**PROJECT NAME**

**Method Statement**

Method Statement for Installation of HVAC Ducts and Accessories

|  |  |
| --- | --- |
| Project Image | **Client**  **Consultant**  **Contractor**  **Issued on** |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Prepared By** | | **Reviewed by** | | **Approved by** | | **MS** |
| **Rev.** | **Name** | **Date** | **Name** | **Date** | **Name** | **Date** | **No.** |
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**1. Purpose**

This document describes the methodology and procedure of installation of HVAC ducts and accessories for the ABC Project, and to ensure that all concerned persons are familiar with the sequence of activities, utilization of resources, and execution of the works in compliance with applicable Safety and Quality Procedures, and Project Documents and Specification.

**2. Scope of Works**

This document covers the following scope of works:

This method statement is intended to outline the activities and the methods used for installation of HVAC ducts and accessories. All activities will be carried out in accordance with the contract details and in full compliance to the Contract Specifications and Documents. All work within the rights-of-way of the standards and specifications will be done in compliance with requirements issued by authorities.

**3. Legislation and Code of Practice**

* All related codes and standards referenced in the Contract Specifications

**4. Reference**

* Contract Specifications
* Approved Drawings

**5. Definitions**

Client :

Consultants :

Contractor :

**6. Resources**

6.1. Equipment / Tools Required

|  |  |
| --- | --- |
| **NO.** | **DESCRIPTION** |
| 1 | Mechanical Toolkit |
| 2 | Riveting |
| 3 | Grinding/Cutting Machine |
| 4 | Drill machine |
| 5 | Mechanical Tool kit |
| 6 | Scaffolding |

**6.2 Materials**

* Pre-fabricated Ducts of various sizes
* S-cleat, C-Clamp, duct mate, flanges and angle
* Acoustic Liner
* Mechanical Insulation Board
* AluGlass Duct Insulation
* Lagging Adhesive
* Fungicidal Protective Coating
* Aluminium Foil Tape
* Woven Glass Cloth (20x20 thread/inch)
* Stuck up pins

6.3 Safety of Equipment’s

Necessary measures will be taken for the safety of the equipment and any other works affected by the works subject of this document. Relevant entities which might require protection include any such works in the vicinity of the area of work or on the service access or discharge path.

The construction team will ensure that any such requirements are documented.

**7. Health, Safety & the Environment**

7.1 Construction Hazards (tick as appropriate)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Corrosive** | **Oxidizing** | **Highly flammable** | **Extremely flammable** | **Toxic** | **Highly Toxic** | **Irritating** | **Harmful** |
|  |  |  |  |  |  |  |  |
| **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** |
| **Explosive** | **Danger for the Environment** | **Constrained Space** | **Slippery Surface** | **Danger of Electrocution** | **Falling from Height** | **Other** | |
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The hazards identified above will be controlled under the overall Project Safety Plan which is a separate document communicated to all parties on the project.

7.2. Personal Protective Equipment (tick as appropriate)

The works subject of this document requires that the following PPE be used:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Safety Precaution** | **Helmet** | **Hi-Viz** | **Eye Protection** | **Face Protection** | **Mask Required** | **Respirator Required** | **Ear Protection** |
|  |  |  |  |  |  |  |  |
| **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** | **🞏** |
| **Gloves Required** | **Safety Shoes Required** | **Protective Clothing** | **Safety Harness** | **Equipment Guards** | **Lifejacket** | **Other** | |
|  |  |  |  |  |  | **🞏\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | |
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7.3. Safety Training and Emergency procedures

Before commencing any works, all employees will attend a site safety induction training to ensure all safety measures are understood and implemented and to cover specific procedures in case of emergency. If necessary, practical training exercises will be conducted on escape routes, signage, evacuation and rescue.

7.4. First Aid

Prior to the commencement of work, arrangements will be made for medical facilities and medical personnel to be available from prompt attention to the injured person. The contractor’s vehicle assigned to the job site will be used for transporting the injured person to the first aid station and to the nearest hospital when required.

