

METHOD STATEMENT FOR INSTALLATION OF HVAC DUCTWORK

(The content of this method statement is subject to material submittal approval)

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1. PURPOSE AND SCOPE

- 1.1. To define the methodology to be followed during the fabrication of HVAC ductwork and installation of fabricated ductwork and its associated accessories in supply, return, exhaust, and fresh air ducts and all such inline components as indicated on the approved shop drawings.
- 1.2. To ensure, the installation and testing are in compliance with the specifications, standards and project specific requirements.
- 1.3. This procedure is applicable to all HVAC ductwork installation and activities which include components such as, AHU, and FCU connections, flexible ducts, sleeves, identification, supports, etc.

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 (Section 15075, 15812, 15820)
- 3.2. Project IFC Drawings
- 3.3. SMACNA – HVAC Duct Construction Standards 2nd Edition 1995
- 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. GENERAL

- 4.1. Prior to the procurement of any materials and equipment all such materials and equipment shall be submitted to the client for approval. Only approved materials may be used in the fabrication and installation of the ductwork systems. Ducts shall be constructed of material of the correct wall thickness, correct reinforcements, with joints and seams as per the classification applicable to each system.
- 4.2. Ductwork shall be constructed of galvanized steel sheet, except where specifically stated otherwise or as indicated on the approved shop drawings.
- 4.3. Rectangular or square ductwork shall be prime locked forming quality:
 - 4.3.1. Galvanize sheet steel to comply with ASTM A653/653M
 - 4.3.2. Metal gauges in accordance with published SMACNA HVAC Duct Construction Standard – Metal and Flexible to suit the duct configuration and classification.
 - 4.3.3. Carbon steel sheet to comply with ASTM A 1008A/1008M

- 4.3.4. Stainless steel sheet to comply with ASTM A480/A480M – Type 304 or 316 as indicated on drawings. Exposed surface finish to be No. 4 finish and concealed surface finish to be No. 2D
- 4.3.5. Aluminum sheets to comply with ASTM B 209 Alloy 3003, H14 temper. With mill finish for concealed ducts, and standard, one-sided bright finish for duct surfaces exposed to view.
- 4.4. Round ductwork shall be prime lock forming quality:
 - 4.4.1. Galvanize sheet steel to ASTM A653/653M
 - 4.4.2. Metal gauges in accordance with published SMACNA Round Industrial Duct Construction Standards to suit the duct configuration and classifications.
- 4.5. Seismic restraints shall be installed in compliance with the specifications and as indicated on the approved shop drawings.
- 4.6. All angle iron required for ductwork construction or supports shall be galvanized.
- 4.7. Rectangular duct joinery and fabrication shall be as specified in the specifications and in compliance with SMACNA.
- 4.8. Rectangular duct fittings shall be as specified in the specifications section, and in compliance with SMACNA.
- 4.9. Round and oval joinery and fabrication shall be as specified in the project specifications, and in compliance with SMACNA.
- 4.10. All unlined duct shall be cross broken or beaded in accordance with SMANCA.
- 4.11. All unlined duct shall be coated with anti-microbial/fungicide coating in accordance with the manufacturer recommended procedure.
- 4.12. Ensure approved for construction shop drawings of current revision are available prior to fabrication and installation commencement.
- 4.13. All ductwork shall be coordinated with other services to ensure access to execute the works.
- 4.14. Construction and installation of the HVAC ductwork systems shall be as per approved shop drawings.
- 4.15. It will be necessary to give consideration to the sequence in which the work shall proceed.
- 4.16. Prior to commencing any works, risk assessment must be conducted, taking into account all possible risks and the appropriate precautions put in place, i.e. fire extinguishers, fire blankets, safety harness, etc. Refer to the risk assessment/management section of this method statement.

5. PRE-WORKS

- 5.1. Ductwork shall be pre-fabricated in an off-site facility by a prequalified and approved sheet metal fabricator.
- 5.2. The fabrication shall be carried out in a neat and workmanlike manner, with all internal and external surfaces free from projections and sharp edges.
- 5.3. The ductwork fabricator shall prepare duct manufacturing drawings from the approved shop drawings, showing detailed dimensions for the different composite parts, such as elbows, branches, off-sets, straight runs, etc.
- 5.4. Where flanges are utilized, they shall be of approved manufacture and fitted in accordance with SMACNA.

