



Government of India  
BHABHA ATOMIC RESEARCH CENTRE  
Accelerator and Pulse Power Division  
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Ref.: BARC/APPD/RKR/2018/90

Date: 05.09.2018

**Subject:** Inviting quotations for fabrication and supply of Tool coils with support and different metal inserts as per Annexure-I

Dear Sir,

On behalf of the President of India, you are invited to quote for fabrication and supply Tool coils with support and different metal inserts as per Annexure-I

Terms & conditions are given below.

| S.No | Description of the Job   | Quantity |
|------|--|----------|
| 1.   | Fabrication & Supply of two number of Copper four disc coils with supporting stand, Thirty number of inserts of copper (10Nos), Mild Steel (10Nos) and SS304(10Nos). | Lump sum |

Terms and Conditions:

1. The supplier should quote for fabrication of the item, including the cost of the materials. No free issue material will be provided by BARC.
2. The material will be inspected before the start of the fabrication.
3. The quotations should have the minimum validity period of two months.
4. BARC being a Government organization is exempted from payment of excise duty. However, excise duty exemption certificates will be issued if required. Five percent GST as applicable.
5. Supplier should submit their offers in their letterhead, placed in sealed envelope super scribed with the above mentioned Reference No., Due date and Title "Quotations for fabrication and supply of Coils, support and Inserts". Kind attention: "Shri. M.R.Kulkarni", addressed to Head APPD, Hall-4, BARC, Trombay, Mumbai-400085, **on or before 24/09/2018**. The quotation should contain the following details like (i) Period of validity, (ii) terms and conditions of offer, (iii) Approximate period of completion of job, (iv) Copies of registration and income tax clearance certificates (v) PAN, GST and registration no.
6. The fabrication of the item shall be subjected to inspection by our Scientists / Engineers at the supplier's works. Necessary inspection facilities should be provided to them during fabrication at the supplier's premises. The purchaser has the right to make the minor modifications in the design and drawings. Additional charges will not be admissible for such minor modifications, if any. The item should be delivered to us at **Room N0-51, S-70, SS, APPD, BARC, Trombay, Mumbai-400085**, after approval by our Scientists / Engineers.

7. Please note that shorter delivery period will be preferred. For any clarification you may contact shri.M.R.Kulkarni. PPSS/APPD, BARC on tel. 022-25524701 or Dr.A.Sharma,Head PPSS/APPD on 25590171.
8. Payment will be made only after delivery and testing of the items to the above mentioned address and approval by scientist/engineers as per BARC rules.
9. Head APPD has authority to cancel the bidding process at any time without assigning any reasons.
10. Vendor has to submit the test certificate of material used by approve laboratory of APPD/BARC
11. Vendor has to prepare a fabrication drawing and get approved by end user before start of the Work.
12. Parties are requested to quote for whole work. Quotation for partial work will nnot be consider for evaluation and rejected.

Sd-  
(R.K.Rajawat)  
Head APPD

Copy to: AAO (Works)

## ANNEXURE-I

### COIL AND INSERTS

1. COILS (2 SETS) WITH STAND
2. INSERTS: 30Nos (Copper:10Nos, Mild Steel:10Nos and SS303:10Nos,)

### *COILS*

The coil turns are in the form of copper discs isolated by FRP discs laminated with Mylar insulation. Inter turn connectivity is established by hard drawn copper sectors. All disks are fastened axially by SS304 studs. Isolation between coil turns and SS studs is achieved by Multilayer Polyamide tape for 20kV Insolation. The cold hard drawn copper used for fabrication of field shaper and sector may have yield strength exceeding 275MPa

For assembly and parts details, please refer the drawing MRK/HELIX-1/ASS, MRK HELIX-1/ASS/D1, MRK HELIX-1/ASS/D2, MRK HELIX-1/ASS/D3