|  |  |  |
| --- | --- | --- |
| http://www.clubnautique.net/images/FirstAidLogoCalendar.gif | **Name of On-Site First Aider/s:** |  |
|  |  |
| **First Aid Box Location:** |  |
|  |  |
| **Location of Nearest Hospital:** |  |
|  |  |
| **First Aid and Medical Supplies available at site:** | | |
| Potable Water | | Ice Cubes |
| 10x6cm Sterile Gauze Pad | | 4x6cm Gauze Roller Bandage |
| 10x10cm Sterile Gauze Pad | | 8x10cm Gauze Roller Bandage |
| Large Sterile Gauze Pad | | 10x12cm Gauze Roller Bandage |
| Burn Dressings | | 5cm Elastic Bandage |
| 7.5cm Elastic Bandage | | 10cm Elastic Bandage |
| Triangular Bandage | | Barrier Device for CPR |
| Adhesive Skin Tape | | Adhesive Leucoplast Tape |
| Emergency Blanket | | Safety Pins |
| First Aid Scissors | | Tweezers |
| Disposable Gloves | | Instant Cold Pack |
| Non-prescription Medicines (Aspirin, Ibuprofen, Acetaminophen) | | First Aid and Burn Spray, Deep Heat Spray |

**8. Detailed Construction Sequence (Methodology)**

## Check all material delivered to site is inspected properly by QA/QC Engineer and check if it is stored properly as per manufacturer’s recommendations.

## Work shall be carried out by the site staff under strict supervision and guidance of the concerned Supervisors / Foremen / Engineers.

## The quality Engineer shall check all the installations as per the Installation Check list..

**Handling and Storage**

* On receipt of ducts and accessories at site, necessary precautions shall be taken for unloading, shifting, and storage as follows:
* Any duct works (Rectangular / Square / Circular) deliver at site shall be carefully off-loaded by deploying necessary manpower in such a way that no damage shall caused to duct work.
* All ducts and accessories shall be inspected, handled and stored properly upon receipt at site.
* Ducts and accessories shall be stored in a place free of water, dust and adequately covered to avoid any kind of damages.
* Ducts shall be transported to work place using adequate manpower.

## It shall be ensured that the fabricated duct pieces are numbered or tagged as per latest approved shop drawing to avoid misconnections.

## All insulation materials shall be inspected for the thickness and densities.

## While unloading, shifting and storage, it should be ensured that there are no transit damages.

## All insulation material shall be stored in a dry place and adequate cover shall be provided to ensure that they are not direct exposed to weather as per manufacturer’s recommendations.

## Any discrepancies, damage, and etc. found to the materials will be notified and reported to QA/QC Engineer and Project Engineer for further action.

## Materials found not suitable for site use should be removed from site immediately.

## **Fabrication Of HVAC Ducts:**

## Approved fabricated ducts, elbows, transitions, offsets and branch connections with approved Galvanized Sheet , which shall be used, as indicated in the approved shop drawings, project specification and SMACNA standards in Workshop or Factory.

## Thickness of Galvanized Sheet shall be conforming to BS 2989 or ASTM A653A, 653M G90 (Z275) and having a minimum coating of 1.25 oz/ft².

## The galvanizing shall be carefully done and the sheets shall be of such quality that they may be bent flat on themselves with no fracture to the coating or the base metal.

## Flexible ductwork shall be light weight aluminium laminated duct suitable for low and medium pressure systems.

## The aluminium laminated construction shall encapsulate a high tensible steel wire helix between two layers of 0.9 micron thick aluminium plus 12 micron thick polyester. Flexible ducts shall be with factory applied thermal insulation and vapour barrier. Insulation shall be 25mm thick, 24 kg/m3 density.

## Approved duct sealant shall be used for joining the ducts by using sealant gun to all flanges.

## Flanges shall be clamped with nuts, bolts and cleats as required to avoid leakage.

## Ensure ducts are free from internal roughness, rust formation and sharp edges and corners.

## Raise inspection request.

## **INSULATION OF HVAC DUCTS (Acoustic Insulation)**

## Ducts insulation and cladding materials, thickness and density, shall comply project specification.

## Check all approved materials and accessories are readily available on site.

## Insulation materials shall be applied during dry condition.

## Sharp cutters with straight angles shall be used for cutting insulation materials.

## Impale approved insulation over the ducts and press gently on ducts, elbows, transitions, etc., with full insulation segments for each surface with the least number of joint practical.

## Unless otherwise indicated insulate all ductwork with 25 mm thick, 24 Kg/M3 density aluminium foil faced fibreglass duct insulation. Fasten the insulation with adhesive on 200 to 250 mm centres. Butt all joints tightly and seal all breaks and joints by adhering a 75 mm Aluminium foil vapour barrier tape or sheet with a fire retardant adhesive.

## Insulate flexible connections and connections to diffusers with 25 mm thick, 24 Kg/M3 density reinforced aluminium foil faced, flame resistant flexiblee fiberglas insulation overlap onto adjacent Insulation and seal With adhesive duct tape to give good closure.

