**Appendix H – Summary**

PSFC-01-0000 ________________  ECR Ion Source

### Central elements

<table>
<thead>
<tr>
<th>PSFC-01-1001</th>
<th>Central support</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSFC-01-1002</td>
<td>Quartz tube</td>
</tr>
<tr>
<td>PSFC-01-1003</td>
<td>BN disk</td>
</tr>
<tr>
<td>PSFC-01-1004</td>
<td>Upper shielding</td>
</tr>
<tr>
<td>PSFC-01-1005</td>
<td>8&quot; Flange - MDC 110030</td>
</tr>
<tr>
<td>PSFC-01-1006</td>
<td>Dowel</td>
</tr>
<tr>
<td>PSFC-01-1100</td>
<td>Lower support</td>
</tr>
<tr>
<td>PSFC-01-1101</td>
<td>Lower coil's base</td>
</tr>
<tr>
<td>PSFC-01-1102</td>
<td>Lower coil's shielding</td>
</tr>
<tr>
<td>PSFC-01-1200</td>
<td>Upper support</td>
</tr>
<tr>
<td>PSFC-01-1201</td>
<td>Upper coil's base</td>
</tr>
<tr>
<td>PSFC-01-1202</td>
<td>Upper coil's shielding</td>
</tr>
</tbody>
</table>

### Microwave system

<table>
<thead>
<tr>
<th>PSFC-01-2100</th>
<th>Microwave window</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSFC-01-2200</td>
<td>Waveguide system</td>
</tr>
<tr>
<td>PSFC-01-2201_A</td>
<td>Rectangular waveguide A</td>
</tr>
<tr>
<td>PSFC-01-2201_B</td>
<td>Rectangular waveguide B</td>
</tr>
<tr>
<td>PSFC-01-2202</td>
<td>G10 sandwich</td>
</tr>
<tr>
<td>PSFC-01-2203</td>
<td>Fixing ring A</td>
</tr>
<tr>
<td>PSFC-01-2204</td>
<td>Fixing ring B</td>
</tr>
<tr>
<td>PSFC-01-2205</td>
<td>Kapton film</td>
</tr>
<tr>
<td>PSFC-01-2206</td>
<td>Microwave dowel 6mm</td>
</tr>
<tr>
<td>PSFC-01-2207</td>
<td>Microwave dowel 10mm</td>
</tr>
</tbody>
</table>
Electrodes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSFC-01-3001</td>
<td>Extraction electrode</td>
</tr>
<tr>
<td>PSFC-01-3002</td>
<td>Ground electrode</td>
</tr>
<tr>
<td>PSFC-01-3003</td>
<td>Suppressor electrode</td>
</tr>
<tr>
<td>PSFC-01-3004</td>
<td>Ground electrode's support</td>
</tr>
<tr>
<td>PSFC-01-3005</td>
<td>Grid</td>
</tr>
</tbody>
</table>

Coil

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSFC-01-4101</td>
<td>Upper coil</td>
</tr>
<tr>
<td>PSFC-01-4201</td>
<td>Lower coil</td>
</tr>
</tbody>
</table>

Electrical insulation

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSFC-01-5001</td>
<td>High voltage isolator</td>
</tr>
<tr>
<td>PSFC-01-5002</td>
<td>Supporting pins</td>
</tr>
<tr>
<td>PSFC-01-5003</td>
<td>Medium voltage isolator</td>
</tr>
</tbody>
</table>

Shields

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSFC-01-6100</td>
<td>Small shield</td>
</tr>
<tr>
<td>PSFC-01-6101</td>
<td>Small shield's base</td>
</tr>
<tr>
<td>PSFC-01-6102</td>
<td>Small shield's ring</td>
</tr>
<tr>
<td>PSFC-01-6200</td>
<td>Large shield</td>
</tr>
<tr>
<td>PSFC-01-6201</td>
<td>Large shield's base</td>
</tr>
<tr>
<td>PSFC-01-6202</td>
<td>Large shield's cylinder</td>
</tr>
</tbody>
</table>
Title: Central support

General Dimensional Tolerances: ISO 2768 Medium

Central support

Drawn by: J.Reig

Scale: 1:2

Material: AISI 316L

Quant.: 1

Date: 29/04/2010
Isometric view
Scale 1:2

Quartz tube

MATERIAL: Quartz

DRAWN: J. Reig
DATE: 12/04/2010
SIZE: A4
DWG. NO.: PSFC-01-1002
SCALE: 1:1
MATERIAL: Quartz
FINISH: -
TITLE: BN disk

GENERAL DIMENSIONAL TOLERANCES: ISO 2768 Medium

DRAWN: J.Reig
SIZE: A4
DWG. NO.: PSFC-01-1003
DATE: 12/04/2010
SCALE: 1:1
MATERIAL: Boron Nitride
FINISH: -
QUANT: 1
8" Flange - MDC 110030