#### Notes:-

1. Clearance between Kapton insulated studs should be such that Studs should able to go without hindrance.
2. All holes made for fastening are to be chamfered both side to avoid the cutting of insulator during assembly and operation of coil.
3. End plates be provided with 10 holes of clear dia 6.6mm for coil connection to the system.
4. Bore of each disc is insulated by 3 mil Kapton tape extending up to 20 mm radial outwards on both sides except the place where copper sector comes in contact with main disc. All holes in main disc provided for stud are also should be insulated by 3 mil Kapton tape extending up to 20 mm radial outward. All outer edges of copper discs have to be insulated by 3mil thick kapton, extending 30mm radially inward.
5. Inner portion should be insulated for electrical isolation of 20kV with respect to field Concentrator.
6. Tightening of all nut of the studs are done uniformly in steps from both sides of the coil.
7. All Copper discs should be numbered in order to facilitate ease assembly of the coil. All copper sectors are also to be numbered in such a fashion that sector face number matches the number of disc. All holes in discs also are numbered from 1 to 4.

8. Test certificate of Copper used for fabricating sectors be provide for Chemical composition, Electrical, Thermal and Mechanical properties.
9. Electrical grade, no porous material should be used wherever FRP is mentioned. The dielectric strength of FRP should be at least 150V/mil
10. The surface between adjacent turns which comes in contact via copper sector should be thoroughly cleaned / polished to establish good electrical contact.
11. All four studs should be extended to 30mm extra at one end after locking by two nuts. This extended portion of the studs be just be matched with table top recess where coil fits.
12. Assembly of the coil should be done in presence of BARC Scientist/Engineer.
13. One extra FRP end sheet for each coil of size 200mm x 200mm x 16mm be provided

Encls: For assembly and parts details, please refer the drawing MRK/HELIX-1/ASS, MRK HELIX-1/ASS/D1, MRK HELIX-1/ASS/D2, MRK HELIX-1/ASS/D3; (Total 4 drawings).

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## INSPECTION & ACCEPTANCE OF COIL

On job floor the following inspection may be performed in steps before assembly of the coil. The scientist from APPD/BARC will carry stage wise inspection and suggest minor modification required, if any.

- A. Dimensionality inspection as per specifications
  1. Inspection of all Copper discs
  2. Inspection of All inter disc FRP sheets
  3. Mylar insulation that is laminated on both side of the FRP sheet.
  4. Studs, Nuts, Recess for studs, radius given to recess
  5. Terminal welding at both end plates and their surface flatness.
  6. FRP end disc
- B. Visual Inspection.
  1. Kapton insulation of all SS studs; 50% overlap, no wrinkles.
  2. Inner bore insulation by Kapton Tape before assembly.
  3. Plainness of the both terminal leads and recess for bolts
  4. Cleanliness of all discs, insulation surfaces

C. While assembly.

1. Through buffing and cleaning of Al Disc-Cu sector contact surface.
2. Maintaining the order of disc and sector
3. Uniformly tightening of nuts, subsequently locknut to max torque possible

D. Acceptance tests:

1. Measurement of Inductance and resistance of Coil
2. Megger test (at 20°C-35°C, ~70% humidity) between
  - (i) All studs and main turn up to Rated maximum voltage (20kV)
  - (ii) Main turn and a conducting cylinder inserted at internal bore for rated maximum Voltage (20kV)
3. Qualifying 10Nos. of discharge shot at rated voltage and current (10kV, 250kA, ~18 kHz). The Coil should meet the performance requirement without failure.

## *INSERTS*

The fabrication of INSERTS should be as per the drawing shown in Figure.5. The following points may be noted.

1. Before procurement of raw material, properties of the material have to be got approved from the end user.
2. A test certificate of actual properties of the material used may be provided.
3. All sharp corners should be rounded 0.5R and the mating edges of outer diameter of the field chamfered to 2R.
4. Minor modification may be permitted without extra cost at the time of fabrication.
5. Final fabrication drawing has to be got approved from the user before starting fabrication.
6. Supplier should provide the dies for exact measurement of dimensionality of the component at the time of final inspection.
7. Finish of the surfaces should be as close to 5 micro meters.
8. Slit have to be made by EDM, close to 0.6mm±0.02