- 5.5. Duct reinforcement shall be in compliance with SMACNA standards. Where sealing is applied at the fabrication stage or the installation stage, it shall be as per the approved duct sealant.
- 5.6. Ductwork sections shall be fabricated from approved materials and in compliance with the project specifications and SMACNA. Duct sections shall be fabricated with approved joints and seams. Ducts shall be adequately braced to prevent vibration.
- 5.7. Duct sections shall be fabricated in manageable lengths. The site supervisor and the fabrication supervisor shall review all duct runs to establish that fabrication sequence, best suited for ease of installation.
- 5.8. Acoustically lined ductwork shall be fabricated in accordance with the SMACNA standard and located as shown on the IFC drawings. Dimensions for acoustically lined ducts are clear inside dimensions.
- 5.9. Fabricated sections shall be labelled, giving the following information:
 - Gauge Number
 - Dimensions
 - Line Number
 - Location
 - Type of duct (supply/return/exhaust/fresh air)
- 5.10. Fabricated sections shall, on arrival to site, be monitored by the QA/QC department to ensure compliance with the specifications.
- 5.11. All ductwork shall be checked when delivered to site, for correct dimensional accuracy, based on the factory fabrication shop drawing and the labelled affixed to it.
- 5.12. On delivery to site duct sections shall be inspected to ensure that they are not damaged. Sections will be stored in a suitable environment prior to insulations and anti-microbial coating is applied. Ductwork shall be stored as such to avoid it coming in contact with abrasive surfaces. Delivery shall be coordinated to ensure ductwork is delivered to coincide with the installation schedule, and thus limit the storage requirements on site.
- 5.13. Duct sections are to be thoroughly cleaned of any debris and dust and placed in the insulation section of the duct workshop on site. Duct to be insulated as per approved method statement (submitted separately).
- 5.14. Ducts that are insulated and are clean on the inside surface to be coated with a microbial/fungicide coating. The coating application on to ducts is to be as per the manufacturer recommended procedures. Following is the procedure for the approved material:



- 5.14.1. Anti-microbial Coating Material: Foster 40-25
- 5.14.2. Surface Preparation: Apply only to surfaces free of all loose dirt, grease, mould or other materials that may interfere with the adhesion of the coating to the substrate. Remove any dust, grease, oil, or materials. Abrade all surfaces to remove all surface rust. Clean the intended surface of any materials that may interfere with the adhesion of the coating and allow to dry completely before proceeding. Follow manufacturer's directions for application. All rusted metal surfaces must be primed before application of Foster Fungicidal Protective

Coating. Foster Fungicidal Protective Coating may be applied directly onto cleaned un-rusted galvanized surfaces.

5.14.3. Material Preparation: DO NOT THIN. Keep container closed.

5.14.4. Product Application: Apply between 50°F (10°C) and 100°F (38°C) with less than 70% RH air conditions maintained until dry. Always ensure adequate ventilation. Workshop must be under negative air pressure during and after application to allow for exhausting of odours and rapid drying of the coating. Apply Foster Fungicidal Protective Coatings to all surfaces by brush or airless spray at the following wet coverage rates (rates are minimum required and are subject to the nature of the material being coated):

- Galvanized Metal = 0.75 gal/100 ft² (0.31 L/m²)
- New Duct Liner = 1.0 gal/100 ft² (0.41 L/m²)

Unsealed, rough, or low density surfaces may require more material to attain required surface sealing.

Continue to circulate fresh dry air throughout the area during the application and for as long after the application as is possible. This circulation and filtration helps to reduce the dry time of the coating and reduce latex type odours that could possibly migrate from the application area.

5.14.5. Application Techniques: Foster Fungicidal Protective Coating may be applied by brush, roller or airless spray as well as certain automated spray systems. Refer to sections below for more information on application equipment and devices. Brushing or rolling will require two coats applied at 90° to each other. Under normal circumstances a spray application can be completed in one coat, but for extremely porous or irregular surfaces, a second coat may be required. Overlap applications to assure complete coverage and the surface is smooth and well-sealed. Cover surface completely while avoiding runs or pooling.

