Part 1: A joint, L-shaped and a separate moveable optical table with self-levelling pneumatic vibration isolator frames

This part of the bid applies to the purchase of 3 optical tables with spill-free optical bench, metric M6 tapped holes on 1-inch (25 mm) grid. The top and bottom of the plate material of the table must be made of ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.

Note that the table of **type 1** and of **type 2** will be joined together along the smaller side of type 2 (1200 mm) and longer side of type 1 (1800 mm) to obtain a "L"-shape. Sufficient and adequate jointer must be provided accordingly.

Each table must be equipped with air vibration isolators (Self levelling pneumatic isolator frames). For the **table type 3, in addition to self-levelling pneumatic isolator** frame**,** we require levelling feet for each leg to compensate the uneven floor and retractable roller casters under each leg.

The optical bench and legs dimensions and properties of all parameters including vibration damping for bench, air vibration isolators, flatness precision are indicated in Tab. 1-5 hereafter. ***All tables must comply the parameters given in the tables especially flatness, vibration damping, air vibration isolator, height control and load capacity requirements***.

Please note that Tab. 1-4 below contain specifications of two optical tables which will be join to make an L-Shaped optical table. Tab. 5 contains specifications of an independent moveable optical table.

Parameter name	Required value
Properties of optical table type 1	
Quantity	1
Maximum weight of table type 1	550 kg
Bench	spill free optical bench, all steel construction with closed shell honeycomb core with internal cell size not exceeding 5 cm^2
Hole pattern	M6 tapped on 1 inch (25 mm) grid
Dimensions	1800x1200x300 mm (thickness +- 2 %)
Material and thickness of upper and lower plate of the bench	Ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.
Tabletop sidewalls	Steel sidewalls (damping quality)
Vibration damping	Yes (Broad band vibrational damping)
First resonance frequency	> 150 Hz
Maximum Static deflection	≤ $2x10^{-6}$ mm/N
Air vibration isolators Isolation efficiency @ 5 Hz Isolation efficiency @ 10 Hz	Yes (Self-levelling pneumatic isolator frame) Vertical ≥80% Horizontal ≥80% Vertical ≥90% Horizontal ≥90%
Finish for isolator frame	Black powder coat
Isolators total load capacity	Total ≥ 2000 kg
No of legs	Sufficient to support the joint table configuration and the load capacity
Legs height	So that the height of the table-top from the floor is between 900 and 915mm, with the self-levelling pneumatic isolation on
Height control system	Self-levelling pneumatic, air pressured with height control repeatability ≤ 250 um

Table 1 Technical specifications of optical table type 1

Parameter name	Required value
Properties of optical table type 2 (This table will be joint to table type 1, to make a joint L-shaped optical table)	
Quantity	1
Maximum weight of table type 2	450 kg
Bench	spill free optical bench, all steel construction with closed shell honeycomb core with internal cell size not exceeding 5 cm^2
Hole pattern	M6 tapped on 1 inch (25 mm) grid
Dimensions	1500x1200x300 mm (thickness +- 2%)
Material and thickness of upper and lower plate of the bench	Ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.
Tabletop sidewalls	Steel sidewalls (damping quality)
Vibration damping	Yes (Broad band vibrational damping)
First resonance frequency	> 150 Hz
Maximum Static deflection	≤ $2x10^{-6}$ mm/N
Air vibration isolators Isolation efficiency @ 5 Hz Isolation efficiency @ 10 Hz	Yes (Self-levelling pneumatic isolator frame with height control repeatability ≤ 250 um) Vertical ≥80% Horizontal ≥80% Vertical ≥90% Horizontal ≥90%
Finish for isolator frame	Black powder coat
Isolators total load capacity	Total ≥ 2000 kg
No of legs	Sufficient to support the joint table configuration and the load capacity
Legs height	So that the height of the table-top from the floor is between 900 and 915 mm, with the self-levelling pneumatic isolation on
Roller casters	NO
Height control system	Self-levelling pneumatic, air pressured with height control repeatability ≤ 250 um

Table 2 Technical specifications of optical table type 2

Parameter name	Required value
Flatness	
Flatness over entire surface of joint table	Max. +/- 0.20 mm over entire surface of joined tables
Total weight	
Maximal total weight of the joint L-shaped table (table 1 assembled together to table 2)	975 kg

Table 3 Surface Flatness and total weight requirement for Joint L-shaped optical table.

Parameter name	Required value
Jointers	
Type	Metallic plate jointers in order to join the optical tables type 1 and 2. One must be able to remove joiner in order to use table separately.
Quantity	Enough to ensure above mentioned required flatness and vibration isolators efficiency criteria of both tables together.

Table 4 Joiners requirement to combine table type 1 and 2 to make a joint L-shaped table.

Parameter name	Required value
Properties of optical table type 3	
Quantity	1
Maximum weight of table type 3	350 kg
Bench	Spill free optical bench with closed shell honeycomb core with internal cell size not exceeding 5 cm^2
Dimensions	1200x900x100mm (thickness between 95 and 115 mm)
Material and thickness of upper and lower plate of the bench	Ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.
Flatness	+/- 0.20 mm over entire length of table=1200 mm
Vibration damping	Yes (Broad band vibrational damping)
First resonance frequency	>150 Hz
Maximum Static deflection	≤ $2x10^{-6}$ mm/N
Air vibration isolators Isolation frequency @ 5 Hz Isolation frequency @ 10 Hz	Yes (Self levelling pneumatic isolator frames for legs with height control repeatability ≤ 250 um) Vertical ≥80% Horizontal ≥80% Vertical ≥90% Horizontal ≥90%
No of legs	4
Legs height	So that the height of the table-top from the floor is between 900 and 915 mm, with the self-levelling pneumatic isolation on
Levelling feet	YES, levelling feet for every isolator to compensate uneven floor
Roller casters	Yes (quantity = 4), retractable
Load capacity	Total ≥ 580 kg (145 kg per isolator)

Table 5 Technical specifications for independent moveable optical table type 3

Part 2: A joint, U-shaped and a separate optical table

This part of the bid applies to the purchase of 4 optical tables with metric M6 tapped holes on 1-inch (25 mm) grid. The top and bottom of the plate material of the table must be made of ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.

