1. BACKGROUND

Sydney Water has several distinctive types of ventilation shafts in use. Some of them are current and others are legacy designs.

**Guy Wire Type**

Guy wire vents are the most type common in use.

Sizes are DN 150, 225 & 300 and heights range from 14 to 18 m.

Note: showing matt finish stainless steel vent shaft next to a light pole

**DTC 9-18 m Post Type**

A free-standing structure. Sizes are DN 150, 225 and 300 with a height between 9 and 14 metres.

Note: showing painted vent shaft to suit local environment requirement

**Post Type**

A free-standing structure. Sizes are DN 150, 225 and 300 with a maximum height of 9 m.

May be installed only where the catchment being vented is less than 80-100 houses

Unsuitable in vicinity of multi-story buildings (wall vent preferred in such situations).

**Wall Type**

Wall vents are attached to a building and may be enclosed inside the building under certain circumstances.

Vent may only be attached to a solid wall i.e. double brick or concrete, not clad timber frame.

Preference is for vent tube not to be enclosed inside a wall cavity.

Sizes are DN 150, 225 and 300.
**Fibreglass Type**

A freestanding structure used in aggressive conditions e.g. coastal areas (salt-laden sea breezes).

Sizes range from DN 150 to DN 400 and heights from 13 to 16 m.

---

**Special Type**

Any vent larger than DN 300 is considered a special and requires separate design consideration.

---

**Cast Iron Column Type (legacy)**

CI column vents are no longer being installed but are maintained in heritage areas such as Paddington by the use of an adaptor plate to use a stainless steel tube.

---

**Tapered Type (legacy)**

Tapered vents are no longer being installed or maintained due to corrosion of the galvanised mild steel tube resulting in unpredictable catastrophic failure.
Concrete Type (legacy)

Concrete vents are normally inherited from Council sewerage schemes. They are prone to concrete cancer and are not maintained but are replaced when required with either a post or guy wire vent.

Four types of vent cowl are used, viz:

**Wire Cowl**
For use on induct and educt vents; also known as a bird cowl. It is non-directional and the most common and the preferred cowl option.

**Rotating Cowl**
Used on educt vents (similar in principle to a “whirly-bird” house vent).

**Forced Induct Cowl**
The cowl rotates so that the front is always pointing into the wind to force air into the vent.

**Induct Cowl**
Whilst no longer installed, existing induct cowls are maintained and replaced where they have heritage value.
2. DESIGN REQUIREMENTS

2.1 Material selection
- Material shall be designed for a minimum 50 year service life
- For vents located in coastal environment (within 1 km of coastline), vents and cowls shall be made of 316 stainless steel. An alternative grade having a minimum PREN of 24 may be used.
- For vents located in inland environment (further than 1 km of coastline), vents and cowls shall be made of 304 stainless steel. An alternative grade having a minimum PREN of 18 may be used.
- Hot dipped galvanised structural members shall only be used in places where rusting can readily be detected and maintenance repair can be carried out. Alternative is 304 stainless steel
- Plastic components of rotating cowls shall be UV stabilised where exposed to sunlight
- Materials for vent lines and bends shall comply with the Sewerage Code of Australia (Sydney Water Edition)

2.2 General Requirements
- Unless restricted by the maximum design height or building height, vents shall be at least 2 m higher than adjacent buildings and any proposed building having DA approval
- Wind load design criteria shall comply with AS 1170.2, Region A2 or A3 as appropriate and Category 1
- Vent size shall be the same size as the sewer up to DN 300. For larger sewers, special design is required
- Vents shall be designed to support ladders used for maintenance
- All vents shall have an anemometer access (minimum opening 115 x 55 mm) and door within 1.5 m of the ground to allow access to the line
- A vent line shall only be constructed off a maintenance hole (MH) and shall have a minimum of 1% grade back to the MH (i.e. wet vent lines, where the line was constructed off a customer sanitary drain, are no longer permitted)
- The length of any vent from the MH to the top of the vent (cowl) shall not exceed 25 m, or 35 m if the line is increased by one (1) nominal size
- The depth of the vent line shall be between 0.5 m and 1.5 m

Guy Wire Type
- Base of vent shall have a minimum of 2 m clearance on all sides to facilitate maintenance
- Main structural members shall be a minimum of 70x70x8 mm hot-dipped galvanised “T” iron
- Tube thickness shall be 1.2 mm
- Concrete around the base shall be graded at a 30 to 45 degree angle to prevent build-up of leaf litter and soil
- All guy wires shall have turnbuckles with lock nuts