This product must be evenly applied to the coated surfaces. Even and uniform application is essential for satisfactory results. The procedures, equipment and techniques described below have been used to provide the desired result. Other procedures, equipment and techniques may also achieve satisfactory results, but must not be used without discussing the specific situation with a qualified professional for assistance.

The applicator must have access to the surfaces being coated. This will require entering the ducts. In such cases, application must start from the point most distant from the point of entry into the duct. The applicator will then work from that point back to the entry point covering a 4 foot length of duct at a time.

5.14.6. Using Brush or Roller: Brushes and paint rollers suitable for application of water based paints are acceptable. Use a 3/8" nap roller for smooth surfaces. Clean brushes and equipment with warm water before product dries.

5.14.7. Rate of Application: The required rate of application for Foster Fungicidal Protective Coating varies depending on the surface being coated. Users of this product must carefully follow the rate of application instructions provided above. Surfaces must be evenly coated to provide a complete surface film. Avoid over application resulting in pooling of the coating.

5.14.8. Maintenance: Normal cleaning procedures must be maintained in HVAC systems to remove accumulated airborne particles. Where accessible the coating may be washed down periodically to remove any accumulation of materials with water and a mild detergent. If coating becomes damaged clean surface and re-apply coating.

5.15. After completion of the coating process and proper drying of the same, the open ends of the ducts to be sealed with durable plastic sheeting to prevent the ingress of sand, dirt, water, or other contaminants.

6. WORKS

6.1. Duct sections shall be transported from the workshop to the work site in applicable manner.

6.2. Ensure that scaffolding is executed in high areas and safety check tag is properly displayed.

6.3. Inline equipment such as dampers, fire dampers, VAV boxes, etc. shall be stored in a suitable storage facility on site, as required. Supporting systems such as threaded rods, angle iron, etc. shall similarly be stored in suitable storage facilities as will sealants and other assembly components.

6.4. Using approved for construction shop drawings the duct routes shall be marked on the underside of the slab or otherwise as per the dimensioned location as shown on the drawings.

6.5. Confirmation shall be received from the consultant that the areas where the ductwork is to be installed, have been released for such works to proceed.

6.6. Supports shall be installed as per the approved support and hanger details. Supports shall be securely installed and adequate for the purpose. Supports shall be spaced in compliance with the approved support and hanger details.

DUCT HANGERS & SUPPORTS

WIDTH OF DUCT (mm)	MS ANGLE IRON SIZE (mm)	HANGER ROD(mm)	MAX. SPACING (mm)
UPTO 400	25x25x1.6	8mm	3000 mm
401–600	25x25x3	10mm	3000 mm
601–1000	30x30x3	10mm	3000 mm
1001–1500	40x40x3	10mm	2500 mm
1501–2000	50x50x5	10mm	2500 mm
2001–3000	60x60x6	12mm	2500 mm

6.7. Vertical supports shall be installed as per the approved support and hanger details and as per SMACNA standards. Supports shall be securely installed and adequate for the purpose. Refer to below image for reference.

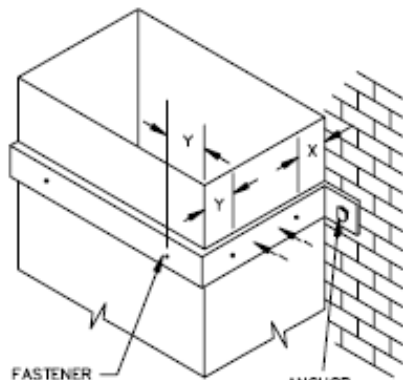


FIG. A
 FASTENER ANCHOR
 ----- SHOWS SUPPLEMENTAL FASTENER LOCATIONS

FIG. A - SUGGESTED SIZING

DUCT SIZE	ANGLE
18" x 12"	1 1/2" x 1/8 GA.
24" x 20"	1" x 1/8"

TABLE 4-4

DUCT GAGE	ALLOWABLE LOAD PER FASTENER *
28, 26	25 lb
24, 22, 20	35 lb
18, 16	50 lb

* WELD, BOLT OR NO. 8 SCREW (MIN.) DEVIATION PERMITTED BY OTHER ANALYSIS. X=1", Y=2"; ADD OTHERS TO ACCOMMODATE LOAD. MINIMUM OF 3 ON 24" WIDTH AND UP. ADD ALONG SIDES NEAREST ANCHORS.