Note that the 2 tables of **type 4** and 1 table of **type 5** will be joined together forming a "U" shape. The type 5 table will be the middle piece and its short sides (400 mm) will be connected to the long sides of the type 4 tables (Fig. 1). Sufficient and adequate jointer must be provided accordingly. All the tables are at the same height and each table must be equipped with passive broadband damping.

All tables will be equipped with rigid supports.

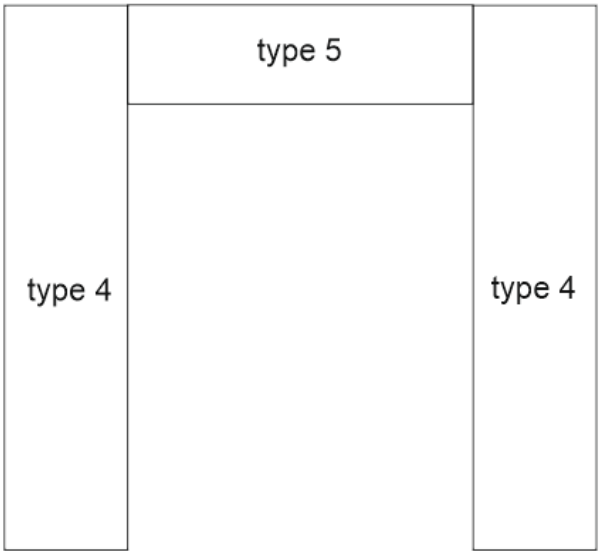

Fig. 1: 3 tables forming a U shape

Please note that Tabs. 6-8 below contain specifications of two optical table which will be join to make a U-Shaped optical table. Tab. 9 contains specifications of an independent optical table.

Parameter name	Required value
Properties of optical table type 4 (side parts of the U-shaped table)	
Quantity	2
Maximum weight of table	250 kg max
Bench	spill free optical bench, all steel construction with closed shell honeycomb core
Hole pattern	M6 tapped on 1 inch (25 mm) grid
Dimensions	2200x500x203 mm (thickness +- 2 mm)
Material and thickness of upper and lower plate of the bench	Ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.
Tabletop sidewalls	Steel sidewalls (damping quality)
Vibration damping	Yes (Broad band vibrational damping)
No of legs	Rigid supports sufficient to support joint table configuration
Legs height	So that the height of the table-top from the floor is between 905 and 915mm

Table 6 Technical specifications of table type 4

Parameter name	Required value
Properties of optical table type 5 (middle part of the U-shaped table)	
Quantity	1
Maximum weight of table	150 kg max
Bench	spill free optical bench, all steel construction with closed shell honeycomb core
Hole pattern	M6 tapped on 1 inch (25 mm) grid
Dimensions	1400x400x203 mm (thickness +- 2 mm)
Material and thickness of upper and lower plate of the bench	Ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.
Tabletop sidewalls	Steel sidewalls (damping quality)
Vibration damping	Yes (Broad band vibrational damping)
No of legs	Rigid supports sufficient to support joint table configuration
Legs height	So that the height of the table-top from the floor is between 905 and 915mm

Table 7 Technical specifications of table type 5

Parameter name	Required value
Jointers	
Type	Metallic plate jointers in order to join the optical tables type 1 and 2. One must be able to remove joiner in order to use table separately.

Table 8 Joiners requirement to combine table type 4 and 5 to make a joint U-shaped table.

Parameter name	Required value
Properties of optical table type 6	
Quantity	1
Weight of table	Not exceeding 350 kg
Bench	Spill free optical bench with closed shell honeycomb core
Dimensions	2400x750x203mm (thickness +- 2mm)
Material and thickness of upper and lower plate of the bench	Ferromagnetic stainless steel with minimum sheet thickness of 4.75 mm.
Vibration damping	Yes (Broad band vibrational damping)
No of legs	4 rigid supports
Legs height	So that the height of the table-top from the floor is between 905 and 915mm
Load capacity	At least 500 kg

Table 9 Technical specifications for independent optical table

Part 3: A joint, L-shaped table and a two separate optical tables

This part of the bid applies to the purchase of 3 optical tables with metric M6 tapped holes on 1-inch (25 mm) grid. The top and bottom of the plate material of the table must be made of ferromagnetic stainless steel.

Two optical tables are joined together and together with the third table, they are described in the Drawing No SL-1058861.

1. REQUIREMENTS:

1.1 Performance Values

Table 10 shows the required specification for the optical table surfaces.

Table 10: Performance requirements for all optical tables

Parameter	Target	Minimum Requirement
Surface Flatness	< ±0.1mm per $1m^2$	< ±0.1mm per 0.6 m^2
The following parameters apply to a table of the same type and thickness, of size 90 cm by 180 cm, centrally loaded with 1.5kN.		
Maximum Dynamic Deflection Coefficient	< $0.4x10^{-3}$	< $0.8 x10^{-3}$
Deflection Under Load.	< 0.5µm (micron)	< 1.3 µm (micron)
Maximum Relative Table-top Motion	<0.14 nm	< 0.2 nm

Additional requirements are:

- Core construction is expected to be high density honeycomb
- The working surface material shall be magnetic
- The Supplier shall indicate the best practice for earthing the tables, i.e. whether top and bottom surfaces are connected, suitable connection points etc.
- The Tables will be located in a cleanroom environment, ISO 7 so shall be delivered clean and free of accessible oil, swarf and other machining residues, including on the inside of the M6 mounting holes. It is expected that this requirement is fulfilled by standard-grade tables, and that an upgrade to special cleanroom grade is not required.

