

**Government of India
Bhabha Atomic Research Centre
Multidisciplinary Research Group
Applied Physics Division**

Ref: APD/CB/MF/22/VTM/417

28/06/2022

Sub:- *“Repair and Maintenance of existing HV Sphere Fixture Assembly for High Voltage Experiments”.*

Due Date: 7th July, 2022

Dear Sirs,

1. Quotations are invited for the minor repair job, as per the enclosed specifications and drawings.
2. Bidder shall quote for repair of these components/parts with/without material.
3. Bidder shall take out an insurance policy in favor of BARC for any free issue material supplied.
4. Taxes shall be quoted separately. Form H shall be provided where necessary.
5. The quotations must reach Head, Applied Physics Division on or before the due date referred.
6. **The bidders must quote in a two part tendering system, which means that they will mention the technical specifications and financial terms in separate sealed envelopes, clearly mentioning which is which. These two separate envelopes viz. technical and financial will be enclosed in a bigger sealed envelope super scribed with the above reference number and due date. Offers must reach us by INDIAN Post only.**
6. The address on the envelope should read:

**The Head,
Applied Physics Division, PURNIMA LABS,
Bhabha Atomic Research Centre
Trombay, Mumbai - 400 085.
Attn: Mr. Vijay Tanaji Mandharekar**
7. The repair work shall be subject to inspection by our representative. The finalized components/parts shall not be dispatched prior to approval by our representative at the bidder's works. Necessary inspection facilities should be provided to our engineers during fabrication at bidder's premises.
8. The bidder shall deliver the finished/finalized components/part after approval by our representative, within period mentioned in work order issued to the bidder. The finished components shall be delivered by the bidder at **Applied Physics Division, Purnima Laboratory, (Near Plutonium Plant), Bhabha Atomic Research Centre, Trombay, Mumbai-400 085.**
9. Head, Applied Physics Division, BARC, reserves the right to accept/reject any or all quotations without assigning any reason.
10. Payment will be made by cheque only after satisfactory completion of work on production of bill, delivery challan and advance stamped receipt. It may be noted that IT @ 2% shall be deducted from your bills.
11. Job will be guaranteed against material and manufacturing defects for 1 year from the date of supply.

Vijay Tanaji Mandharekar
For and on behalf of
Head, Applied Physics Division

Repair and Maintenance of existing HV Sphere Fixture Assembly for high voltage experiments

This job includes the repair and maintenance of existing HV Sphere Fixture assemblies for High voltage applications at voltages exceeding 60,000 volts or more for high voltage experiments. The fabricator/manufacturer needs to be well versed in the fabrication aspects of high voltage components and systems at the above-mentioned voltage levels or more.

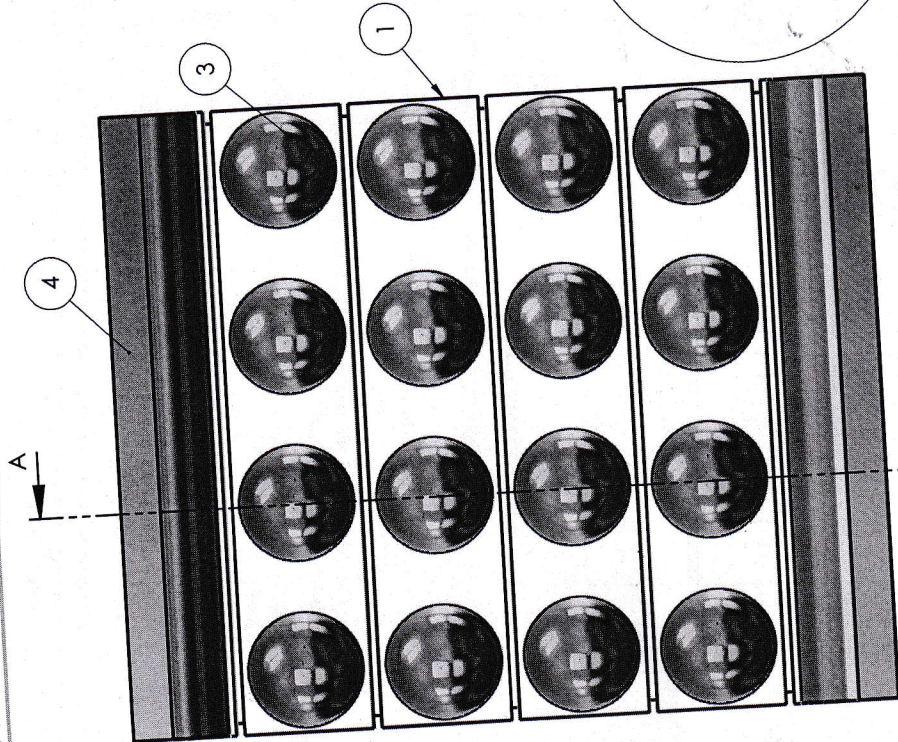
HV Sphere fixture assembly, available in our department, and tested at voltages ranging from 55 kV to 60 kV will be provided. This assembly has undergone ~50 numbers of high current discharges resulting in erosion of electrodes and development of surface tracks on the 40 mm insulating holder interface. This assembly will be provided to the fabricator for repair and maintenance of the various constituent parts for further departmental usage. In addition, a number of minor modifications in the placement of electrodes has been incorporated as part of this repair and maintenance schedule.

