

Ventshaft Guidelines

July 2015

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).



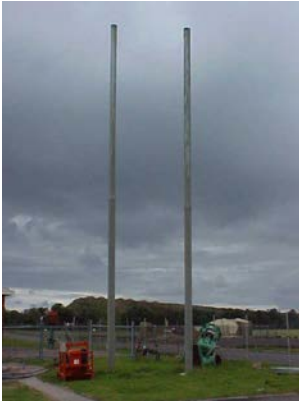
Wall Type

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 eaves 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. DEEEMED-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

Drawing Title	Drawing No.
Stainless steel 9-18 m Height DN150-DN300, Sheet 1 of 2	DTC 2300
Stainless steel 9-18 m Height DN150-DN300, Sheet 2 of 2	DTC 2301
Replacement, Stainless steel 9-18 m Height DN150-DN300, Sheet 2 of 2	DTC 2302

3.2 Guy Wire, 9 m Post and Wall Types

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

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:

Drawing Title	Drawing No.
Ventshaft Maintenance Guy Wire Type DN 150	4376/33
Ventshaft Maintenance Guy Wire Type DN 225 and 300	4377/33
Ventshaft Maintenance Post Type DN 150, 225 and 300	4378/33
Ventshaft Maintenance DN 150 and 225 Cast Iron Type	4379/33
Ventshaft Maintenance Ladder 8 m Timber Type	4380/33

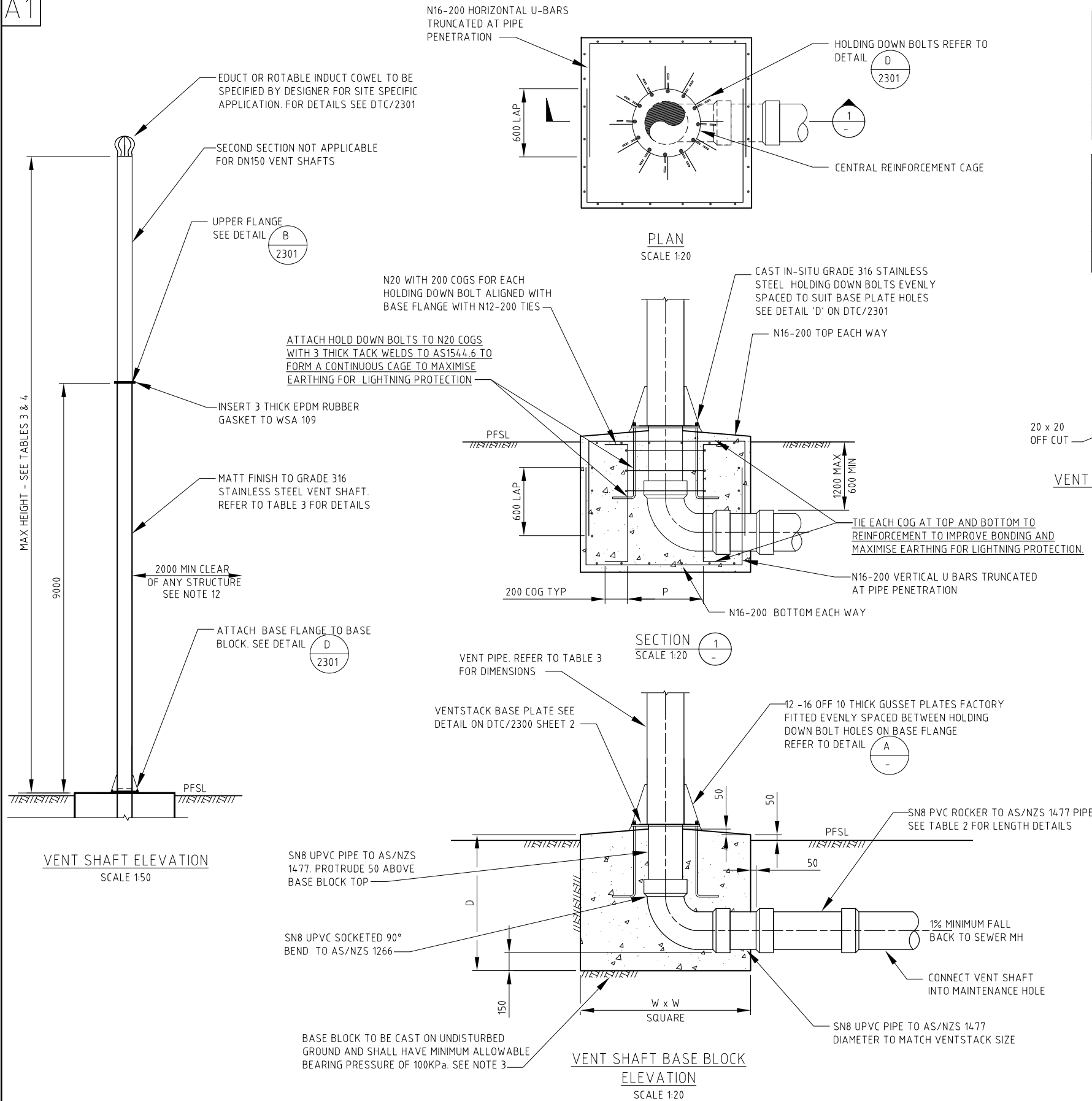


TABLE 1 - BASE BLOCK DIMENSIONS

SIZE	MIN 100KPa ALLOWABLE BEARING PRESSURE		
	W	D	P
DN150	1750	1300	Ø450
DN225	2250	1500	Ø550
DN300	2500	1500	Ø600

TABLE 2- ROCKER PIPE DIMENSIONS

SIZE	MIN	MAX
DN150	300	450
DN225	450	675
DN300	600	900

THIS DRAWING MAY ONLY BE USED IN THE COURSE OF AND FOR THE PURPOSE OF CREATING SYDNEY WATER ASSETS. USE THIS DRAWING WITH CARE. THE USER IS RESPONSIBLE FOR THE CORRECT APPLICATION OF THIS DRAWING.

NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- VENTILATION SHAFT DESIGN BASED ON AS/NZS 1170.2:2011 STRUCTURAL DESIGN ACTIONS PART 2: WIND ACTIONS. REFER TO TABLES 3 AND 4 FOR APPLICABLE DESIGN WIND SPEED.
- FOUNDATION MATERIALS TO BE INSPECTED AND APPROVED BY AN EXPERIENCED GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION OF THE CONCRETE BASE BLOCK. ANY OVER- EXCAVATION OR VOIDS IN THE FOUNDATION MATERIALS TO BE FILLED WITH CLASS N15 MASS CONCRETE TO AS 1379.
- ALL REINFORCEMENT SHALL BE TO AS/NZS 4671 SHAPE -D, STRENGTH GRADE - 500 MPa, DUCTILITY CLASS - N WITH 70 CLEAR COVER.
- ALL CONCRETE SHOWN SHALL BE CLASS N32 TO AS1379. SLUMP SHALL BE IN THE RANGE OF 80-120. MAXIMUM NOMINAL AGGREGATE SIZE SHALL BE 20.
- VENT SHAFT SHOULD NOT BE ERECTED UNTIL THE CONCRETE BASE BLOCK HAS REACHED 25 MPa STRENGTH.
- DESIGN IS NOT SUITABLE FOR APPLICATION IN AGGRESSIVE SOIL CONDITIONS.
- ALL STAINLESS STEEL SHALL BE GRADE 316L TO ASTM A240M. VENT PIPE SHALL BE TO ASTM A312. FLANGES ARE TO BE SEALED WITH A 3 THICK EPDM GASKET WITH LOCK NUTS AND BOLTS TO ASTM A276. BOLTS SHALL BE TIGHTENED 'SNUG TIGHT'. FLANGES SHALL BE FACTORY FILLET WELDED TO THE VENT PIPE TO AS 1544.6.
- ALL STAINLESSBEAD BLASTING
- WHERE PROPRIETARY PRODUCTS ARE SPECIFIED, THE PRODUCT SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
- FINAL DIMENSION OF ALL ELEMENTS TO BE SHOWN ON WAC DRAWINGS.
- EXTERNAL SURFACES FOR ALL STAINLESS STEEL ITEMS 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. NO ADDITIONAL PICKLING OR PASSIVATION IS REQUIRED FOR BLASTED SURFACES.
- UNLESS DIRECTED OTHERWISE BY SYDNEY WATER, THE VENT SHAFT SHALL NOT BE PAINTED. WHERE REQUIRED, PAINTING SHALL BE IN ACCORDANCE WITH SYSTEM CS-03 OF SYDNEY WATER STANDARD SPECIFICATION PCS-100 PROTECTIVE COATING STANDARD. BEAD BLASTING IS NOT REQUIRED FOR VENT SHAFTS TO BE PAINTED.
- THIS DRAWING SHALL BE READ IN IN CONJUNCTION WITH DEEMED TO COMPLY DRAWING DTC/2301.

TABLE 3- VENT PIPE DIMENSIONS
DESIGN WIND SPEED = 56 m/s

NOMINAL DIAMETER	MAX HEIGHT	PIPE SCHEDULE	DIMENSIONS	
			OD	WALL THICKNESS
DN150	14,000	S80	168.3	10.97
DN225	18,000	S40	273.1	9.27
DN300	18,000	S40	323.9	9.53

TABLE 4 - VENT PIPE DIMENSIONS
DESIGN WIND SPEED = 89 m/s

NOMINAL DIAMETER	MAX HEIGHT	PIPE SCHEDULE	DIMENSIONS	
			OD	WALL THICKNESS
DN150	9,000	S80	168.3	10.97
DN225	12,000	S40	273.1	9.27
DN300	14,000	S40	323.9	9.53

Sydney
WATER

© COPYRIGHT
STATE OF NEW SOUTH WALES THROUGH SYDNEY
WATER CORPORATION. ALL RIGHTS RESERVED

APPROVED

PETER GILLMAN
MANAGER - E & ES

ENGINEERING & ENVIRONMENTAL SERVICES

LETTER	DETAILS OF ISSUE / AMENDMENT	APP'D	DATE
C	APPLICABLE HEIGHT RANGE AMENDED. DESIGN WIND SPEED ADDED. GENERAL REVISION	RL	16/04/13
B	REFERENCE DRAWING No.s REVISED. GENERAL REVISION	RL	01/03/13
A	ORIGINAL ISSUE	PJG	21/12/12

DEEMED TO COMPLY DRAWINGS

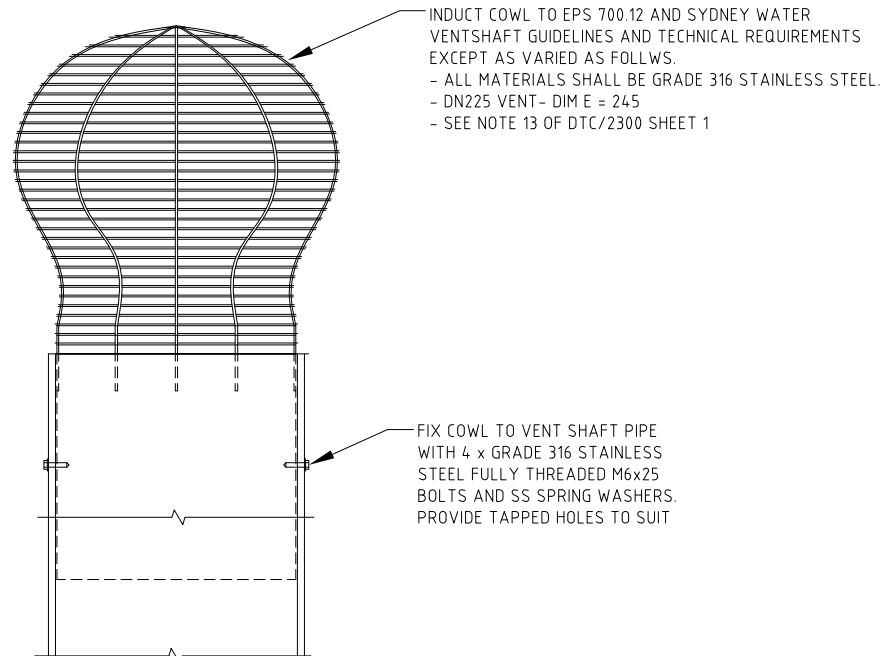
VENTILATION SHAFT
STAINLESS STEEL 9 - 18m HEIGHT
DN150 - DN300 SHEET 1 OF 2

DTC
2300

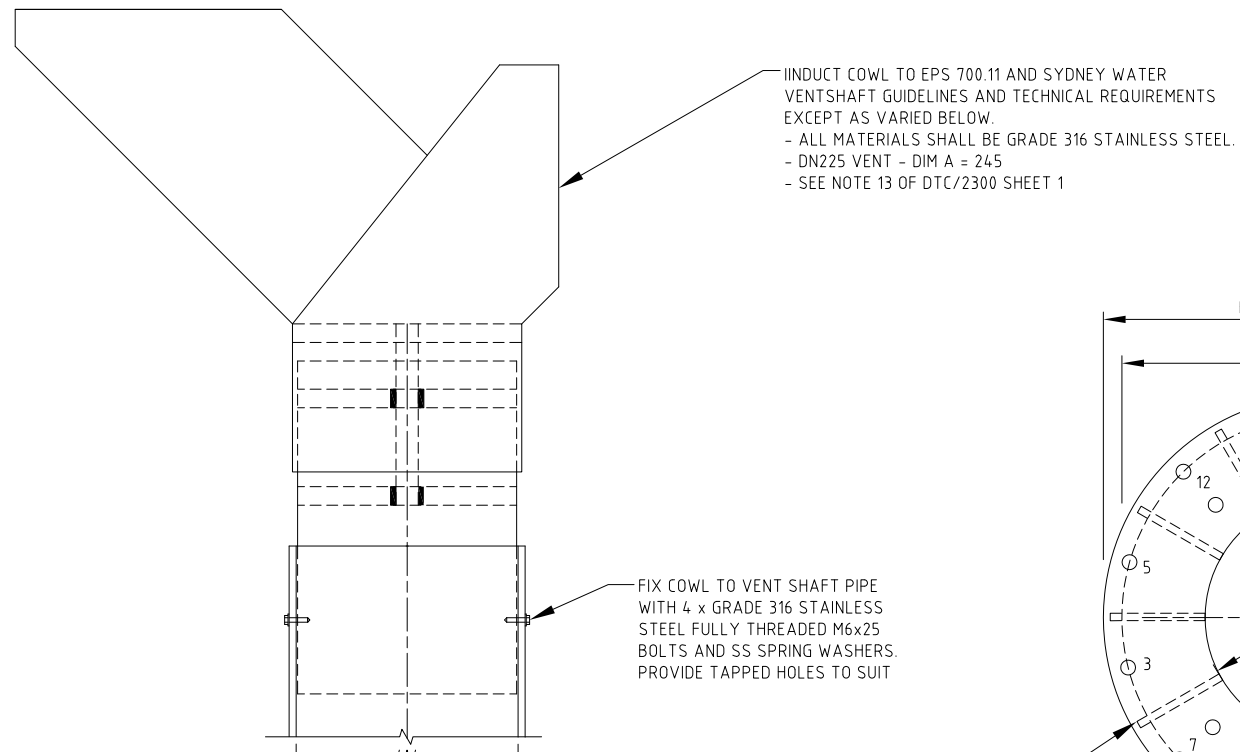
ISSUE	DATE
C	16/04/13

NOTES:

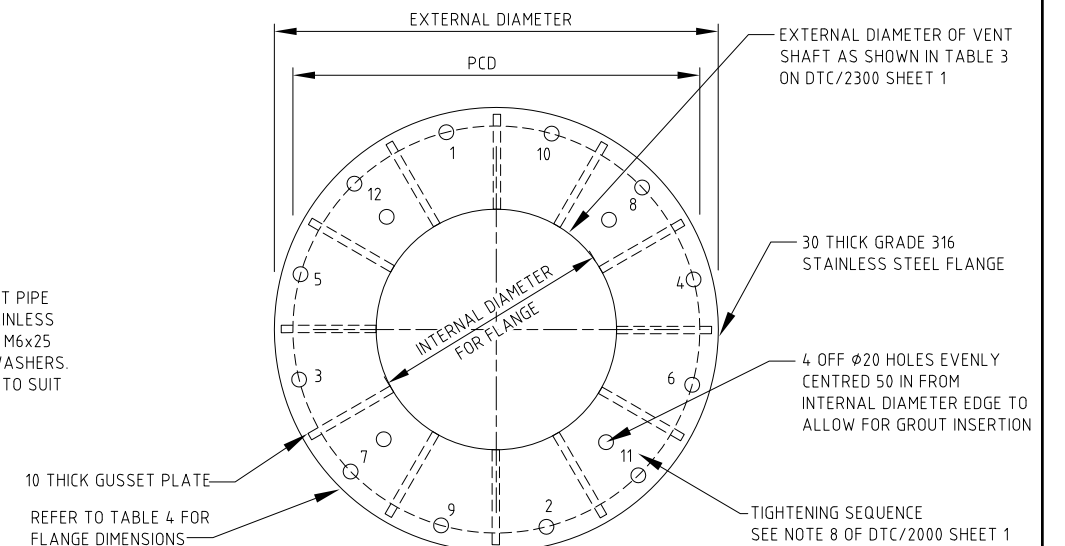
1. THIS DRAWING SHALL BE READ IN IN CONJUNCTION WITH
DEEMED TO COMPLY DRAWING DTC/2300 SHEET 1.



ELEVATION
EDUCT COWL
SCALE 1:5

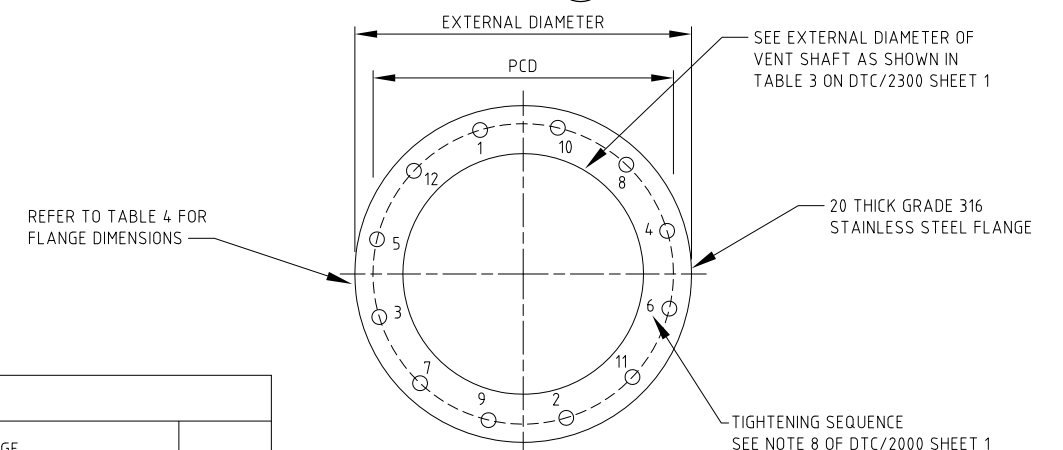


REFER TO TABLE 3 FOR DIMENSIONS
ROTABLE INDUCT COWL DETAIL
SCALE 1:5



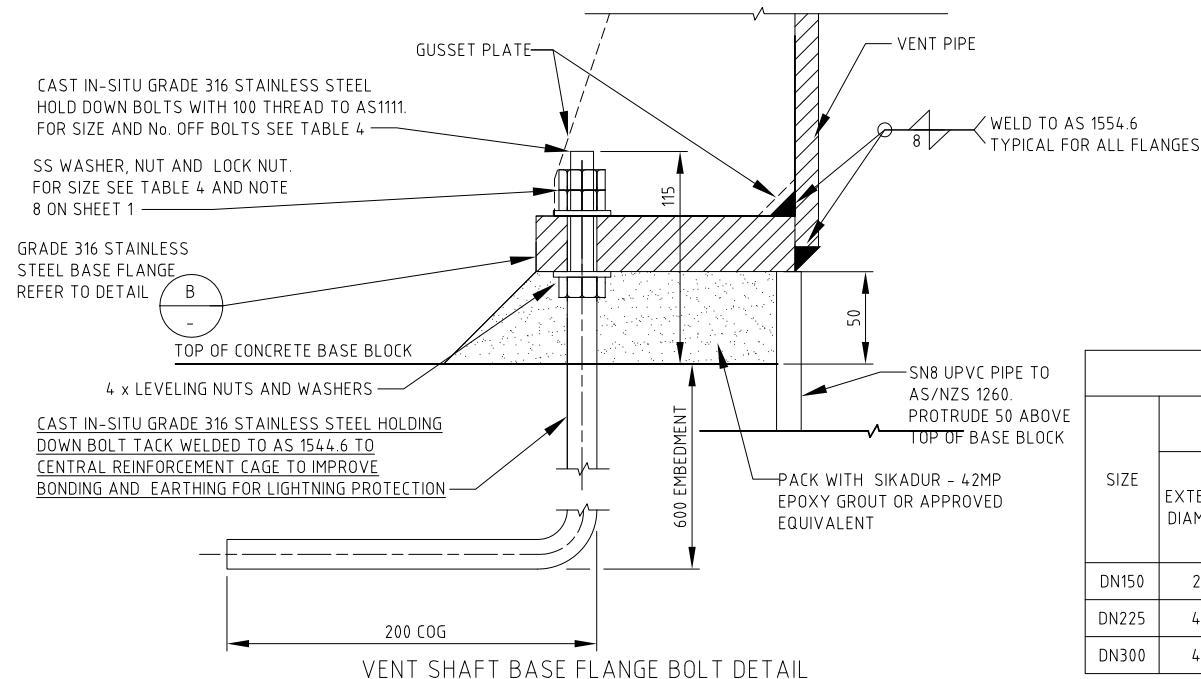
VENT SHAFT BASE FLANGE

DETAIL C
SCALE 1:5



VENT SHAFT UPPER FLANGE
(NOT REQUIRED FOR DN150 VENT SHAFTS)

