Introduction

A clean environment is critical to the production of optical fibre. The clean air system operates on the preform and furnace modules together with all other sections of the draw tower where uncoated fibre is exposed and substantially reduces the dependence on clean room installations.

(Drawings 380001A, 188532A 380120A & 380422A refer)

Description

The clean air system comprises a series of manifolds and plenum chambers mounted within the tower modules, typically from the preform module down to the first coating station, which duct Class 100 clean air (Federal Standard 209B) to laminar flow High Efficiency Particulate Air (HEPA) filters located on the front face of the tower modules. The HEPA Micropleat paper filter elements are 99.97% efficient in the removal of >0.3 micron diameter particles and may be used in any combination to meet the tower configuration requirement.

The operating face of the tower is supplied with pre-filtered air from a dedicated fan/pre-filter unit providing step-less speed control over a range 0-100%. Reducing the input voltage decreases the torque output of the motor so providing a means of adjusting the air output volume. Air, to Class 10,000, is passed through a pre-filter prior to entering the tower frame and being ducted to the HEPA filters (Figure 2). Adjustable damper valves on individual plenum inlets allow the air flow to be balanced over the full length of the clean air coverage. The HEPA filter elements are easily replaced during routine servicing.

The clean air fan is software controlled via the Motor Drive Box and will come on as selected on the SCADA user interface.

Operation

Before commencing tower fibre drawing operations carry out the following steps:

1. Ensure air drawn into the pre-filter cabinet is at the same temperature as the environment surrounding the fibre drawing tower to prevent the onset of condensation or undesirable convection effects generating a vertical component to air flow patterns.
2. Check the airflow from the HEPA filters is at a predetermined value within the range of 0.25 to 0.5 metres/second. Adjust the airflow rate if required (see Maintenance).

Clean Air Velocity

The following criteria may be used to determine an acceptable range for the clean air velocity.

Excessive clean air velocity will cause unacceptable forward displacement of the fibre from the nominal line, especially at low fibre tensions. This will result in difficulty in centring the fibre in the bare fibre monitor gauge window and/or preform contact with the rear edge of the furnace top disc. The fibre may also contact the helium cooling tubes with resulting fibre weakness or breakage.

Inadequate velocity may not protect the fibre from particulates in the ambient air. Air flow currents in the fibre vicinity can be determined using commercial air current test kits, e.g. Drager. Optimum air velocity will be at an intermediate setting where both the above problem areas can be equally avoided.

Switching

When the system is operating, check the following.

1. The fibre position in the bare fibre diameter gauge does not move too close to the edge of the measurement window as the fan comes on line.

Note 1: If the fibre position does move too close to the edge of the bare fibre diameter gauge measurement window, exit auto diameter control and apply correction with the joystick and check the clean air velocity (see step 2 above).

Note 2: Confirm bare fibre tension is correct and that line speed at which the fan is started is not to low.

Maintenance

Personnel are to comply with the following warnings.

Warning The correct Personal Protective Equipment (PPE) is to be worn at all times.

Warning Working at height and related safety.

- ***Personnel are to remain behind guard rails at all times and/or wear an appropriate safety harness.***
- ***Personnel are to practice good housekeeping and methodical working practices to prevent items falling from the tower.***

General

The clean air system requires on-condition servicing dependant on the results of routine maintenance inspections.

Routine

The following inspections and servicing procedures are to be carried out. The frequency of the inspections and servicing may be varied dependant on the clean air system useage, the cleanliness of the intake air, the volume of air passed and the working environment.

Monthly

Carry out the following procedure:

1. Visually inspect the system for wear or damage.
2. Ensure the air intakes are not obstructed.
3. Ensure the environment is not excessively dusty.
4. Using a hand-held anemometer ensure the air flow from the HEPA filter units is at the optimum setting at the fibre line (see Operation step 4 and Clean Air Velocity). Check the airflow is consistent between filter panels and along the entire length of each panel.
5. Adjust the air flow rate, if required, using the speed control on the pre-filter cabinet and the adjustable dampers on each branch of the air distribution manifold to balance flows between individual sections.

6. If the correct air flow rate cannot be obtained using the speed control, inspect the pre-filter and ensure the pre-filter cabinet air intake is not blocked or obstructed (Figure 5).

6 Monthly

Carry out the following procedure:

1. Replace the pre-filter.
2. Reset the speed control to give the correct flow rate from the HEPA filter.
3. If the air flow remains incorrect replace the HEPA filter.