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***Technical drawing has been attached in successive five pages. Before stating fabrication drawings have to be got approved from the end used.***

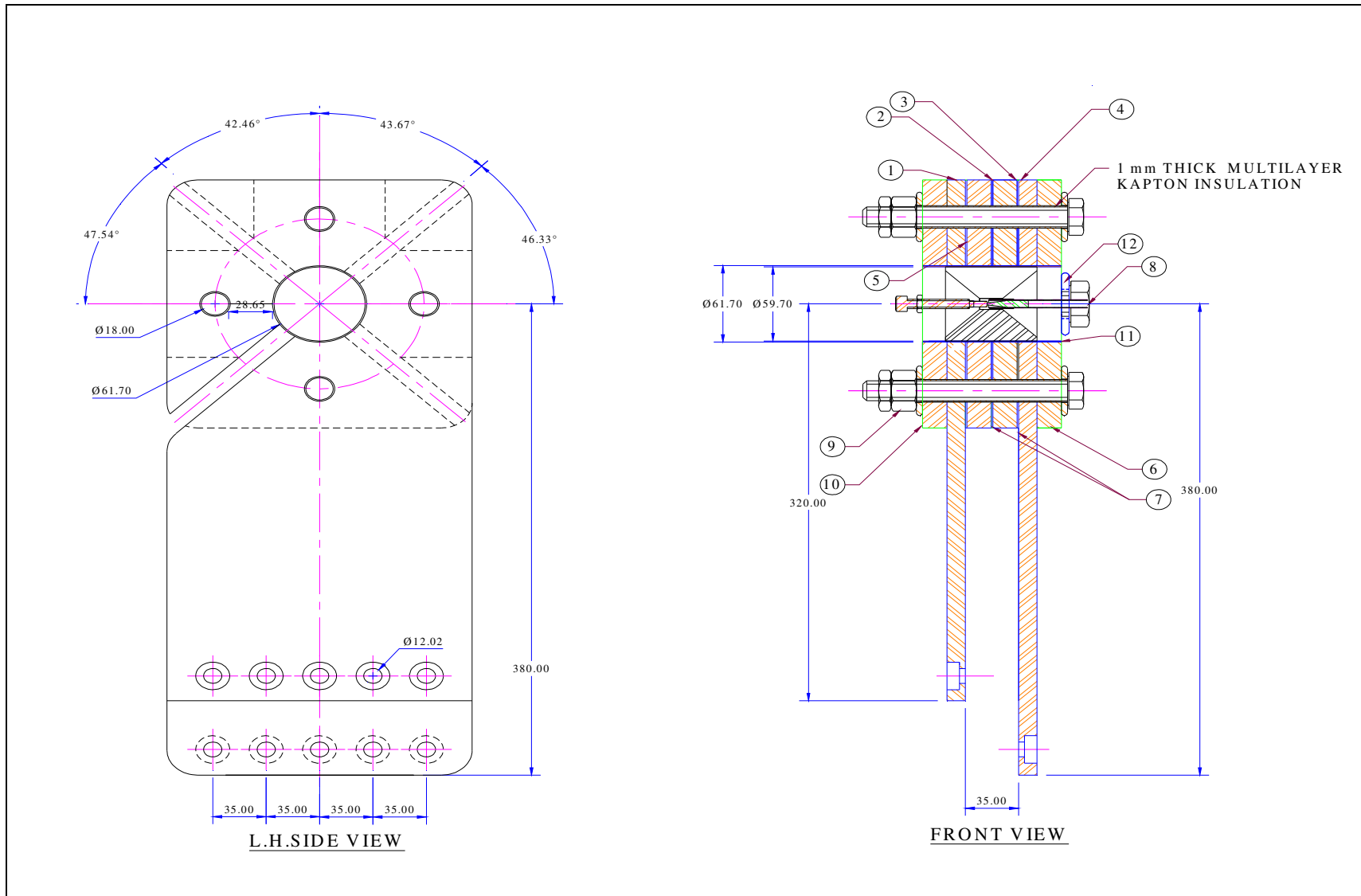


Figure 1. Assembly of Coil. QTY: 2 Sets (MRK/HELIX-1/ASS)