- It is desirable for the table to have sealed holes such that liquids / dust / contaminants cannot become trapped within the Tables and risk escaping upon transport and reinstallation. The sealing material shall be compatible with alcohol based solvents and acetone.

1.2 Dimensions

1.2.1 Optical tables

Tables defined in Drawing No SL-1058861 have 3 table *segments* (monolithic optical tables). These are grouped into two *sections*

The first section is L-shaped and consists of two segments (Front End Table and 10J Table A) which are bolted together using the Supplier's table joining / doubling system. One segment (10J Table A) will have a non-standard shape, as indicated in Drawing No SL-1058861. The joint between the two segments shall not protrude from the working surface and should not use any working surface mounting holes.

The second section consists of a single segment (10J Table B), again with a non-standard shape.

1.2.2 Table support legs

The Tables shall be supplied with rigid (neither passively nor actively damped) support legs.

- The Supplier shall perform their own loading calculations in order to determine optimum leg positions, according to the load distribution as detailed in Drawing No SL-1058861. Leg positions shown in the drawing are indicative only. Forth optical table is anticipated to have load distributed uniformly.
- Height adjustability shall be at least +15/-8 mm from the nominal height.

Table 12 shows the dimension specifications that apply to the Tables.

Table 12: Dimension requirements for optical tables and tapped holes

Item	Target	Acceptable Range
Hole Size	M6-1.0	NA
Hole Pitch	25mm square	NA
Table thickness	310mm	300-400mm
Table-top height above floor	910mm	905-915mm
Gap between floor and underside of tables (i.e. height	600mm	>520nm

of support legs)		
Edge to centerline of first hole distance	12.5mm	NA
Distance of nearest holes across joint between Front End Table and 10J Table A	75 mm or less	125 mm or less

1.3 Mounting holes on underside

The Tables shall contain a number of M6 threaded holes in the bottom plate, as detailed in in Drawing No SL-1058861.

Alternatively, the bottom plate can have the same threaded hole pattern as the top plate, if it is convenient for manufacturer and performance requirements (Table 10) are not compromised.