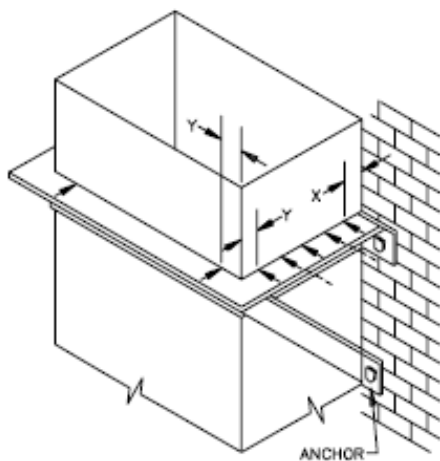
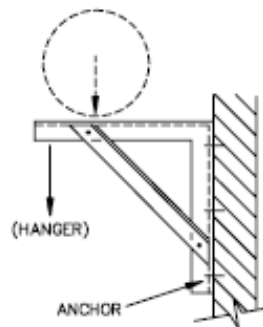


FIG. B



SEE KNEE BRACKET TABLES IN THE ROUND INDUSTRIAL STDS.

FIG. B - SUGGESTED SIZING

DUCT SIZE	ANGLE
30" x 12"	1" x 1" x 1/8"
36" x 18"	1" x 1" x 1/8"
42" x 24"	1 1/4" x 1 1/4" x 1/8"
48" x 30"	1 1/4" x 1 1/4" x 1/8"

- NOTES: 1. BRACKETS ARE SIZED FOR 12 FEET OF DUCT, MAXIMUM.
 2. LOCATE DUCTS AGAINST WALL OR MAXIMUM OF 2" AWAY FROM WALL.
 3. EACH WALL ANCHOR SHALL SATISFY THE FOLLOWING CRITERIA UNLESS OTHER ANALYSIS IS MADE:
 A. TENSILE LOAD = 3/8 x DUCT WEIGHT; SAFETY FACTOR 4.
 B. SHEAR LOAD x 1/2 x DUCT WEIGHT; SAFETY FACTOR 4.

- 6.8. As indicated on relevant approved construction drawings where more than one duct can be supported on one hanger the size of the hanger will be accessed tables on the sum of the maximum widths.
- 6.9. All support materials such as anchors, threaded rod, angle iron, etc. shall be of approved materials in compliance with the specifications or approved alternative.
- 6.10. Round duct sections and flexible duct shall be supported by means of a suitably approved type of support as per the approved support and hanger details.
- 6.11. Duct sections shall be lifted in to place either manually or mechanically, depending on the weight, size and elevation of the ducts final position. Once located as shown on the drawings the supports shall be finalized and the section secured in position either by connection to the previously installed duct sections or by temporary suitable restraints or supports.

- 6.12. Ensure that insulation shall not be damaged during lifting and insulation is properly done at the joint.
- 6.13. Each successive section of duct shall be joined to the previous piece, taking care to ensure that the joints are correctly sealed with the approved duct sealant or gasket material.
- 6.14. Duct sections shall be joined together by means of flanges or as per the specifications and SMACNA standards. Transvers joints using S-clip, C-clip drive etc. shall be sealed by means of approved duct sealant.
- 6.15. Where duct sections are to be joined by means of welding at joints, project specification and SMACNA standards to be adhered to strictly.
- 6.16. Allowance or branch or spur lines shall be made at the fabrication stage in compliance with the specifications and standards.
- 6.17. Duct risers shall be installed through the building openings provided. Ducts shall be placed in the openings as per the dimensioned locations as shown on the drawings. Ducts rising through shafts shall be installed in a similar manner, where necessary a coordinated drawing section will be provided and details shall be checked to confirm the exact location of ducts. Duct riser supports shall be as per approved shop drawing detail.
- 6.18. At no time shall ductwork locations vary from that shown on the approved for construction shop drawings, without first seeking approval from the engineering department.
- 6.19. Approved re-routing of ducts shall be "Red Lined" on the appropriate drawings and forwarded to the engineering department for the As-Built drawings, for final hand over.
- 6.20. All left out openings around the ducts shall be sealed off with the approved sealing materials.
- 6.21. During installation the open ends of ducts and accessories shall be protected to prevent dirt or debris from entering.
- 6.22. For all non-fire rated penetrations where no fire dampers are to be installed a sleeve of the same gauge as the duct is to be installed at the opening to prevent the duct and its insulation from the opening.
- 6.23. Pre-fabricated plenum boxes shall be installed as shown on the IFC drawings. Plenum boxes shall be installed and secured as per the specifications and standards.
- 6.24. Variable Air Volume (VAV) boxes shall be located and installed per the approved for construction shop drawings. VAV boxes shall be supported by means of a suitably approved type of support as per the approved support and hanger details.
- 6.25. Volume control dampers (VCD) and back draft dampers (BDD) and all other inline accessories shall be located and installed as per the approved for construction shop drawings and in compliance with project specifications. Ensure VCD and BDD can freely move through its full rotation.
- 6.26. In line equipment is to be independently supported.
- 6.27. Fire dampers and smoke dampers shall be installed as per the locations indicated on the approved for construction shop drawings and using the approved installation detail method statement for the same. Ensure the correct type and size of damper is installed in each location by referring to the fire and smoke damper schedule.
- 6.28. Ensure all attenuators/duct silencers are of approved material and construction. Attenuators shall be located and installed in the locations indicated on the approved for