DTC 9-18 m Post Type
- Vent shall have a minimum of 2 m clearance on all sides to facilitate maintenance

9 m Post Type
- Maximum height shall be 9 m and tube thickness 1.2 mm
- Concrete around the base shall be graded at a 30 to 45 degree angle to prevent build-up of leaf litter and soil

Wall Type
- Vent shall be attached to a structural building wall that is at least double brick or 150 mm concrete
- Vent shall not pass through eves or roofing material
• Guy wires may be required to stabilise the free-standing section of vent
• Bracket spacing shall be a minimum of 2 m and anchor points shall be rated at 5 kN or greater.
• Preference is for vent tube not to be enclosed inside a wall cavity. If enclosing the vent is the only option, then access to the base shall be provided by means of an access door of minimum dimensions 1.5 m by 1 m and through which it must be possible to remove the vent.
• Tube thickness shall be 1.2 mm for vents less than 20 m high. The bottom section of tube of vents greater than 20 m high shall have a thickness of 2 mm

Fibreglass Vent
• Acceptable sizes are DN 150, 200, 225, 250, 300, 350 and 400 and heights from 13 to 16 m
• A concrete block and spigot design is preferred to the flange option
• The outside of the tube shall be flow-coated with a colour as close as practicable to environmental green
• Fibreglass vents shall be manufactured from vinyl ester resin and “E” glass fibres with flow-coat on the external surface

2.3 Surface Finish

Unless otherwise specified, painting of stainless steel vents is not required. All external stainless steel surfaces shall be bead blasted to achieve a non-directional low reflective uniform matt finish with a surface roughness profile of Ra 3.5 to 4.5 microns. Blast media shall be glass. The blasting media shall be free of contamination including iron and steel. The blasted surface shall then be chemically passivated.

Some vent shafts require painting for aesthetic or environmental reason. Where it is required, painting shall be done in accordance with coating system PUR-B of WSA 201 Manual for Selection and Application of Protective Coatings and its Sydney Water supplement.
3. DEEMED-TO-COMPLY DESIGNS

Sydney Water has prepared the following designs that are deemed-to-comply with the requirements outlined in the previous section.

3.1 DTC 9-18 m Post Type

<table>
<thead>
<tr>
<th>Drawing Title</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless steel 9-18 m Height DN150-DN300, Sheet 1 of 2</td>
<td>DTC 2300</td>
</tr>
<tr>
<td>Stainless steel 9-18 m Height DN150-DN300, Sheet 2 of 2</td>
<td>DTC 2301</td>
</tr>
<tr>
<td>Replacement, Stainless steel 9-18 m Height DN150-DN300, Sheet 2 of 2</td>
<td>DTC 2302</td>
</tr>
</tbody>
</table>

3.2 Guy Wire, 9 m Post and Wall Types

<table>
<thead>
<tr>
<th>Drawing Title</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educt Ventshaft Base Block Details</td>
<td>SEW-1451-S</td>
</tr>
<tr>
<td>Educt Ventshaft Guy Wire Type DN 150 Shaft and Details</td>
<td>EPS 700.01</td>
</tr>
<tr>
<td>Educt Ventshaft Guy Wire Type DN 150 Details</td>
<td>EPS 700.02</td>
</tr>
<tr>
<td>Educt Ventshaft Guy Wire Type DN 225 Shaft and Details</td>
<td>EPS 700.03</td>
</tr>
<tr>
<td>Educt Ventshaft Guy Wire Type DN 225 Details</td>
<td>EPS 700.04</td>
</tr>
<tr>
<td>Educt Ventshaft Guy Wire Type DN 300 Shaft and Details</td>
<td>EPS 700.05</td>
</tr>
<tr>
<td>Educt Ventshaft Guy Wire Type DN 300 Details</td>
<td>EPS 700.06</td>
</tr>
<tr>
<td>Educt Ventshaft Post Type DN 150 - 9 m</td>
<td>EPS 700.07</td>
</tr>
<tr>
<td>Educt Ventshaft Wall Type DN 150, 225 and 300</td>
<td>EPS 700.08</td>
</tr>
<tr>
<td>Educt Ventshaft Wall (Cavity) Type DN 150, 225 and 300</td>
<td>EPS 700.09</td>
</tr>
<tr>
<td>Educt Ventshaft Wall Type Clip Bands and Anemometer Door Details</td>
<td>EPS 700.10</td>
</tr>
<tr>
<td>Induct/Educt Ventshafts Rotating Cowl Detail</td>
<td>EPS 700.11</td>
</tr>
<tr>
<td>Induct Ventshaft Wire Cowl Details</td>
<td>EPS 700.12</td>
</tr>
<tr>
<td>Induct Ventshaft DN 150 and 225 Fluted Cowl Details</td>
<td>EPS 700.13</td>
</tr>
</tbody>
</table>

