

**METHOD STATEMENT FOR INSULATION OF DUCTING
SYSTEM**

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1. PURPOSE AND SCOPE

- 1.1. To define the methodology to be followed for the installation of duct insulation and the inspection of the installed insulation.
- 1.2. To establish the acceptable criteria for the storage, handling, and application of such insulation.
- 1.3. To establish the acceptance criteria for the installed insulation. This method shall be verified to Manufacturer's Method of Insulation Application which is submitted and approved by the supervision consultant.
- 1.4. This method statement is applicable to the application of insulation to all ducting systems as set out in the project specifications and the approved shop drawings. The insulation of in line equipment, is also covered by this method statement.

2. OBJECTIVES

- 2.1. To ensure the work is carried out as per approved planning sequence of work and project schedule with adequate resources to meet target.
- 2.2. To ensure the construction of the scope of work is in accordance with project specifications, SMACNA, and approved shop/coordination drawings.

3. REFERENCE DOCUMENTS

- 3.1. Project Specifications
- 3.2. Project IFC Drawings
- 3.3. Qatar Construction Standards
- 3.4. Approved Shop Drawings (as applicable)
- 3.5. Approved Material Submittal (as applicable)
- 3.6. Project Quality Plan
- 3.7. Project HSE Plan

4. CONSTRUCTION METHODOLOGY

4.1. Pre-Installation Checks

- 4.1.1. Ensure all drawings are the latest revision and approved for construction issue.
- 4.1.2. Check the location of structural openings in relation to ducting routes as indicated on the drawings to ensure adequate room for insulation.
- 4.1.3. Check the location of the ducting within risers to ensure adequate space has been allowed to facilitate the application of insulation.
- 4.1.4. Confirm that adequate means of access to high level insulation area is available. Check all scaffolds and mobile towers are in compliance with the project requirements.
- 4.1.5. Check to ensure that all equipment and tools required, to undertake the works in a proper and efficient manner, are available and in good working order.
- 4.1.6. Ensure that all quick assembly mobile towers are assembled correctly.
- 4.1.7. Ensure that all personnel assembling and dismantling such towers are adequately instructed on correct assembly methods.

- 4.1.8. Prior to commencing any works, a risk assessment must be conducted, taking in to account all possible risks and the appropriate precautions put in place, i.e. fire extinguishers, fire blankets, safety harnesses, etc. Refer to the risk assessment/risk management section of this method statement.

4.2. Application Method for Duct Insulation

- 4.2.1. All works shall be undertaken in a neat and workmanlike manner to ensure a quality inspection.
- 4.2.2. Check the insulation material size and thickness is correct and as per specification.
- 4.2.3. Access to duct routes at high level beneath the slab shall be by scaffolding or mobile tower scaffolding. Such mobile towers shall be constructed as per manufacturer's instructions, with proper bracing and guard rails as required. No tower may be moved with personnel on the structure of the tower.
- 4.2.4. Weld pins will not be used to secure the insulation as they break the integrity of the galvanized coating, which in the course of time will lead to a corrosion point.
- 4.2.5. Visually inspect the duct surface to ensure it is clean, with no dust, oil/grease, or other chemicals are left on the pipes to be insulated.
- 4.2.6. Work in a clean area and avoid dusty places.
- 4.2.7. To clean the substrate surface, first wipe down with a clean cloth to remove excess dust. Then remove grease and oil using a suitable cleaning agent. Wipe ducts clean and allow cleaning agent to evaporate.
- 4.2.8. Conventional hangers are suitable for the installation of Thermo break. If the duct is insulated before it is installed, the hanger base must be lined to protect Thermo break against compression (Figure 1). A strip of Thermo break cut to size would be suitable.

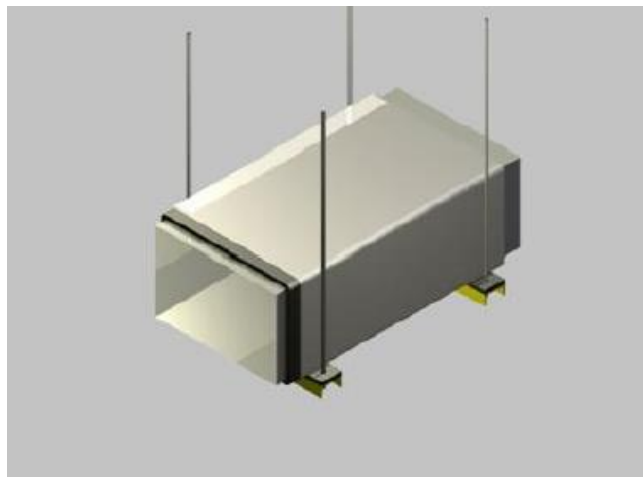


Figure 1

4.2.9. Refer to Table 1 below as to recommendations for following specific installation instructions for cutting and fixing Thermo break Sheet.

