture, the drying process stops until the air is replaced with fresh, warm, dry air;

c) Uncured or unsealed concrete and unsealed wood can absorb and retain moisture from the installation. This moisture must also dry out before being subject to temperatures below our required minimum.

**PLEASE NOTE:**

1) Be sure that when dealing with marginal temperature conditions:

i) Ambient and substrate temperatures are continuously maintained at or above our recommended minimum during the entire preparation, spraying and drying period;

ii) Air circulation constitutes a minimum of 3 complete changes per hour of fresh, dry and heated air;

iii) Exteriors are sealed and waterproofed to eliminate the risk of water penetration through the substrate, which could cause freezing at the interface.

2) **NOTE:** Generally, materials that have frozen while wet will delaminate cleanly from the substrate with very few fibers left in place. Fallen material will often be damp or wet, which indicates either it had not cured before freezing or it had been penetrated by moisture after curing that had subsequently frozen at the interface. If the material was installed in an incorrect location, subject to repeated condensation absorption/release caused by repeated freeze/thaw cycles, fallen material will be dry and may exhibit loss of adhesive.

## Part 4.4: Low Temperature Precautions - Adhesive

### 4.4.1 ADHESIVE STORAGE:

a) Do not allow adhesive to freeze either in concentrate or dilute form;

b) If adhesive concentrate contains lumps, or if there is noticeable separation of liquid and dissolved solids, discard immediately;

c) If dilute adhesive contains ice, or if there is noticeable separation of liquid and dissolved solids, discard immediately;

**NOTES:**

i) Mixed adhesive left undisturbed for two or more days may show settlement of solids. This condition is normal. Re-mix thoroughly before use;

ii) Discard all adhesive and containers according to instructions on the adhesive container.

## Part 5.1: Field Inspection of Installation

**5.1.1 SCOPE:**

The inspection procedure described herein provides a method by which field inspection of spray-applied thermal and acoustic insulation can be performed to accurately determine installation thickness;

**5.1.2 INSPECTION PROCEDURE:**

The inspection of the installation should be carried out by an independent testing laboratory or other authority acceptable to the owner or his representatives;

**5.1.3 QUALIFICATION OF INSPECTION PERSONNEL**

Personnel inspecting the installation of spray-applied thermal and acoustic insulation shall be trained in the application and capabilities of spray-applied glass and mineral fibres, and shall be thoroughly familiar with the details of the inspection procedures;

**5.1.4 THICKNESS TESTING:**

a) All testing shall be based on random sampling of areas preselected from project drawings before any visual inspection of the areas is made;
b) Thickness of installation shall be determined by use of a thickness gauge consisting of a 25mm (1") diameter disc attached to a graduated scale and penetrated by a movable needle that registers on the scale;
c) Select locations in accordance with a) (above) to yield two samples for an area of no less than 2500 square feet (235$m^2$) of installed product;
d) Select two areas 12" X 12" (300 X 300mm) from which thickness measurements are to be taken at each corner. Average the four readings for each square and report each as a single reading. State the location from which each sample was taken and record the average thickness of each;

**5.1.5 DETERMINING THICKNESS:**

a) Hold the gauge perpendicular to the installation and extend the needle until it touches the substrate;
b) Hold the needle steady and move the scale inward until it contact the material surface;
c) Apply light pressure to the gauge to compress the material to the average plane of the material (to determine the average of the crests and troughs);
d) Withdraw the gauge assembly and read the depth to the nearest increment on the scale as indicated by the top of the needle;
e) When averaging measurements any measurement 0.25" (6mm) or more over the design thickness shall be recorded as the design thickness plus the overage.

# INSTALLATION HANDBOOK

## Technical Support

- We provide full technical support for the companies and individuals who sell and install our products;
- Our office hours are from 07:00 to 15:30 Pacific Time, Monday to Friday (Canadian official holidays excepted);
- We try to respond to all messages during the working day on which we receive them. For most North American customers this means answers on the day the enquiry is made. However, delays can occur, due to time zone differences or the intrusion of local holidays.
- **If you have any questions or concerns please sure to contact us without delay.**

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