Note: The EPS drawings may have contradicting requirements to the details in Section 2. Where there is a contradiction, the requirements in the Section 2 shall prevail.

4. ALTERNATIVE DESIGNS

Sydney Water encourages alternative design proposals that meet the essential requirements detailed in this document. An alternative design must first be approved by Sydney Water before it can be adopted. To facilitate this, any new design should be accompanied by detailed design drawings, material specifications and calculations.
5. REFERENCE MAINTENANCE INFORMATION

For information, related maintenance drawings (available upon request) include the following:

<table>
<thead>
<tr>
<th>Drawing Title</th>
<th>Drawing No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventshaft Maintenance Guy Wire Type DN 150</td>
<td>4376/33</td>
</tr>
<tr>
<td>Ventshaft Maintenance Guy Wire Type DN 225 and 300</td>
<td>4377/33</td>
</tr>
<tr>
<td>Ventshaft Maintenance Post Type DN 150, 225 and 300</td>
<td>4378/33</td>
</tr>
<tr>
<td>Ventshaft Maintenance DN 150 and 225 Cast Iron Type</td>
<td>4379/33</td>
</tr>
<tr>
<td>Ventshaft Maintenance Ladder 8 m Timber Type</td>
<td>4380/33</td>
</tr>
</tbody>
</table>
### Table 1 - Vent Fire Openings

<table>
<thead>
<tr>
<th>Duct Dia</th>
<th>Max Height</th>
<th>Fire Schedule</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN150</td>
<td>14,000</td>
<td>560</td>
<td>154.03</td>
</tr>
<tr>
<td>DN200</td>
<td>14,500</td>
<td>560</td>
<td>137.32</td>
</tr>
<tr>
<td>DN250</td>
<td>15,000</td>
<td>560</td>
<td>121.55</td>
</tr>
<tr>
<td>DN300</td>
<td>15,500</td>
<td>560</td>
<td>105.78</td>
</tr>
</tbody>
</table>

### Table 2 - Vent Fire Openings (Internal Dia. with Fire Stays)

<table>
<thead>
<tr>
<th>Duct Dia</th>
<th>Max Height</th>
<th>Fire Schedule</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN150</td>
<td>14,000</td>
<td>560</td>
<td>154.03</td>
</tr>
<tr>
<td>DN200</td>
<td>14,500</td>
<td>560</td>
<td>137.32</td>
</tr>
<tr>
<td>DN250</td>
<td>15,000</td>
<td>560</td>
<td>121.55</td>
</tr>
<tr>
<td>DN300</td>
<td>15,500</td>
<td>560</td>
<td>105.78</td>
</tr>
</tbody>
</table>

---

**DEEMED TO COMPLY DRAWINGS**

**VENTILATION SHAFT**

STAINLESS STEEL 9 - 18m HEIGHT

DN150 - DN300  SHEET 1 OF 2

**DTC 2300**

**Sydney WATER**

**APPROVED**

F. OLIPHAN

MANAGER - E & E

**ENGINEERING & ENVIRONMENTAL SERVICES**

**STANDARDCONFORMITY**

**DEPARTMENT OF PUBLIC WORKS**

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*Notes:*

1. All openings sized exercising inherent fire stopping.
2. Ventilation shafts sized exercising inherent fire stopping.
3. Structural opening exercises inherent fire stopping.
4. All openings sized exercising inherent fire stopping.
5. Sectional views exercises inherent fire stopping.
6. All openings sized exercising inherent fire stopping.
7. All openings sized exercising inherent fire stopping.
8. All openings sized exercising inherent fire stopping.
9. All openings sized exercising inherent fire stopping.
10. All openings sized exercising inherent fire stopping.
11. All openings sized exercising inherent fire stopping.
12. All openings sized exercising inherent fire stopping.
13. All openings sized exercising inherent fire stopping.
14. All openings sized exercising inherent fire stopping.
15. All openings sized exercising inherent fire stopping.
16. All openings sized exercising inherent fire stopping.
17. All openings sized exercising inherent fire stopping.
18. All openings sized exercising inherent fire stopping.
**VENTSHAFT BASE BLOCK**