Table 1

Insulation Thickness	Cutting Method	Fixing Method
< 20mm	Wrap-around	Adhesive or glue
≥ 20mm	Cut section	Adhesive or glue

4.2.10. Wrap around insulation system:

- 4.2.10.1. The adhesive used relies on pressure to properly bond to the duct. Once fixed, adhesive should be padded firmly to ensure contact with the duct metal sheet.
- 4.2.10.2. The adhesive can be re-positioned for better alignment, provided no pressure is applied and it is done immediately. However, once the adhesive cures, it will be impossible to re-position or peel off the duct.
- 4.2.10.3. Cut Thermo break to the required length to wrap around the duct. Always allow excess 20-30mm for final adjustment. Do not peel the backing paper off at this stage.
- 4.2.10.4. Peel off only a small section to start off with (150 mm). Align with duct edge with the insulation sheet edge, and gently lower to the duct. Pad firmly. Starting from the fixed edge, move to the other edge by lowering the insulation to the duct progressively whilst padding insulation at the same time. Peel off enough paper to cover one side at a time only. Ensure air is expelled.
- 4.2.10.5. Do not try to lower entire sheet to one side of the duct at once. This will lead to trapped air pockets. (Figure 2). Thermobreak is a closed cell material and will not allow trapped air to escape.

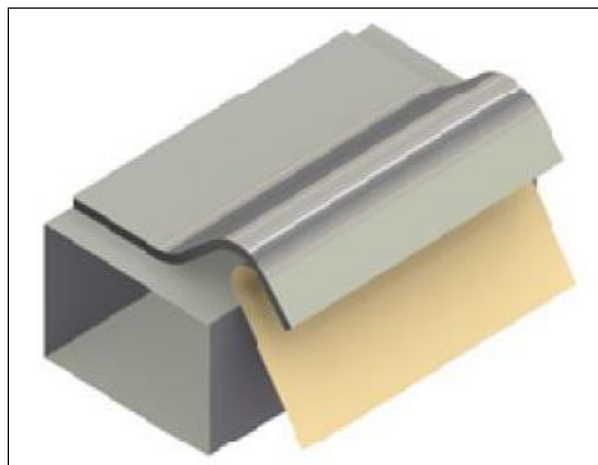


Figure 2

- 4.2.10.6. Once one side is fixed, continue to the next side.
- 4.2.10.7. Slowly peel off enough backing paper to cover the edge and side of duct. Slowly pad the adhesive to the edge; do not pull the insulation on the duct corners. Guide the insulation over the corner by pressing lightly (Figure 3).

The insulation on the corners should be the same thickness as on the flat sections.

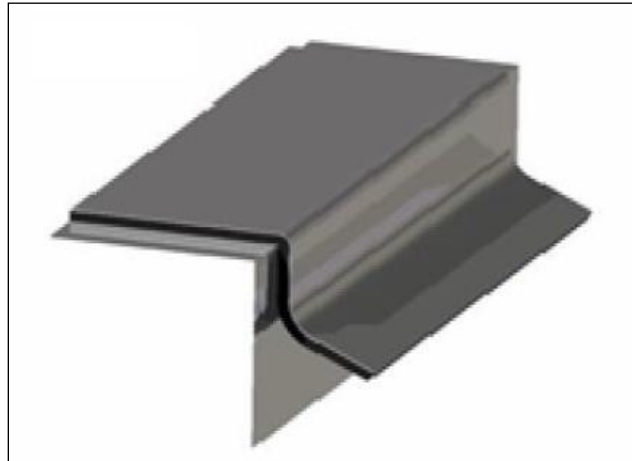


Figure 3

4.2.10.8. Repeat until completely covered. On the final side, ensure the insulation length reaches the same level as the starting edge. Trim off excess length with sharp knife until it is level with adjacent side. (Figure 4)



