



Government of India  
**Bhabha Atomic Research Centre**  
Nuclear Recycle Group  
Process Development Division

Ref: PSDD/MF/TM/2021/ ए०५५८२/१७६३०

Date: \_\_\_\_\_

**Sub:** Design, fabrication and supply of customized movable high frequency high voltage control PVC sealing machine module with flexible aluminium electrode assembly (1 no.) as per the attached technical specification without any free issue material.

Dear,

You are requested to submit your quotation in sealed envelope for the above mentioned job. The material should confirm to our specifications. The reference no. given above should be clearly mentioned on the sealed envelope.

Due consideration shall be given to the following aspects while you submit your offer:

1. Quotation is to be in printed letter head/quotation format which should consist of GSTN, PAN Number of the firm etc.
2. Quotation shall be complete in all respects with regard to specifications, validity of offer etc.
3. Break of cost may be provided as:

Sr. no.	Item	Qty.	Rate	Price
1	High frequency high voltage control PVC sealing machine	1 no.		
<b>Other charges</b>				
<b>Total Cost</b>				

4. NIT will be issued to eligible tenderers from 26/10/21 to 09/11/21.
5. Sealed quotation shall reach the following address on or before 12/11/21 by 14:00 hr.

**Trushit Makwana**  
SO/E, PSDD,  
Room no. 204, CDCFT, WIP Complex,  
BARC, Trombay, Mumbai-400 085  
Tel: 022-25591392

6. Taxes, duties and other charges applicable, if any, shall be indicated separately.
7. Quotation shall be sent by speed post.
8. The work shall be completed within four calendar months from issue of work order.
9. The offer shall be valid for a period of thirty days and in case of placement of the work order, shall remain firm till the completion of the work.

*Trushit*  
13/10/14  
**Trushit Makwana**  
SO/E

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## Technical Specification

### **A. Scope of work:**

Design, fabrication and supply of customized movable high frequency high voltage control PVC sealing machine module with flexible aluminium electrode assembly (1 no.) without any free issue material.

### **B. Brief description:**

The movable high frequency high voltage (HFHV) control module with flexible aluminium electrode assembly is to be used for sealing of PVC bags, sheets etc. in radiochemical laboratories. The control module will be consisting of HFHV generator of approximately 1kW power which will be coupled to aluminium electrode assembly where the PVC material to be sealed will be held under mechanical pressure. The sealing in PVC material will be achieved by sending high frequency current through two or more layers of PVC material (0.2 – 0.8 mm). Aluminium electrode assembly shall be handy, light in weight and will be connected to HFHV generator through flexible shielded coaxial PTFE cable having high temperature and electrical insulation properties. Both sealing electrodes shall have flat mirror surface and should perfectly overlap with each other with uniform pressure. The effective seal size should be minimum 210mm (L) x 12mm (W). Since the electrode carries high voltage and has a tendency to acquire heat from the PVC material being sealed, both the electrodes shall be firmly covered with a suitable heat & electrical insulation sheet. Sealing operation shall be free from spark and arc on the electrode assembly and also should not affect normal operation of other surrounding electronic equipment.

### **C. General:**

1. The HFHV control module shall be designed as per the schematic circuit arrangement given in sketch 1. It should work on 230VAC, 50Hz single phase power supply. It should have step-up type high voltage iron core transformer having 4kV/1A @ secondary side, high voltage rectifier, filter and vacuum valve based high voltage sinusoidal oscillator circuit. The output frequency of HFHV module should be 27.15MHz  $\pm$ 20kHz. This signal shall be coupled to aluminium electrode assembly having electrode seal surface (effective sealing area) of 210mm (L) x 12mm (W). All the items of HFHV control module and electrode assembly shall have smooth surface finish and there shall not be any sharp edges & corners.
2. **Operation:** PVC material to be sealed is held between the two electrodes. On pressing push button on electrode assembly, the HFHV module generates HFHV signal for the time period as long as the push button is pressed or till seal timer is reset.
3. **Safety interlocks:** The HFHV generator shall trip and stop working on following abnormal conditions.
  - a. If earth is open
  - b. If sealing electrode shorts or coaxial cable insulation is punctured
  - c. If sealing current exceeds set limit