**TABLE 1**

**VENTSHAFT AND BASE BLOCK DIMENSIONS FOR SHAFT HEIGHTS 9m TO 18m**

<table>
<thead>
<tr>
<th>VENTSHAFT NOMINAL DIAMETER</th>
<th>BASE DIMENSIONS</th>
<th>MINIMUM SHAFT PENE TRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IN SAND WxWxD (m)</td>
<td>IN SOLID ROCK WxWxD (m)</td>
</tr>
<tr>
<td>150</td>
<td>1.5 x 1.5 x 1.2</td>
<td>0.9 x 0.9 x 0.9</td>
</tr>
<tr>
<td>225</td>
<td>1.9 x 1.9 x 1.2</td>
<td>1.1 x 1.1 x 1.1</td>
</tr>
<tr>
<td>300</td>
<td>2.2 x 2.2 x 1.4</td>
<td>1.2 x 1.2 x 1.2</td>
</tr>
</tbody>
</table>

**NOTES**

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. VENTSHAFTS TO COMPLY WITH SYDNEY WATER'S VENTSHAFT GUIDELINES AND TECHNICAL REQUIREMENTS.
3. VENTSHAFTS TO BE EITHER:
   (i) DUCT GUY WIRE TYPE
   (ii) POST TYPE
4. LOCATION, HEIGHT AND SIZE OF BASE BLOCK TO BE AS SPECIFIED IN DESIGN DRAWINGS.
5. SIZE OF BASE BLOCK MAY VARY TO SUIT PARTICULAR CONDITIONS PREVAILING ON SITE, BUT UNDER NO CIRCUMSTANCES IS BLOCK TO BE SMALLER THAN SHOWN IN TABLE 1.
6. CONCRETE TO BE NORMAL CLASS TO AS 1779 AND MINIMUM STRENGTH GRADE 28.
7. COLUMN SUPPORT DETAILS TO BE AS SHOWN IN DESIGN DRAWINGS.
8. POSITION A 230 OVERBURIED TUBE IN CONCRETE BLOCK TO ACT AS FORMWORK DURING INSTALLATION. SEAL BOTTOM EDGES OF SLEEVE BEFORE CONCRETE POUR.

**COMPOSITE MAINTENANCE HOLE**

**VENTSHAFT BASE BLOCK**

**DIAGRAM:**

- **ELEVATION:** Ventshaft Base Block
- **COMPOSITE MAINTENANCE HOLE ELEVATION:**
- **END ELEVATION:**
- **SECTION:**

**SYDNEY WATER CODE:**

**SEWERAGE CODE WSA-02**

**VENTILATION DETAILS:**

**EDUCT VENTSHAFT BASE BLOCK DETAILS**
14 m STEEL SUPPORT PIECE

PART No. 1
NO. OFF - 2

PART No. 2
NO. OFF - 1

18 m EXTENSION PIECE

PART No. 3
NO. OFF - 3

150 RING BRACKET

NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
2. VENT TUBE SUPPORTS TO BE 15A 30 X 3 GALVANCED "T" IRON
3. STEEL SUPPORTS & BRACKETS TO BE HOT DIPPED GALVANIZED AND COATED AS PER DRAWING
4. ALL ANGLES TO BE 3 SIDED BRANCHED FULL DEPTH AS SHOWN.
5. ALL GAGES TO BE NO. 5 1/2" UNC X 3/4" HEXAGON SET SCREWS AND SS WASHERS FOR METRIC EQUIVALENT.
NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. VENT TUBE SUPPORT LEGS TO BE 76 X 76 X 3 GALVANIZED "T" IRON.
3. STEEL SUPPORTS & BRACKETS TO BE HOT DIPPED GALVANIZED AND COATED AS PER RECOMMENDATIONS.
4. ALL WELDS TO BE 7 MIG WELD (6/8) DEPTH TO AS PER.
5. ALL M36 x 700 mm LIME 2 3/8" KENSON SET SCREWS AND 3 X WASHERS OR METRIC COUNTERSUNK.
When shaft is over 3500 above roof two wire stays to be fitted and secured to roof. Circular clip and guy wire shall be used (Refer DRG EPS 700.01 & EPS 700.10)