Figure 4

4.2.10.9. Use aluminium foil tape to seal the joint. (Figure 5)

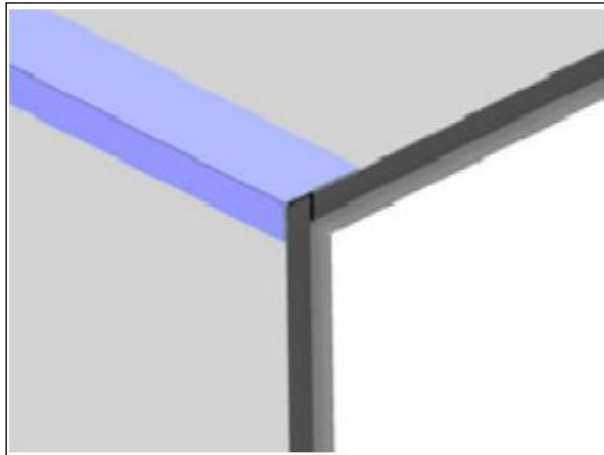


Figure 5

4.2.11. Joints:

- 4.2.11.1. Joints should be butted firmly together. The factory cut straight edge allows perfect mating between two sections.
- 4.2.11.2. Ensure no gaps are visible. In case of gaps, trim the edge again in a straight line to ensure proper alignment of butt joints.
- 4.2.11.3. In cases where the edges do not align perfectly, a 50mm width strip of Thermobreak can also be used to cover any visible gaps.
- 4.2.11.4. Seal all joints with aluminium foil tape as per Taping Instructions (Section 4.2.13)

4.2.12. Flanges:

- 4.2.12.1. Insulation should be butted against flange joints tightly.
- 4.2.12.2. For flange insulation use 150-200mm wide insulation strip.
- 4.2.12.3. Fix one side first with aluminium foil tape, and then fold material over flange and fix with aluminium foil tape (Figure 9 and Figure 10). A small gap in the corner is normal and does not affect the performance of the insulation.

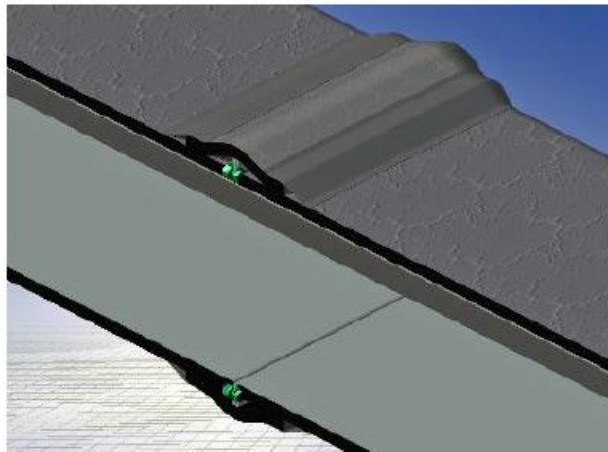


Figure 9 (Installation of strips around flanges – cut-away view)

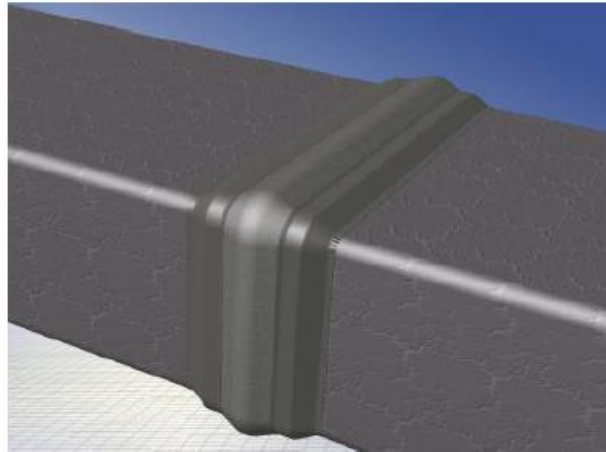


Figure 10 (Installation of strips around flanges)

4.2.13. Cut section insulation system:

- 4.2.13.1. For thickness greater than 20mm, it is advisable to use four cut sections to insulate the duct.
- 4.2.13.2. Observe cleaning requirements of the duct as outlined in the pre-works section.
- 4.2.13.3. Observe application techniques as explained in previous section relating to application of insulation. Apply sheets slowly starting from one edge and then slowly moving to the opposite edge whilst applying pressure at the same time. Never lay the whole sheet at once as this will lead to air pockets.
- 4.2.13.4. Ensure width of sheets is adequate to cover the duct and the extra width from the adjacent sheets of insulation. (Figure 6)dfggf