#### **4. Indicators and Control on Front panel of HFHV generator**

- a. ISI graded MCB for Mains power On/Off and its indication by LED based panel lamp (Green)
- b. ISI graded MCB for High Voltage On/Off
- c. LED based panel lamp (red) for indication of Earth Fault (open earth)
- d. LED based panel lamp (red) for indication of Sealing On
- e. Three way rotary selector switch on front panel for selecting sealing voltages
- f. Analogue ammeter (0-1ADC) on front panel for indication of seal current.
- g. Electronic timer to set sealing time from 0 to 12 seconds selectable by selector switch
- h. Electro-mechanical counter (0-999999) to count number of sealing cycles
- i. Digital AC voltmeter for indication of input mains (line) voltage
- j. Power control for continuous adjustment of sealing power
- k. Over load control for continuous adjustment of seal current from 0 to 1000 mA. Machine shall trip on crossing the set limit
- l. Fuse holders for Mains and High Voltage
- m. Control circuitry of HFHV control module shall be assembled on a single electronic card size approximately 200mm x 150mm with detachable edge connectors for ease of maintenance.

#### **5. HFHV control module:**

Enclosure as per sketch 2 for HFHV control module shall be fabricated out of MS angle of 45mm x 45mm x 5mm with side panels of 16 SWG MS sheet with overall size approximately 1000mm (L) x 700mm (W) x 600mm (H). Bottom panel of the module should be provided with perforation for ventilation inlet. It can be of holes of approximately 5mm with 5mm pitch between adjacent holes on MS sheet of 16 SWG. Front panel should be removable hinged type made out of MS sheet of 16SWG with cut-outs to be provided for mounting of controls and indicators as specified in point no. 4. All side panels except front panel shall be made of aluminium sheet of 15 SWG and all panels should be powder coated with blue colour. Top panel of the HFHV enclosure should detachable and to be fabricated out of SS304 sheet of 20 SWG. Detachable aluminium housing as per sketch 3 for the oscillator circuit should be fabricated out of aluminium sheet of 15 SWG and should be mounted inside the control panel. The control module should be provided with Push Pull handle and 04 nos. of heavy duty, ball bearing, PVC shoe type caster wheels (dia.4 inch).

#### **6. Aluminium electrode assembly:**

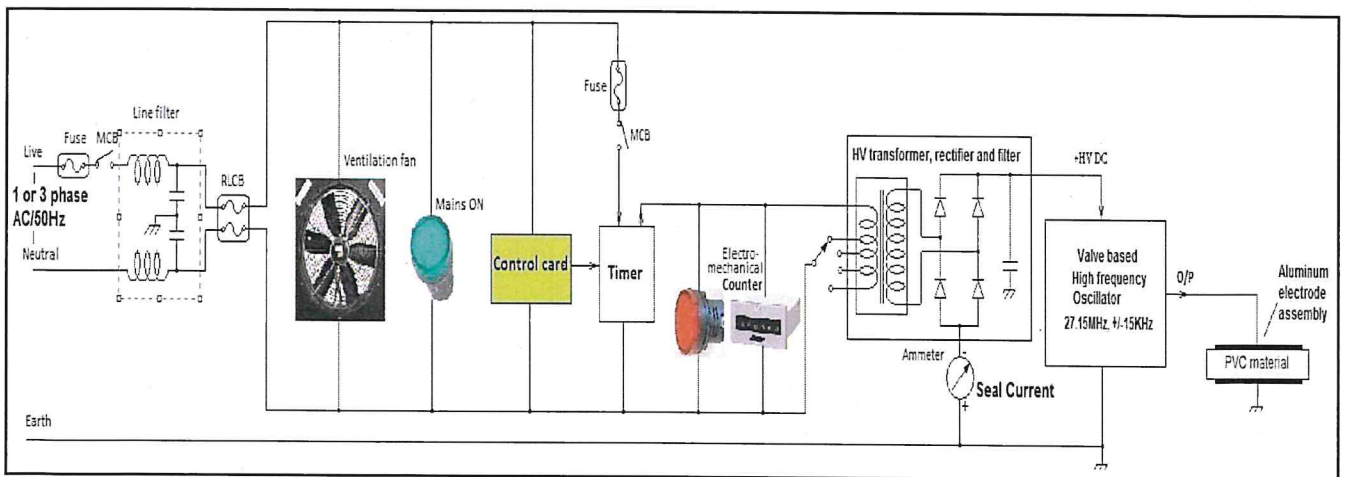
This shall be spring loaded scissor type assembly with adjustable pressure for sealing operation. The tong assembly shall be fabricated as per the details given in sketch 4 and should consist of the following parts:

- a. Top Channel with negative electrode: The channel shall be fabricated with extruded & double powder coated (blue colour, glossy finish) aluminium channel. The negative electrode shall be fabricated with solid aluminium block and shall be fitted in the top

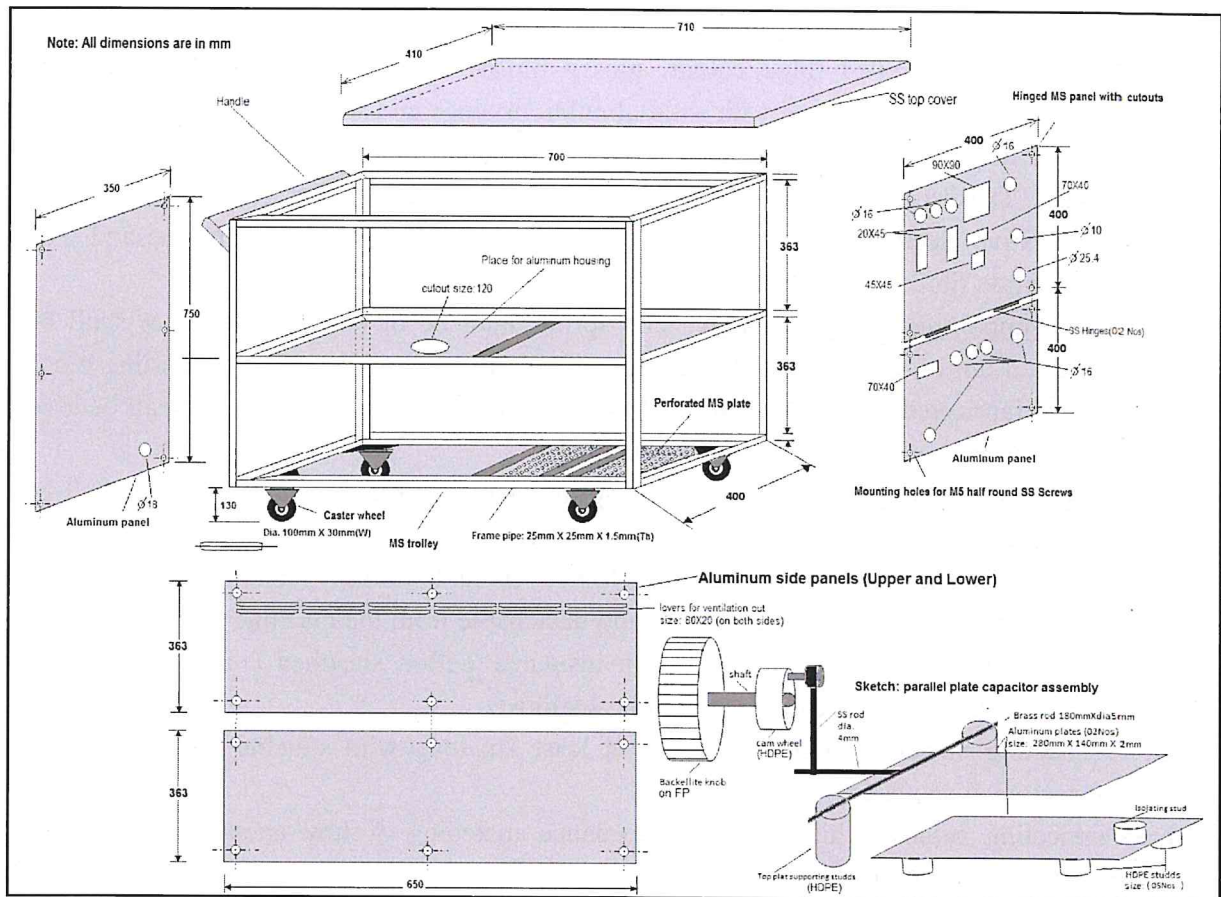
channel using SS roller washer. The top channel shall be fitted with suitable push button (push to On).