Note: After changing any air filter, the speed control will require adjustment to give the required flow rate through the HEPA filter.

Air Filter Replacement

Pre-filter

Warning Ensure electrical power is isolated before removing, installing or servicing components.

Carry out the following procedure:

1. Release the four latches which secure the pre-filter outlet to the pre-filter cabinet.
2. Remove the pre-filter outlet to expose the filter element and securing frame.
3. Remove the securing frame and filter element.
4. Inspect the PVC foam seal, in both the pre-filter outlet and the pre-filter cabinet, for damage and security.
5. Remove and discard the filter element.
6. Install the securing frame and replacement filter element.

Note: Ensure that the pre-filter element is installed correctly. A series of arrows on the edges of the filter element indicate the correct direction of air flow through the filter (loose weave facing the fan, tight weave facing the outlet).

7. Install the pre-filter outlet and close the four latches

Note: After changing any air filter, the speed control will require adjustment to give the required flow rate through the HEPA filter.

HEPA Filter

The HEPA filter units are installed on the front face of the tower frame and access to the filter requires the operator to reach to the tower structure from the lift or working platform.

Warning Working at height and related safety

- ***Personnel are to remain behind guard rails at all times and/or wear an appropriate safety harness.***
- ***Personnel are to practice good housekeeping and methodical working practices to prevent items falling from the tower.***

Warning : Ensure electrical power is isolated before removing, installing or servicing components.

To replace an HEPA filter carry out the following procedure:

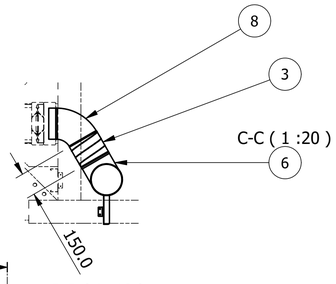
1. Ensure electrical power to the pre-filter cabinet is switched OFF.
2. Remove the securing nuts from each of the filter unit retaining clamps and hold the filter against the tower frame to prevent it tipping forward
3. Lift the filter forward from the front of the tower frame.
4. Install the replacement filter in position on its supporting rail, holding it against the tower frame.
5. Install the filter retaining clamps and hand tighten the securing nuts.
6. Fully tighten the securing nuts in diagonal sequence.

Note: After changing any air filter, the speed control will require adjustment to give the required flow rate through the HEPA filter

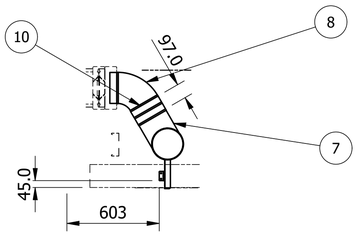
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	6	280851	200Ø DUCT SUPPORT
2	6	280853	DUCTING SUPPORT MNTG BRK
3	3	P02801	TUBE SPIROL Ø200MM
4	2	P02802	250mm TO 200mm REDUCER
5	1	P02803	250mm EQUAL TEE
6	1	P04186	200mm EQUAL TEE
7	2	P02805	200mm dia B 90DEG.
8	3	P02806	200mm dia B 60DEG.
10	3	P02919	DUCT COUPLING FEMALE 200mm
11	3	P02920	DUCT COUPLING FEMALE 200mm
12	1	P02923	300mm-250mm REDUCER