## Where ductwork is installed in ceiling voids and masonry shafts, which are not used as return air plenums insulate with 50mm thick, 48 Kg/M3 density aluminium foil faced rigid fibreglass duct insulation.

## Finish all duct insulation with an Aluglass Cloth backing (18u I FR Glue 18x8 Mesh Aluglass Cloth), combined with a high performance flame retardant solvent acrylic adhesive, protected by an easy-release silicone release paper.

## Prepare a mock-up of HVAC Ducting System with insulation and raise request for inspection.

## As required where ductwork passes through a wall or floor, other than when a fire damper is required, pack around the duct using a fire resistant material to ensure a sound and air-tight joint. Cover the opening with sheet metal flange of the same metal thickness of duct, overlap opening on four sides by at least 38mm.

## Fire Damper and volume control damper shall be fixed matching the duct layout and shall be fixed with access doors to the ducting layout as per approved details on approved shop drawings.

## Sound liner shall be installed in the main duct and elbows at the beginning of each unit up to 3 meters of duct length or up to the first branch then VAV up to the outlets or in considering with the contract drawings and approve material.

## For ducts exposed inside conditioned spaces, insulate as described above for concealed air ducts using 25mm thick aluminium foil faced fiberglass boards with density 48 kg/m3. Then apply an Aluglass Cloth backing (18u / FR Glue / 8x8 Mesh Aluglass Cloth), combined with a high performance flame retardant solvent acrylic adhesive, protected by an easyrelease silicone release paper.

## Exposed ductwork within conditioned areas shall be claded with plain aluminium sheet 0.9mm or thicker.

## For ducts exposed in non air conditioned areas, insulate using the method described for concealed ducts, but using insulation with a minimum thickness of 50 mm, 48 Kg/M3 density rigid fiberglass insulation. Then apply an Aluglass Cloth backing (18u I FR Glue/ 8x8 Mesh Aluglass Cloth), combined with a high performance flame retardant solvent acrylic adhesive, protected by an easy-release silicone release paper. Then cover with plain sheet Aluminium, 0.9 mm or thicker.

## All ductwork exposed externally to the building, installed on roof and within plant rooms is to be clad with plain aluminium, 0.9 mm or thicker.

## Where ducts penetrate the building shell, the duct shall be flashed and waterproofed before any insulation is applied.

## Approved Lagging Adhesive shall be applied over the entire inner surface of the ducts.

## Impale approved insulation over the adhesive and press gently on ducts, elbows, transitions etc., with full insulation segment for each surface with the least number of joint practical.

## Approved insulation sheet shall be cut to the size of duct to be insulated, Adhesive is applied on the inner surface and all over the periphery of ducts. The adhesive is allowed to dry for sometimes and the insulation sheet shall be firmly fixed to the duct.

## Insulation should be applied with approved woven glass cloth both sides cover with two coats of fungicidal protective vapour barrier adhesive.

## **INSULATION OF HVAC DUCTS (External)**

## Ducts insulation and cladding materials, thickness and density, shall comply project specification Sections.

## 25mm thick, 48 kg/m³ density reinforced aluminium foil faced fiberglass insulation shall be used for exposed duct insulation as per specification and as per approved materials. Then apply an approved woven glass cloth covered adhered between two coats of fire resistant fungicidal protective lagging adhesive.

## Check all approved materials and accessories are readily available on site.

## Insulation materials shall be applied during dry condition.

## Sharp cutters with straight angles shall be used for cutting insulation materials.

## Install insulation stuck up pins as per manufacturer recommendations in the entire circumference of the ducts and all surfaces of fittings and transitions with proper spacing as per approved detail on shop drawing.

## Apply adhesives as per approval on the entire circumference of the ducts and to all surfaces of fittings and transitions. Adhesive shall be flexible, fire resistive compound suitable for vapour sealing insulated ducts and pipes. Adhesive shall be suitable for indoor and outdoor use and in high humidity environments. Adhesives shall be UL classified and shall meet or exceed their requirements of NFPA 90A and 90 B 25/50.

## Impale approved insulation over the ducts and press gently on ducts, elbows, transitions, etc., with full insulation segments for each surface with the least number of joint practical.

## For ducts exposed in non air conditioned areas, insulate using the method described for concealed ducts but using insulation with a minimum thickness of 50mm, 48kg/m³ density rigid fibre glass insulation. Then apply a 20x20 woven glass cloth covered adhered between two coats of approved fire resistant fungicidal protective lagging adhesive.