A1 | SL-1058861 | A

DO NOT SCALE

ITEM No	DRAWING NO / CATALOGUE No	TITLE / DESCRIPTION	QTY
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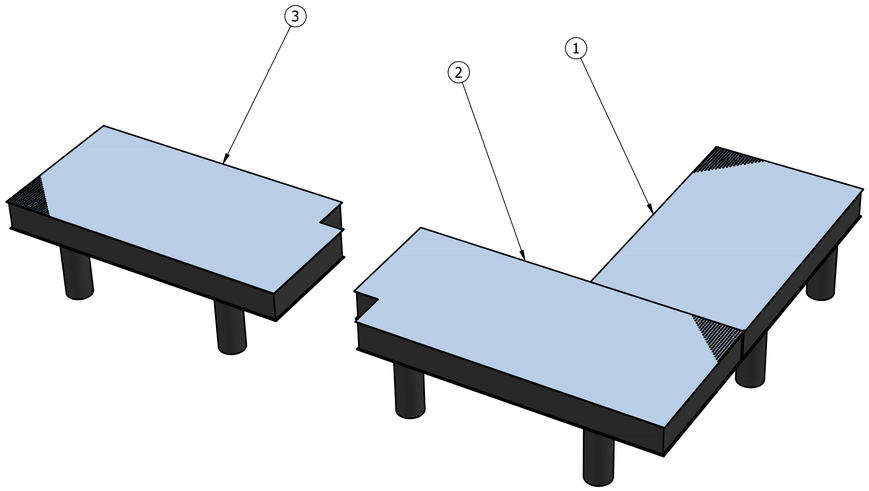
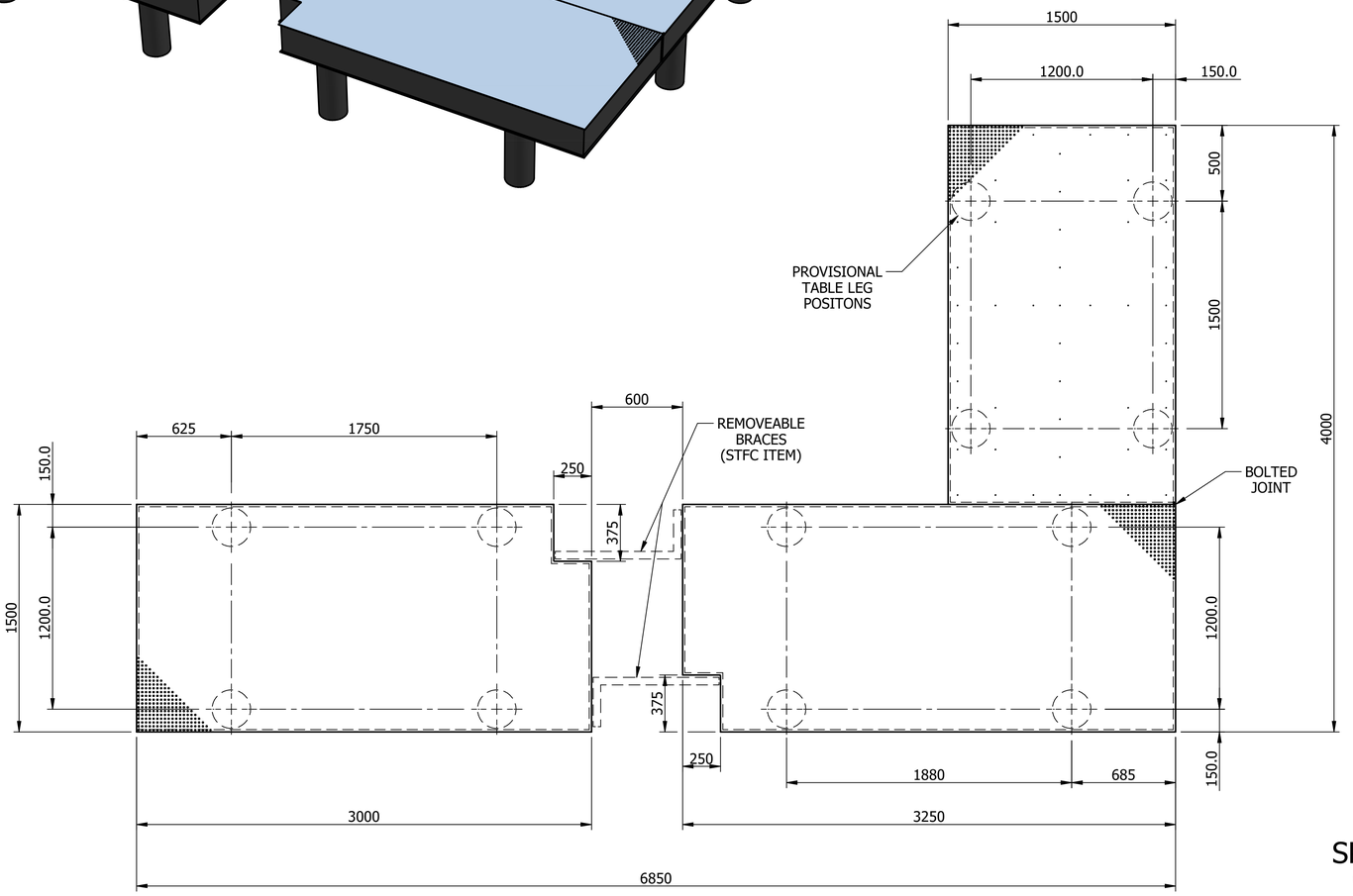
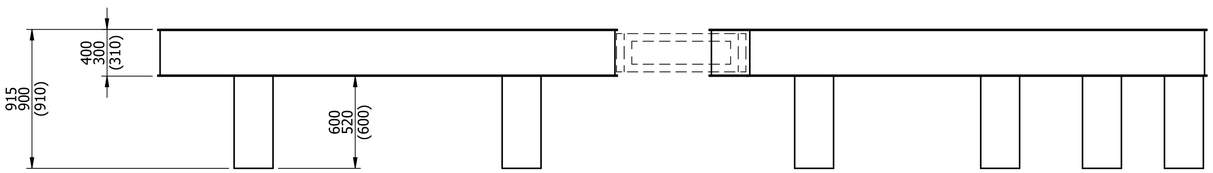
2	SEE SHEET 3	100Hz 10J TABLE A	1
3	SEE SHEET 4	100Hz 10J TABLE B	1







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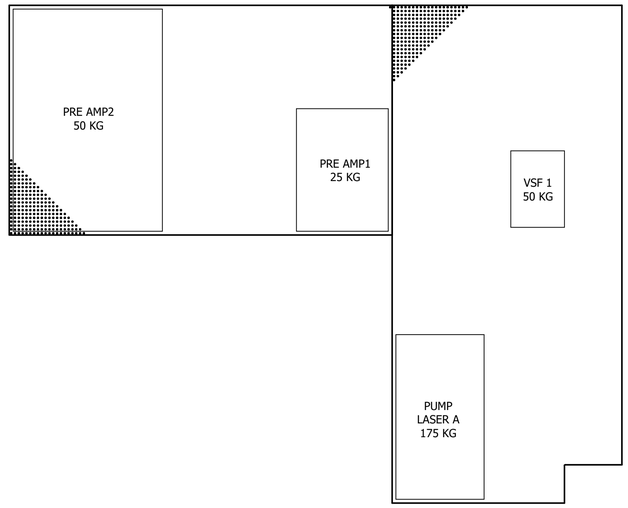

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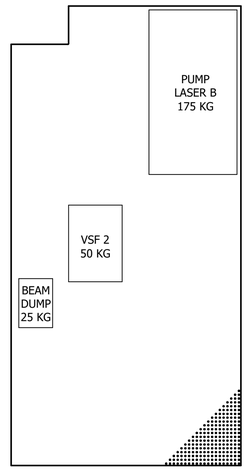

REFER TO 100Hz TABLE
SPECIFICATION DOCUMENT
'WSPD-WP4-S11-0020-SP'

ISSUE	DATE	DRN BY	CHKD BY	APPD BY	DESCRIPTION OF CHANGE
A	02.03.2020	AJL56	ADN	KGE	

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MATERIAL & SPEC.