REVISION HISTORY				
REV	DESCRIPTION	DCR No.	DATE	APPROVED
1	FIRST ISSUE		23/11/17	CK

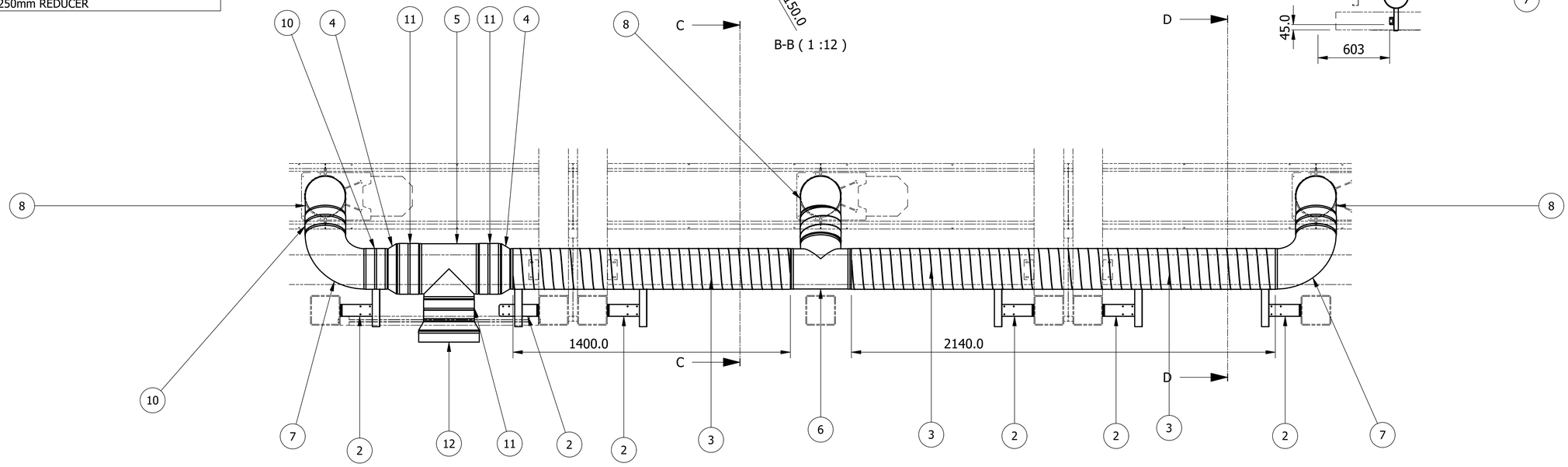
C-C (1 :20)



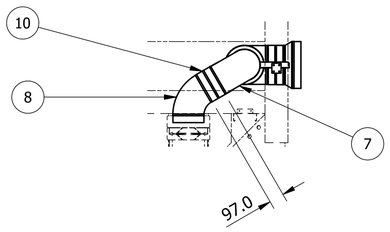
D-D (1 :20)

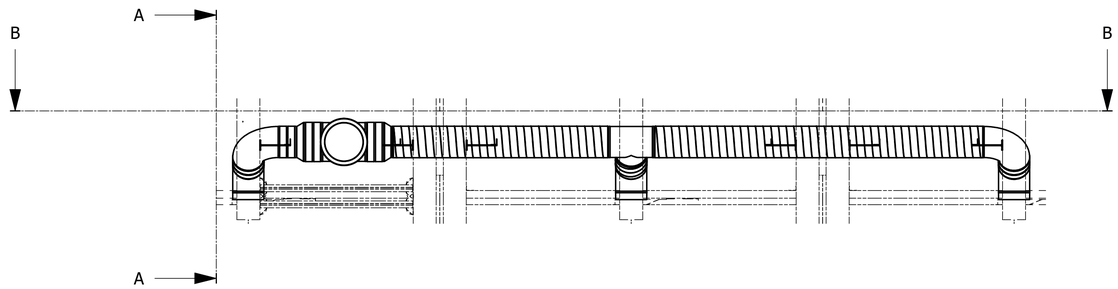


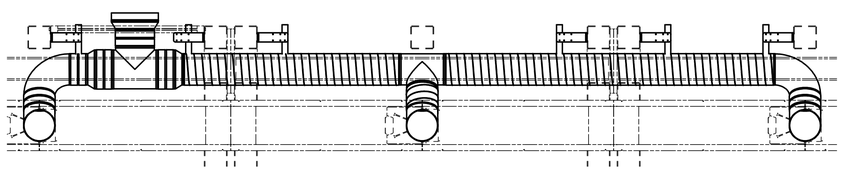
B-B (1 :12)



A-A (1 :20)