Documents required during quotation: **Documentary proof/ Work Order copies of similar high voltage work done in BARC or other government organizations to be provided.**

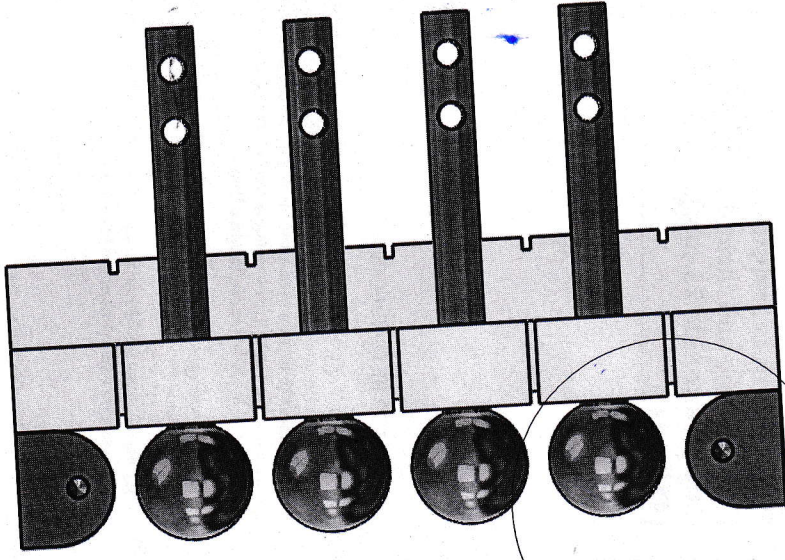
A schematic drawing of the assembly with all its constituent parts is provided as a reference for the repair and maintenance of the given job. A detailed account of the repair and maintenance schedule, which is in the scope of the fabricator, is summed up in the following points:

- 1. The required HV Sphere Fixture assembly provided by the department, which requires repair and maintenance, needs to be collected by the fabricator from the departmental laboratory as noted in the floated enquiry by the divisional representative.*
- 2. PART 1: a) Changing the diameter of the dia. 10.2 studs for insertion of M12 Threaded SS304 studs, b) Modification of the location of dia. 10.2 holes as shown in PART 1 drawing attached herewith, (c) Modification of the location of dia. 6.2 holes (8 nos.) as shown in PART 1 drawing attached herewith, (d) modification of the corrugation geometry by changing its depth from 6 mm to 2 mm, (e) Change and replacement of SS304 Heli-coils of each of the threaded holes in the PART, f) Removal of tracks developed in the PART geometry as a result of long periods of extended tests and finally g) Repair and replacement of embedded resistance network to have electrode-to-electrode resistance of 40 Mega-ohms, along with test certificate of new resistance network.*
- 3. Tests to be conducted on PART 1: a) A detailed chemical (composition analysis) as well as mechanical test (Yield strength, ultimate Tensile Strength, Percentage elongation, percent reduction etc.) report to be provided after the repair schedule to*