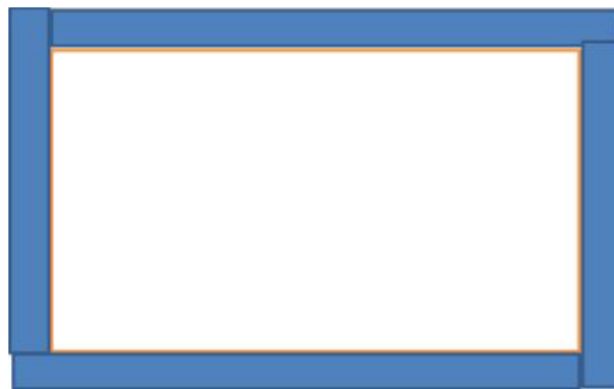


Figure 6

- 4.2.13.5. Observe taping requirements of the duct as per Taping Instructions (Section 4.2.13).

4.2.14. Taping Instructions:

- 4.2.14.1. Use recommended width of specified reinforced aluminium foil tape.
- 4.2.14.2. It is important that the insulation surface to which tape is to be adhered is free from dust and dirt. If uncertain, clean the surface with a clean rag. In

the case of any oil or silicone contamination, wipe the surface with a clean rag and suitable cleaning agent, then wait to dry before applying tape.

- 4.2.14.3. Aluminium foil tapes must be applied using pressure. The more pressure applied, the more surface contact is achieved and the better the result.
- 4.2.14.4. The best way to apply this pressure is to repeatedly rub the tape external surface with a flat blunt object.
- 4.2.14.5. The vapour barrier should be continuous wherever there is a break in the Thermobreak foil facing; i.e. no foam surfaces must be exposed after installation.
- 4.2.14.6. When applying tape, follow the contours of the material. Do not try to flatten the contours out with the tape. Let the tape relax into and conform to the irregularities of the surface, then rub down (refer to Figures 7 and 8) to eliminate air bubbles.

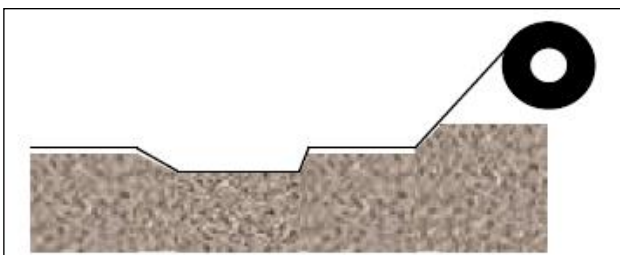


Figure 7

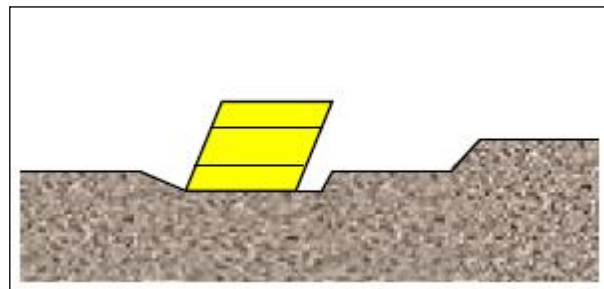


Figure 8

- 4.2.14.7. Fix tape over all joins, ensuring a continuous seal. Where possible, the length of the tape should not only exceed the length of the join, but continue around the next edge to provide an anchor point. There should be at least 50mm overlap.

5. RESPONSIBILITIES

5.1. Construction Manager

- 5.1.1. Shall be responsible for the overall construction activities.

5.2. Site Engineer / Supervisor / General Foreman

- 5.2.1. Implementation of safe work method statement and risk assessment plan.
- 5.2.2. Arrange TBT prior to commencement of work.
- 5.2.3. Visit the area of work for no hazard items exist.
- 5.2.4. Organizing the site and work places so as to ensure that work is carried out to the required standard, with minimum risk to men, equipment and materials.
- 5.2.5. Ensure that the employees under his responsibility do not engage in unsafe work practices or take unnecessary risks.

5.3. QA/QC Engineer

- 5.3.1. Shall ensure that all works are carried out strictly in accordance with approved method statements and inspections test plans.