SG Controls Limited

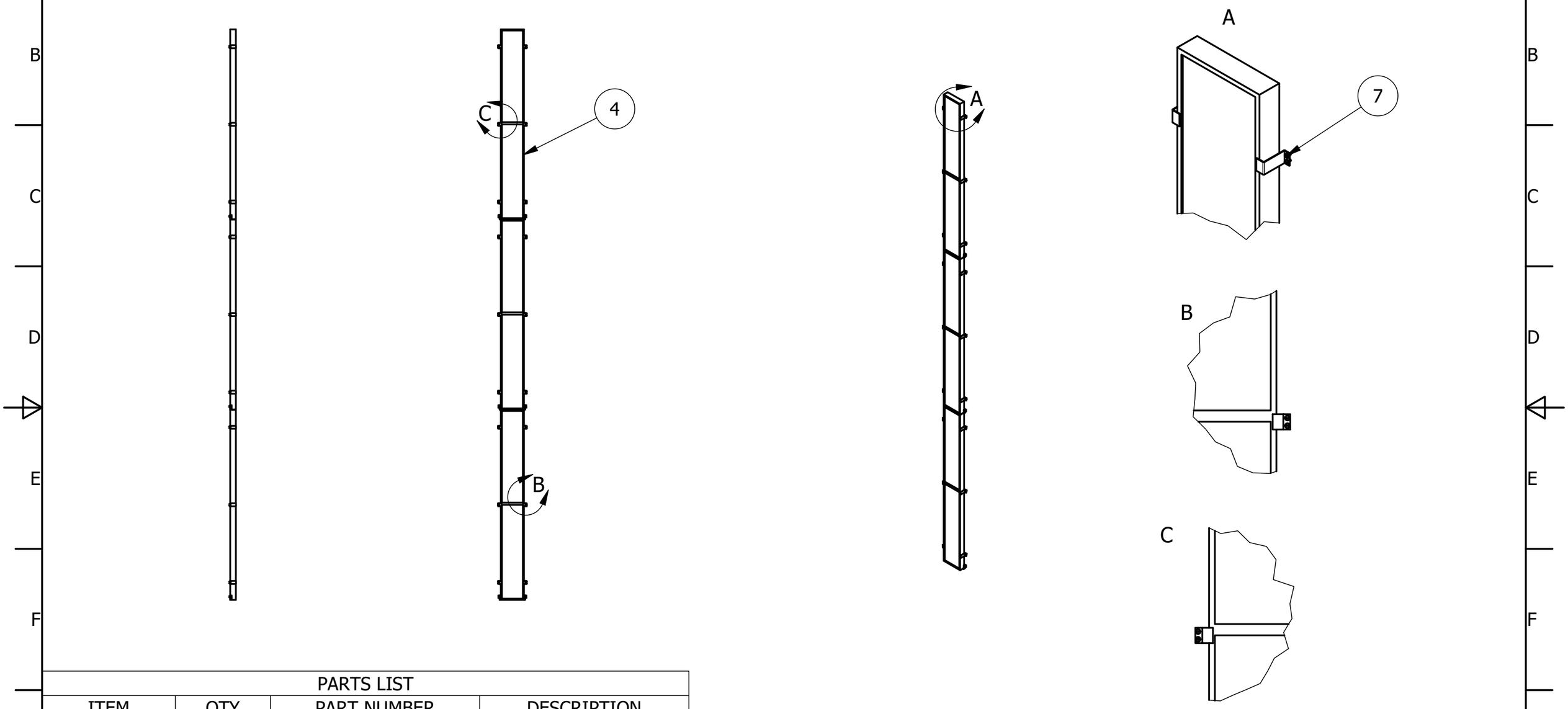
DO NOT SCALE
IF IN DOUBT ASK
UNLESS OTHERWISE STATED DIMENSIONS ARE IN mm
DIM TOL ±0.3
0.0 ±0.1
ANGULAR TOL ±0.5
SURFACE FINISH 1.6
REMOVE ALL SHARP EDGES

DATE: 12/11/2018

TITLE: 12.5m TOWER DUCTING ASSY

USED ON	DRG No.	SHEET	REV.
380000A	380422A	1 OF 1	1
	MATERIAL:		ORIG. SCALE 1:20
	FINISH:		ORIG. SHEET A1

REVISION HISTORY				
REV	DESCRIPTION	DCR No.	DATE	APPROVED
1	FIRST ISSUE		30/10/17	CK



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	280967	FILTER BRACKET LH
2	3	280968	FILTER BRACKET RH
3	18	282329	FILTER CLAMP BRACKET
4	3	F00137	FILTER - HEPA
5	12	K00072	CskSlt M3x10 S/S
6	36	K00313	6mm PLAIN WASHER - STD, S/S
7	36	K00324	M6 x 12 PAN SLOT S/S

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DRAWN: jgregory DATE: 27/10/2017