DETAIL B
SCALE 1:5



VENT SHAFT BASE FLANGE BOLT DETAIL

DETAIL D
SCALE 1:2

TABLE 4- UPPER FLANGE AND BASE FLANGE DIMENSIONS									
SIZE	UPPER FLANGE				BASE FLANGE				INTERNAL DIAMETER
	EXTERNAL DIAMETER	PITCH CIRCLE DIAMETER (PCD)	BOLTS No. OFF AND SIZE	DIAMETER OF BOLT HOLES	EXTERNAL DIAMETER	PITCH CIRCLE DIAMETER (PCD)	BOLTS No. OFF AND SIZE	DIAMETER OF BOLT HOLES	
DN150	280	235	8/M16	18	460	400	12/M20	24	170.5
DN225	405	356	8/M20	22	575	500	12/M24	28	275.0
DN300	455	406	12/M20	22	625	550	16/M24	28	325.0

Sydney
WATER

© COPYRIGHT

STATE OF NEW SOUTH WALES THROUGH SYDNEY
WATER CORPORATION. ALL RIGHTS RESERVED

APPROVED

PETER GILLMAN
MANAGER - E & ES

ENGINEERING & ENVIRONMENTAL SERVICES

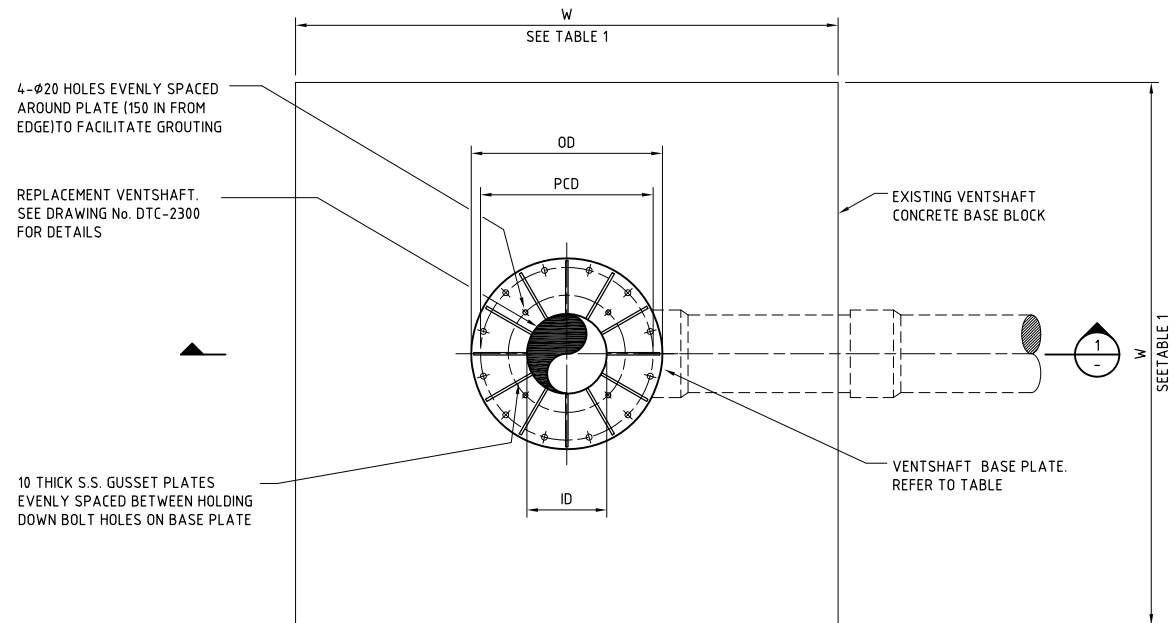
C	APPLICABLE HEIGHT RANGE AMENDED	RL	16/04/13
B	DRAWING No. CHANGED. GENERAL REVISION	RL	01/03/13
A	FINAL ISSUE	PJG	21/12/12
LETTER	DETAILS OF ISSUE / AMENDMENT	APP'D	DATE

DEEMED TO COMPLY DRAWINGS

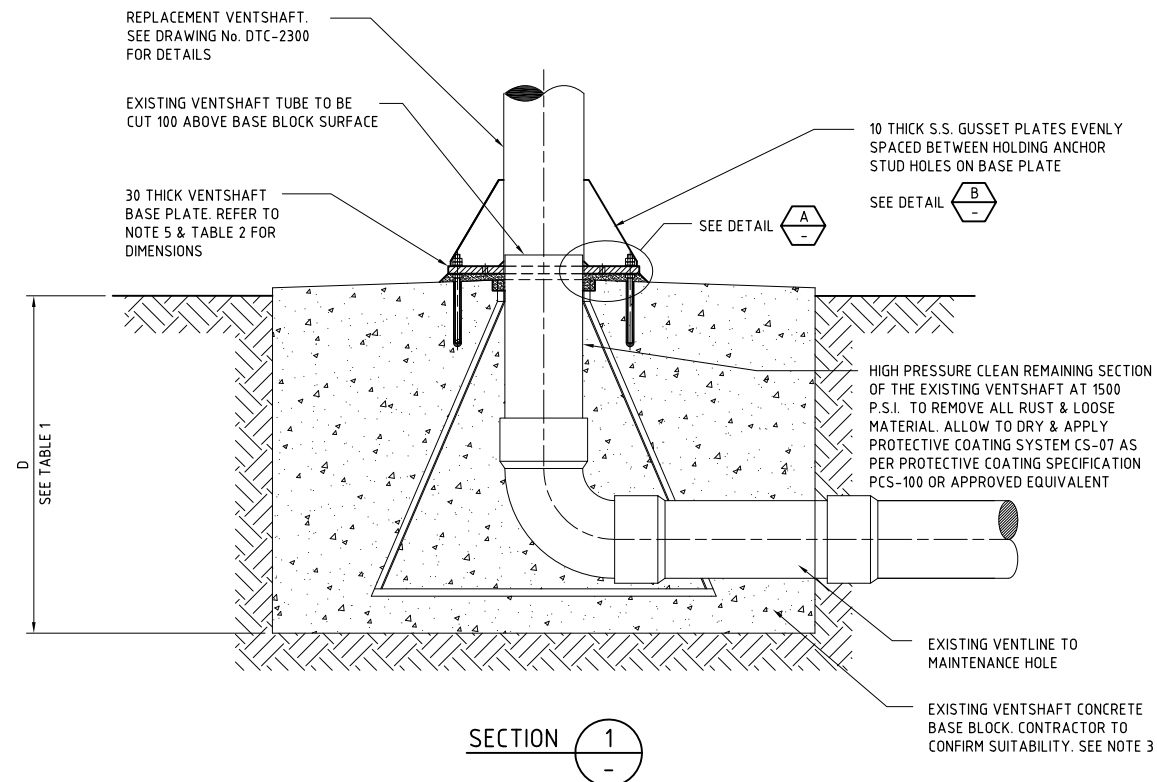
VENTILATION SHAFT
STAINLESS STEEL 9-18m HEIGHT
DN150 - DN300 SHEET 2 OF 2

DTC
2301

ISSUE	DATE
C	16.04.13



PLAN



ARRANGMENT FOR FITTING NEW VENTSHAFT TO EXISTING CONCRETE BASE BLOCK

SCALE - 1:15

4- ϕ 20 HOLES EVENLY SPACED AROUND PLATE (150 IN FROM EDGE) TO FACILITATE GROUTING. FILL WITH GROUT TO TOP OF PLATE

EXISTING VENTSHAFT TUBE TO BE CUT 100 ABOVE CONCRETE SURFACE & SLEEVED INTO NEW VENTSHAFT. IF REQUIRED, CUT SLIT IN EXISTING SHAFT TO FACILITATE INSTALLATION

EXISTING VENTSHAFT T-IRONS CUT BACK TO 50 BELOW CONCRETE SURFACE AND VOID FILLED WITH GROUT

THIS DRAWING MAY ONLY BE USED IN THE COURSE OF AND FOR THE PURPOSE OF CREATING SYDNEY WATER ASSETS. USE THIS DRAWING WITH CARE. THE USER IS RESPONSIBLE FOR THE CORRECT APPLICATION OF THIS DRAWING.

CUT BACK ANCHOR STUD AS REQUIRED

GRADE 316 S.S. NUT, WASHER & LOCK NUT

GRADE 316 S.S. NUT & WASHER BELOW BASEPLATE FOR LEVELLING DURING INSTALLATION - 4 MINIMUM EVENLY SPACED

FILL UNDER BASEPLATE WITH 25-50 THICK "SIKADUR-42 MP" NORMAL GROUT OR APPROVED EQUIVALENT

PRIOR TO GROUTING THE BASE PLATE, CONCRETE SURFACE TO BE HIGH PRESSURE CLEANED AT 1500 P.S.I. WITH WATER TO REMOVE ALL LAITANCE & DEBRIS.

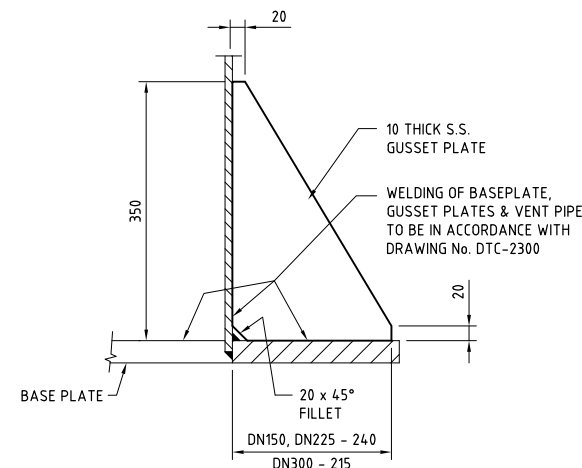
FIX BASE PLATE TO EXISTING CONCRETE BASE WITH "HILTI HIT-RE 500 OR RAMSET CHEMSET RE0502 INJECTION MORTAR, OR APPROVED EQUIVALENT, AND GRADE 316 STAINLESS STEEL ANCHOR STUDS 380 LONG TO ASTM A276

TABLE 1 - MINIMUM BASEBLOCK DIMENSIONS

SIZE	W	D
DN150	1500	1200
DN225	1900	1200
DN300	2200	1400

DETAIL A

SCALE - 1:2.5



DETAIL B

SCALE - N.T.S.

TABLE 2 - BASEPLATE DIMENSIONS

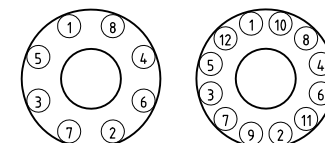
VENTSHAFT DIAMETER	BASEPLATE ID	BASEPLATE OD	PITCH CIRCLE DIAMETER (PCD)	NUMBER OF ANCHOR STUDS	DIAMETER OF BOLT HOLES	ANCHOR STUD SIZE
DN150	168	675	600	8	20	M16
DN225	273	775	700	12	24	M20
DN300	324					

** BOLT HOLE DIAMETER IS FOR THE CONCRETE & THE BASEPLATE

THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No. DTC/2300 (SHEETS 1 & 2)

NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
- A SITE SPECIFIC RISK ASSESSMENT SHALL BE UNDERTAKEN TO DETERMINE IF ADDITIONAL CONTROL MEASURES (SUCH AS EARTHING, BONDING, INSULATION ETC) ARE REQUIRED FOR ELECTRICAL HAZARDS ASSOCIATED WITH LIGHTNING STRIKE OF THE VENT SHAFT.
- PRIOR TO INSTALLING REPLACEMENT VENTSHAFT, THE CONTRACTOR SHALL UNDERTAKE A CONDITION ASSESSMENT OF THE EXISTING CONCRETE BASE TO CONFIRM THE FOLLOWING:
 - THE CONCRETE BASE SHALL BE FREE OF ANY DEFECTS OR SIGNS OF DISTRESS SUCH AS CRACKING OF MORE THAN 100MM IN LENGTH, OR SPALLING, SCALING, SOFTENING, DRUMMINESS, ETC. OF MORE THAN 25MM DEEP.
 - THERE IS NO EXPOSED REINFORCEMENT.
 - SETTLEMENT OR TILTING OF EXISTING BASE DOES NOT EXCEED THE LEAST DIMENSION OF THE BASE DIVIDED BY 100.
 - DIMENSIONS OF THE BASE COMPLIES WITH TABLE 1.
- THE CONTRACTOR SHALL PROVIDE WRITTEN CONFIRMATION TO THE PRINCIPAL PRIOR TO ANY REPLACEMENT WORKS CONFIRMING SUITABILITY IN TERMS OF CONDITION AND DIMENSIONS, OR OTHERWISE, OF THE EXISTING CONCRETE BASE. THE CONTRACTOR IS RESPONSIBLE FOR THE ASSESSMENT.
- ANCHORS SHALL BE ALLOWED TO CURE FOR A MINIMUM OF 48 HOURS PRIOR TO ATTACHING THE VENTSHAFT.
- STAINLESS STEEL BASE PLATE AND GUSSET PLATES SHALL BE GRADE 316L TO ASTM A240M. BEAD BLASTING FOR MATT-FINISH SHALL BE AS PER DTC/2300.
- ALL WELDING OF STAINLESS STEEL SHALL BE IN ACCORDANCE WITH AS/NZS 1554.6.
- ALL PROPRIETARY ITEMS SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATION.
- HOLD DOWN NUTS SHALL BE TIGHTENED USING A TORQUE WRENCH IN THE TIGHTENING SEQUENCE BELOW. SEQUENCE SHALL COMPLETED FIRST FOR 50% AND REPEATED FOR 100% OF FINAL TIGHTENING TORQUE. FINAL TIGHTENING TORQUE SHALL BE 55N.m FOR M16 AND 100N.m FOR M20.



Sydney WATER

© COPYRIGHT

STATE OF NEW SOUTH WALES THROUGH SYDNEY WATER CORPORATION. ALL RIGHTS RESERVED

APPROVED

PETER GILLMAN
MANAGER - E & ES

ENGINEERING & ENVIRONMENTAL SERVICES

C

APPLICABLE HEIGHT RANGE AMENDED

RL

16/04/13

B

DRAWING NO. CHANGED. GENERAL REVISION

RL

01/03/13

A

ORIGINAL ISSUE

PJG

21/12/12

LETTER

DETAILS OF ISSUE / AMENDMENT

APP'D

DATE

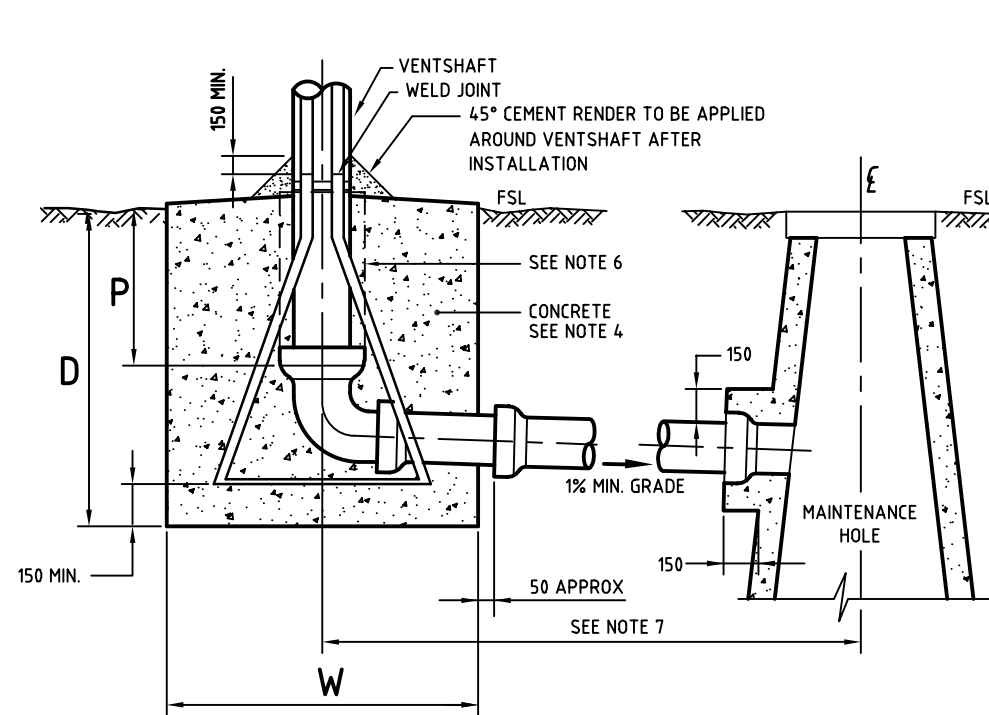
DEEMED TO COMPLY DRAWINGS

**VENTILATION SHAFT REPLACEMENT
STAINLESS STEEL 9-18m HEIGHT
DN150 - DN300**

**DTC
2302**

ISSUE DATE

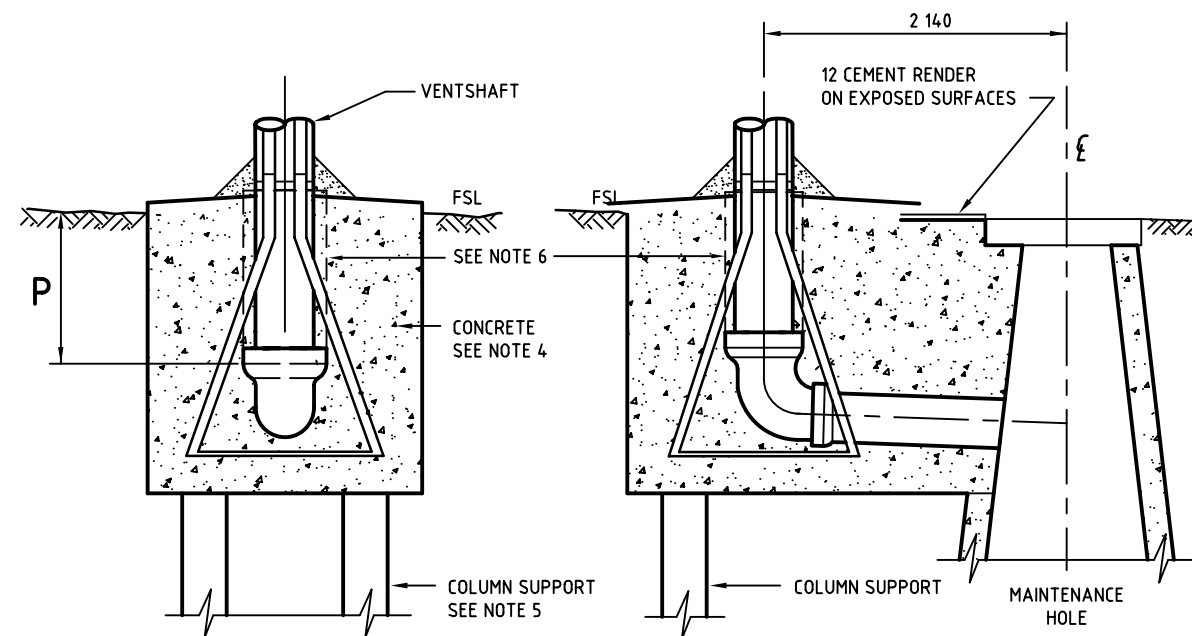
C 16.04.13



ELEVATION

VENTSHAFT BASE BLOCK

SEE NOTE 3



END ELEVATION

ELEVATION

COMPOSITE MAINTENANCE HOLE VENTSHAFT BASE BLOCK

TABLE 1

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

VENTSHAFT NOMINAL DIAMETER	BASE DIMENSIONS		MINIMUM SHAFT PENETRATION P
	IN SAND WxWxD (m)	IN SOLID ROCK WxWxD (m)	
150	1.5 x 1.5 x 1.2	0.9 x 0.9 x 0.9	300
225	1.9 x 1.9 x 1.2	1.1 x 1.1 x 1.1	450
300	2.2 x 2.2 x 1.4	1.2 x 1.2 x 1.2	600

NOTES

- ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
- VENTSHAFTS TO COMPLY WITH SYDNEY WATER'S VENTSHAFT GUIDELINES AND TECHNICAL REQUIREMENTS.
- VENTSHAFTS TO BE EITHER:
 - EDUCT GUY WIRE TYPE
 - POST TYPE

LOCATION, HEIGHT AND SIZE OF BASE BLOCK TO BE AS SPECIFIED IN DESIGN DRAWINGS.