construction shop drawings. Attenuators shall be supported by means of a suitably approved type of support as per the approved support and hanger details.

- 6.29. Access doors shall be provided at all fire dampers, smoke dampers, automatic control dampers, filters, etc. and all other apparatus concealed within the duct as shown on the approved for construction shop drawings and in compliance with the project specifications. Access doors shall also be installed in straight runs, before or after turning vanes, etc. as per project specifications to ease in access during cleaning of ducting. Access doors shall be of the pressure classification and construction standards as designated by the designers and shall be of size as specified in the project specifications.
- 6.30. Flexible ducts shall be connected from branch duct to air outlet as per approved for construction shop drawings and the same shall be supported by means of a suitably approved type of support as per the approved support and hanger details.
- 6.31. Approved Flexible Duct Connector 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 riveted and sealed with approved duct sealant.
- 6.32. All duct systems shall be identified using labels in compliance with the project specifications.
- 6.33. Test hole to be provided and plugged ready for commissioning and control equipment's.

7. AIR LEAKAGE TEST PROCEDURE

Ductwork testing shall be carried out in compliance with the project specifications and SMACNA - HVAC Air Duct Leakage Test Manual.

7.1. Precautions:

- 7.1.1. Prior to commencing any ductwork pressure testing it will be necessary for all such ductwork to be inspected. The direct line construction supervisor shall first inspect the installation to ensure compliance with the specifications. On satisfactory inspection and making good and defects, the QA/QC department will be requested to inspect the works.
- 7.1.2. All open end ductwork shall be properly capped during testing.
- 7.1.3. All open ends will be checked to ensure they are sealed.
- 7.1.4. Verify that an adequate and matched electric power source is available for the test apparatus.
- 7.1.5. Determine that the capacity of the test apparatus is suitable for the amount of duct to be tested.
- 7.1.6. Isolate equipment (fans, in-line flanged coils, volume regulating boxes, etc.) from tested ductwork. The system designer should have independently accounted for leakage in equipment.
- 7.1.7. Anticipate difficulty with any test of ductwork that has no prescription for sealing yet is required to meet an allowable leakage level.
- 7.1.8. Do not over pressurize ducts. Provide pressure control or pressure relief if test apparatus behavior is unfamiliar; *e.g.*, start test apparatus with flow restricted and gradually build up pressure.
- 7.1.9. Prepare carefully when testing in cold weather. Low temperature influences the effectiveness of sealants and gaskets.