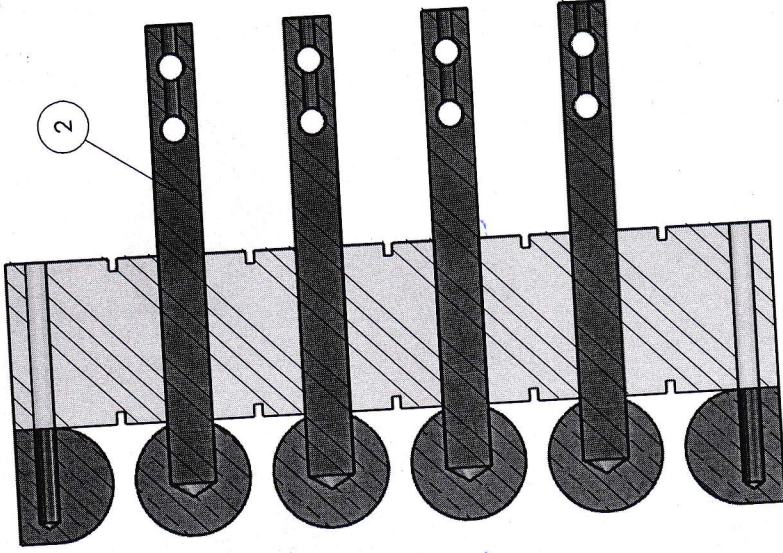
- identify any damage caused to the PART 1. Any damage caused during the repair and maintenance of PART 1 may lead to cancellation of the job. (b) Dimensional test to check the conformity of the modifications as suggested in PART 1 drawing to a geometric tolerance of ± 0.01 mm. (c) High voltage withstand test up to 60,000 volts for a period of five minutes for the resistance network embedded in PART 1*
- 4. PART 2: a) Change in the diameter of the SS304 studs, similar to an M12 stud, b) Removal of threads from exposed surfaces, c) Replacement of the Delrin nuts associated with the PART 2.*
 - 5. PART 3: a) Change in the PART radius from dia. 14.50 mm to 13.75 mm, b) Diamond polishing of the Part to remove erosion spots and c) Surface roughness of grade N3 to be obtained.*
 - 6. Tests to be conducted for PART 3: Roughness test certificate conducted by a NABL accredited laboratory to be provided after the repair and maintenance job on PART 3.*
 - 7. PART 4: a) Change in the PART radius from dia. 14.50 mm to 13.75 mm, b) Diamond polishing of the Part to remove erosion spots, c) Surface roughness of grade N3 to be obtained and d) Change in placement of M6 Threads with replacement of SS304 Heli-coils.*
 - 8. Tests to be conducted for PART 4: Roughness test certificate conducted by a NABL accredited laboratory to be provided after the repair and maintenance job on PART 4.*



TOP VIEW



SIDE VIEW



SECTION A-A

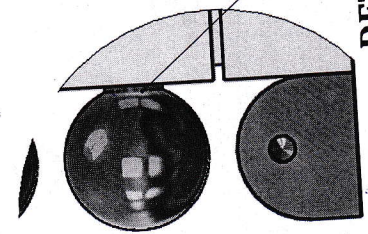
NOTE:
1 such assembly will be provided
for repair and maintenance