SURFACE TEXTURE UNLESS STATED: Ra N/A

FINISH: CLEAN; REMOVE ALL BURRS & SHARP EDGES

PROJECTION

DIMENSIONS IN mm UNLESS STATED

DRAWING CONFORMS TO BS 8888 TOLERANCING ISO 8015

CENTRAL LASER FACILITY
RUTHERFORD APPLETON LABORATORY
HARWELL CAMPUS, DIDCOT, OXFORDSHIRE, OX11 0QX

USED ON: SL-1053300 ---- ---- ---- ---- ----

TITLE

100Hz 10J OPTICAL TABLE LAYOUT

E-254

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WP4 S11
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A1 | SL-1058861 | SHEET 1 OF 4 | MANUFACTURE ONLY WHEN STATUS IS **ISSUED** | STATUS **ISSUED** | A

A | SL-1058861 | A1

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A1 | SL-1058861 | A

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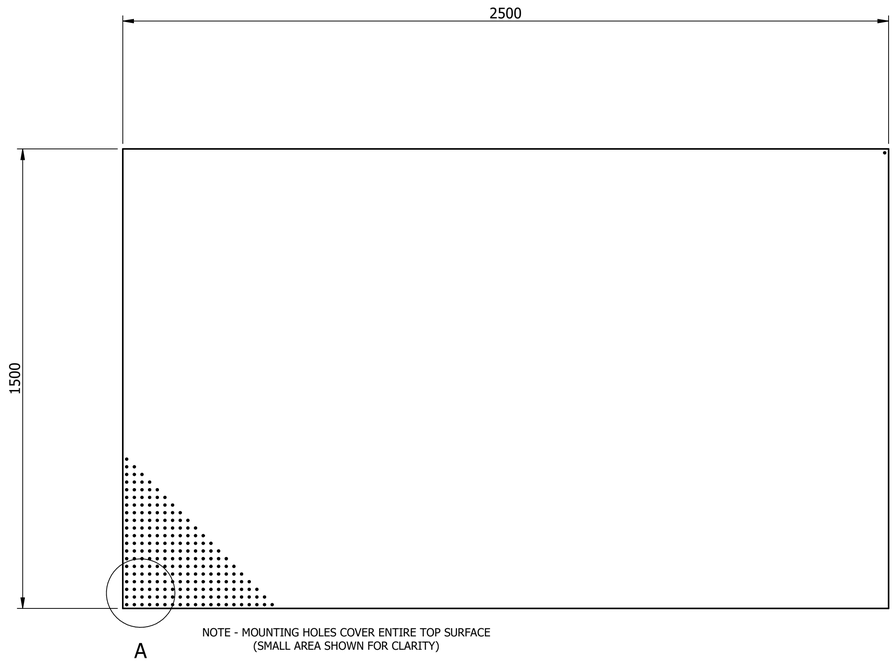
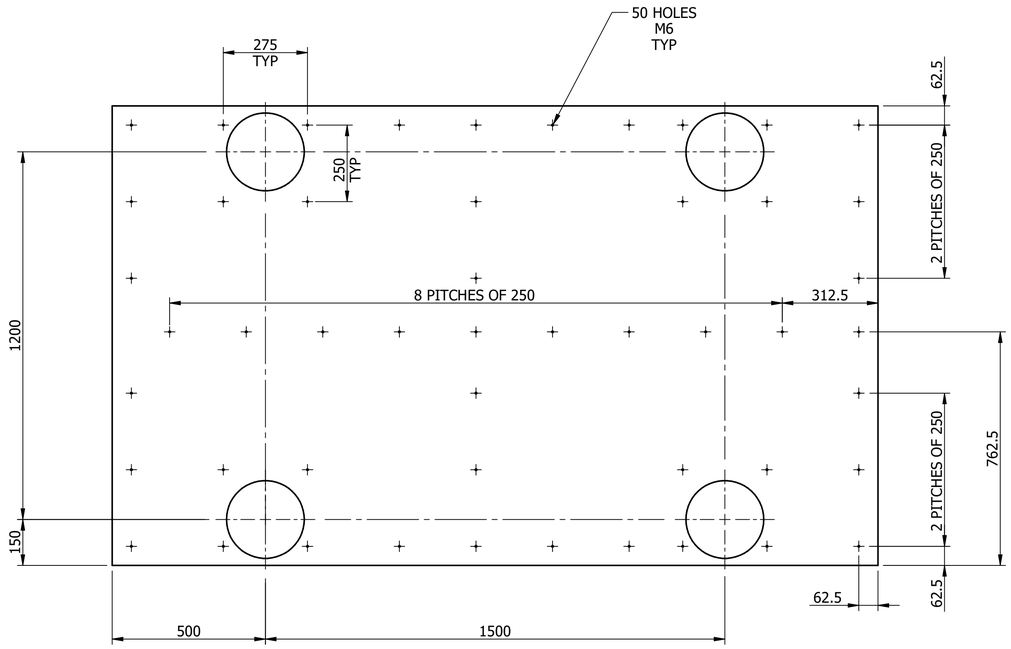
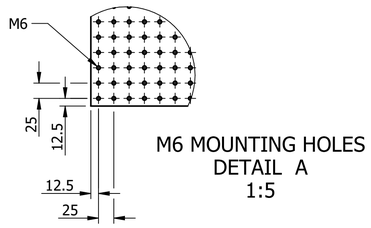
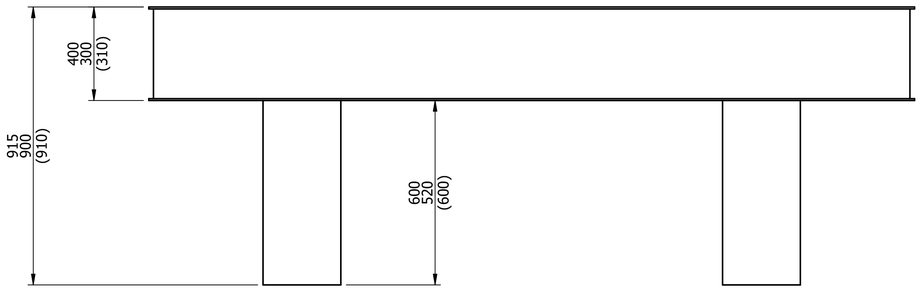
FRONT END TABLE







M6 MOUNTING HOLES
DETAIL A
1:5



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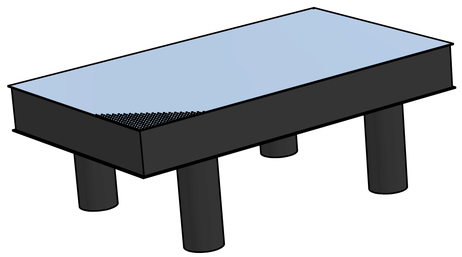

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MATERIAL & SPEC.