- 7.1.10. Instruct installers to use special care when assembling ducts that will be relatively inaccessible for repair.
- 7.1.11. Do not overlook leakage potential at access doors.
- 7.1.12. Do not leave test apparatus unattended.
- 7.1.13. Avoid excessive blanking, consistent with industry practice, by testing prior to installation of collars for room air terminals
- 7.1.14. Take testing seriously; work sequence, work duration and costs can be significantly affected.
- 7.1.15. Prior to starting the duct leak testing confirm all duct blank off and seal of all aperture in the selected length of duct by using blanking plates, caps or polythene bags, taped to ductwork. Ensure carefully no opening has been overlooked. Choose a length of duct work to be tested for which the estimated leakage will not exceed the capacity of the Test apparatus.
- 7.2. The QA/QC department will inspect the duct sections and issue a punch/snag list if necessary.
- 7.3. On satisfactory completion of the inspection and making good such punch items, the QA/QC department shall issue a request for inspection to the consultant.
- 7.4. On satisfactory completion of the inspection by the consultant, and making good such punch items as may be noted by the consultant, the duct sections may be released for testing.
- 7.5. All test measuring equipment shall be calibrated, and a certificate of calibration shall be available for review.
- 7.6. Ductwork testing shall be conducted in manageable sections to allow construction to proceed without delays.
- 7.7. A manometer or approved measuring apparatus shall be used to measure the airflow.
- 7.8. The duct test pressure shall be sensed only from an opening in the duct.
- 7.9. Do not test uncured seals
- 7.10. Connect the blower and flow meter to the duct section and provide temporary seals at all open ends of the ductwork.
- 7.11. To prevent over pressurizing of the ducts, start the blower with the variable inlet damper closed. Controlling pressure carefully, pressurize the duct section to the required level.
- 7.12. Once the required test pressure has been achieved read the flow meter and compare the leakage on CFM per square foot with the allowable rate. If it meets the allowable rate the test certificate shall be completed and signed.
- 7.13. Prior to the consultant being requested to witness any test, an in-house test shall be carried out to ensure the nominated duct system is within the allowable leakage rate. In the event that a test should fail the allowable leakage rate the following shall apply.
- 7.14. Should the test not meet the allowable rate, the duct work should be closely inspected for leaks. Any and all leaks shall be repaired. In the event that no significant leaks were found, consideration should be given to diving the duct section into two or more tests.
- 7.15. Where significant leakage was discovered they should be repaired and the system re-pressurized and re-tested.
- 7.16. Temporary blanks and seals may be left in place until permanent connection is completed to maintain cleanliness.
- 7.17. Testing must comply with all the requirements of the Project Specifications under Section 15812.

7.18. Leakage classification:

Leakage classification identifies a permissible leakage rate in cfm per 100 ft² of duct surface according to the relationship $C_L = F \div (P)^{0.65}$.

C_L - is a constant obtained for below shown Table-1

F - is the leakage rate in cfm/100 ft² of duct surface (it varies with static pressure).

P - is the static pressure.

N - is an exponent (most typically it is 0.65 but in some cases it is 0.5 to 0.9)

Values for (P)^{0.65} are shown below in Table-1.

Table-1

		LEAKAGE CLASS (C _L)				UNSEALED
PRESSURE W.G.		CLASS	CLASS	CLASS	CLASS	CLASS
p ^{0.65}	P''	3	6	12	24	48
0.143	0.05	0.4	0.9	1.7	3.4	6.7
0.224	0.10	0.7	1.3	2.7	5.4	10.7
0.351	0.20	1.1	2.1	4.2	8.4	16.8
0.457	0.30	1.4	2.7	5.5	11.0	21.9
0.551	0.40	1.7	3.3	6.6	13.2	26.4
0.637	0.50	1.9	3.8	7.6	15.3	30.6
0.717	0.60	2.2	4.3	8.6	17.2	34.4
0.793	0.70	2.4	4.8	9.5	19.0	38.1
0.865	0.80	2.6	5.2	10.4	20.8	41.5
0.934	0.90	2.8	5.6	11.2	22.4	44.8
1	1	3	6	12	24	48