ITEM NO.	PART	MATERIAL	QTY.
1	PART 1	UHMW NYLON	1
2	PART 2	SS 304	20
3	PART 3	BRASS	20
4	PART 4	BRASS	2

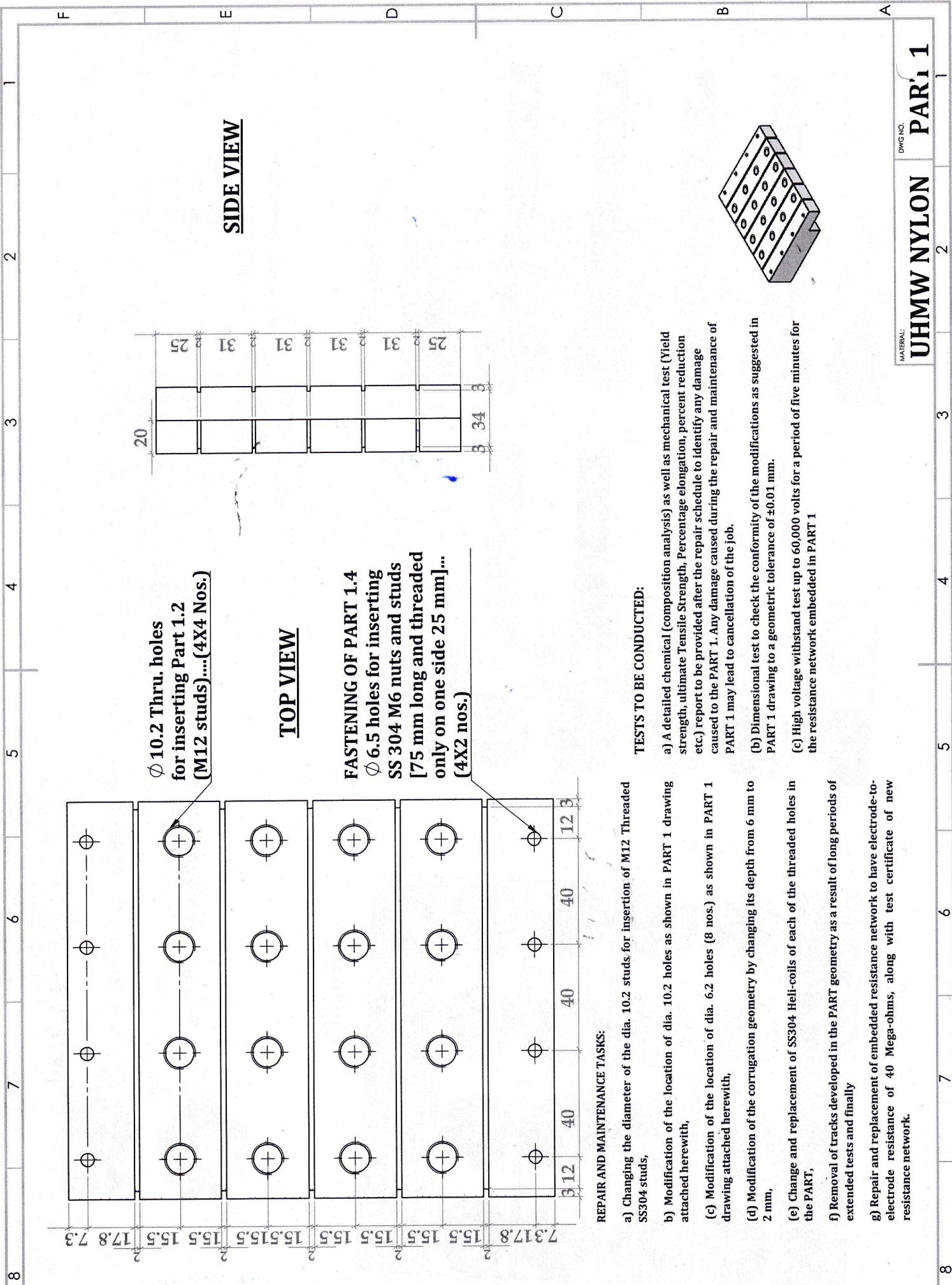
DWG NO. **ASSEMBLY 1**

1 No.

The heights of Part 3 and Part 4 should be set so that they are at the same height. Suitable insulated washers may be incorporated to increase the height.



DETAIL B

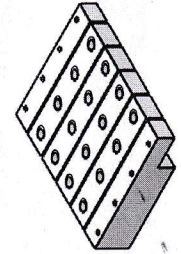


Ø 10.2 Thru. holes for inserting Part 1.2 (M12 studs)....(4X4 Nos.)

TOP VIEW

FASTENING OF PART 1.4
 Ø 6.5 holes for inserting SS 304 M6 nuts and studs [75 mm long and threaded only on one side 25 mm]... (4X2 nos.)

SIDE VIEW

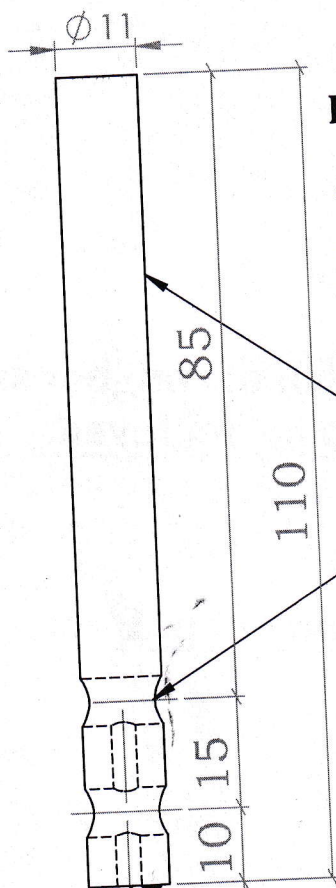


REPAIR AND MAINTENANCE TASKS:

- a) Changing the diameter of the dia. 10.2 studs for insertion of M12 Threaded SS304 studs,
- b) Modification of the location of dia. 10.2 holes as shown in PART 1 drawing attached herewith,
- (c) Modification of the location of dia. 6.2 holes (8 nos.) as shown in PART 1 drawing attached herewith,
- (d) Modification of the corrugation geometry by changing its depth from 6 mm to 2 mm,
- (e) Change and replacement of SS304 Heli-coils of each of the threaded holes in the PART,
- f) Removal of tracks developed in the PART geometry as a result of long periods of extended tests and finally
- g) Repair and replacement of embedded resistance network to have electrode-to-electrode resistance of 40 Mega-ohms, along with test certificate of new resistance network.