## Apply approved plain aluminum sheet 0.9mm or thicker to exposed duct work within conditioned areas.

## Prepare a mock-up of HVAC Duct with insulation and raise request for inspection.

## Fire rated walls shall have galvanized steel sleeves.

## Ductwork passes through a wall or floor, other than when a fire damper is required, pack around the duct using a fire resistant material to ensure a sound and air-tight joint. Cover the opening with sheet metal flange of the same metal thickness of duct, overlap opening on four sides by at least 38mm.

## Fire damper and volume control damper shall be fixed matching the duct layout and shall be fixed to the ducting layout as per approved details on approved shop drawings.

## Access doors shall be provided at all fire dampers locations.

## Sound liner shall be installed in the main ducts up to 4 meter of duct length. Approved adhesives shall be applied over the entire inner surface of the ducts. Where required by project specification and the duct dimensions, it should meet the inside of lining.

## Main supply and return trunk ducts, first 4 meter minimum should be internally lined with acoustic glass fibre insulation. The insulation should be between 24-48 kg/m³, and be at least 25 mm thick.

## The VAV boxes and diffusers should be selected to achieve maximum NC rating of 25.

## The ducting from the VAV box to the diffusers should be lined with acoustic insulation, at least 25 mm thick.

## The ducting to supply air diffusers or VAV boxes should be straight and unobstructed for at least 4 duct diameters upstream of the diffuser.

## The supply ducting should not include dumper within at least 4 duct diameters upstream of a supply diffuser.

## All ducting in mechanical rooms shall be externally covered with 50mm of glass fibre insulation and lagged with 2 coats of anti fungus coating having a surface density of at least 20 kg/ml.

## Flexible duct connectors should be provided between all fans and ductwork as per approved materials and its length to not exceeding 1.5 meter for the rectangular ducts.

## Resilient thrust restraints should be incorporate into the flexible connections to eliminate loading of the flexible connection. The restraints should be steel spring isolators having a static deflection of at least 19mm.

## Wall or floor duct penetrations should allow for a 13 mm clearance around the duct. The gap should be stupped with glass fibre insulation and sealed with non-hardening caulking. The duct should be supported on both sides of the wall.

## Variable-Air-Volume (VAV) units should be mounted as high in the ceiling space as possible, at least 2m away from return air opening.

## Mock up of sound liner installation for duct internal & external shall be done and inspection to be done.

## The corners of the insulation shall be applied with the approved woven glass cloth and adhesives.

## **INSTALLATION OF HVAC DUCTS**

## Fix the box outs with sizes as per schedule shown in the approved shop drawings during the construction of structural elements.

## Install supports or brackets for ducting as per specification, approved shop drawing and site conditions for each individual case (i.e. Slab and Walls etc.).

## Mark the location of ducting as per the approved layout and site conditions.

## Install insulated ducts as per approved layout and conforming to site conditions.

## S-cleat, C-Clamp, duct mate, flanges and angle shall be used for jointing ducts and plumbed to duct. Jointing shall be in accordance with SMACNA standards.

## Approved duct mastic will be used in the joints to avoid air penetrations.

## Volume Control Dampers, Fire Dampers, and accessories shall be installed as per approved shop drawings and manufacturer’s recommendations.

## Insulate all the joints and make air flow labeling with approved materials as per project specification.

## Apply insulation for ducts continuously crossing walls and partitions except the fire rated walls.

## For exposed duct work in non-conditioned areas apply approved cladding over the insulated ducts as per specification.

## Fire dampers will be installed in the ducting layout which is passing through the fire rated walls with access door provided.

## Non-insulated ducts shall be provided in fire rated walls, fire dampers shall be fixed with insulated ducts. Minimum 25mm gap shall be maintained on all sides of the ducts.

## Gap between the walls and ducts Fiber Glass Insulation will be rammed properly and sealed with approved mastic both sides of walls.

## Access panels shall be provided near to all fire dampers for future cleaning, inspecting and maintenance purpose.

## Flexible ducts shall be connected from branch duct to air outlet as per approved shop drawings and the same shall be supported properly as per manufacturer recommendations.

## Approved Flexible Duct Connector, Durodyne shall be installed in expansion joints and between connections of HVAC equipment (packaged units, exhaust fans, etc..) and HVAC ducts by means of S-type cleat joints and will be riveted and sealed with approved duct sealant.