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.
- CONCRETE TO BE NORMAL CLASS TO AS 1379 AND MINIMUM STRENGTH GRADE 20.
- COLUMN SUPPORT DETAILS TO BE AS SHOWN IN DESIGN DRAWINGS.
- POSITION A 20 OVERSIZED TUBE IN CONCRETE BLOCK TO ACT AS FORMWORK DURING INSTALLATION. SEAL BOTTOM EDGES OF SLEEVE BEFORE CONCRETE POUR.
- 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.

PREPARED BY
**ASSET
MANAGEMENT**

© COPYRIGHT

RECOMMENDED

Elizgi
for WASTEWATER SYSTEMS MANAGER

APPROVED

B Nelson 7/08/03
for MANAGER, STRATEGIC ASSET MANAGEMENT

**Sydney
WATER**

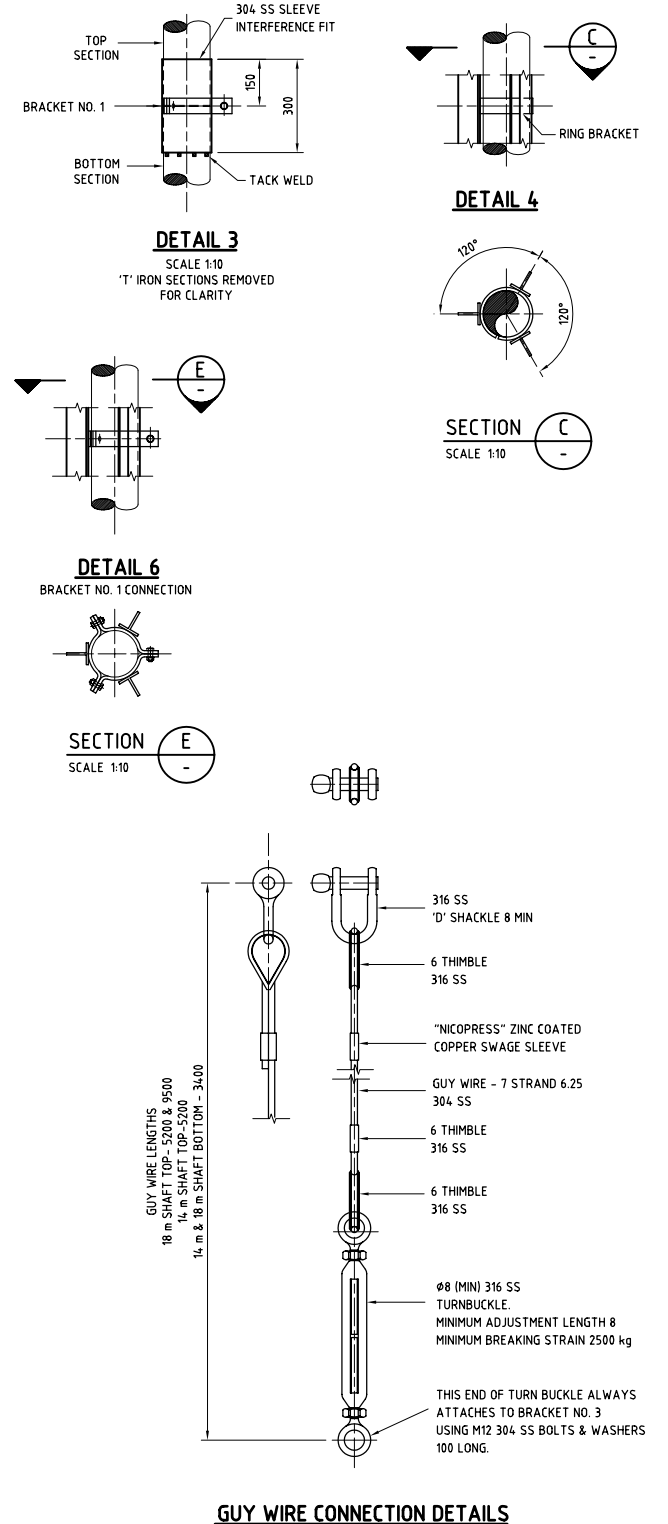
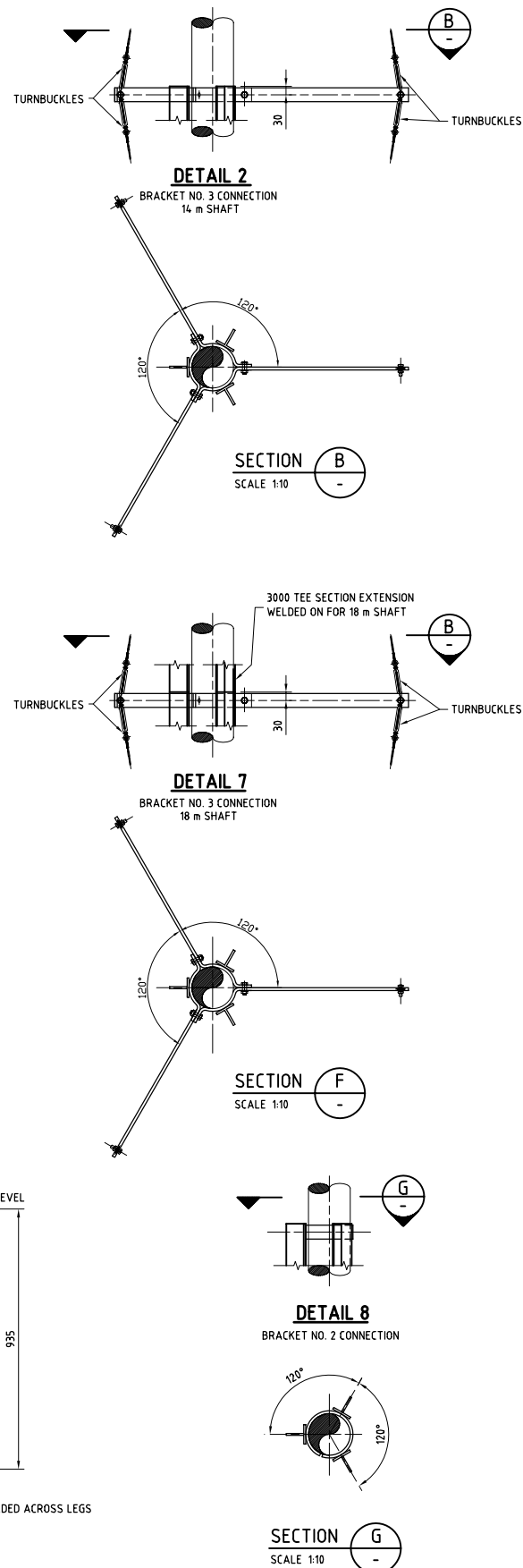
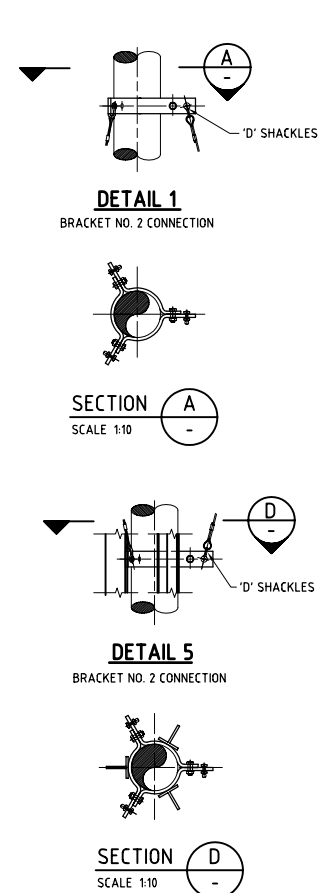
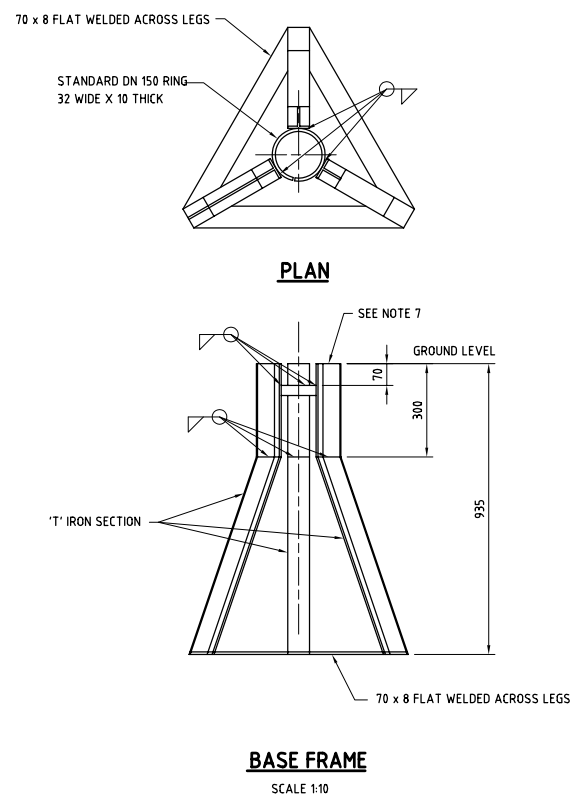
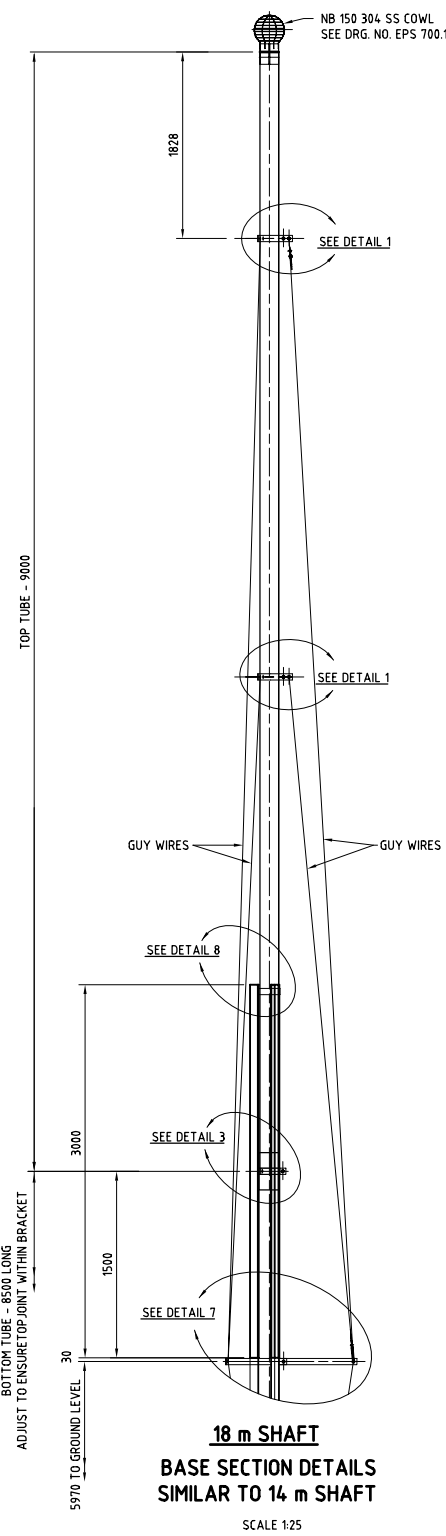
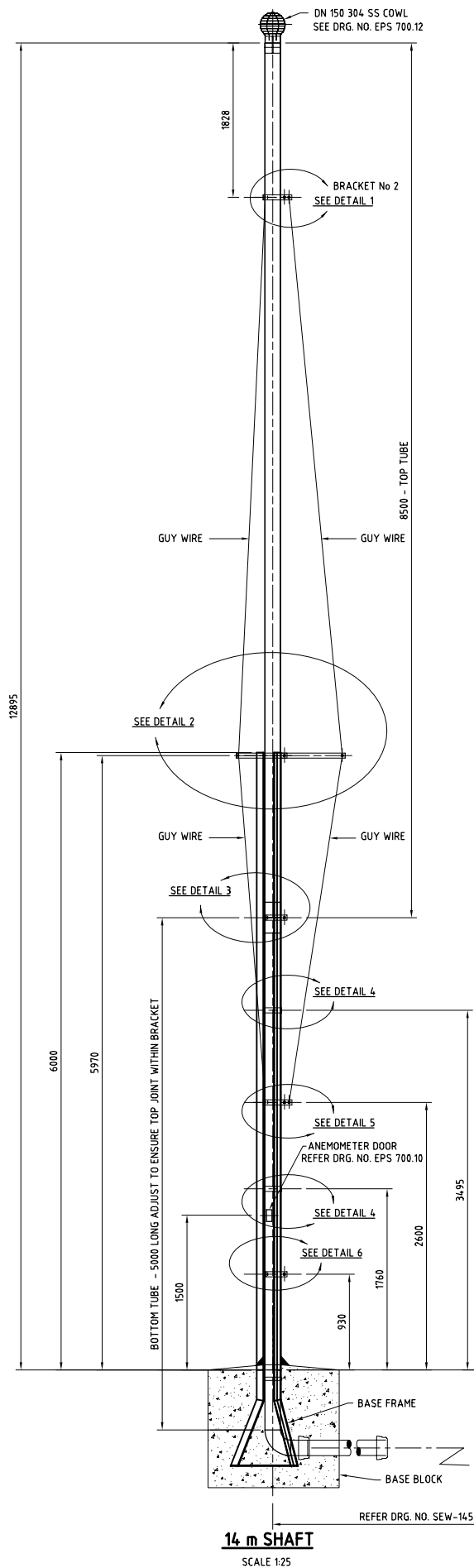
SEWERAGE CODE WSA-02

**VENTILATION DETAILS
EDUCT VENTSHAFT
BASE BLOCK DETAILS**

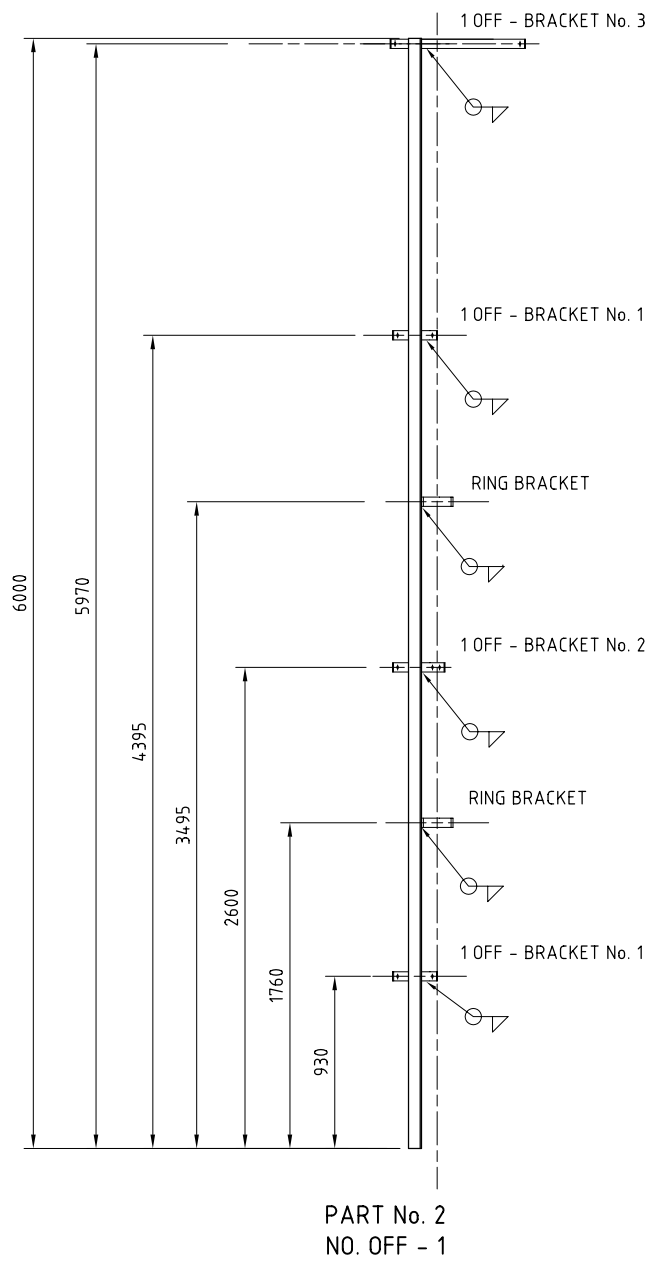
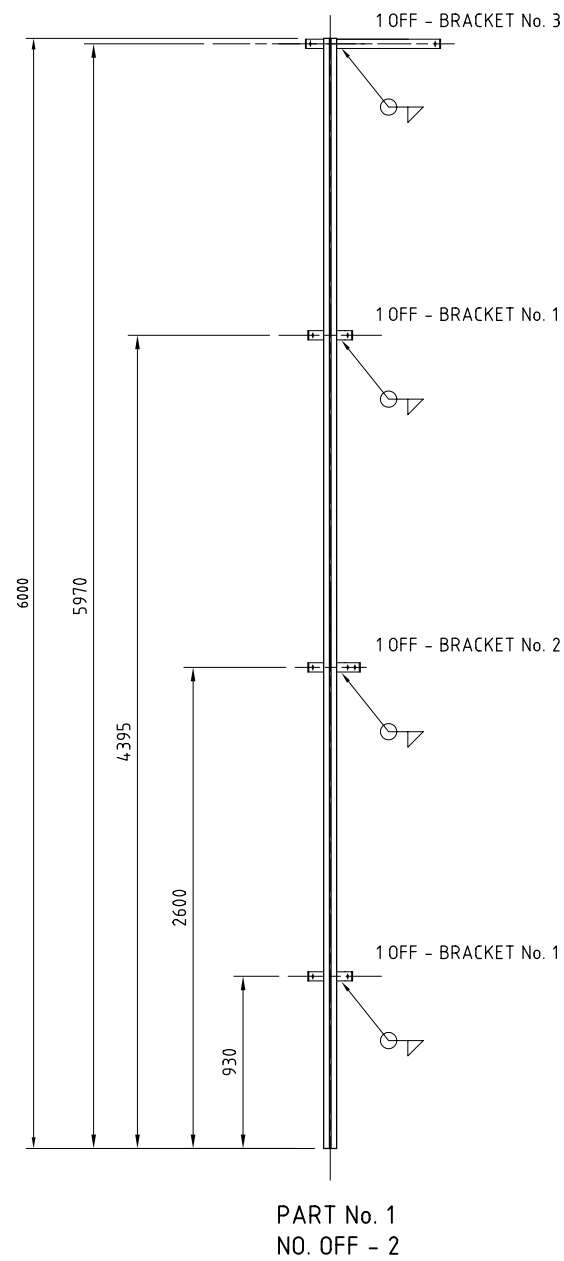
DRAWING NUMBER

SEW-1451-S

ISSUED: 2005 | VERSION 2

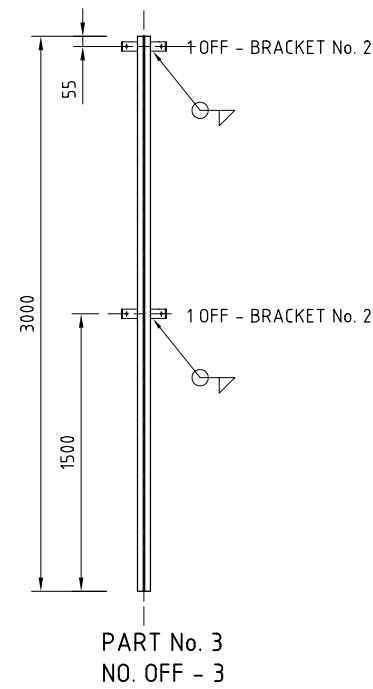


- NOTES**
- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
 - VENT TUBES TO BE DN 150 304 (MINIMUM) SS. EITHER EXTRUDED OR SPIRAL WELDED.
 - VENT SHAFT TUBING, STEEL SUPPORTS, BRACKETS & COWLS TO BE COATED AS PER PCS 109
 - CONCRETE TO BE NORMAL CLASS TO AS 1379 AND MINIMUM STRENGTH GRADE 20.
 - VENT SUPPORT LEGS TO BE 70 x 70 x 8 GALVANISED 'T' IRON
 - ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
 - BASE FRAME TO BE SET IN CONCRETE BASE BLOCK & ALLOWED 5 DAYS TO CURE BEFORE SUPPORT LEGS ARE WELDED ON.
 - ALL BOLTS & WASHERS TO BE M12 304 SS 75 LONG UNLESS NOTED OTHERWISE.
 - FOR DETAILS OF BRACKET NO.S 1, 2, 3 & RING BRACKET SEE DRG NO. EPS 700.02