SURFACE TEXTURE UNLESS STATED: Ra N/A

FINISH: CLEAN; REMOVE ALL BURRS & SHARP EDGES

PROJECTION

DIMENSIONS IN mm UNLESS STATED

DRAWING CONFORMS TO BS 8888 TOLERANCING ISO 8015

CENTRAL LASER FACILITY
RUTHERFORD APPLETON LABORATORY
HARWELL CAMPUS, DIDCOT, OXFORDSHIRE, OX11 0QX

USED ON

SL-1053300	----
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TITLE: **100Hz 10J OPTICAL TABLE LAYOUT**

E-254

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A1 | SL-1058861 | SHEET 2 OF 4 | MANUFACTURE ONLY WHEN STATUS IS ISSUED | STATUS: ISSUED | A

A | SL-1058861 | A1

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A1 | SL-1058861 | A

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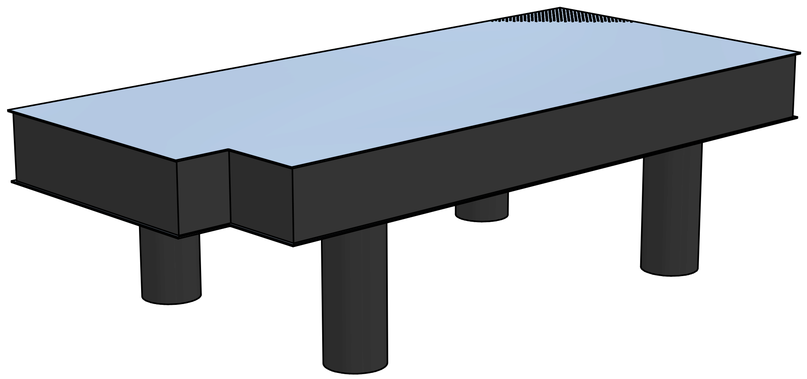
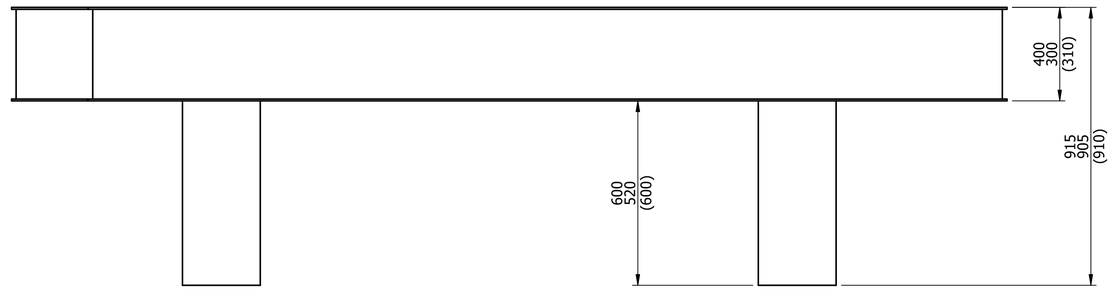
10J TABLE A





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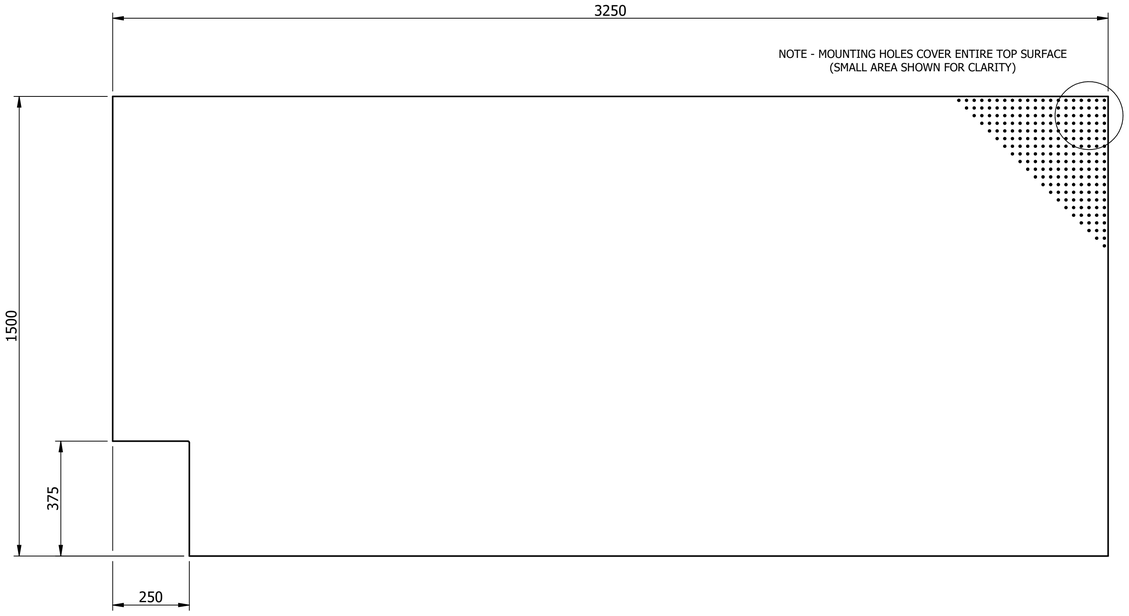