TESTS TO BE CONDUCTED:

- a) A detailed chemical (composition analysis) as well as mechanical test (Yield strength, ultimate Tensile Strength, Percentage elongation, percent reduction etc.) report to be provided after the repair schedule to identify any damage caused to the PART 1. Any damage caused during the repair and maintenance of PART 1 may lead to cancellation of the job.
- (b) Dimensional test to check the conformity of the modifications as suggested in PART 1 drawing to a geometric tolerance of ±0.01 mm.
- (c) High voltage withstand test up to 60,000 volts for a period of five minutes for the resistance network embedded in PART 1

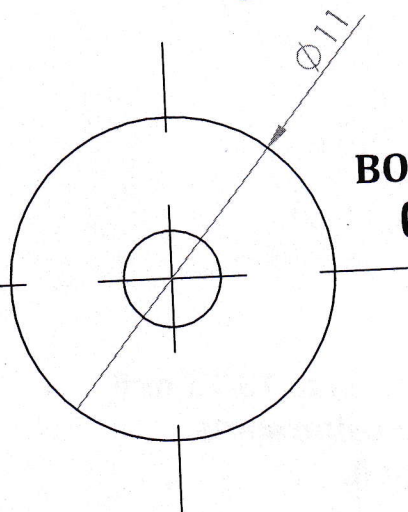


FRONT VIEW

This is basically a modified M12 SS304 stud. The entire body of this stud [except the 36 mm from Plane A] must be threaded to mate with corresponding $\phi 10.2$ holes in Part 1.1.

$\phi 6.5$ mm Thru. holes, 2 Nos.

M4 tapping, 25 mm deep, 1 no. for insertion of headless M4 SS304 Allenhead bolts

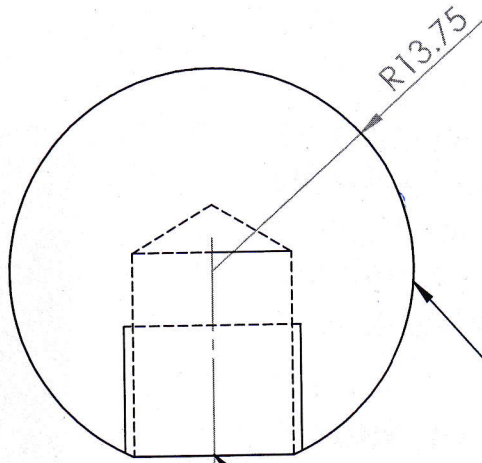


BOTTOM VIEW (PLANE-A)

REPAIR AND MAINTENANCE TASKS:

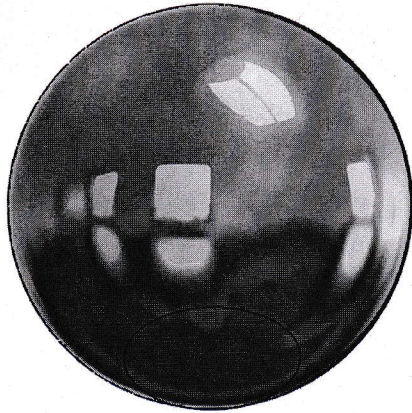
- 1) Change in the diameter of the SS304 studs, similar to an M12 stud.
- 2) Removal of threads from exposed surfaces
- 3) Replacement of the Delrin nuts associated with the PART 2.
- 4) Diamond polishing of component.

MATERIAL:	SS 304	DWG NO.	PART 2
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Surface finish of roughness grade N3 to be achieved.

M12 Tapping, 15 mm deep, 1 no.



Repair and Maintenance tasks:

- 1) Change in the PART radius from dia. 14.50 mm to 13.75 mm
- 2) Diamond polishing of the Part to remove erosion spots.
- 3) Surface roughness of grade N3 to be obtained.