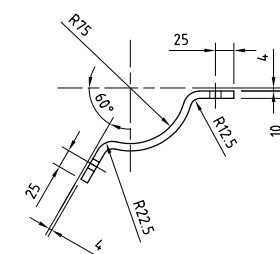
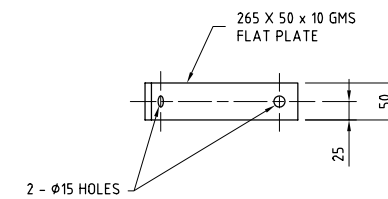
14 m STEEL SUPPORT PIECE

SCALE 1:20



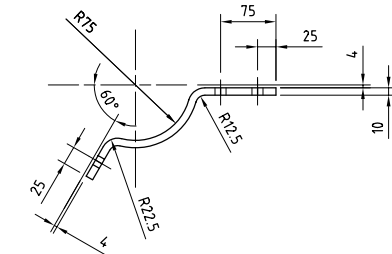
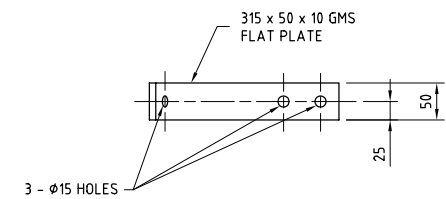
18 m EXTENSION PIECE

SCALE 1:20



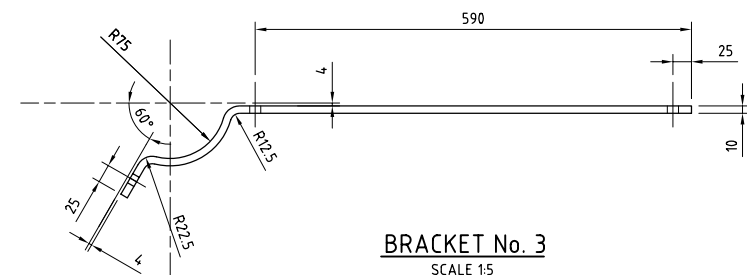
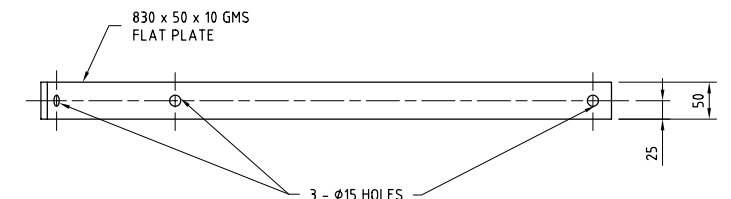
BRACKET No. 1

SCALE 1:5



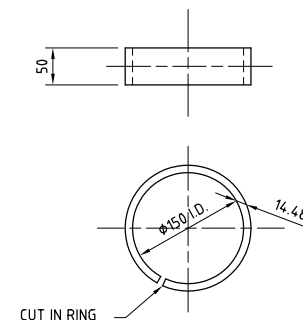
BRACKET No. 2

SCALE 1:5



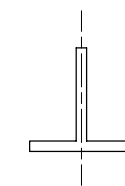
BRACKET No. 3

SCALE 1:5



Ø150 RING BRACKET

SCALE 1:5

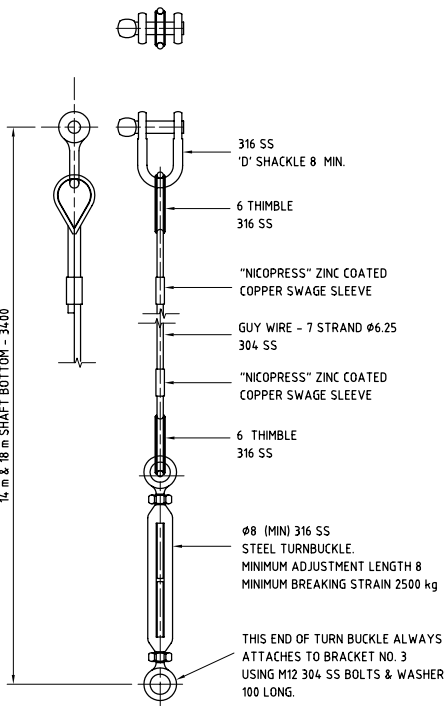
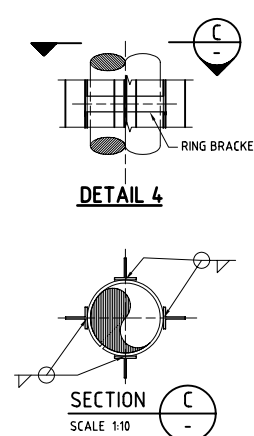
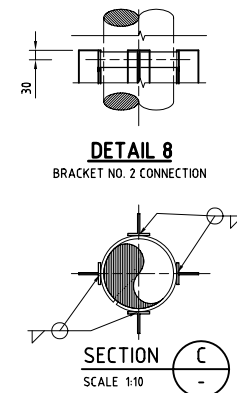
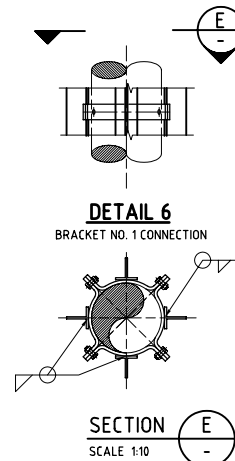
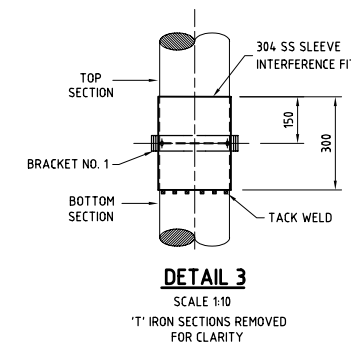
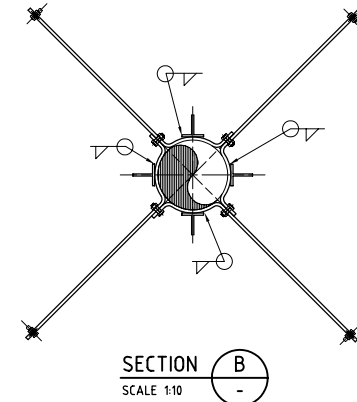
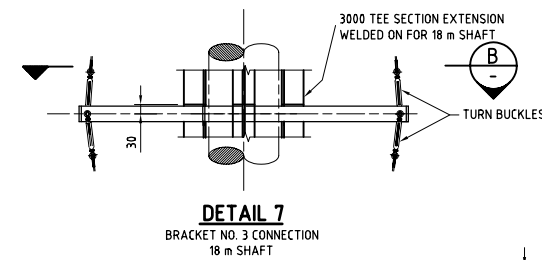
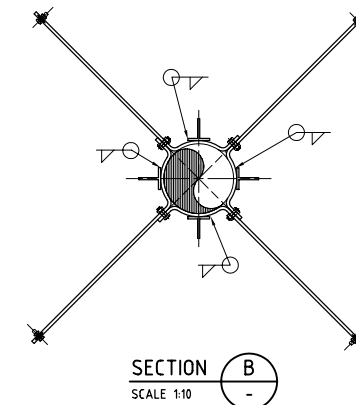
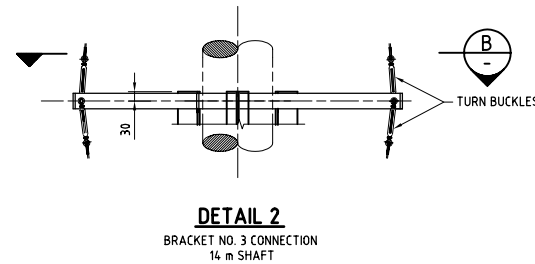
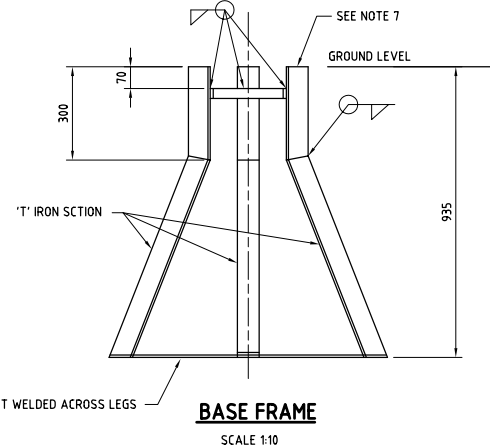
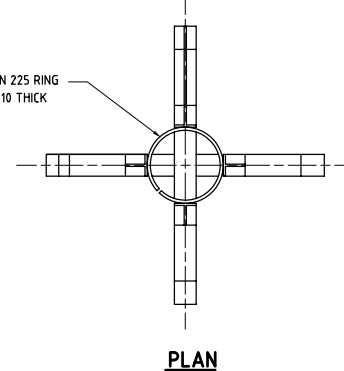
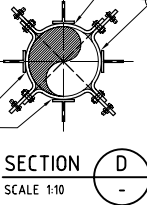
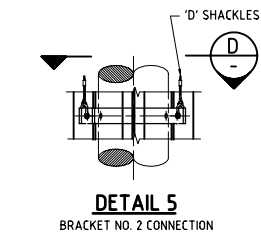
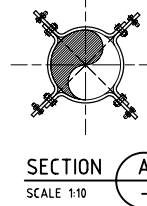
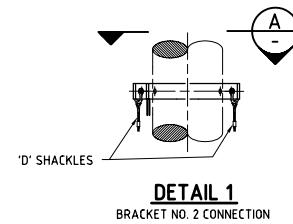
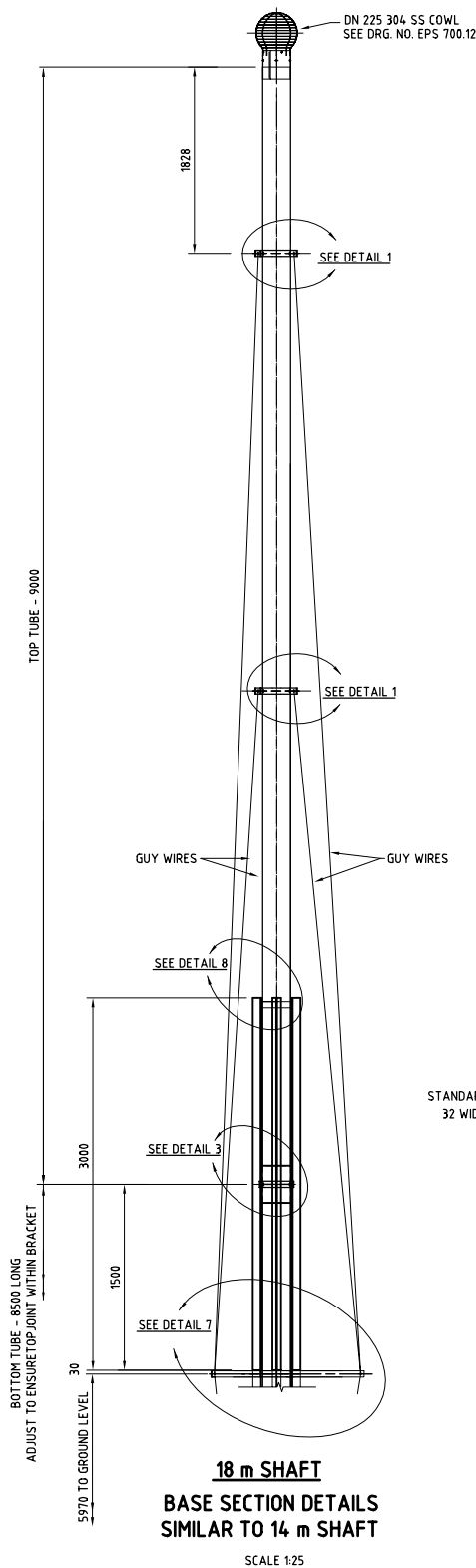
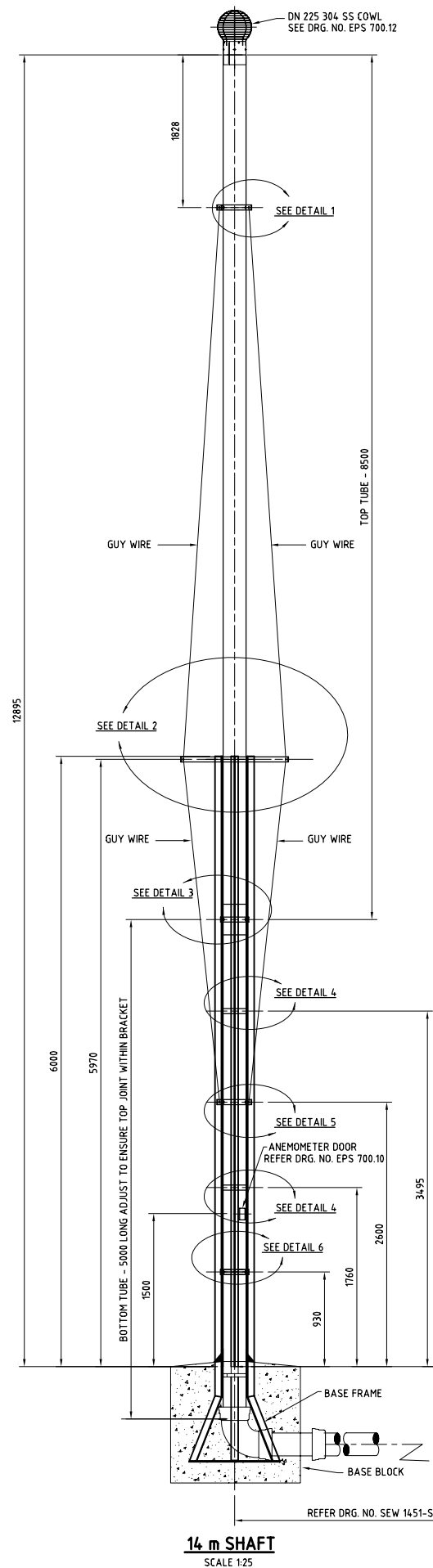


DETAIL 'T' IRON

70 X 70 X 7 TEE SECTION

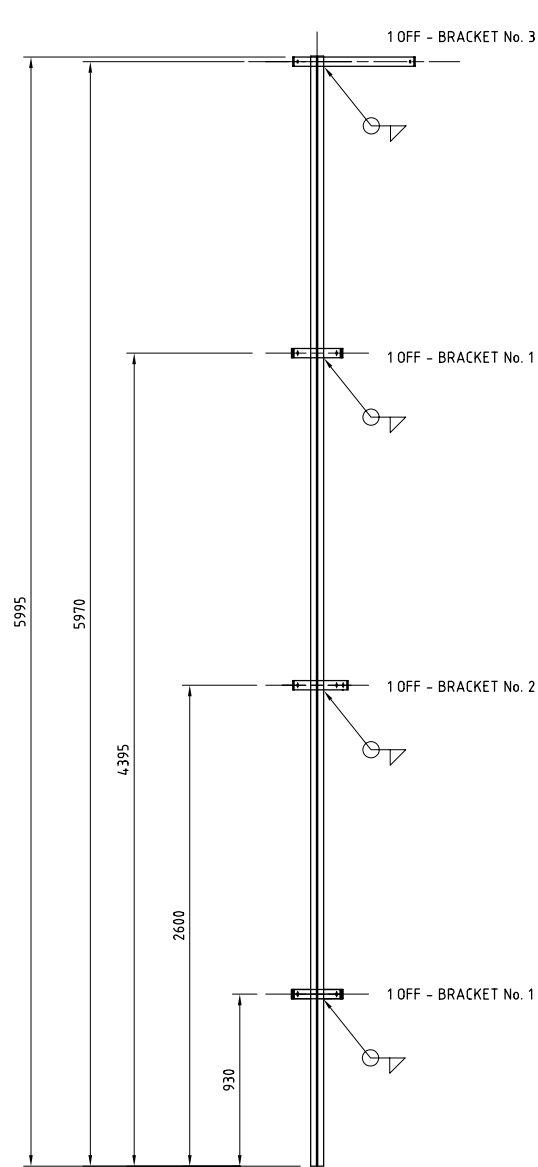
NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
2. VENT TUBE SUPPOORT LEGS TO BE 70 x 70 x 8 GALVANISED "T" IRON.
3. STEEL SUPPORTS & BRACKETS TO BE HOT DIPPED GALVANISED AND COATED AS PER PCS109.
4. ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
5. ALL BOLTS TO BE 304 SS 1/2" UNC x 2 1/2" HEXAGON SET SCREWS AND SS WASHERS OR METRIC EQUIVALENT.

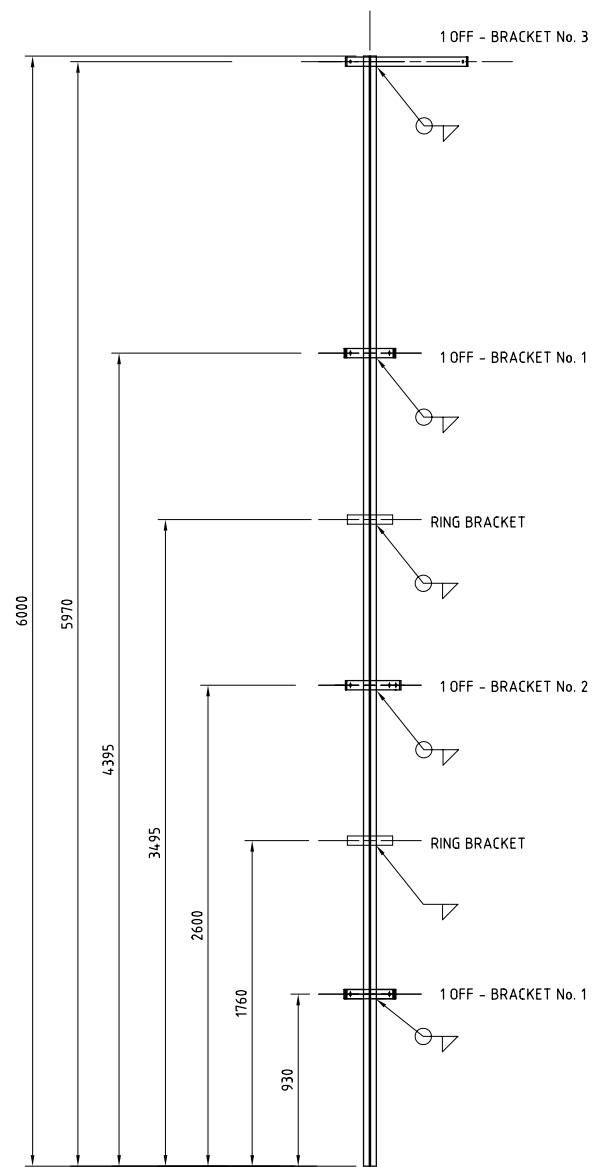


NOTES

- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED
- VENT TUBES TO BE DN 225 304 (MINIMUM) SS. EITHER EXTRUDED OR SPIRAL WELDED.
- VENT SHAFT TUBING, STEEL SUPPORTS, BRACKETS & COWLS TO BE PAINTED AS PER PCS 109
- CONCRETE TO BE NORMAL CLASS TO AS 1379 AND MINIMUM STRENGTH GRADE 20.
- VENT SUPPORT LEGS TO BE 70 x 70 x 8 GALVANISED 'T' IRON
- ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
- BASE FRAME TO BE SET IN CONCRETE BASE BLOCK & ALLOWED 5 DAYS TO CURE BEFORE THE SUPPORT LEGS ARE WELDED ON.
- ALL BOLTS & WASHERS TO BE M12 304 SS 75 LONG UNLESS NOTED OTHERWISE.
- FOR DETAILS OF BRACKET NOS 1, 2, 3 & RING BRACKET SEE DRG. NO. EPS 700.04