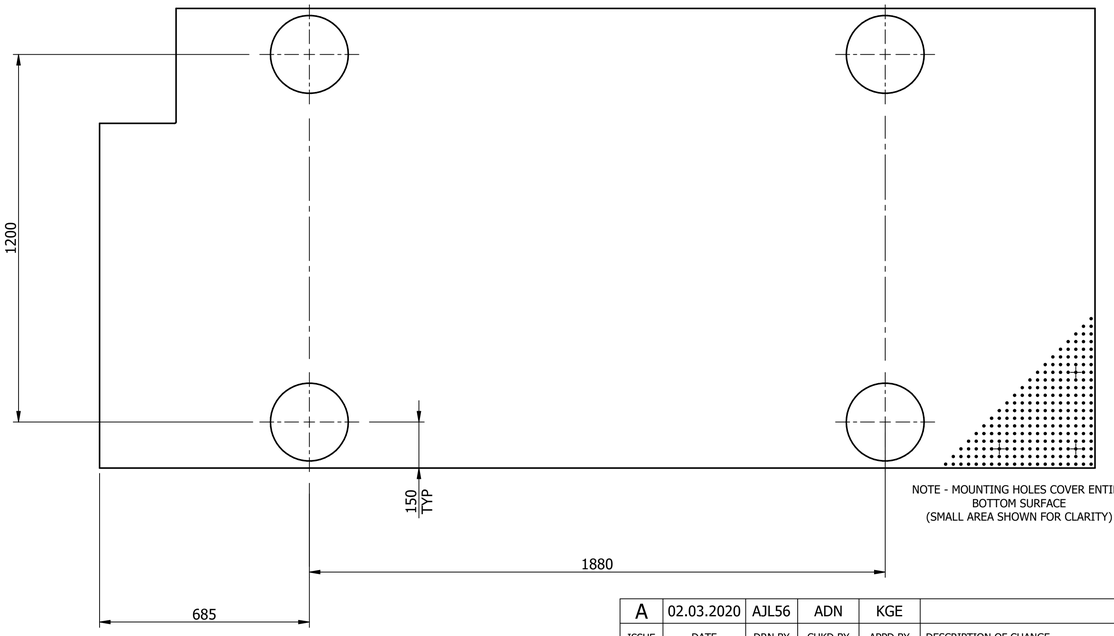

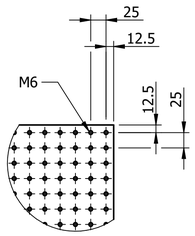

DETAIL B

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MATERIAL & SPEC.

SURFACE TEXTURE UNLESS STATED: Ra N/A

PROJECTION

DIMENSIONS IN mm UNLESS STATED

DRAWING CONFORMS TO BS 8888 TOLERANCING ISO 8015

FINISH: CLEAN; REMOVE ALL BURRS & SHARP EDGES

CENTRAL LASER FACILITY
RUTHERFORD APPLETON LABORATORY
HARWELL CAMPUS, DIDCOT, OXFORDSHIRE, OX11 0QX

USED ON

SL-1053300	----
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TITLE

100Hz 10J OPTICAL TABLE LAYOUT

E-254

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WP4 S11

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A1 | SL-1058861 | SHEET 3 OF 4 | MANUFACTURE ONLY WHEN STATUS IS **ISSUED** | STATUS **ISSUED** | A

A1 | SL-1058861 | A

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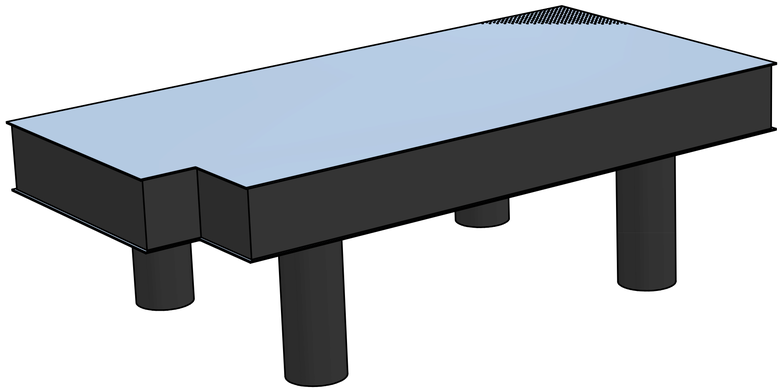
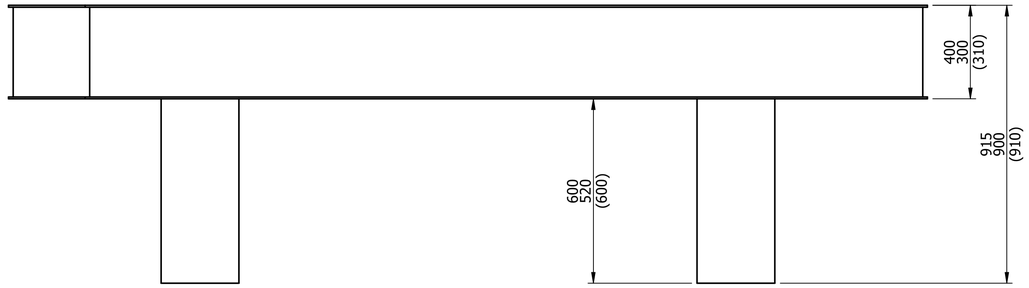
10J TABLE B