Tests to be conducted:

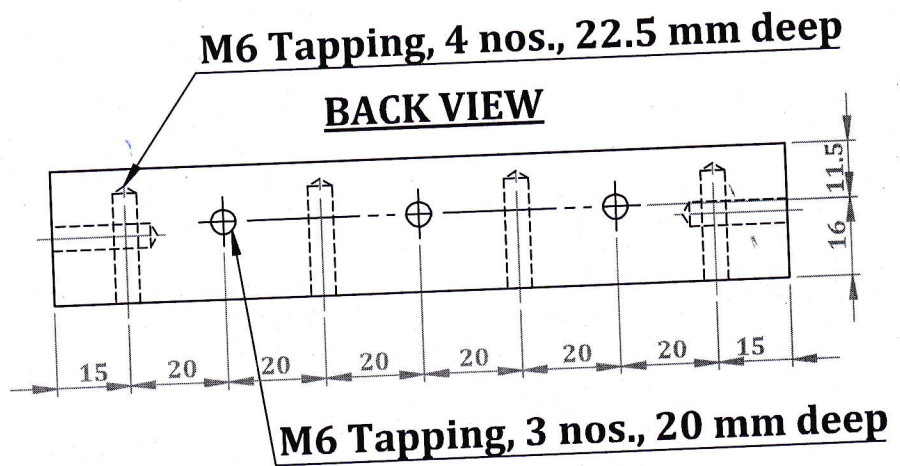
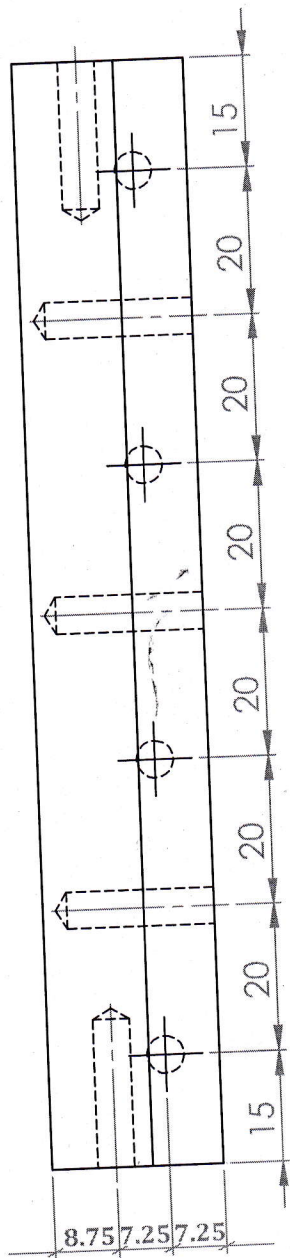
- 1) Roughness test certificate conducted by a NABL accredited laboratory to be provided after the repair and maintenance job on PART 3.

MATERIAL:

BRASS

DWG NO.

PART 3

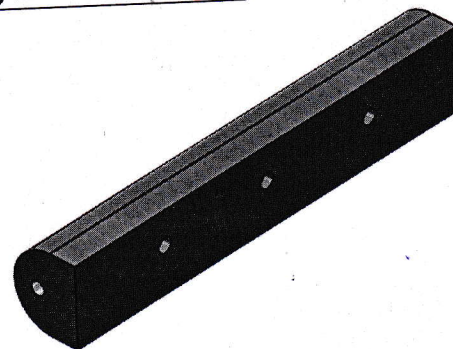
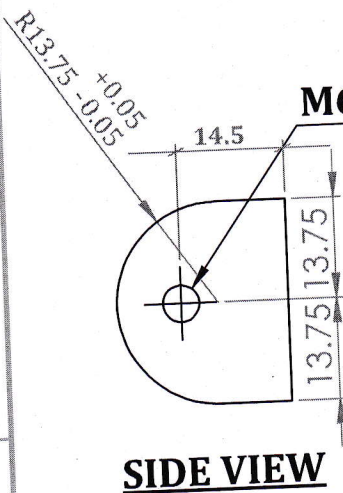


Repair and Maintenance tasks:

- 1) Change in the PART radius from dia. 14.50 mm to 13.75 mm
- 2) Diamond polishing of the Part to remove erosion spots.
- 3) Surface roughness of grade N3 to be obtained.
- 4) Change in placement of M6 Threads with replacement of SS304 Heli-coils.

Tests to be conducted:

- 1) Roughness test certificate conducted by a NABL accredited laboratory to be provided after the repair and maintenance job on PART 4.



MATERIAL: **BRASS**

DWG NO. **PART 4**