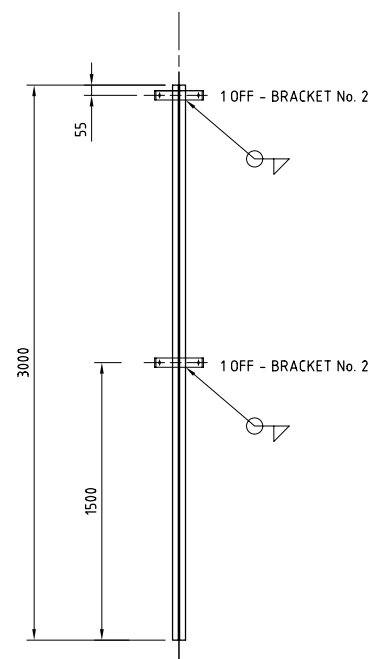


PART No. 1
NO. OFF - 3

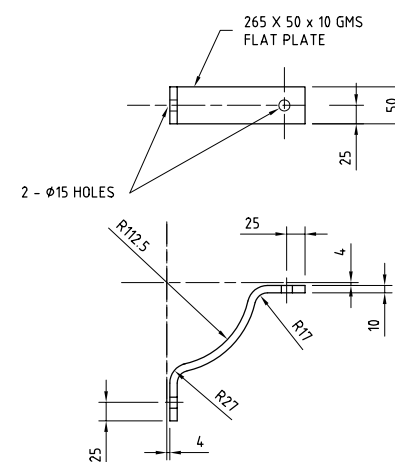


PART No. 2
NO. OFF - 1

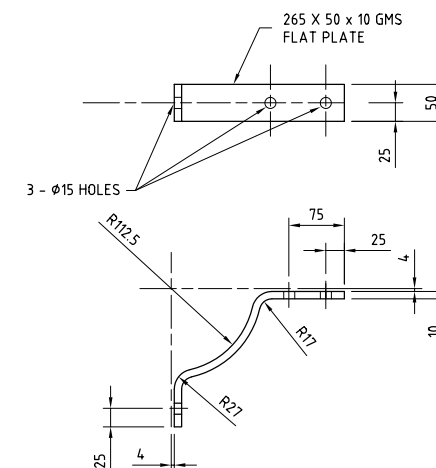
14 m STEEL SUPPORT PIECE
SCALE 1:20



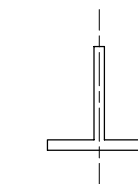
PART No. 3
NO. OFF - 4
18 m EXTENSION PIECE
SCALE 1:20



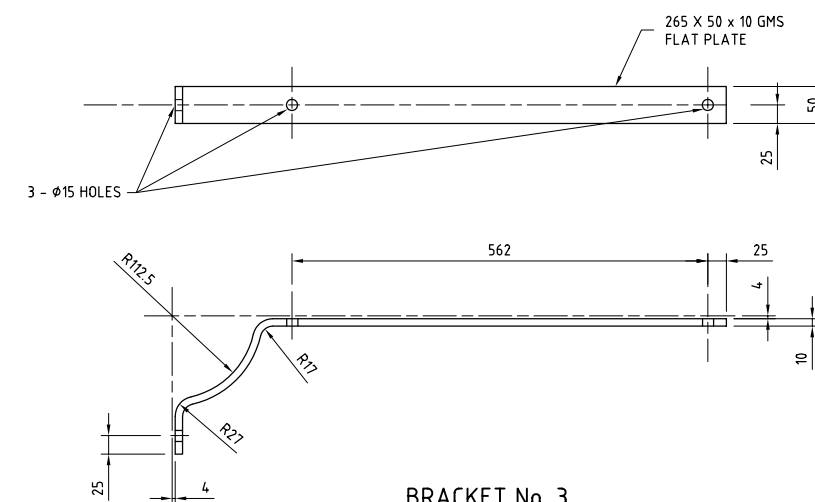
BRACKET No. 1
SCALE 1:5



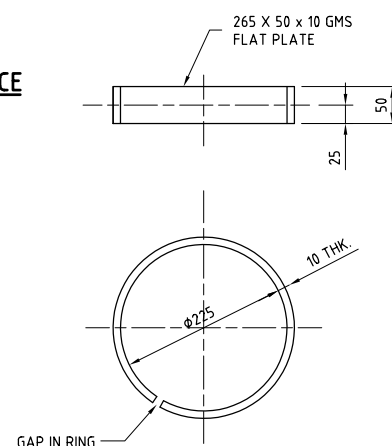
BRACKET No. 2
SCALE 1:5



DETAIL 'T' IRON
70 X 70 X 7 TEE SECTION



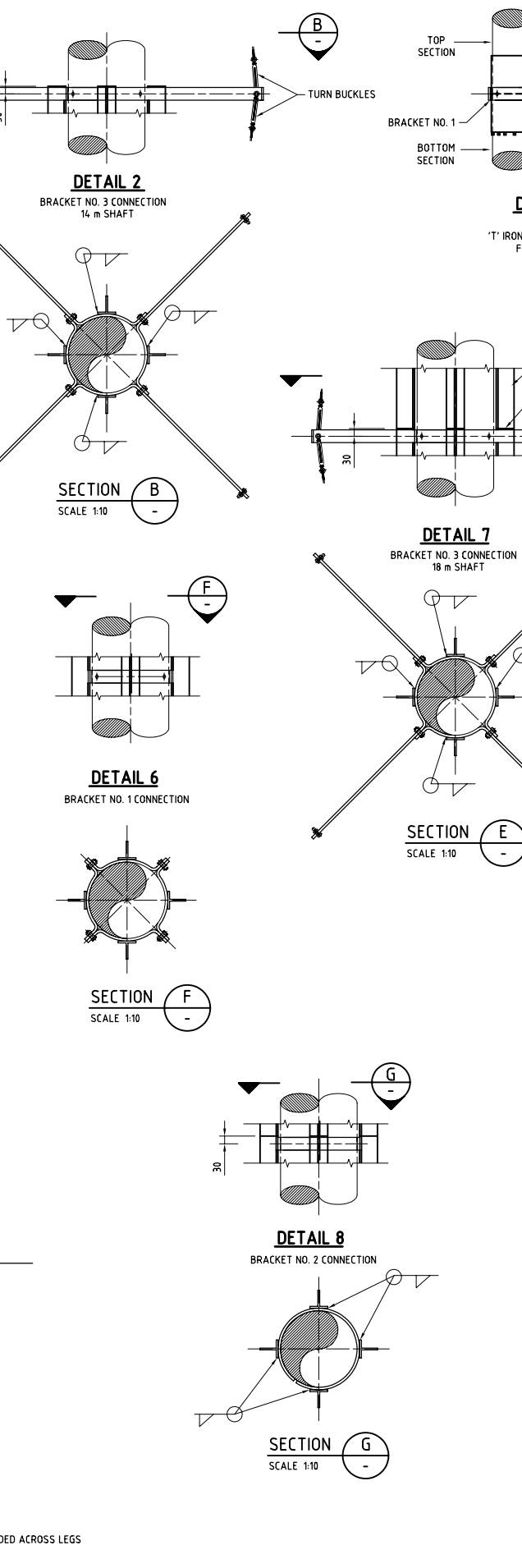
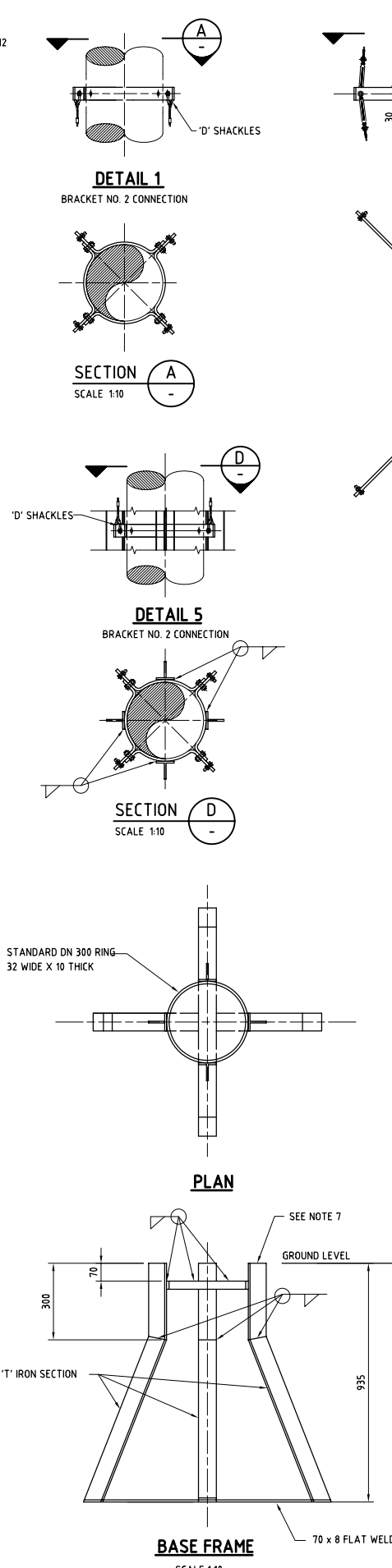
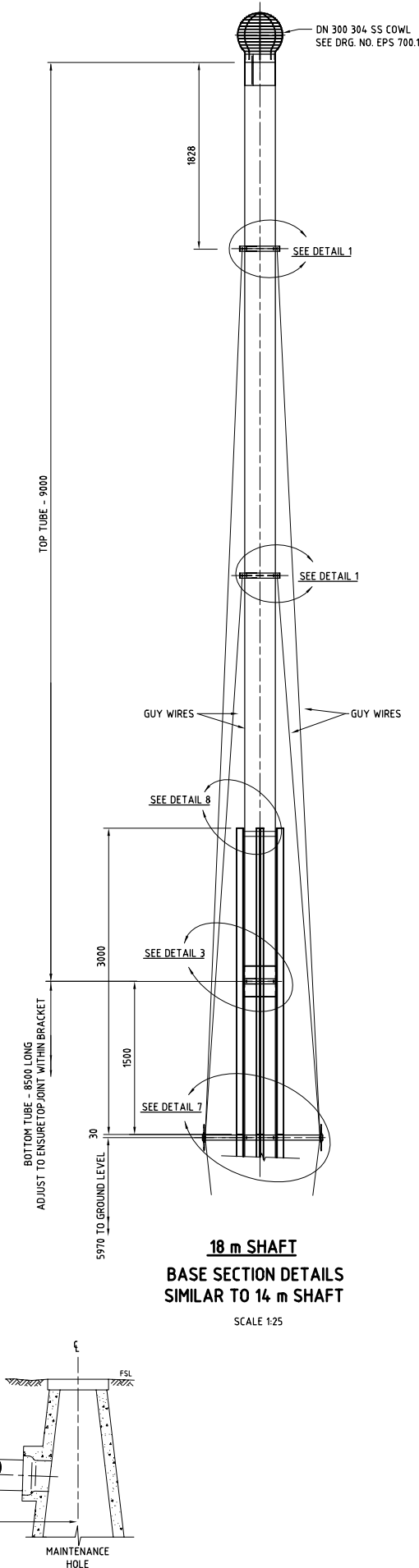
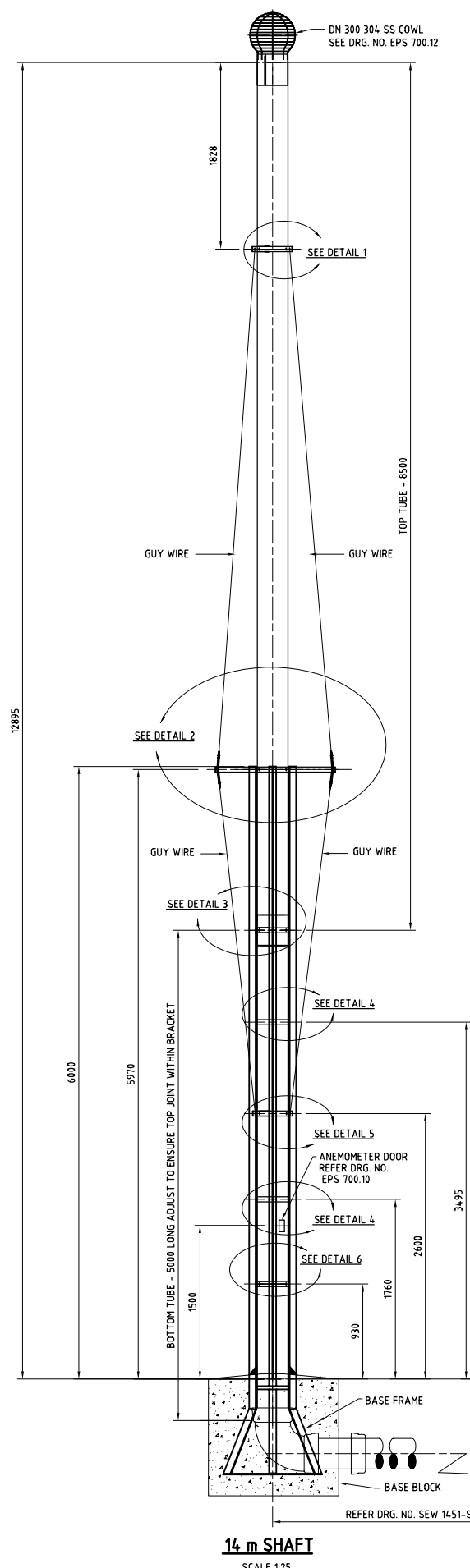
BRACKET No. 3
SCALE 1:5



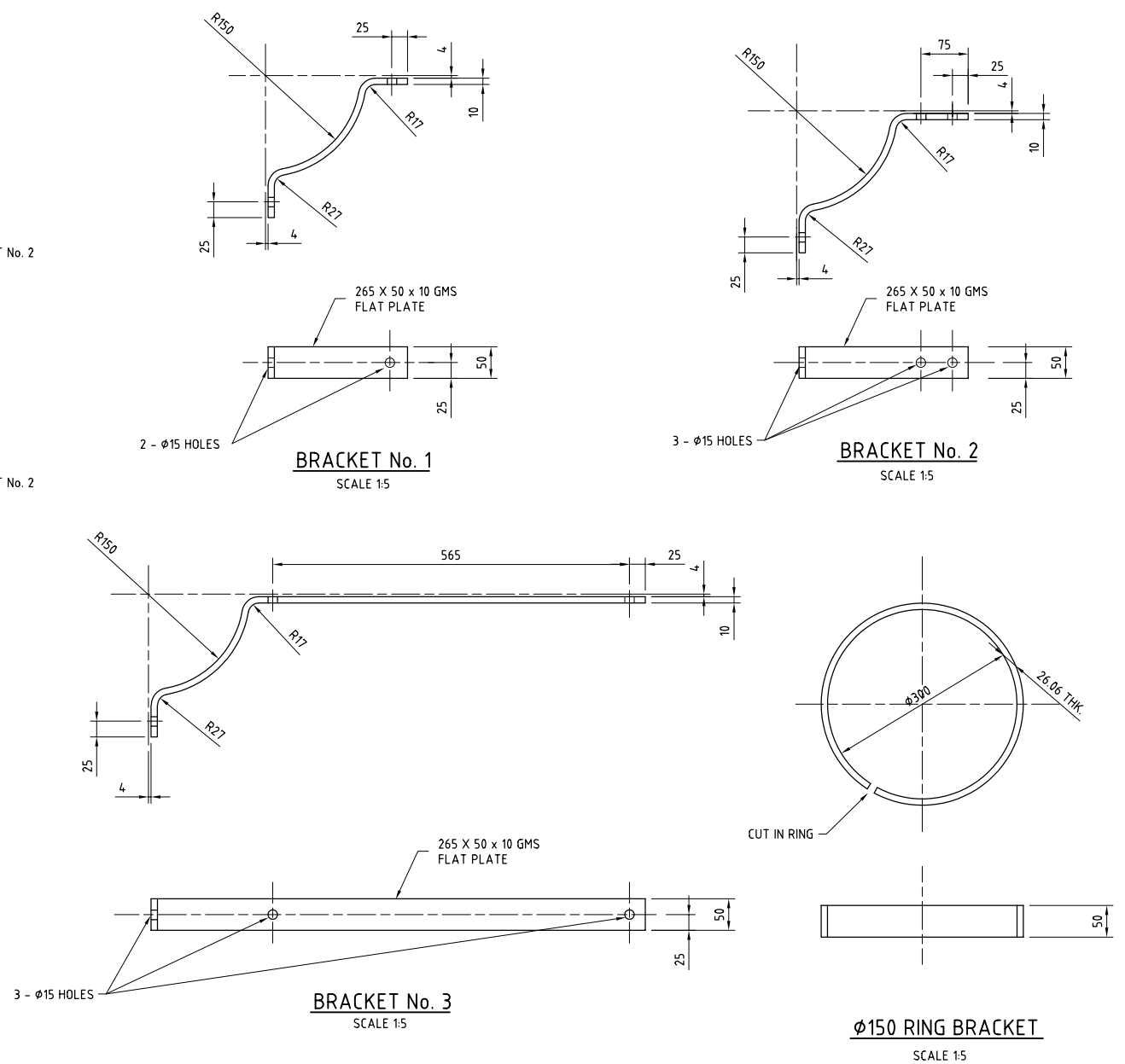
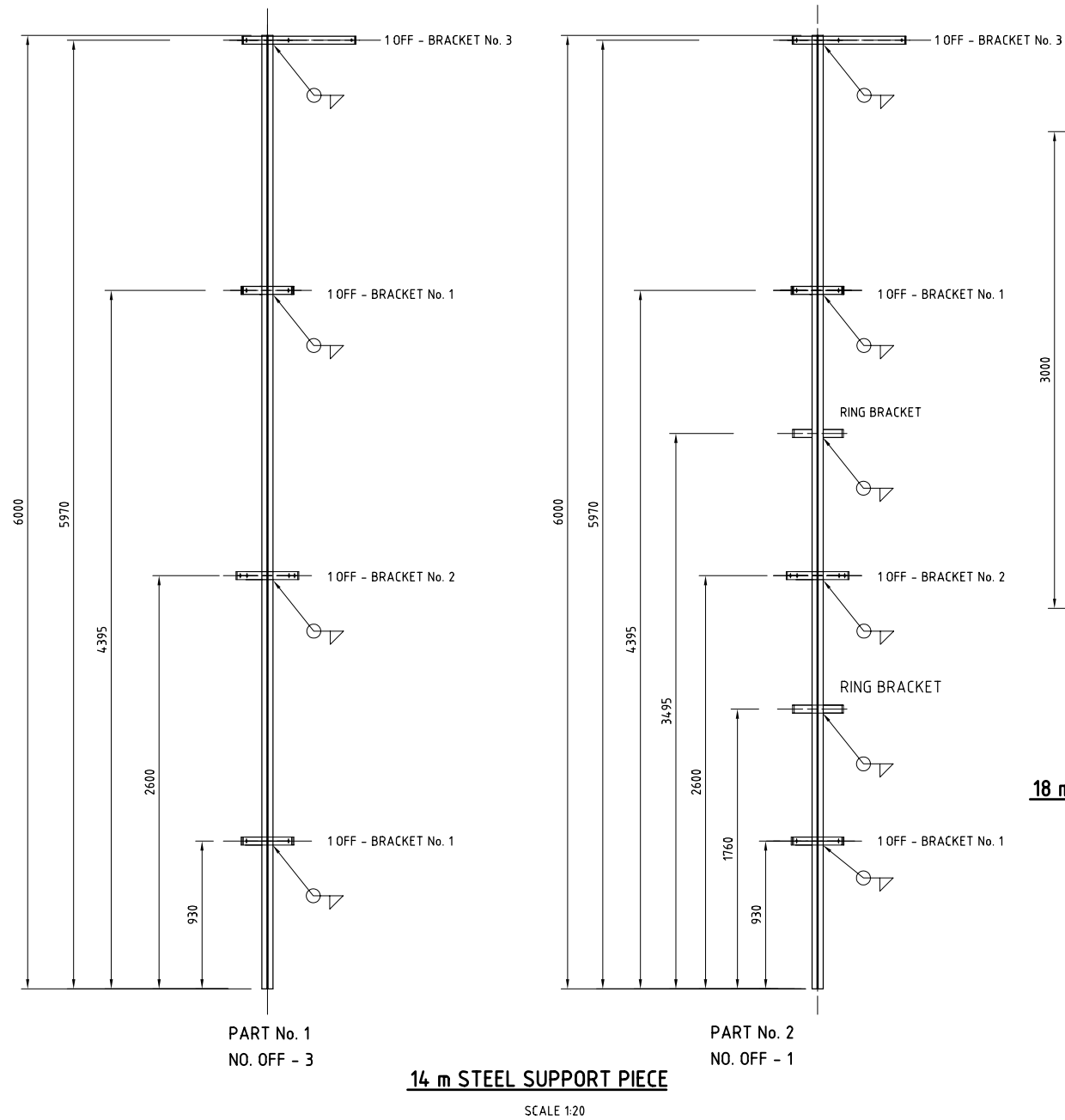
Ø225 RING BRACKET
SCALE 1:5

NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
2. VENT TUBE SUPPOORT LEGS TO BE 70 x 70 x 8 GALVANISED "T" IRON.
3. STEEL SUPPORTS & BRACKETS TO BE HOT DIPPED GALVANISED AND COATED AS PER PCS109.
4. ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
5. ALL BOLTS TO BE 304 SS 1/2" UNC x 2 1/2" HEXAGON SET SCREWS AND SS WASHERS OR METRIC EQUIVALENT.