Table-1

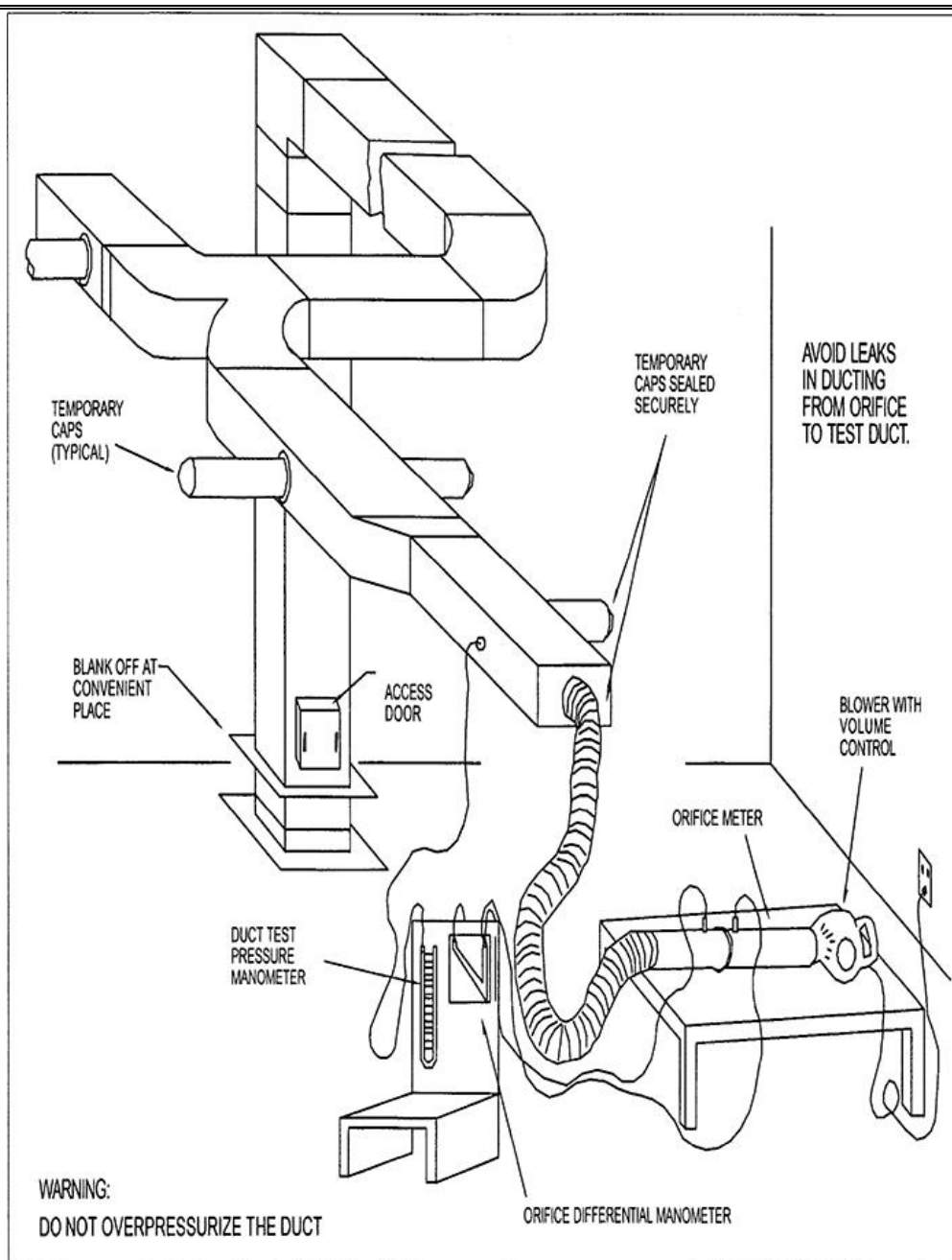
		LEAKAGE CLASS (C _L)				UNSEALED
PRESSURE W.G.		CLASS	CLASS	CLASS	CLASS	CLASS
P ^{0.65}	P"	3	6	12	24	48
1.30	1.5	3.9	7.8	15.6	31.2	62.4
1.57	2.0	4.7	9.4	18.8	37.7	75.4
1.81	2.5	5.4	10.9	21.7	43.4	86.8
2.04	3.0	6.1	12.2	24.5	49.0	98.0
2.26	3.5	6.7	13.6	27.1	54.2	108.5
2.46	4.0	7.4	14.8	29.5	59.0	118.1
2.66	4.5	8.0	16.0			
2.85	5.0	8.6	17.1	When $C_L = \frac{F}{P^{0.65}}$ $P = 1$ $C_L = F$ $F = C_L(P)^{0.65}$		
3.03	5.5	9.1	18.2			
3.20	6.0	9.6	19.2			
3.54	7.0	10.6	21.2			
3.86	8.0	11.6	23.2			
4.17	9.0	12.5	25.0			
4.47	10.0	13.4	26.8			

Table-1

		LEAKAGE CLASS (C_L)				UNSEALED
PRESSURE W.G.		CLASS	CLASS	CLASS	CLASS	CLASS
$p^{0.65}$	P''	3	6	12	24	48
4.75	11.0	14.3	28.5			

C_L is the leakage class and is a constant.