DO NOT SCALE

IF IN DOUBT ASK

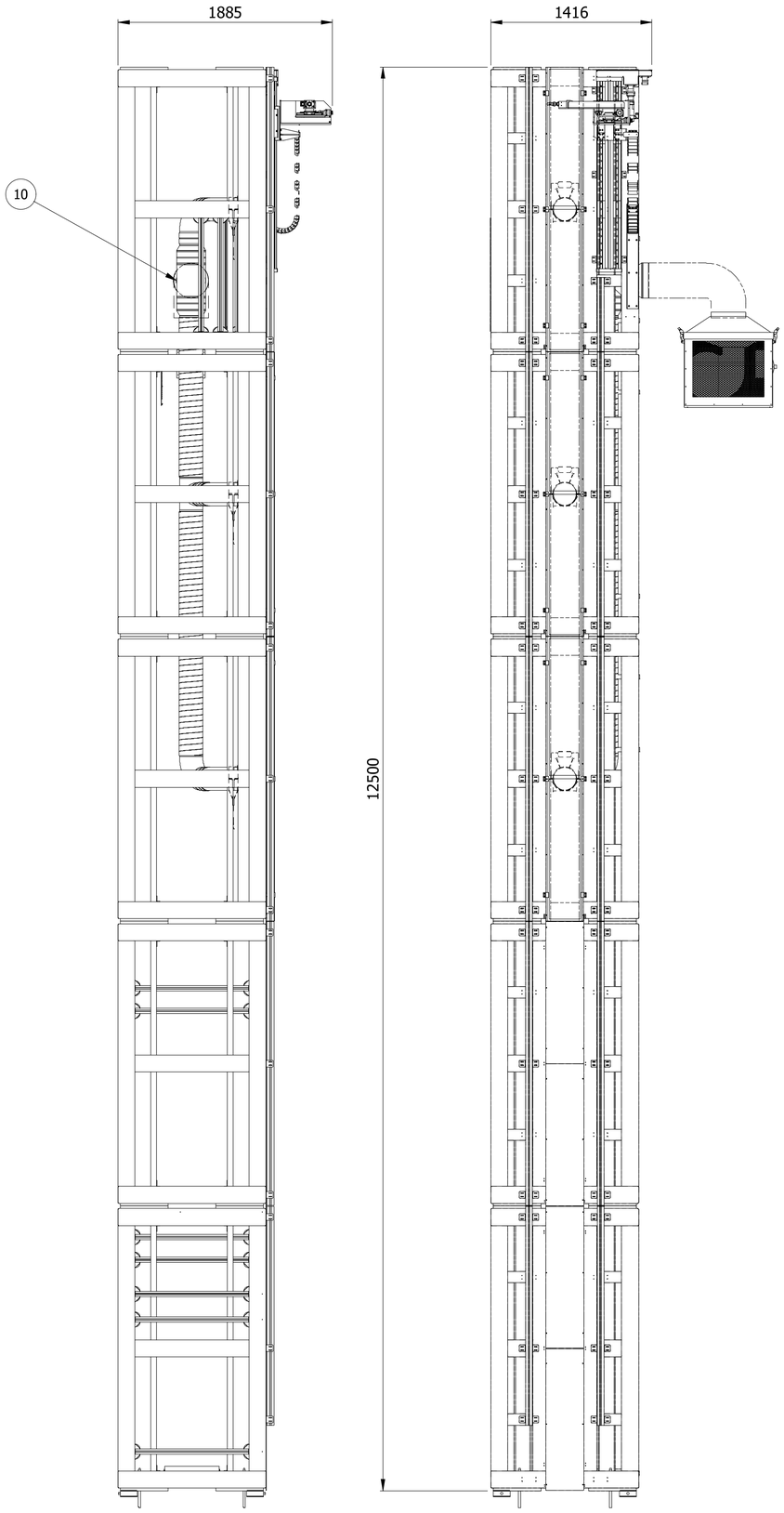
UNLESS OTHERWISE STATED
DIMENSIONS ARE IN mm
DIM TOL 0 ± 0.3
0.0 ± 0.1
ANGULAR TOL ± 0.5
SURFACE FINISH - um1.6