## Duct leak test shall be carried out after the completion of duct installation.

## Raise inspection request for installation of HVAC Ducts with Accessories to the client.

## **INSTALLATION OF AIR OUTLETS**

## Approved make, type and model of grilles, diffusers, registers, slot diffusers, bar grilles and exhaust disc valves shall be installed as per approved material submittal and project specification.

## Air outlets models and type shall be installed as per approved shop drawing and manufacturer’s recommendations.

## All air outlet shall be reflected with the false ceiling and the architectural approval is required before find selection of air outlet.

## All air outlets shall be vertically and horizontally checked during fixing.

## Approved sealant shall be used to seal the connections between the ducts and air outlets.

## Corners of air outlets shall be sealed by silicon sealant matches to match wall or ceiling finishing.

## All air outlets shall not have direct contact to supports, in case of contact it will be insulated with approved insulation materials.

## Paint visible internal surface behind each grille or register flat black.

**INSTALLATION OF SOUND ATTENUATORS**

## Approved make, type, and model of sound attenuators shall be installed as per approved material submittal.

## All sound attenuators sizes shall match the HVAC Ducting and approved noise level calculation.

## Galvanized angles and channels shall be used for supporting all sound attenuators.

## Sound attenuators shall be connected with ducting by flange which is already provided by the manufacturer.

## All sound attenuator shall be insulated as per project specification.

## Raise inspection request for installation of Sound Attenuators.

## **IDENTIFICATION OF HVAC DUCTING AND ACCESSORIES**

## Generally colour code and label to HVCA Specification DW 144 (Appendix B).

## **Primart Identification:** Apply colour bands, 300mm wide, to each duct at least once in every room or enclosed area; at intervals not exceeding fifteen metres; at every junction; at every damper; and at every inspection and access position into service shafts, false ceilings, bulkheads etc.

## **Secondary Identification:** For ducts with longest side or diameter up to and including 225mm. Paint colour bands 50mm wide and superimpose legends.

## For ducts with longest side or diameter over225mm. paint or apply transfers to identification triangles, or triangular plates. Superimpose or incorporate legends.

## **Triangular Plates:** Attach to buckle bands or stool pieces and fix to ducting, with apex indicating direction of airflow. Submit details of plates and fixings for approval before painting and marking. Use equilateral triangle of side 150mm minimum.

## **Legends:** Apply transfers of an approved type to colour bands or triangles or triangular plates. Identify floor and space served, associated equipment reference and direction of airflow.

**9. Construction Program**

* As per main program

9.1 Housekeeping

The work area shall be maintained neat and tidy as reasonable practical at all times.

9.2 Protection of Executed Works

Executed works in areas were other works are still being carried out shall be protected as per the contract requirements.

9.3 Responsibilities

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Position** | **Overall Resp.** | **Supervise** | **Perform** | **Short Description** |
| Project Manager |  | **🞏** | **🞏** |  |
| Construction Manager |  | **🞏** | **🞏** |  |
| Project Engineer | **🞏** |  | **🞏** |  |
| Site Manager | **🞏** |  | **🞏** |  |
| Site Engineer | **🞏** | **🞏** |  |  |
| Land Surveyor | **🞏** | **🞏** | 🞏 |  |
| Safety Engineer | **🞏** |  | **🞏** |  |
| QA/QC Engineer | **🞏** |  | **🞏** |  |
| MEP Coordinator | **🞏** | 🞏 | **🞏** |  |
| General Foreman | **🞏** |  | **🞏** |  |
| Foreman | **🞏** | **🞏** |  |  |
| Charge hand | **🞏** |  | **🞏** |  |
| Labourer | **🞏** | **🞏** |  |  |
| Helper | **🞏** | **🞏** |  |  |

9.4 Records

In accordance with the Quality Management System, the following records will be maintained as documentary evidence of the establishment of this method statement:

|  |  |  |  |
| --- | --- | --- | --- |
| **Records to be retained** | **Responsibility** | **Minimum Retention Period** | **Disposition** |
| Work Notification  ( If required) | Site Manager | As per Contract  Requirements |  |
| Request for Inspection  ( RIW ) | QA/QC Engineer | As per Contract  Requirements |  |

**10. Inspection and Testing**

* In Process works shall be monitored for quality of workmanship and fabrication against approved shop drawings and standards by the relevant supervisor.
* All works shall be inspected for conformance to specification.
* The inspection formats shall be used in accordance with the requirements of the main contractor.
* An inspection request for INSTALLATION OF DUCTS AND ACCESSORIES shall be submitted one day prior to the consultant

**11. Related Forms**

* As per required forms

**12. Attachments**

* Risk Assessment