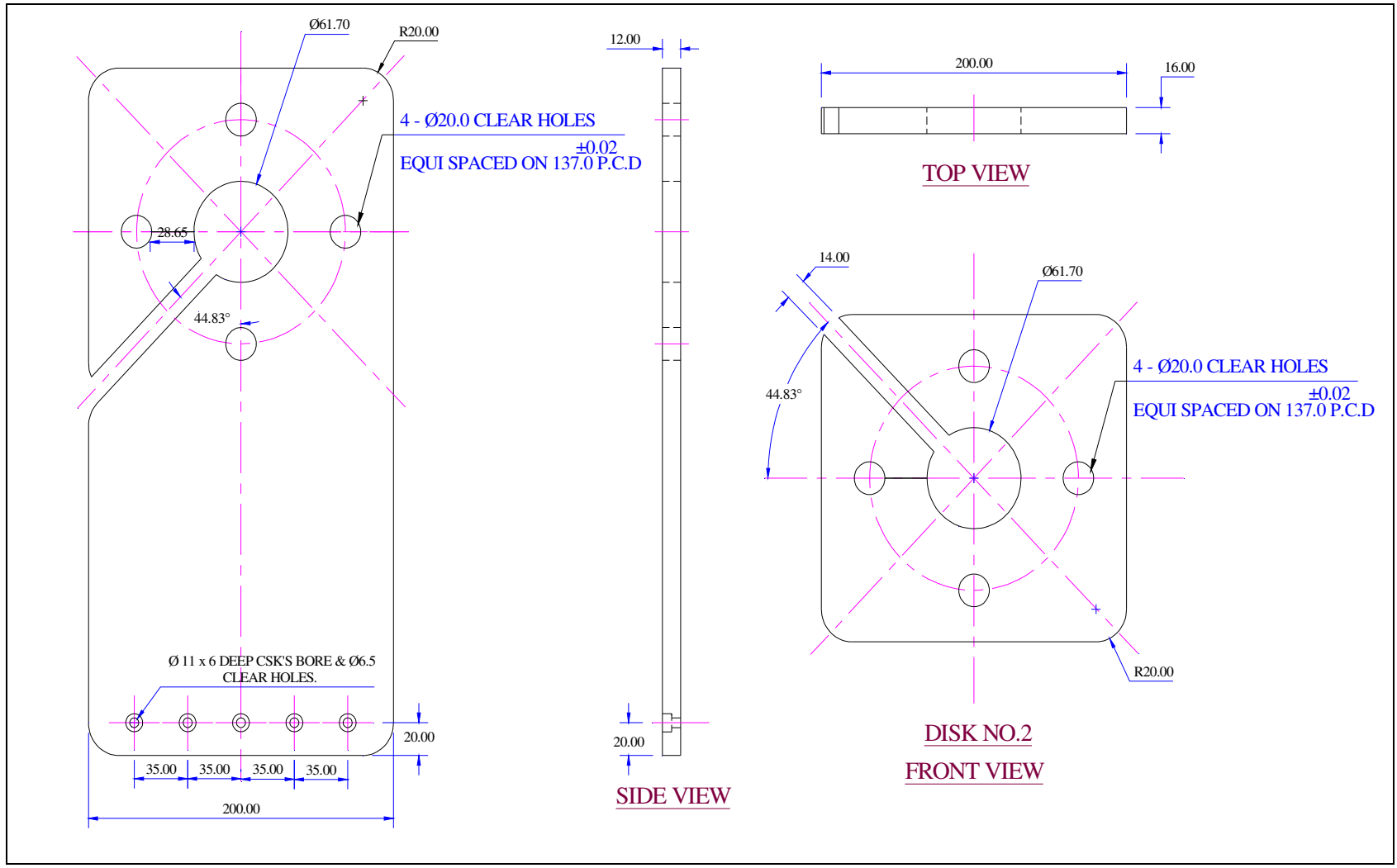


Figure 2. Details of Disc No.1 and Disc No.2 (MRK HELIX-1/ASS/D1)