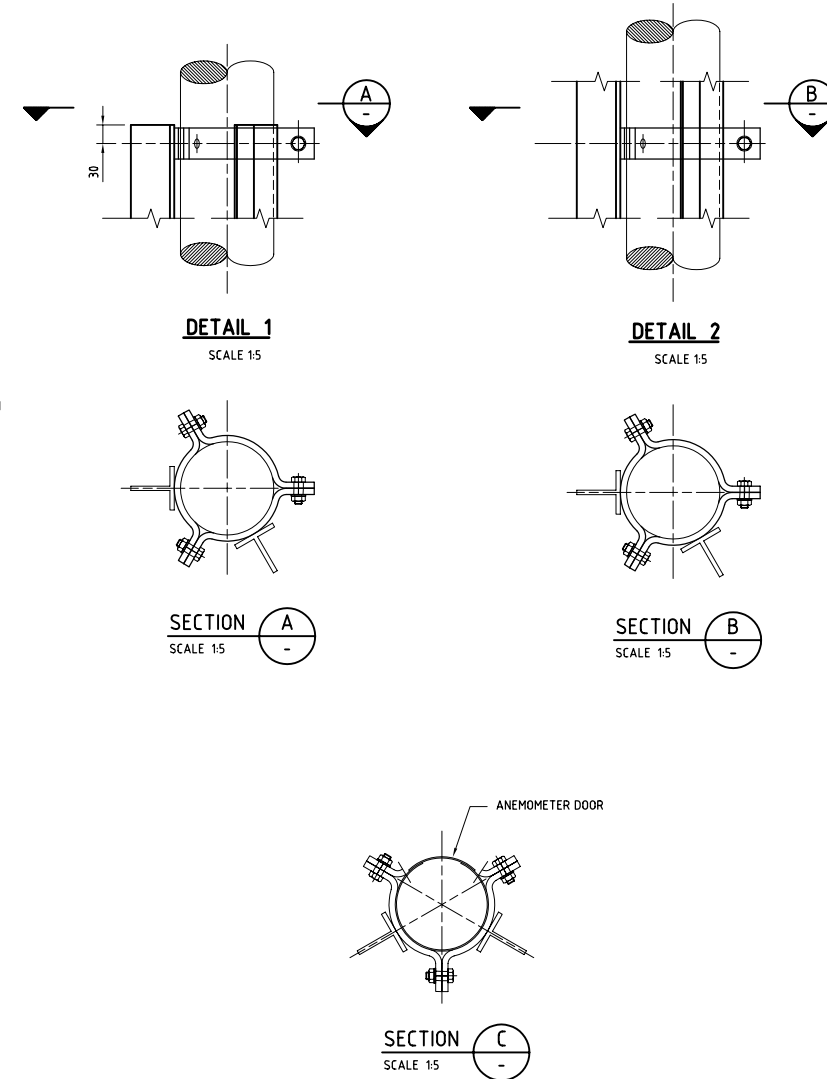
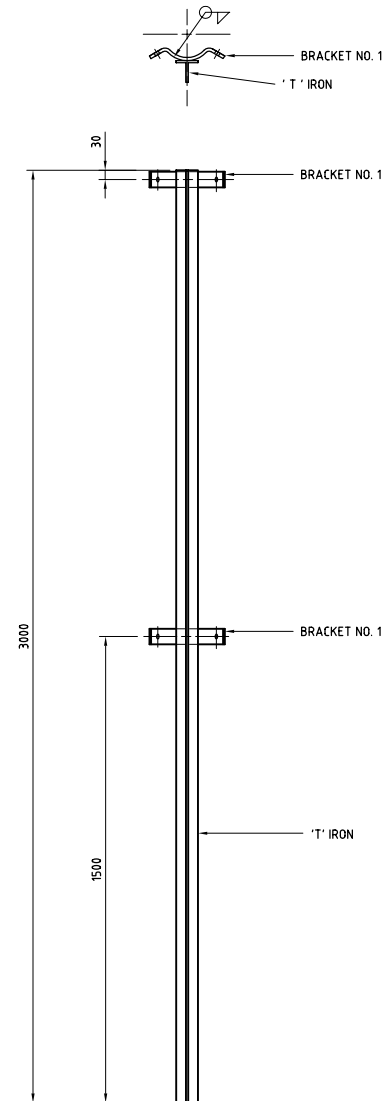
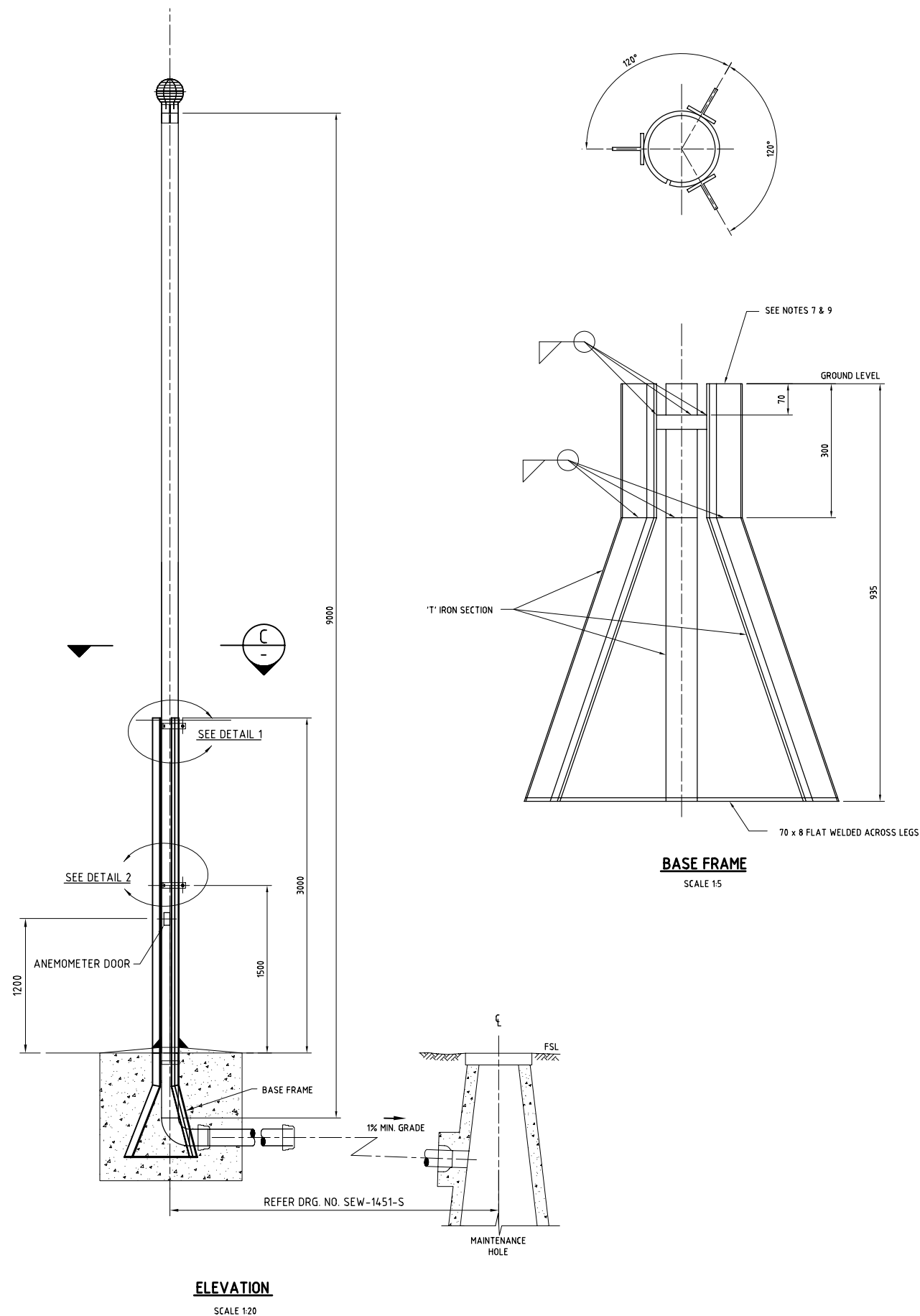


- NOTES**
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
 - VENT TUBES TO BE DN 300 304 (MINIMUM) SS. EITHER EXTRUDED OR SPIRAL WELDED.
 - VENT SHAFT TUBING, STEEL SUPPORTS, BRACKETS & COWLS TO BE PAINTED AS PER PCS 109
 - CONCRETE TO BE NORMAL CLASS TO AS 1379 AND MINIMUM STRENGTH GRADE 20.
 - VENT SUPPORT LEGS TO BE 70 x 70 x 8 GALVANISED 'T' IRON.
 - ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
 - BASE FRAME TO BE SET IN CONCRETE BASE BLOCK & ALLOWED 5 DAYS TO CURE BEFORE THE SUPPORT LEGS ARE WELDED ON.
 - ALL BOLTS & WASHERS TO BE M12 304 SS 75 LONG UNLESS NOTED OTHERWISE.
 - FOR DETAILS OF BRACKET NO.S 1, 2, 3 & RING BRACKET SEE DRG. NO. EPS 700.06



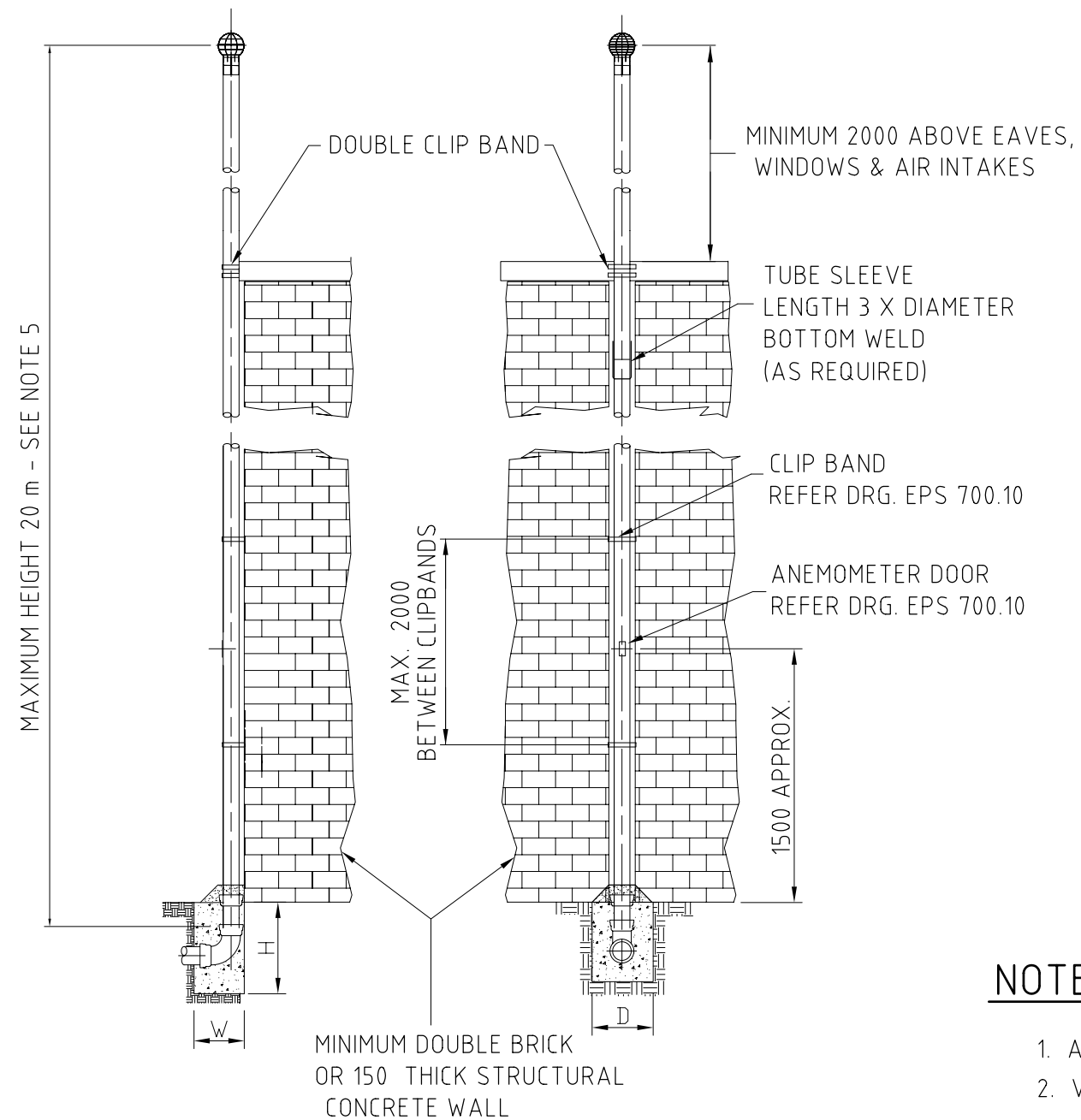
NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
2. VENT TUBE SUPPOORT LEGS TO BE 70 x 70 x 8 GALVANISED "T" IRON.
3. STEEL SUPPORTS & BRACKETS TO BE HOT DIPPED GALVANISED AND COATED AS PER PCS109.
4. ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
5. ALL BOLTS TO BE 304 SS 1/2 " UNC x 2 1/2" HEXAGON SET SCREWS AND SS WASHERS OR METRIC EQUIVALENT.



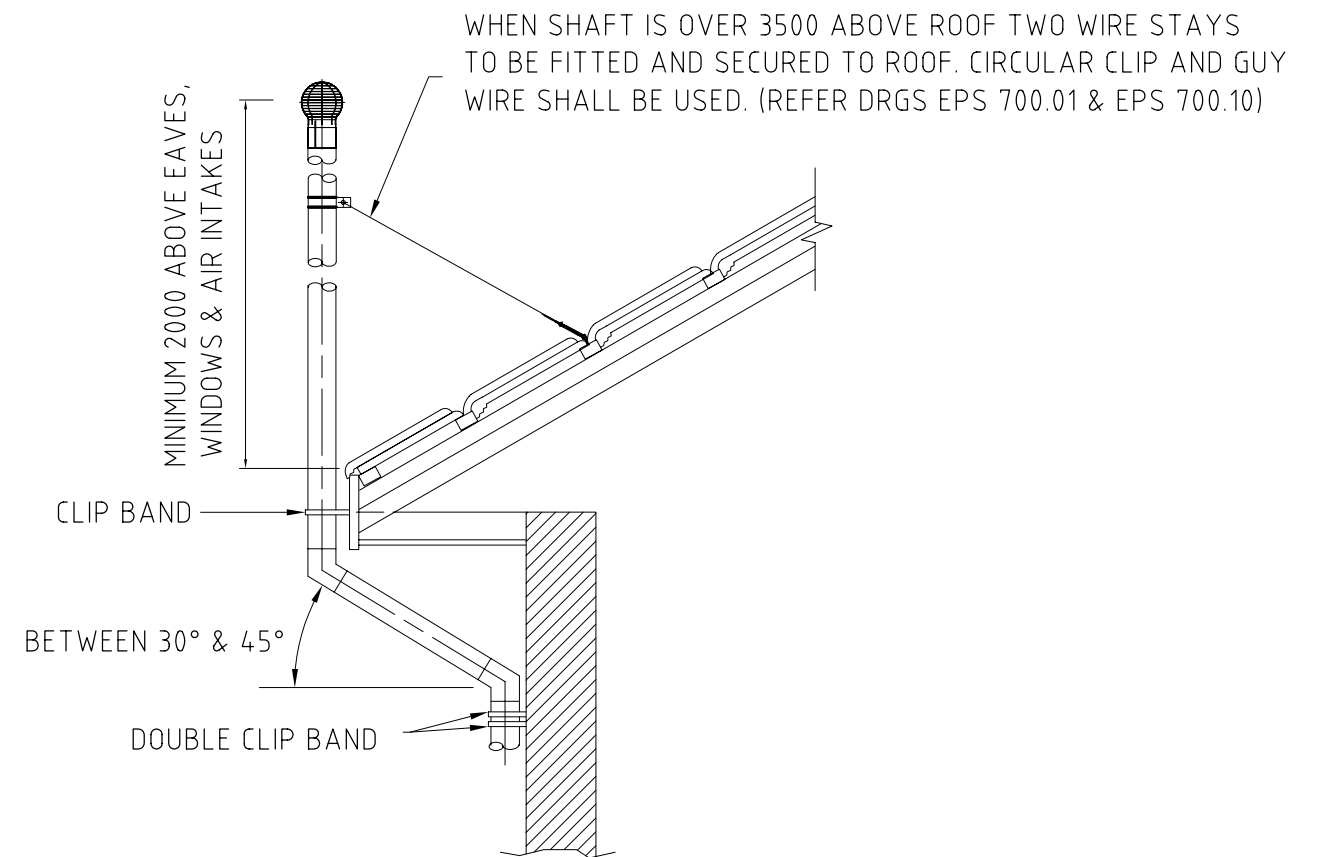
NOTES

- ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED
- VENT TUBES TO BE DN 150 304 (MINIMUM) SS. EITHER EXTRUDED OR SPIRAL WELDED.
- VENT SHAFT TUBING, STEEL SUPPORTS, BRACKETS & COWLS TO BE COATED AS PER PCS 109.
- CONCRETE TO BE NORMAL CLASS TO AS 1379 AND MINIMUM STRENGTH GRADE 20.
- VENT SUPPORT LEGS TO BE 70 x 70 x 8 GALVANISED 'T' IRON
- ALL WELDS TO BE 7 SILICON BRONZE FULL DEPTH TO AS 1167.
- BASE FRAME TO BE SET IN THE CONCRETE BASE BLOCK & ALLOWED 5 DAYS TO CURE BEFORE SUPPORT LEGS ARE WELDED ON.
- ALL BOLTS & WASHERS TO BE M12 304 SS 75 LONG UNLESS NOTED OTHERWISE.
- THE THIRD 'T' IRON BASE LEG IS LEFT UNUSED, BUT IT WILL BE USED IF THE VENT IS CHANGED TO A 14 m GUYWIRE VENT.



PREFERRED OPTION - ATTACHED TO SOLID WALL

HEIGHT OF VENT	DIMENSIONS		
	W	D	H
UP TO 15 m	600	800	1000
15 TO 20 m	800	900	1100



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 VENTLINE 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.