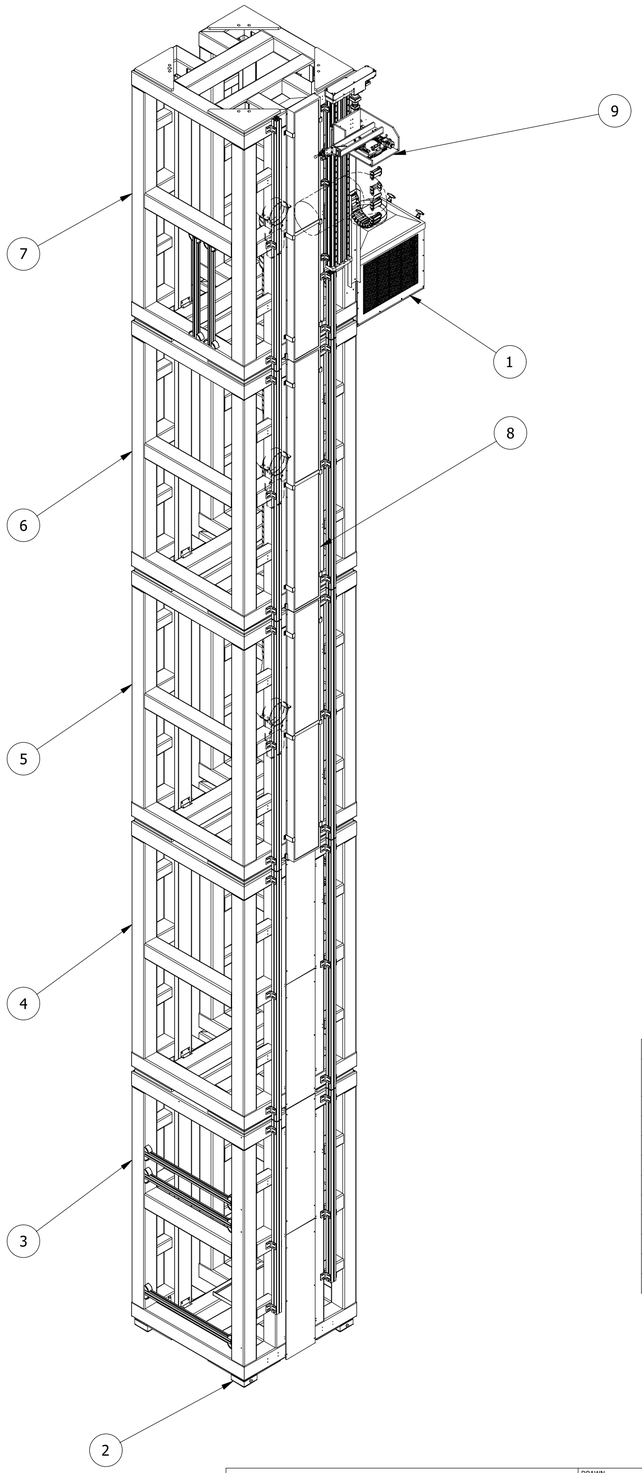
REMOVE ALL SHARP EDGES

TITLE: CLEAN AIR FILTERS x 3

USED ON	DRG No.	SHEET	REV
380001A	380120A	1 OF 1	1
	MATERIAL:	ORIG SCALE	1:50
	FINISH:	ORIG SHEET	A3

REVISION HISTORY				
REV	DESCRIPTION	DCR No.	DATE	APPROVED
1	FIRST ISSUE		18/02/19	LAR





PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	188532A	FAN CABINET ASSY
2	1	284153A	TOWER FIXING ASSY
3	1	380077A	TOWER MODULE 1 ASSY BASE
4	1	380078A	TOWER MODULE 2 ASSY
5	1	380079A	TOWER MODULE 3 ASSY
6	1	380080A	TOWER MODULE 4 ASSY
7	1	380081A	TOWER MODULE 5 ASSY PREFORM
8	1	380120A	CLEAN AIR FILTERS X 3
9	1	380121A	PREFORM DRIVE ASSEMBLY
10	1	380422A	12.5m TOWER DUCTING ASSY