5.4. Safety Officer

- 5.4.1. Enforce the Project HSE rules and regulations.
- 5.4.2. Implement HSE requirements set out in Mercury MENA HSE Plan
- 5.4.3. Ensure work permit has been obtained and implemented (if applicable).

5.5. Material Controller

- 5.5.1. Shall be responsible for receiving materials on site warehouse. He will check the materials for any damages during shipping, handling and storage.

5.6. Tradesmen / Drivers / Operators / Welders

- 5.6.1. Follow supervisor's and/or general foreman's instructions.
- 5.6.2. Only authorised drivers / operators can operate the plants.
- 5.6.3. Only authorized welders can operate welding plants.

6. LIST OF MAIN EQUIPMENT, TOOLS, AND INSTRUMENTS

- 6.1. All equipment/tools shall be inspected prior to use at site and Mercury MENA ID tag shall be placed on equipment where applicable.
- 6.2. No modified tools may be used for any task.
- 6.3. Tools that will be used for the headlined scope of works are as follow but not limited to:
 - 6.3.1. Measuring tape
 - 6.3.2. Ladder
 - 6.3.3. Scaffolding
 - 6.3.4. Duct Insulator Standard Toolbox
 - 6.3.5. Knife/Cutter
 - 6.3.6. Plain Plate – for pressing insulation

7. MATERIAL HANDLING

- 7.1. All materials shall be manufactured by one of the approved manufacturers or otherwise approved.
- 7.2. All materials shall be submitted for approval prior to procurement and delivery to site.
- 7.3. Materials shall be inspected on delivery site, to ensure compliance with the approved submittal. An Over, Shortage, and Damage report shall be completed for all deliveries.
- 7.4. Insulation and ancillary material shall be unloaded in a proper manner, by manual or as necessary mechanical means (by crane or forklift). Materials shall not be dropped to the ground, but lowered carefully.
- 7.5. Material shall be stored appropriately to prevent damage. Material shall not be placed directly on the ground.
- 7.6. All related documents, such as delivery notes, country of origin, bill of landing, test certificates, etc., shall be available along with materials when delivered to site.
- 7.7. Material shall be stored appropriately or placed on shelving units within the warehouse area.
- 7.8. Care shall be taken to prevent the ingress of dirt or foreign objects into materials.
- 7.9. Items requiring preservation and maintenance shall be subject to the requirements of the Preservation and Preventative Maintenance Procedure.

7.10. Manufacturer's instructions with regard to storage requirements shall form the basis for material storage and preservation.

8. HEALTH, SAFETY, AND WELFARE

- 8.1. All safety rules & regulation for the project shall be adhered to at all times. Third party certified equipment's and competent personnel to be deployed. Required permit to be secured. Risk assessment and risk control measures are to be in place.
- 8.2. All site personnel shall be properly equipped with protective clothing and tools appropriate for their duties and shall ensure that work area facilities are safe prior to the commencement of work activities.
- 8.3. All individual tasks mentioned in this method statement will be subject to individual, risk assessments and toolbox talks by safety officer on site before work commences on a daily basis.
- 8.4. No refuelling whilst equipment is running. Refuelling to be carried out only at designated areas on site.
- 8.5. Provide banks man or spotter during equipment manoeuvring and during hauling of excavated materials.
- 8.6. All lifting tackle will be inspected before use.
- 8.7. All personnel will have undergone the applicable safety training and wear PPE i.e., Safety Helmet, Steel-Toed safety Boots or Shoes, Safety Glasses and coveralls as the minimum requirement and gloves and High Vests where necessary.
- 8.8. For dusty working environment dust masks shall be used.

9. ENVIRONMENT

- 9.1. Works will proceed under controlled environment. Control measures identified in the risk assessment to be in place. Significant aspect highlighted to dust and contamination during dewatering. Dust suppression by means of water sprinkling and dewatering method statement to be followed.

10. COMMUNICATION AND TRAINING

- 10.1. After approval of this Method Statement, a pre-construction meeting to be held among the supervisory staff involved. Trainings mentioned in the risk assessment to be followed.

11. QUALITY CONTROL

- 11.1. Significant stages of work shall be monitored and ensured to be enforced by the concerned as per the Inspection and Test Plan (ITP) attached to this document. Inspection request to be submitted to the Engineer a day prior to inspection schedule.
- 11.2. Quality Control tests on performed work and materials shall be in accordance with Project Specificatio