PREPARED BY
**ASSET
MANAGEMENT**

© COPYRIGHT

RECOMMENDED

Elizgi
for WASTEWATER SYSTEMS MANAGER
APPROVED
B Nelson 12/08/05
for MANAGER, STRATEGIC ASSET MANAGEMENT

**Sydney
WATER**

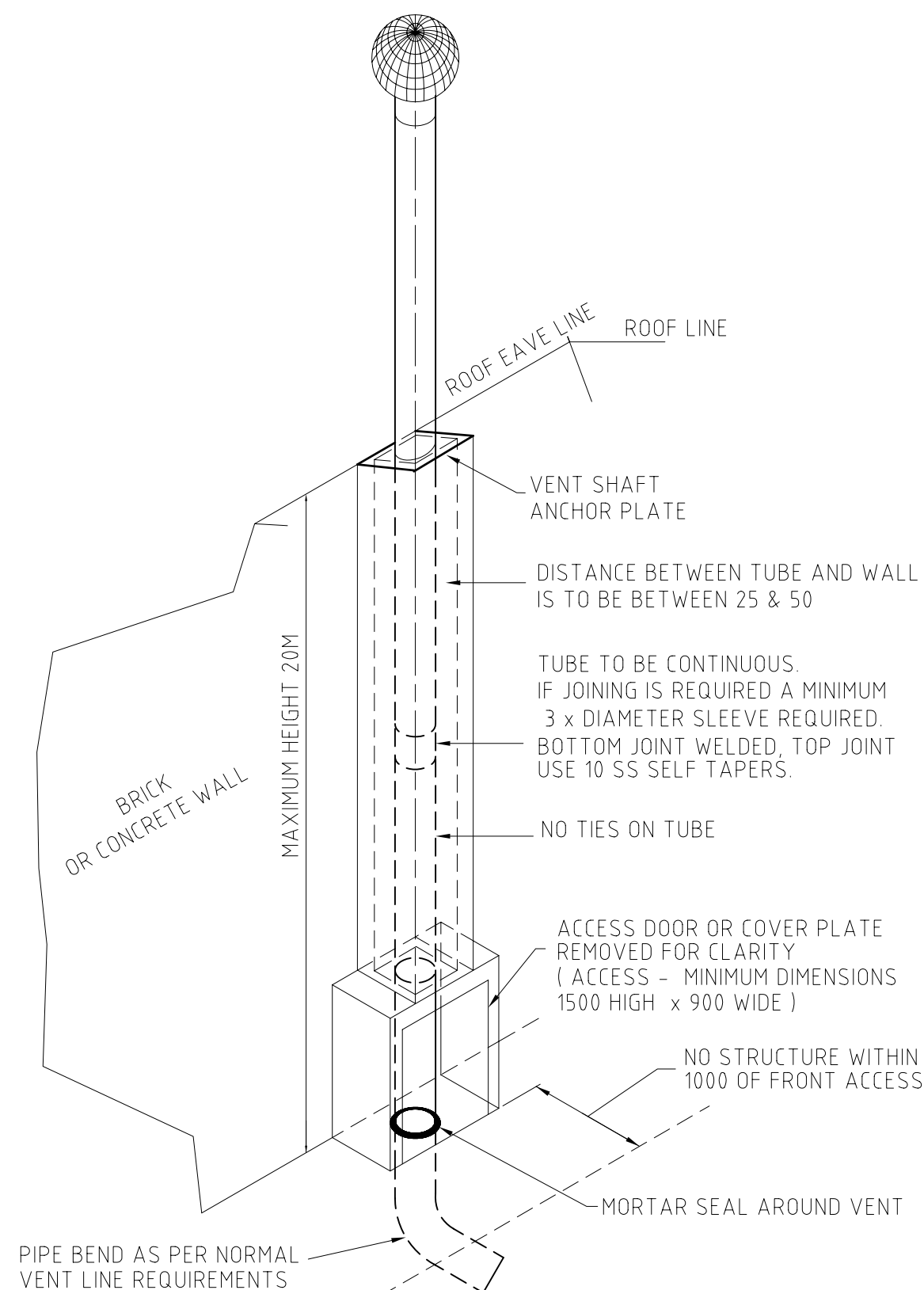
ENGINEERING PRODUCT SPECIFICATION

**VENTILATION SYSTEMS
VENTSHAFT WALL TYPE
DN 150, 225 AND 300**

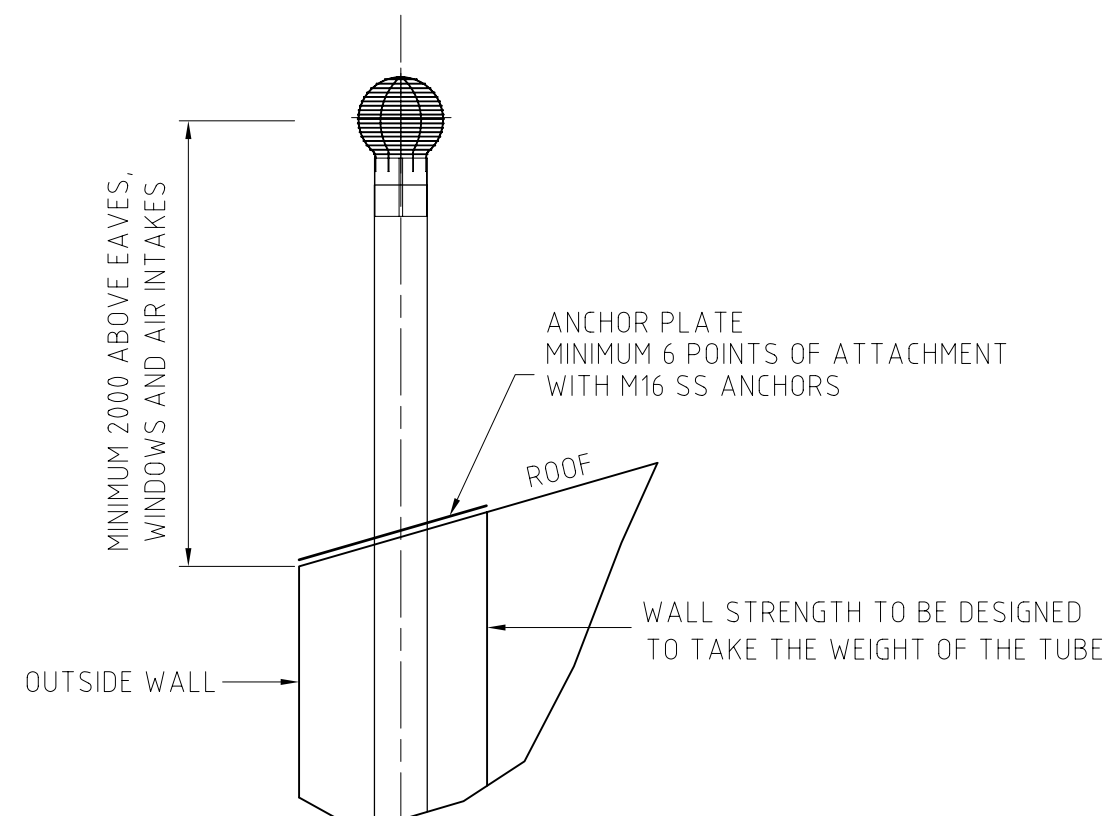
Sydney *WATER*

EPS 700.08

ISSUED: 2005 | VERSION 1



WALL VENT IN CAVITY DETAIL



ROOF CONNECTION DETAIL

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 VENTLINE FROM MH TO TOP OF VENT (COWL), SHALL NOT EXCEED 25m, OR 35m IF THE LINE IS INCREASED BY ONE NOMINAL SIZE.
7. ALL BOLTS & WASHERS TO BE M12 304 SS 75 LONG UNLESS NOTED OTHERWISE.
8. WALL ANCHORS ARE TO BE DESIGNED FOR A LOAD OF 10kN.

PREPARED BY
**ASSET
MANAGEMENT**

© COPYRIGHT

RECOMMENDED

Chiggi
for WASTEWATER SYSTEMS MANAGER

APPROVED

B Nelson 12/08/05
for MANAGER, STRATEGIC ASSET MANAGEMENT

**Sydney
WATER**

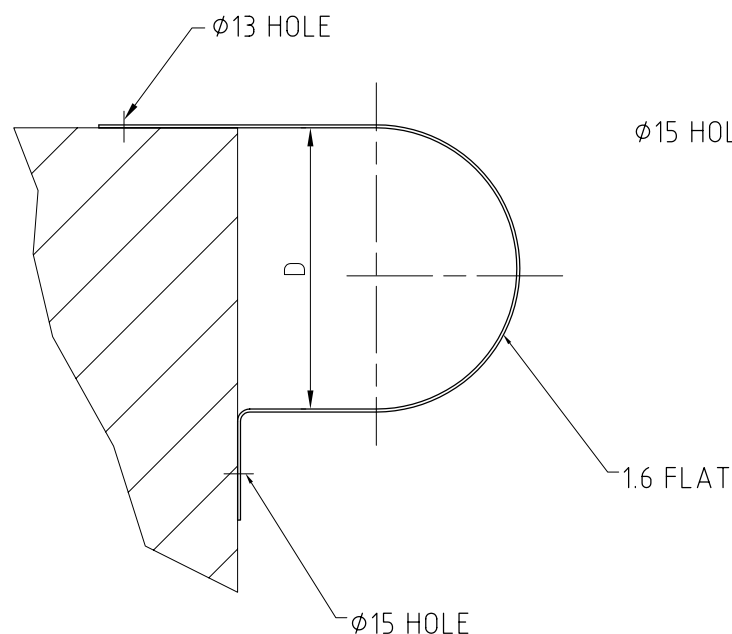
ENGINEERING PRODUCT SPECIFICATION

**VENTILATION SYSTEMS
VENTSHAFT WALL (CAVITY) TYPE
DN 150, 225 AND 300**

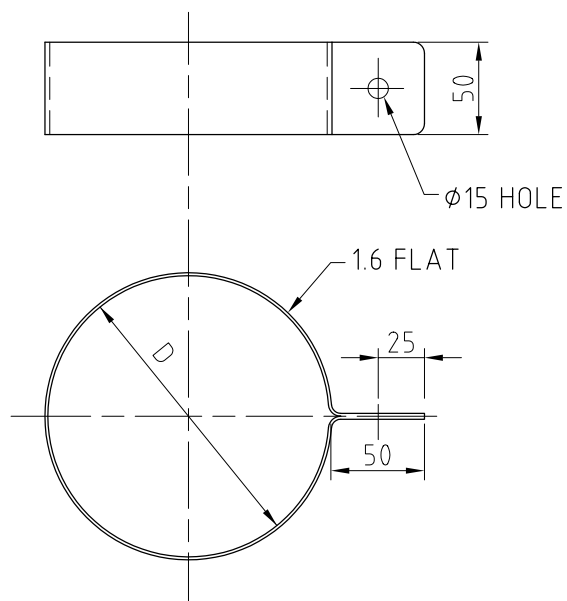
Sydney *WATER*

EPS 700.09

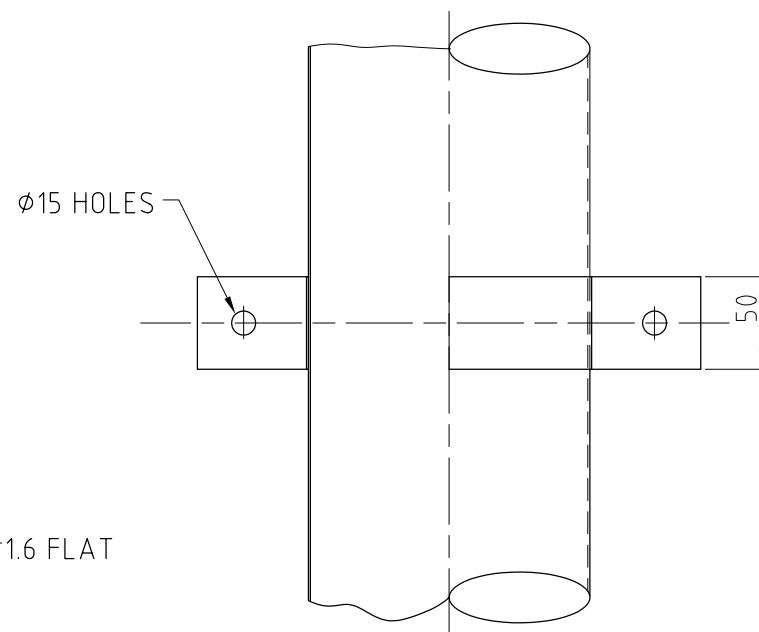
ISSUED: 2005 VERSION 1



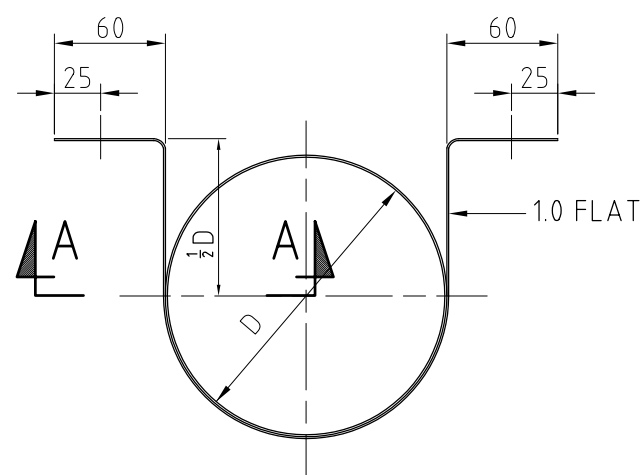
CORNER CLIP BAND



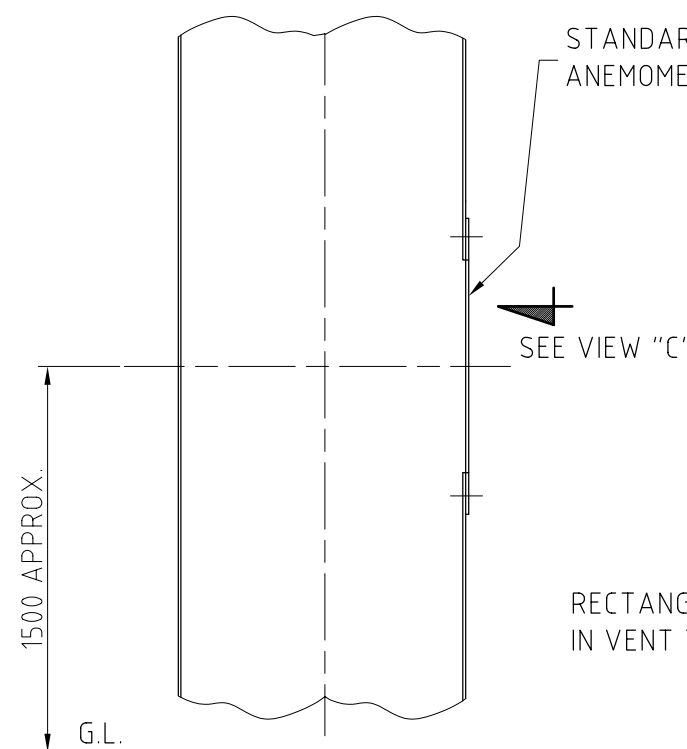
CIRCULAR CLIP BAND



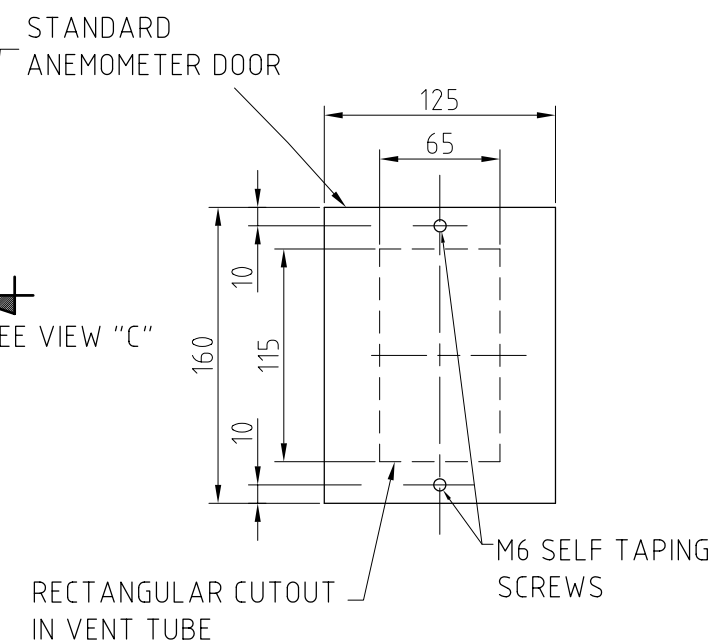
HALF SECTION A - A



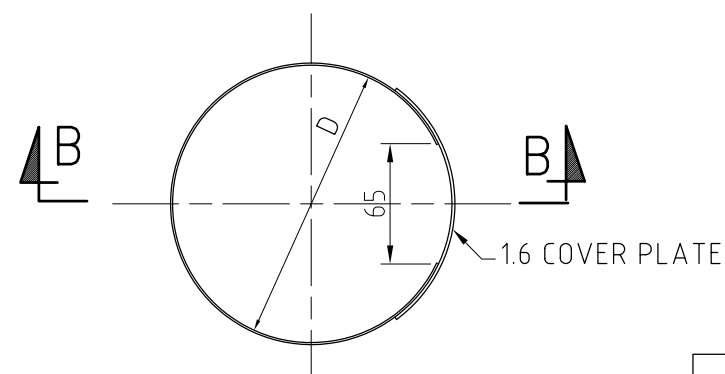
PLAN
CLIP BAND FOR CYLINDRICAL SHAFTS



SECTION B - B



VIEW C
COVER PLATE



PLAN
ANEMOMETER DOOR

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

PREPARED BY
**ASSET
MANAGEMENT**

© COPYRIGHT

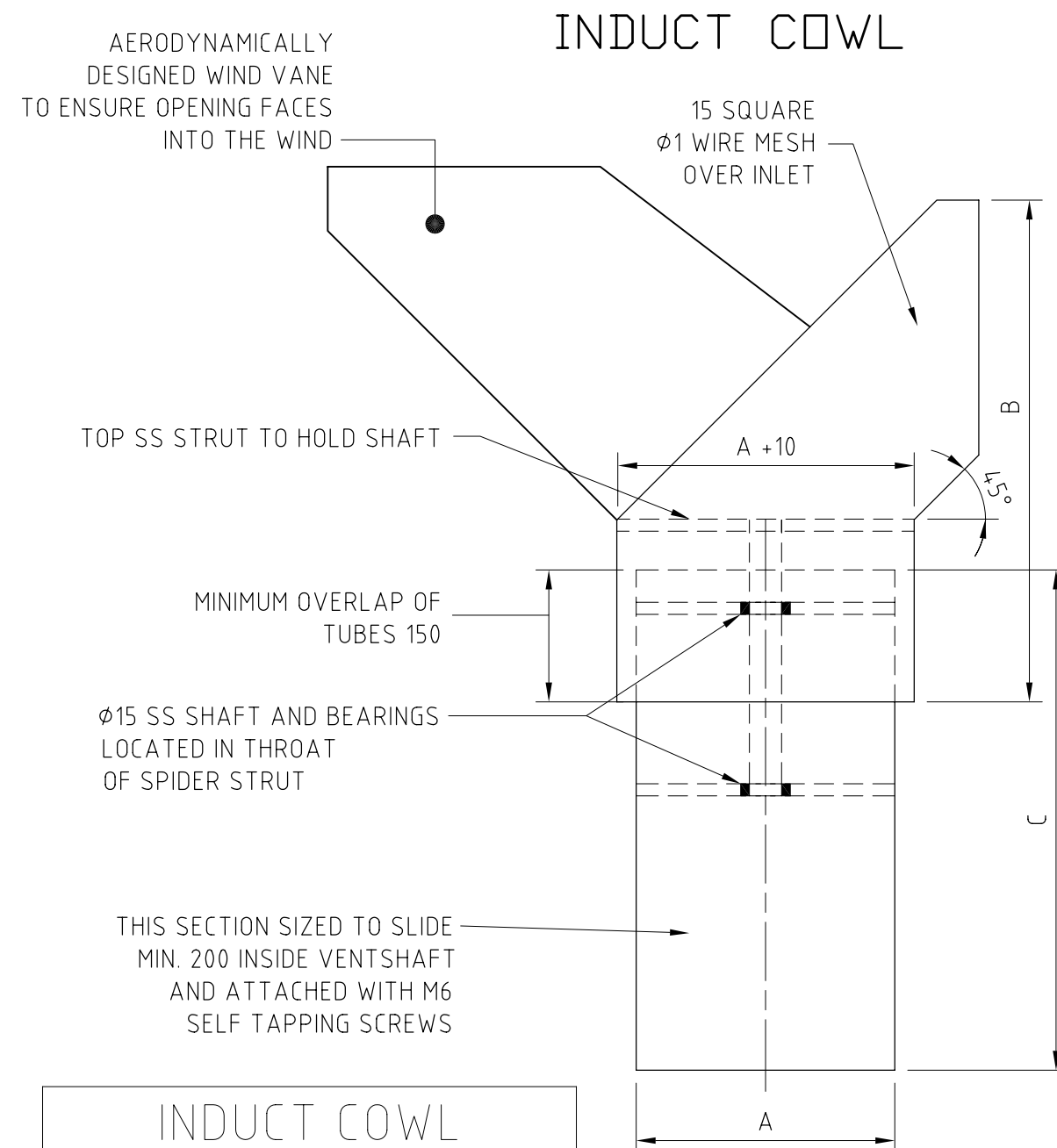
RECOMMENDED
Chiggi
for WASTEWATER SYSTEMS MANAGER
APPROVED
B Nelson 12/08/05
for MANAGER, STRATEGIC ASSET MANAGEMENT