SG Controls Limited

DRAWN LAR | DATE 18/02/2019

DO NOT SCALE

IF IN DOUBT ASK

UNLESS OTHERWISE STATED
DIMENSIONS ARE IN mm
DIM TOL' 0 ± 0.3
0.0 ± 0.1
ANGULAR TOL ± 0.5
SURFACE FINISH: 1.6 µm

REMOVE ALL SHARP EDGES

TITLE

TOWER STRUCTURE

USED ON	DRG No.	SHEET	REV
380000A	380001A	1 OF 1	1
	MATERIAL: -	ORIG SCALE	1:25
	FINISH:	ORIG SHEET	A1

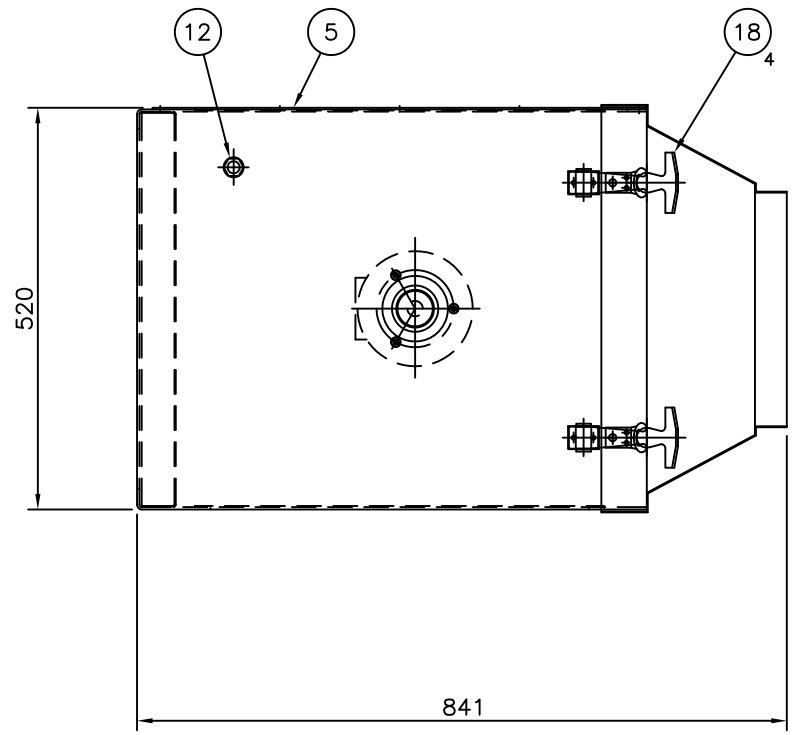
DWG. No. 188532A

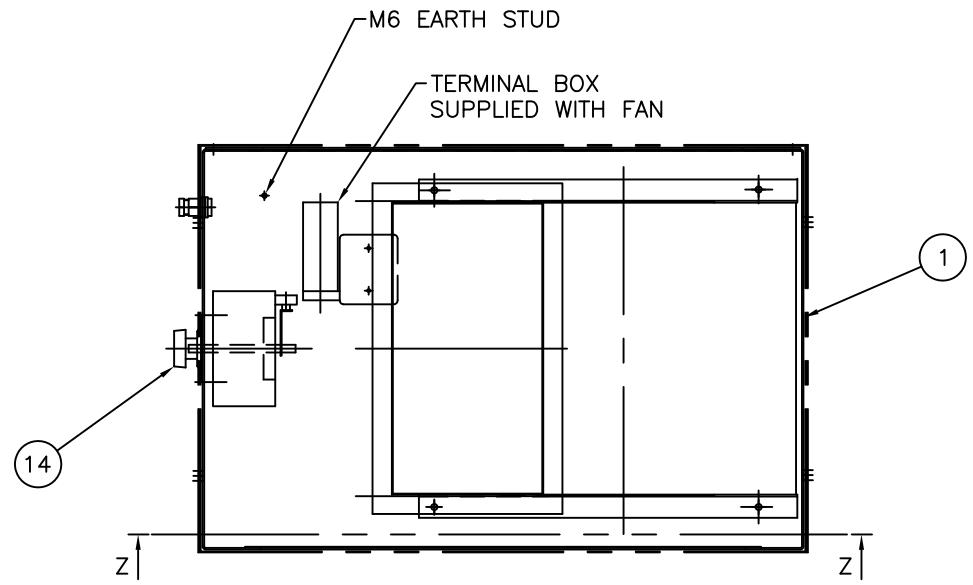
DO NOT SCALE

DRAWING TO BS308

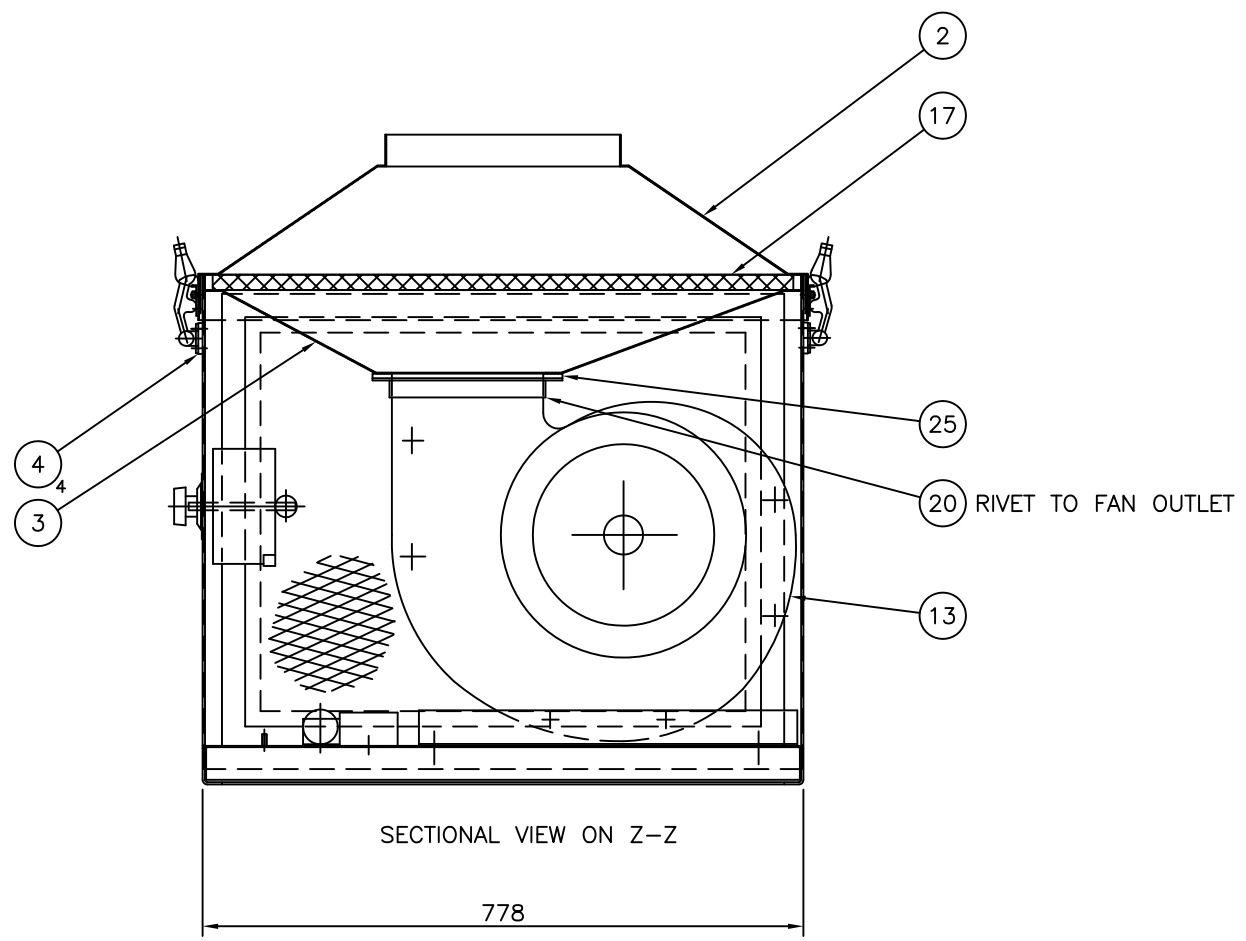
IF IN DOUBT ASK

REVISION HISTORY				
REV.	DESCRIPTION	DCR No.	DATE	APPROVED
1	FIRST ISSUE	7670	6/95	K.C.
2	REDRAWN ON CAD WITH NEW CONSTRUCTION	30359	7.03.01	MDH





ITEMS 2, 3, 4 & 17 NOT
SHOWN IN THIS VIEW



SECTIONAL VIEW ON Z–Z

778

OVERALL MASS OF CABINET &
FAN ESTIMATED AT 100 kg

DRAWN	M.D.HASLAM	DATE 26.02.2001
CHECKED		DATE
APPROVED		DATE

TITLE: FAN CABINET ASSY

SG controls — **SG Controls Limited**

UNLESS OTHERWISE STATED DIMENSIONS ARE IN mm
DIM. TOL. 0 ± 0.5, 0.0 ± 1.0
ANGULAR TOL. ± –
SURFACE FIN. – √(μm)
REMOVE ALL SHARP EDGES

USED ON 188533A

THIRD ANGLE PROJECTION

DWG. No. 188532A

SHEET 1 OF 1

REV 2

MATERIAL SEE PARTS LIST

FINISH –

ORIG. SCALE 1:5

ORIG. SHEET A1