- b. Bottom Channel with positive electrode: The channel shall be fabricated with extruded & double powder coated (blue colour, glossy finish) aluminium channel. The positive electrode shall be fabricated with solid aluminium block and shall be fitted at the bottom channel using Teflon housing providing minimum electrical isolation of  $1000M\Omega$  at 5kVDC. The electrode surface shall have flat mirror surface finishing and perfectly overlap the negative electrode. Both the electrodes shall be covered with cotton tape and then Teflon glass fibre adhesive sheet.
- c. Cable supporting spring assembly: The spring shall be of expansion type & shall be fabricated out of spring steel of diameter suitable to cables. The cable supporting block shall be fabricated out of aluminium. Necessary mounting nut bolts of brass shall be used for mounting this assembly on bottom channel.
- d. Tension adjusting spring assembly: The spring shall be of compression type & shall be fabricated out of spring steel of suitable diameter.
- e. The entire electrode assembly shall be as light as possible for easy handling.
- f. The assembly shall be easily cleanable and detachable from the machine and should have minimum two meter of flexible Teflon insulated Teflon sheathed coaxial cable with minimum 90% TIN coated copper double shielding.
- g. Connecting power & control cable of at least 2m long with suitable industrial grade connectors & switches
- h. Connecting cable of high quality impedance matching & low attenuator type with multilayer insulating type
- i. Approx. overall dimensions of electrode assembly: 550mm (L) x 70mm (H) x 36mm (W).

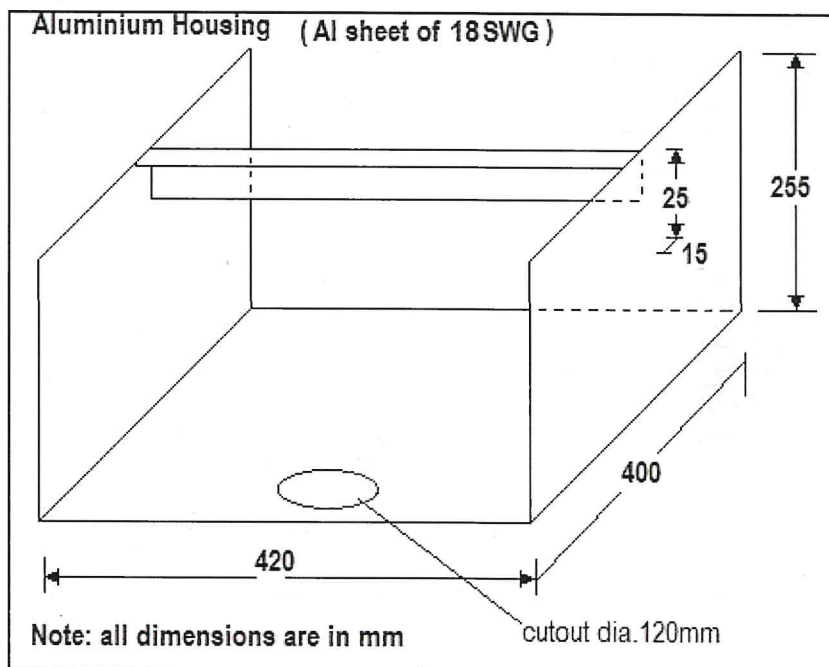
**Sketch 1:** Schematic circuit arrangement for HFHV Generator