**Sydney
WATER**

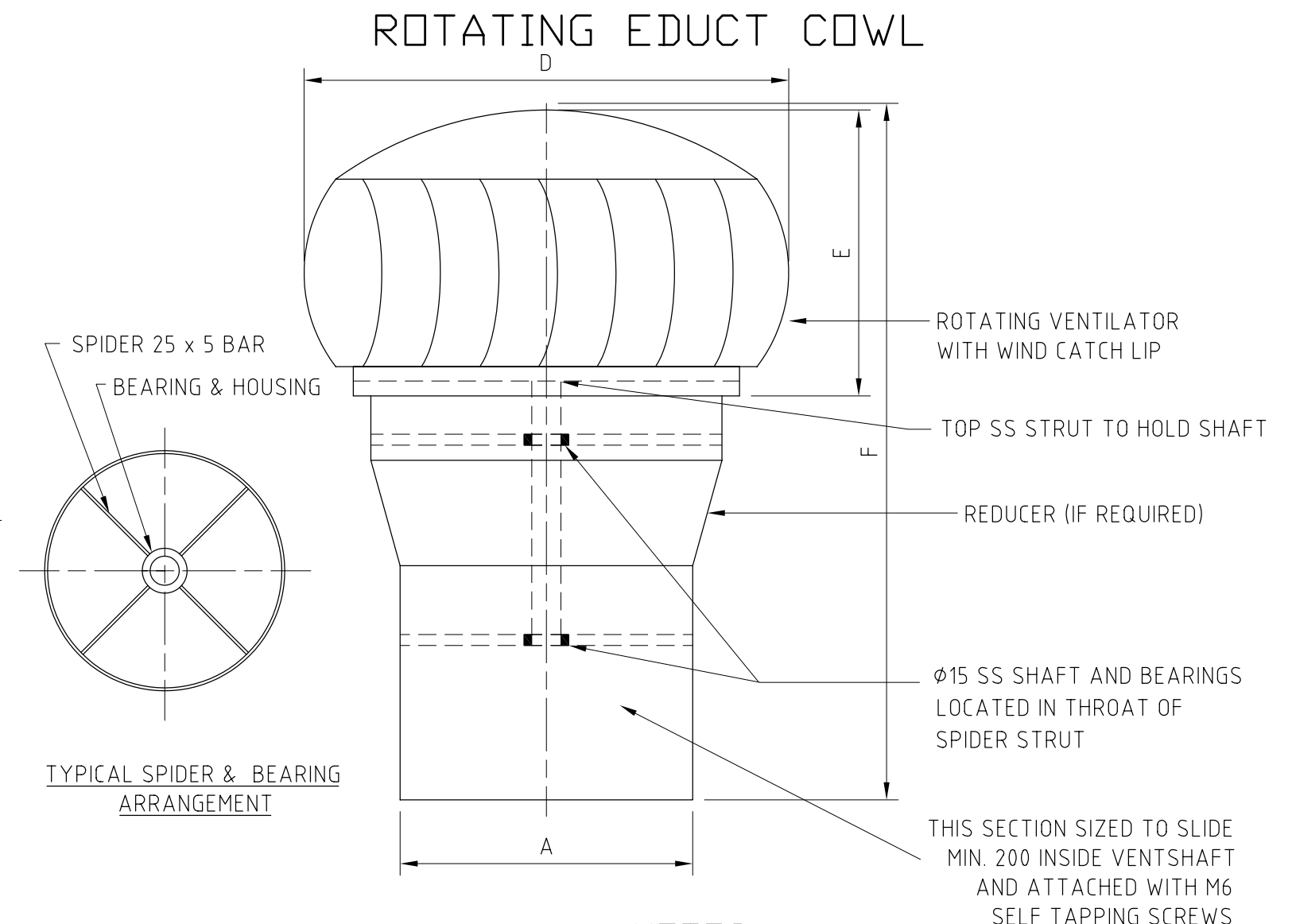
ENGINEERING PRODUCT SPECIFICATION
**VENTILATION SYSTEMS
VENTSHAFT WALL TYPE
CLIP BANDS & ANEMOMETER DOOR DETAILS**

Sydney WATER
EPS 700.10

ISSUED: 2005 | VERSION 1



INDUCT COWL			
NOM SIZE	DIM A	DIM B	DIM C
150	145	320	250
225	220	480	350
300	300	600	400



ROTATING COWL			
NOM SIZE	DIM D	DIM E	Dim F
150	230	220	540
225	320	340	640
300	480	470	820

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.

PREPARED BY
**ASSET
MANAGEMENT**

© COPYRIGHT

RECOMMENDED

Chiggi
for WASTEWATER SYSTEMS MANAGER

APPROVED

B Nelson 12/08/05
for MANAGER, STRATEGIC ASSET MANAGEMENT

**Sydney
WATER**

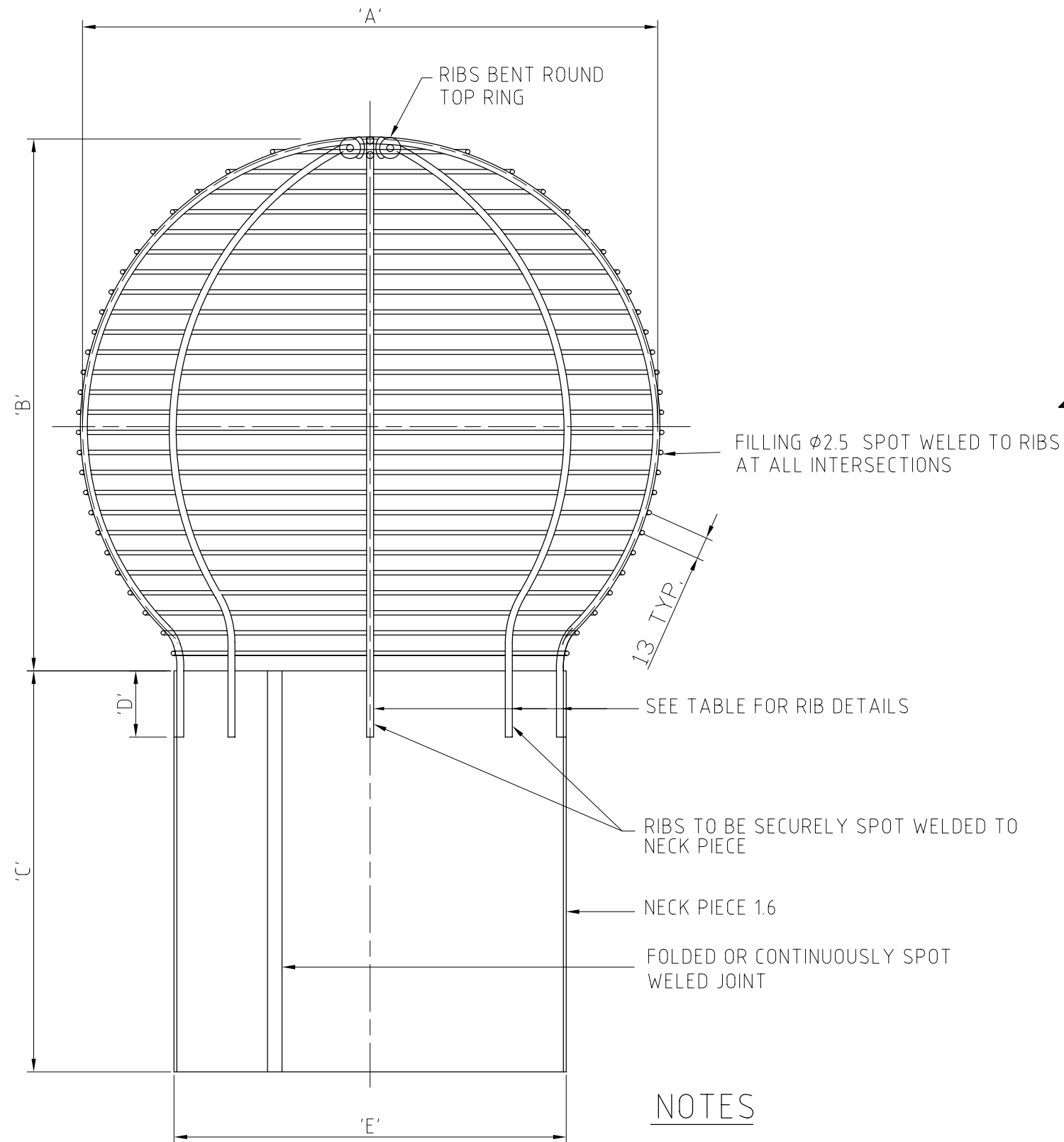
ENGINEERING PRODUCT SPECIFICATION

**VENTILATION SYSTEMS
INDUCT / EDUCT VENTSHAFTS
ROTATING COWL DETAILS**

Sydney **WATER**

EPS 700.11

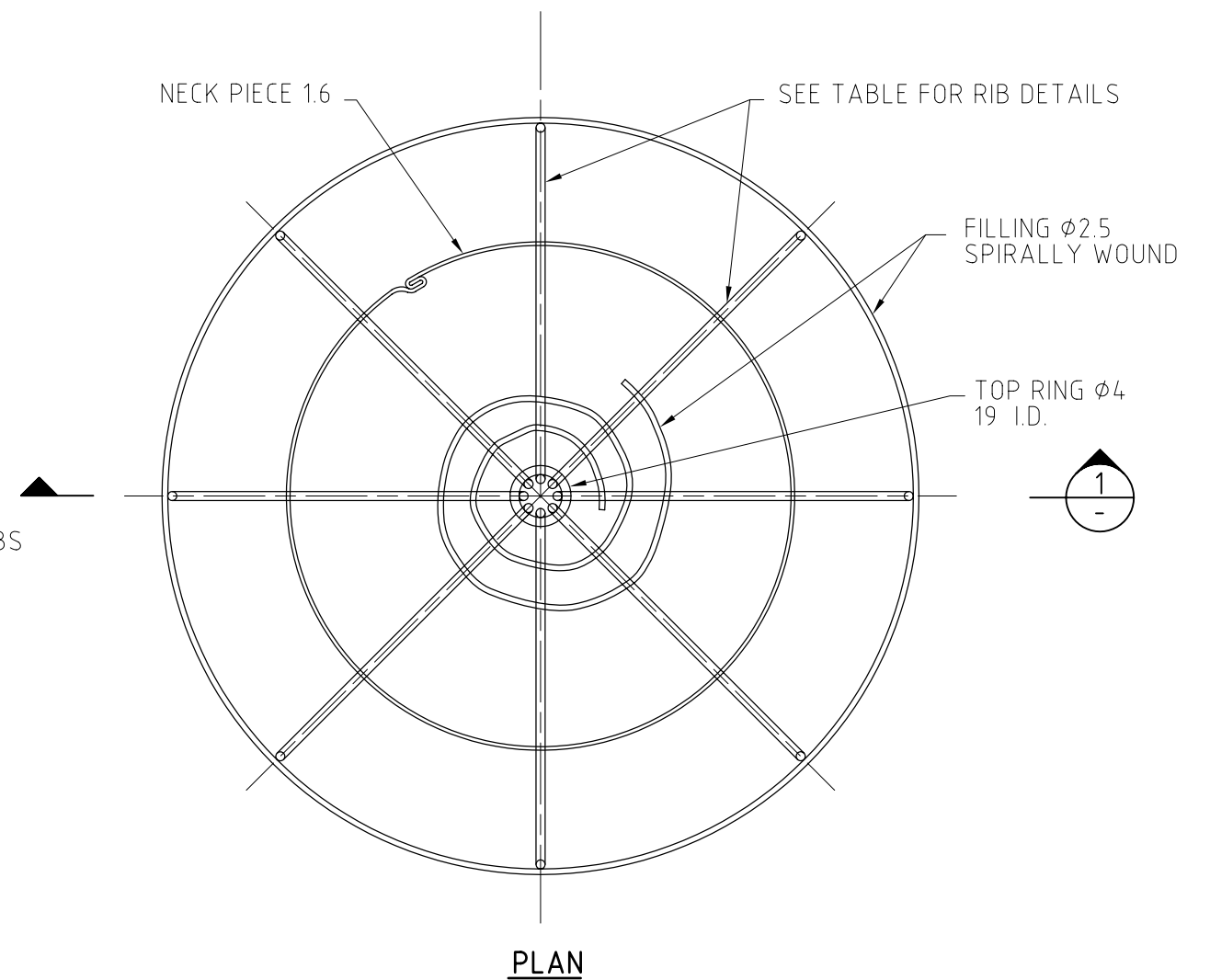
ISSUED: 2005 | VERSION 1



SECTION 1
SCALE 1:2

NOTES

1. ALL DIMENSIONS IN MILLIMETERS.
2. ALL MATERIAL 304 SS.
3. COWL TO BE PAINTED AS IN CONTRACT SPECIFICATION.



VENTSHAFT NOMINAL DIAMETER	DIMENSIONS					NO. OFF RIBS	RIB THICKNESS
	A	B	C	D	E		
150	240	230	200	38	145	6	3
225	330	305	230	38	220	6	4
300	440	405	305	50	295	8	4

PREPARED BY
**ASSET
MANAGEMENT**

© COPYRIGHT

RECOMMENDED

Elizgi
for WASTEWATER SYSTEMS MANAGER

APPROVED

B Nelson 12/08/05
for MANAGER, STRATEGIC ASSET MANAGEMENT

**Sydney
WATER**

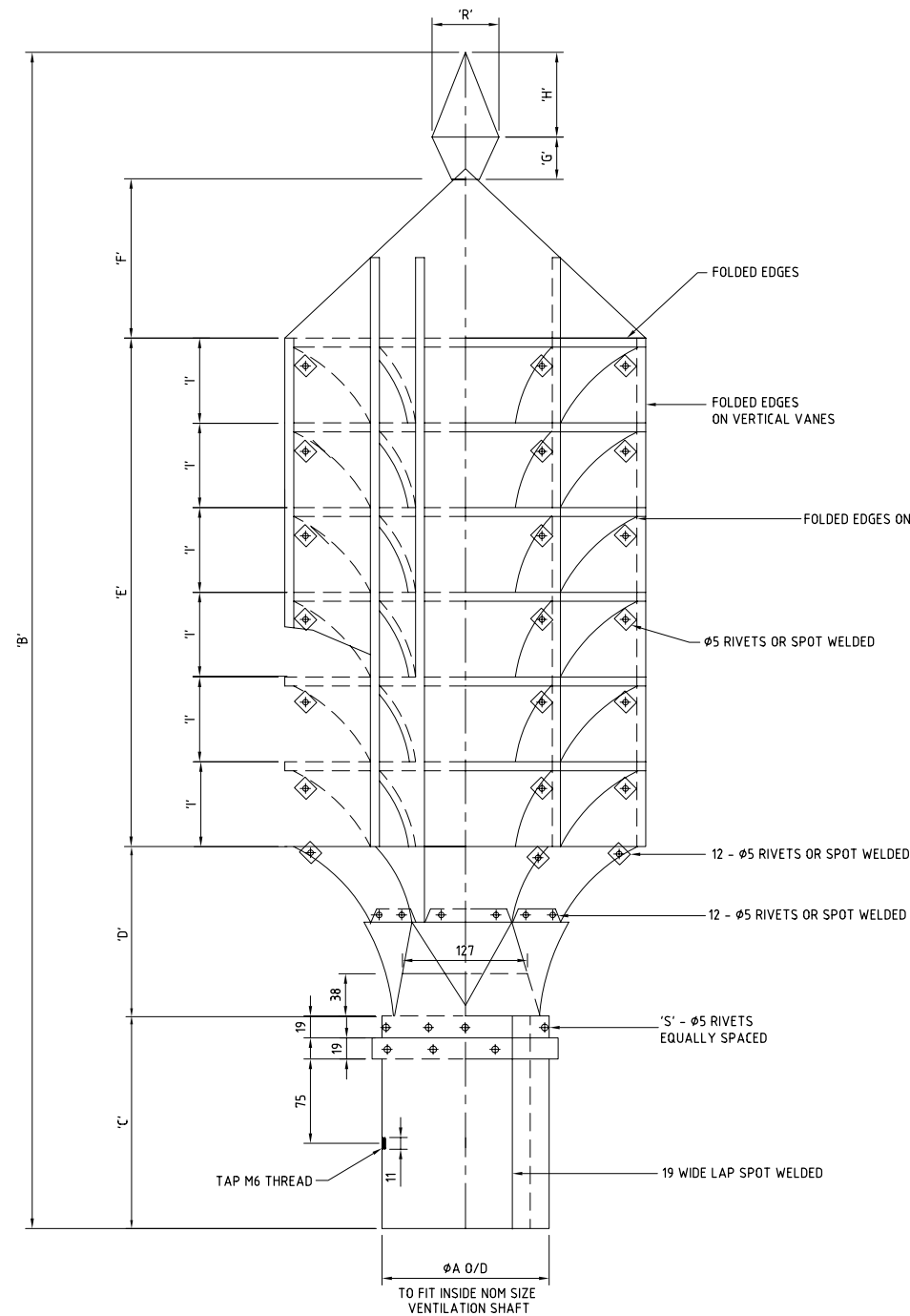
ENGINEERING PRODUCT SPECIFICATION

**VENTILATION SYSTEMS
EDUCT VENTSHAFT
WIRE COWL DETAILS**

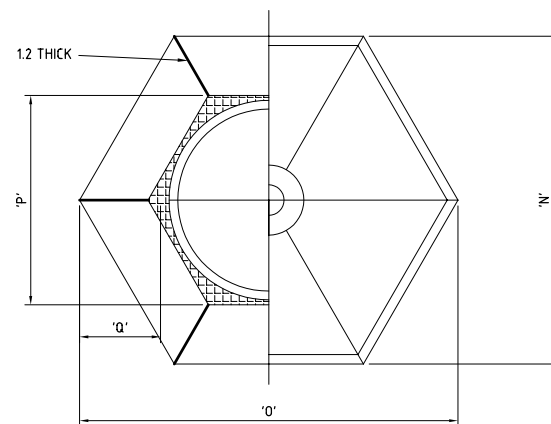
Sydney *WATER*

EPS 700.12

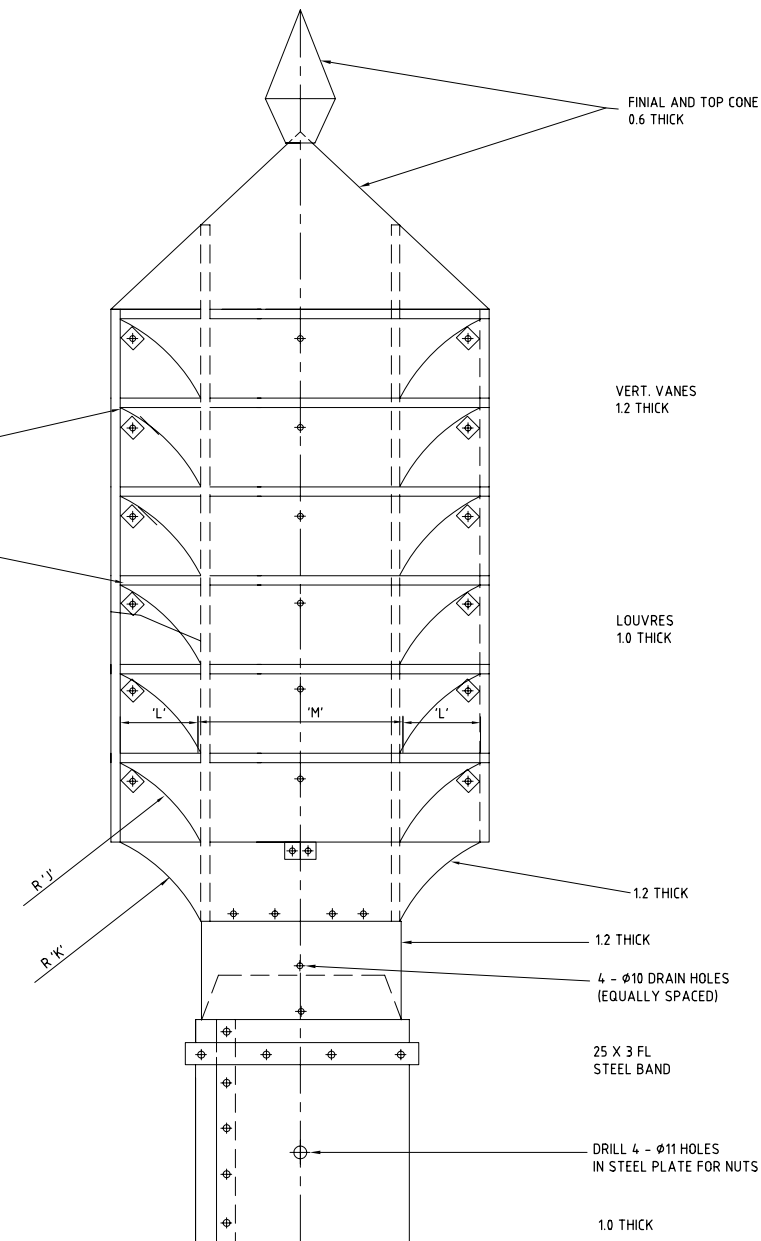
ISSUED: 2005 | VERSION 1



HALF ELEVATION



HALF PLAN



VIEW A

NOTES:

1. ALL DIMENSIONS IN MILLEMETERS UNLESS OTHERWISE NOTED.
2. COWL TO BE FABRICATED FROM 304 SS.
3. ALTERNATIVE FABRICATION MATERIAL - FIBREGLASS
4. ON COMPLETION, COWL TO BE COATED IN ACCORDANCE WITH PCS 109.

COWL SIZE	DIMENSIONS																		
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
DN 150	150	1055	190	152	456	152	38	76	76	152	203	60	152	273	324	150	86	60	7
DN 225	225	1575	280	225	690	225	60	115	115	230	305	87.5	230	405	480	230	480	90	9