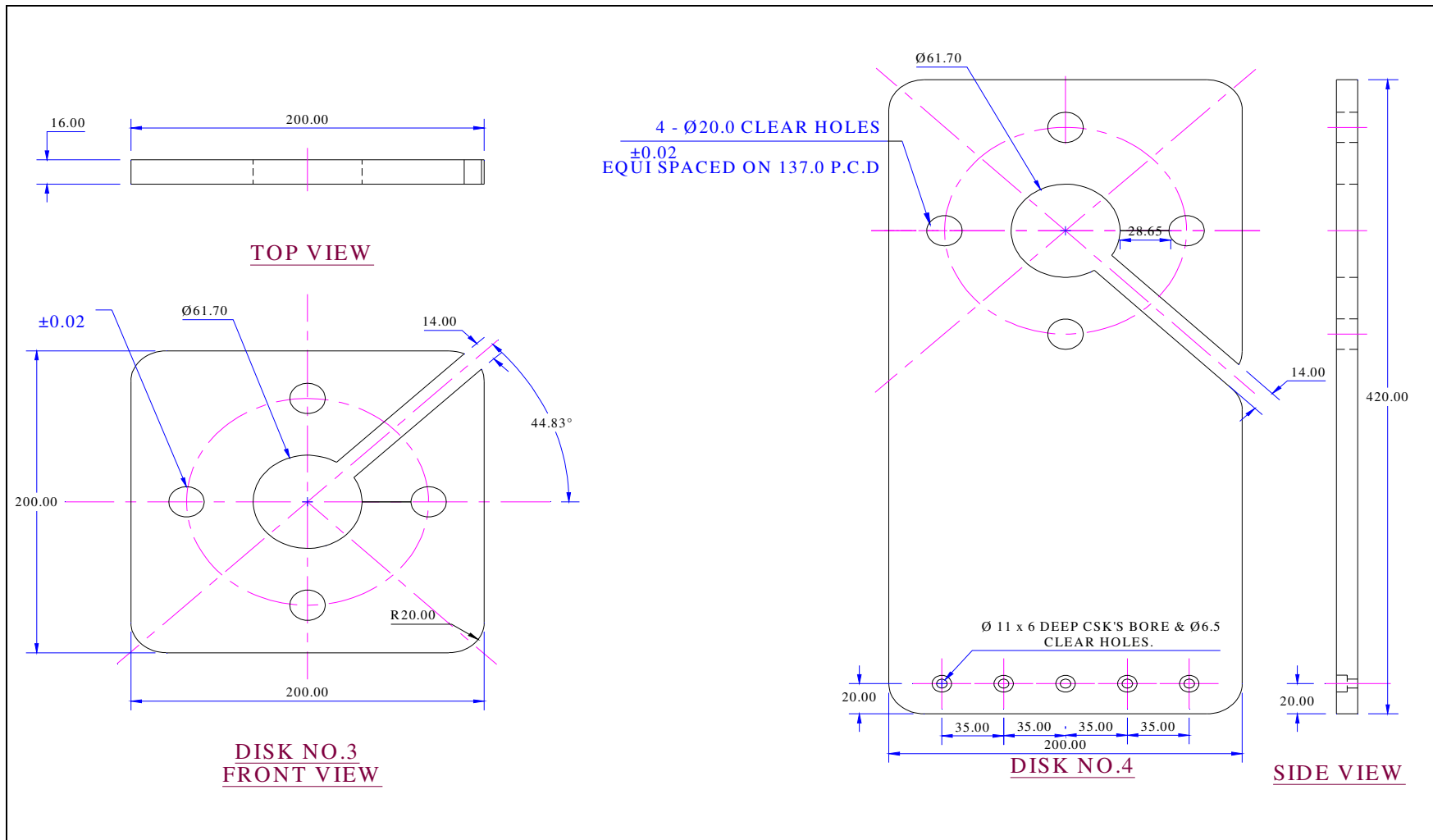


Figure 3. Details of Disc No 3 and Disc No.4 (MRK HELIX-1/ASS/D2)