Section showing shaft deviating around eaves (not preferred)

Notes:
1. All dimensions in millimeters unless otherwise noted.
2. Vent tubes to be DN 300 304 (minimum) SS. Either extruded or spiral welded.
3. Vent shaft tubing, steel supports, brackets & cowls should be painted as per contract specification.
4. Maximum height of wall vents specified on this drawing is 20 m. For wall vents between 20 m & 35 m, the principles on this drawing can be used. If the vent diameter is increased by one nominal diameter and individually designed.
5. Maximum length of vent line from MH to top of vent (cowl) shall not exceed 25m or 35m if the line is increased by one nominal size.
6. All bolts & washers to be M12 304 SS 75 long unless noted otherwise.
7. Wall anchors are to be designed for a load of 10kN.

Prefered option - attached to solid wall

<table>
<thead>
<tr>
<th>Height of Vent</th>
<th>Dimensions</th>
<th>W</th>
<th>D</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 15 m</td>
<td></td>
<td>600</td>
<td>800</td>
<td>1000</td>
</tr>
<tr>
<td>15 to 20 m</td>
<td></td>
<td>800</td>
<td>900</td>
<td>1100</td>
</tr>
</tbody>
</table>
NOTES

1. The option shown on this drawing is only allowed when it is not possible to attach the vent to an outside wall.
2. All dimensions in millimeters unless otherwise noted.
3. Vent tubes to be DN 300 304 (minimum) SS, either extruded or spiral welded.
4. Vent shaft tubing, steel supports, brackets & cowls should be painted as per contract specification.
5. Maximum height of wall vents specified on this drawing is 20 m. For wall vents between 20 m & 35 m, the principles on this drawing can be used. If the vent diameter is increased by one nominal diameter and individually designed.
6. Maximum length of vent line from MH to top of vent (cowl), shall not exceed 25 m, or 35 m if the line is increased by one nominal size.
7. All bolts & washers to be M16 304 SS 75 long unless noted otherwise.
8. Wall anchors are to be designed for a load of 10 kN.
NOTES
1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. ALL MATERIAL TO BE 304 SS.

VENTSHAFT NOMINAL DIAMETER | DIMENSION "D"
---|---
150 | 152
225 | 228
300 | 304
**INDUCT COWL**

- Aerodynamically designed wind vane to ensure opening faces into the wind.
- Minimum overlap of tubes 150.
- Φ15 SS shaft and bearings located in throat of spider strut.
- Top SS strut to hold shaft.
- Spider 25 x 5 bar bearing & housing.
- 15 square Φ1 wire mesh over inlet.

**NOTES**

1. All dimensions in millimetres.
2. All materials to be 304 SS unless otherwise specified.
3. All metal surfaces to be coated in accordance with PCS109.
4. Rotating shafts to be SS.
5. Bearings to be N 308SS.
6. Rotor ventilation blades to be aluminium or UV inhibited ABS polycarbonate.

<table>
<thead>
<tr>
<th>NOM SIZE</th>
<th>DIM A</th>
<th>DIM B</th>
<th>DIM C</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>145</td>
<td>320</td>
<td>250</td>
</tr>
<tr>
<td>225</td>
<td>220</td>
<td>480</td>
<td>350</td>
</tr>
<tr>
<td>300</td>
<td>300</td>
<td>600</td>
<td>400</td>
</tr>
</tbody>
</table>

**ROTATING COWL**

<table>
<thead>
<tr>
<th>NOM SIZE</th>
<th>DIM D</th>
<th>DIM E</th>
<th>Dim F</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>230</td>
<td>220</td>
<td>540</td>
</tr>
<tr>
<td>225</td>
<td>320</td>
<td>340</td>
<td>640</td>
</tr>
<tr>
<td>300</td>
<td>480</td>
<td>470</td>
<td>820</td>
</tr>
</tbody>
</table>
NOTES
1. ALL DIMENSIONS IN MILLIMETERS.
2. ALL MATERIAL 304 SS.
3. COWL TO BE PAINTED AS IN CONTRACT SPECIFICATION.

<table>
<thead>
<tr>
<th>VENTSHAFT NOMINAL DIAMETER</th>
<th>DIMENSIONS</th>
<th>NO. OFF RIBS</th>
<th>RIB THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>240 230 200 38 145</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>225</td>
<td>330 305 230 38 220</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>300</td>
<td>440 405 305 50 295</td>
<td>8</td>
<td>4</td>
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