Note: The entire geometry of the flange is not included in this drawing. Only the added machining features to those already integrated in MDC 110030 are detailed here.
TITLE: Dowel

MATERIAL: AISI 1020

DRAWN: J.Reig

DATE: 29/04/2010

SCALE: 10:1

QUANT.: 2

GENERAL DIMENSIONAL TOLERANCES:
ISO 2768 Medium

(2x) 0.50 X 45°

Ø 3 h8

6
Title: Lower support

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PSFC-01-1101</td>
<td>Lower coil's base</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PSFC-01-1102</td>
<td>Lower coil's shielding</td>
<td>1</td>
</tr>
</tbody>
</table>

Material: -
Finish: -

Drawn by: J.Reig
Date: 29/04/2010

Scale: 1:2

General Dimensional Tolerances: ISO 2768 Medium
Title: Lower coil's base

General Dimensional Tolerances: ISO 2768 Medium

Material: AISI 1020

Scale: 1:2

Date: 29/04/2010
Lower coil's shielding

- Title: Lower coil's shielding
- Scale: 1:2
- Material: AISI 1020
- Finish: H9
- General Dimensional Tolerances: ISO 2768 Medium
- Date: 29/04/2010
- Drawn by: J.Reig
- DWG. No.: PSFC-01-1102
- Quant.: 1
### Title:
**Upper support**

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PSFC-01-1201</td>
<td>Upper coil's base</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PSFC-01-1202</td>
<td>Upper coil's shielding</td>
<td>1</td>
</tr>
</tbody>
</table>

**DRAWN:** J. Reig  
**DATE:** 29/04/2010  
**SCALE:** 1:2  
**QUANT.:** 1

**TOLERANCES:** ISO 2768 Medium

- Silver solder brazing 3mm
Title: Upper coil's base

General Dimensional Tolerances: ISO 2768 Medium

Section A-A

Section B-B

Detail C

Scale 1:1

Isometric view

Scale 1:5
Upper coil's shielding

SECTION A-A

DETAIL B
SCALE 1:1

Isometric View
Scale 1:5

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>FINISH</th>
<th>DRAWN</th>
<th>SIZE</th>
<th>DWG. NO.</th>
<th>QUANT.</th>
<th>DATE</th>
<th>SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISI 1020</td>
<td></td>
<td>J.Reig</td>
<td>A4</td>
<td>PSFC-01-1202</td>
<td>1</td>
<td>29/04/2010</td>
<td>1:2</td>
</tr>
</tbody>
</table>
**Note:** In this drawing only the necessary machining tasks to perform on the microwave window, Model#S270Q, Flange combination UG cover/cover, of Microwave Engineering Corporation are shown.
# Waveguide System

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PSFC-01-2201 A</td>
<td>Rectangular waveguide A</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PSFC-01-2201 B</td>
<td>Rectangular waveguide B</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>PSFC-01-2202 A</td>
<td>G10 Sandwich A</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>PSFC-01-2202 B</td>
<td>G10 Sandwich B</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>PSFC-01-2203</td>
<td>Fixing ring A</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>PSFC-01-2204</td>
<td>Fixing ring B</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>PSFC-01-2205</td>
<td>Kapton film</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>PSFC-01-2206</td>
<td>Microwave dowel 6mm</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>PSFC-01-2207</td>
<td>Microwave dowel 10mm</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>ISO 4016 - M6 x 45 x 45</td>
<td>Hexagon bolt M6</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>Hexagon Nut ISO - 4032 - M6</td>
<td>Hexagon nut M6</td>
<td>6</td>
</tr>
</tbody>
</table>
Note: In this drawing only the necessary machining tasks to perform on the microwave waveguide, Model 4056-0YB10 of Penn Engineering components are shown.
Note: In this drawing only the necessary machining tasks to perform on the microwave waveguide, Model 4056-YYB10 of Penn Engineering components are shown.
*Note:* 2 units with the hole (Ø 4x9mm) - PSFC-01-2202_A
2 units without the hole (Ø 4x9mm) - PSFC-01-2202_B

G10 sandwich A and B
Fixing ring A

SECTION B-B

SECTION A-A

DRAWN: J.Reig
SIZE: A4
DATE: 14/04/2010
SCALE: 1:2
MATERIAL: Aluminum
FINISH: -
Title: Fixing ring B

Dimensions:
- \( \phi 196 \)
- \( \phi 192 \)
- \( \phi 168 \)
- \( \phi 148 \)
- \( R79^\pm0.10 \)
- \( 4 \)
- \( 3 \)
- \( 10 \)
- \( 18 \)
- \( 6.60 (x6) \)
- \( 180 \)
- \( 4 H9 \)