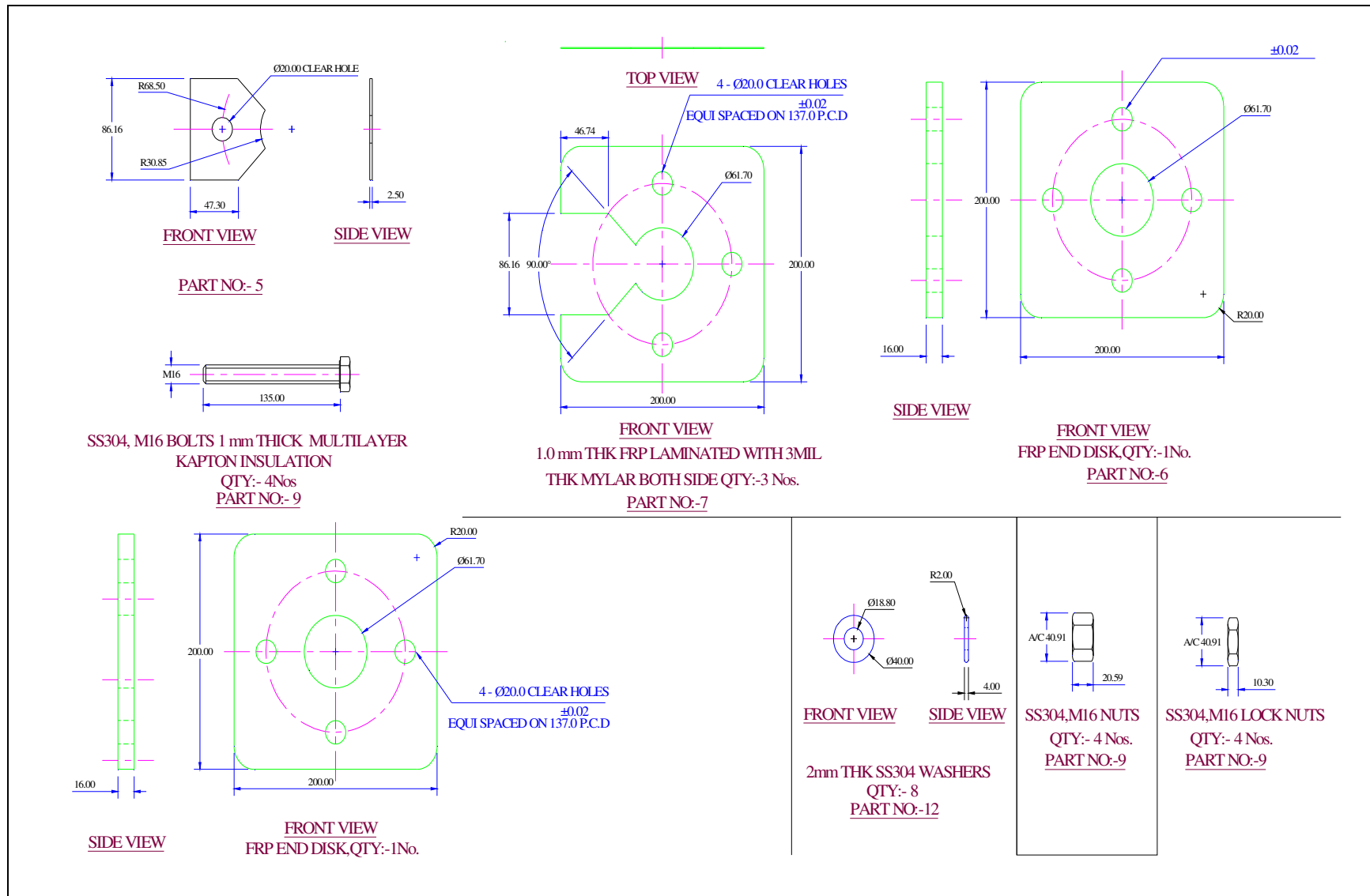


Figure 4: Copper Sector, FRP inter disc Insulators, End FRP discs, SS Fasteners (MRK HELIX-1/ASS/D3)