7.19. All testing must be done by means of an appropriately sized blower, which shall be connected to the section of duct to be tested. See figure below for illustration of the setup.



8. RESPONSIBILITIES

8.1. Construction Manager

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

8.2. Site Engineer / Supervisor / General Foreman

- 8.2.1. Implementation of safe work method statement and risk assessment plan.
- 8.2.2. Arrange TBT prior to commencement of work.
- 8.2.3. Visit the area of work for no hazard items exist.
- 8.2.4. 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.

8.2.5. Ensure that the employees under his responsibility do not engage in unsafe work practices or take unnecessary risks.

8.3. QA/QC Engineer

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

8.4. Safety Officer

8.4.1. Enforce the Project HSE rules and regulations.

8.4.2. Implement HSE requirements set out in Mercury MENA HSE Plan

8.4.3. Ensure work permit has been obtained and implemented (if applicable).

8.5. Material Controller

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

8.6. Tradesmen / Drivers / Operators / Welders

8.6.1. Follow supervisor's and/or general foreman's instructions.

8.6.2. Only authorised drivers / operators can operate the plants.

8.6.3. Only authorized welders can operate welding plants.

9. ENGINEERING

9.1. Ensure that the shop drawings issued to site are approved and latest.

9.2. Shop drawings shall follow the IFC drawings, project specification requirements and local authority's codes and regulations.

10. MATERIALS

10.1. All materials shall be submitted for approval prior to procurement and delivery to site.

10.2. 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.

10.3. Materials 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.

10.4. 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.

10.5. Materials will then be reconciled with the mill certificates, where applicable and any uncertified/non-compliant materials will be removed into quarantine.

10.6. Material shall be stored appropriately or placed on shelving units within the warehouse area.

10.7. Care shall be taken to prevent the ingress of dirt or foreign objects into materials.

10.8. Items requiring preservation and maintenance shall be subject to the requirements of the Preservation and Preventative Maintenance Procedure.

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

11. PLANT AND EQUIPMENT

- 11.1. All equipment/tools shall be inspected prior to use at site and Mercury MENA ID tag shall be placed on equipment where applicable.
- 11.2. No modified tools may be used for any task.
- 11.3. All test equipment shall be checked to assure that they are in good condition and valid calibration certificates are maintained and available for review.
- 11.4. Operator's documentation shall be verified as applicable.
- 11.5. Tools that will be used for the headlined scope of works are as follow but not limited to:
 - 11.5.1. Measuring tape, plumb bob, chalk line, nylon string line
 - 11.5.2. Ball peen hammer
 - 11.5.3. Ladder
 - 11.5.4. Spirit level
 - 11.5.5. Duct fitter standard tool box
 - 11.5.6. Screw driver set
 - 11.5.7. Rivets/Screws
 - 11.5.8. Square drive ratchet spanner
 - 11.5.9. Box spanner
 - 11.5.10. Allen socket adaptor
 - 11.5.11. Calibrated torque wrenches
 - 11.5.12. Electric impact screw driver
 - 11.5.13. Blower fan for leak testing
 - 11.5.14. Anemometer/Monometer
 - 11.5.15. Flow meter
 - 11.5.16. Scaffolding
 - 11.5.17. Drill machine
 - 11.5.18. Grinding machine
 - 11.5.19. Sheet cutters

12. HEALTH, SAFETY, AND WELFARE

- 12.1. 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.
- 12.2. 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.
- 12.3. 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.
- 12.4. No refuelling whilst equipment is running. Refuelling to be carried out only at designated areas on site.
- 12.5. Provide banks man or spotter during equipment manoeuvring and during hauling of excavated materials.
- 12.6. All lifting tackle will be inspected before use.

12.7. 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.

12.8. For dusty working environment dust masks shall be used.

13. ENVIRONMENT

13.1. 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.

14. COMMUNICATION AND TRAINING

14.1. 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.

15. QUALITY CONTROL

15.1. 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.

15.2. Quality Control tests on performed work and materials shall be in accordance with Project Specification

16. ATTACHMENTS

16.1. ITP

16.2. HSE Risk Assessment

ATTACHMENTS