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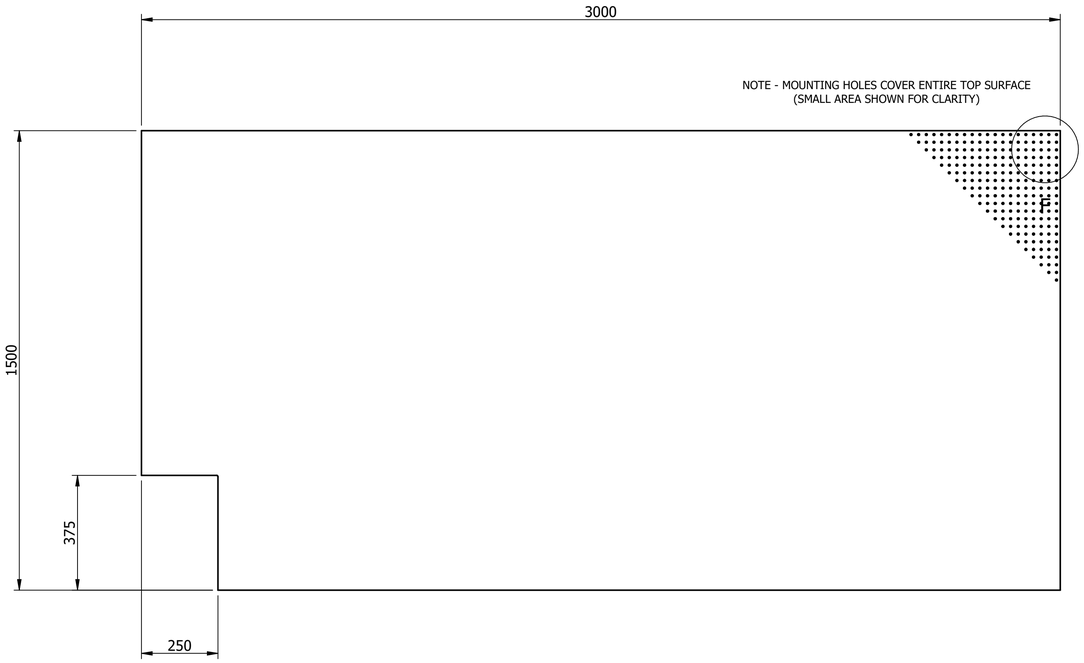

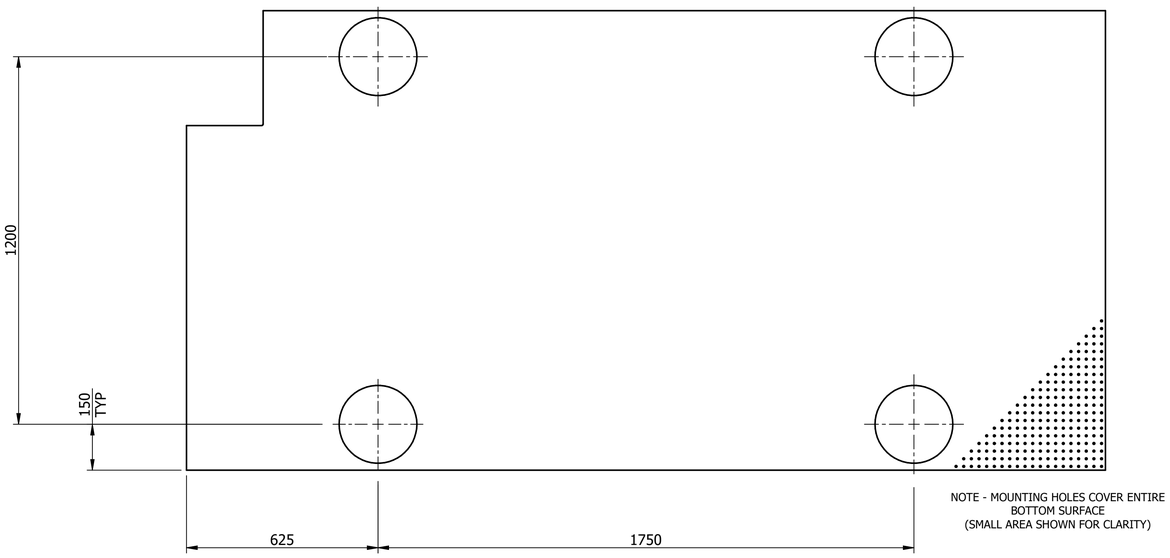

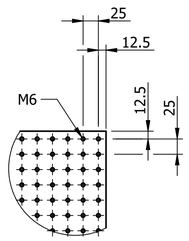

DETAIL F
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X.X ± 0.3
X.XX ± 0.1
ANGLE ± 0.2°

MATERIAL & SPEC.

SURFACE TEXTURE UNLESS STATED
Ra N/A

FINISH
CLEAN
REMOVE ALL BURRS & SHARP EDGES

PROJECTION

DIMENSIONS IN mm UNLESS STATED

DRAWING CONFORMS TO BS 8888 TOLERANCING ISO 8015

CENTRAL LASER FACILITY
RUTHERFORD APPLETON LABORATORY
HARWELL CAMPUS, DIDCOT, OXFORDSHIRE, OX11 0QX

USED ON
SL-1053300 ----
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TITLE
100Hz 10J OPTICAL TABLE LAYOUT

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A1 | SL-1058861 | SHEET 4 OF 4 | MANUFACTURE ONLY WHEN STATUS IS **ISSUED** | STATUS **ISSUED** | A

A | SL-1058861 | A1