Section A-A

Section B-B

Material: Aluminum

Scale: 1:2

Date: 13/04/2010

Finish: -
Kapton film

MATERIAL: Kapton

DRAWN: J.Reig
DATE: 14/04/2010

SCALE: 1:2

SECTION A-A

GENERAL DIMENSIONAL TOLERANCES:
ISO 2768 Medium

PSFC-01-2205

QUANT. 1
Microwave dowel 6mm
**Note:** Break sharp edges

Isometric view
Scale 1:2

---

**Extraction electrode**

**Title:**

**Drawn by:** J. Reig

**Scale:** 1:2

**Material:** AISI 1020

**Quantities:** 1
**Note:** Break sharp edges
**Note:** Break sharp edges
TITLE: Ground electrode's support

DRAWN: J. Reig
SIZE: A4
DWG. NO.: PSFC-01-3004
DATE: 21/05/2010
SCALE: 1:1
MATERIAL: Copper
FINISH: -

GENERAL DIMENSIONAL TOLERANCES: ISO 2768 Medium

Isometric view
Scale: 1:2
TITLE: Lower coil

DRAWN: J.Reig
SIZE: A4
DATE: 21/05/2010
SCALE: 1:2
MATERIAL: Copper
FINISH: -

GENERAL DIMENSIONAL TOLERANCES: ISO 2768 Medium

SECTION A-A

PSFC-01-4201

1:2 Copper - J.Reig
21/05/2010

160

121

16
Coil positioner

TOLERANCES BETWEEN HOLES:
Bolts ± 0.05 mm
Screws ± 0.2 mm

GENERAL DIMENSIONAL TOLERANCES:
DIN 7168 Medium

PSFC-01-4203

DATE: 22/05/2010
SCALE: 1:1
MATERIAL: G10
FINISH: -
MATERIAL
DRAWN
DATE
GENERAL DIMENSIONAL TOLERANCES:
ISO 2768 Medium

TITLE:
High voltage isolator

SIZE DWG. NO. QUANT.

SCALE:
1:1

MATERIAL
Alumina

FINISH
Supporting pins

MATERIAL: Delrin
DRAWN: J.Reig
SIZE: A4
DATE: 14/04/2010
SCALE: 2:1
DWG. NO.: PSFC-01-5002
QUANT.: 6
FINISH: -

Title: Supporting pins

Size: Dwg. No.

Finish: Delrin

Scale: 2:1

Material: Delrin

Date: 14/04/2010

General Dimensional Tolerances: ISO 2768 Medium

Isometric View

Scale 1:1

Dimensions:
- Diameter: 12 mm
- Length: 77 mm
- Hole Diameter: M6
- Hole Depth: 47 +0.10 mm
- Shoulder Diameter: M6
- Shoulder Depth: 10 mm
- Radius: R0.50

Supporting pins PSFC-01-5002A4
Medium voltage isolator

ISO 2768 Medium

PSFC-01-5003

DATE: 14/04/2010

SCALE: 10:1

MATERIAL: Macor

FINISH: -
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PSFC-01-6101</td>
<td>Small protector's base</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PSFC-01-6102</td>
<td>Small protector's ring</td>
<td>1</td>
</tr>
</tbody>
</table>

**Title:** Small shield

**Drawn by:** J.Reig

**Date:** 14/04/2010

**Scale:** 1:1

**Material:** -

**Finish:** -
TITLE: Small shield's base

GENERAL DIMENSIONAL TOLERANCES: ISO 2768 Medium

PSFC-01-6101

DRAWN: J.Reig
SIZE: A4
DATE: 14/04/2010
SCALE: 1:1
MATERIAL: Copper
FINISH: -

SECTION A-A

Dimensions:
- \(\phi 108\)
- \(\phi 96\)
- \(\phi 86\)
- \(\phi 84\ H9\)
- \(\phi 82\)
- \(\phi 4.50\) (x6)

Dimensions:
- 2
- 8
- 10
Small shield's ring

Title: Small shield's ring

Dimensions:
- Diameter: 54 mm
- Diameter: 84 mm

General Dimensional Tolerances: ISO 2768 Medium

Finish: Copper - h8
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PSFC-01-6201</td>
<td>Large protector's base</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>PSFC-01-6202</td>
<td>Large protector's cylinder</td>
<td>1</td>
</tr>
</tbody>
</table>

**Title:** Large shield

**Drawn by:** J.Reig

**Date:** 14/04/2010

**Scale:** 1:1

**Material:** -

**Finish:** -
Large shield's base

Isometric view
SCALE 1:2

GENERAL DIMENSIONAL TOLERANCES:
ISO 2768 Medium

MATERIAL
Copper

DRAWN J.Reig
DATE 14/04/2010
SCALE 1:1
SIZE A4
DWG. NO. PSFC-01-6201
QUANT. 1
FINISH -
Large shield's cylinder

Title: Large shield's cylinder

Dimensions:
- Diameter: 96 mm
- Diameter: 92 mm
- Height: 22 mm

Scale: 1:1

Material: Copper

DATE: 14/04/2010

DRAWN: J.Reig

SIZE: A4

DWG. NO.: PSFC-01-6202

QUANT.: 1