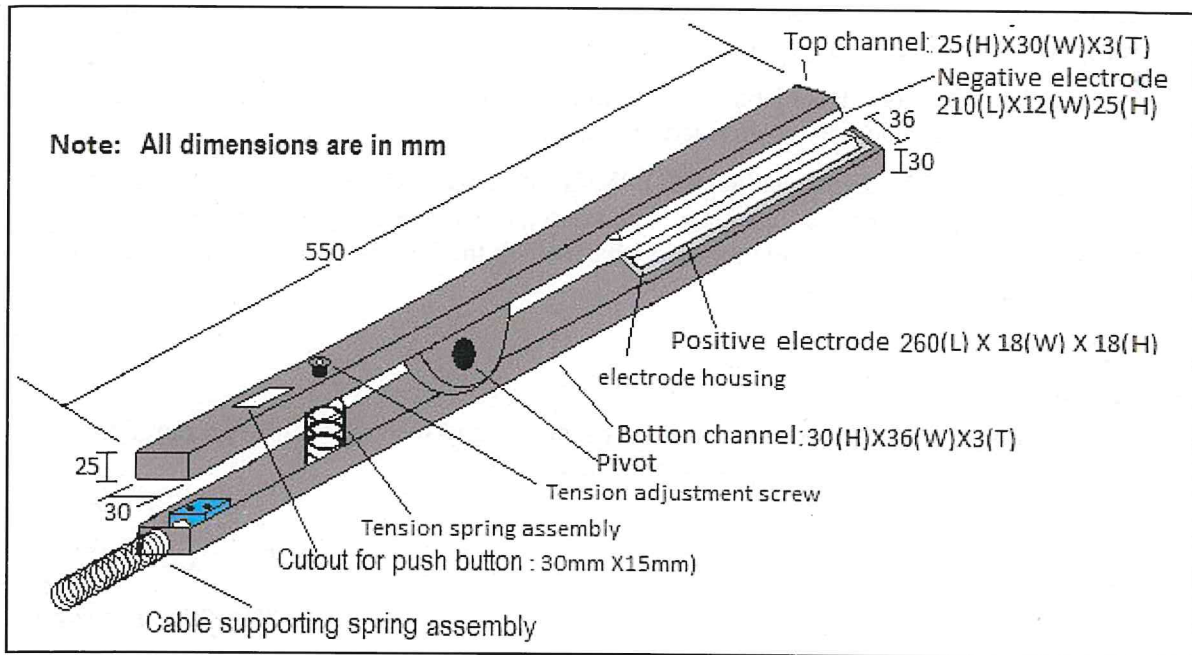
**Sketch 2: Enclosure for HFHV control module**



**Sketch 3: Aluminium housing to be mounted inside the enclosure**



#### Sketch 4. Aluminium electrode assembly



**D. Pre-delivery inspection:** Pre-delivery inspection of all items shall be carried out at the supplier's place. Necessary tools and equipment required to carry out the same shall be arranged by the contractor.

#### **E. Acceptance criteria:**

- For fabrication: As per the drawing/ sketch.
- For internal electrical wiring: Proper ferruling, lugging and no loose connection.
- The HFHV generator module: Satisfactory performance during functional testing at user's site.

**F. Approval:** Prior approval is to be taken from Engineer-in-charge for material to be used for execution.

#### **G. Drawings and Documents to be provided:**

- Test certificate
- Wiring diagram.
- Instruction manual

#### **H. Packaging & Delivery:**

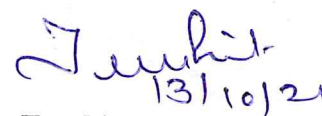
- The finished product shall be thoroughly cleaned and dried before packaging for shipment. It shall be packed in wooden crate with weather proof packaging and shall be properly secured inside the packaging by soft material like foam or thermocol to prevent transit

damages. Necessary indicators such as "Fragile", "This side up" etc. shall be marked in bold fonts on the package. The package shall have provisions for handling by fork lift and also it should have hooks provision. Any additional method/component required for the safe transport of the product may be provided.

- b. A nameplate shall be affixed on the machine at a suitable location containing relevant information of the machine as provided by Purchaser.
- c. The machine shall be dispatched to ASO, WMZ Stores, BARC, Trombay after obtaining a Shipping clearance from the Purchaser. The fabricator shall be fully responsible for the safe delivery at their destination and fabricator shall satisfy the Purchaser that adequate measures have been taken for the same.

**I. Guarantee:**

The finished product shall be guaranteed for material and workmanship for a duration of 1 (one) year from the date of acceptance by BARC.

  
13/10/21

**Trushit Makwana**

SO/E, PSDD