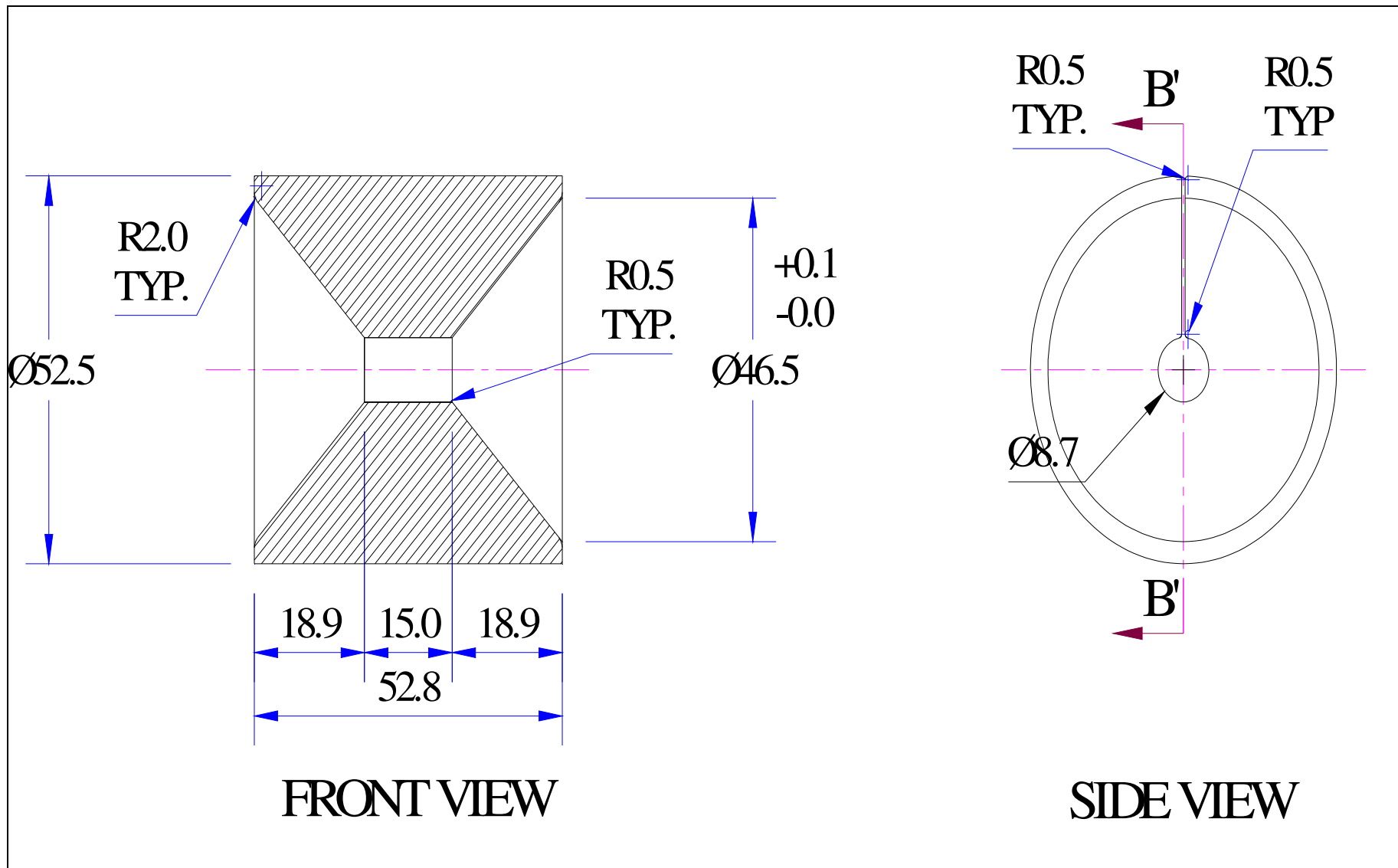


Figure 5: INSERTS. Total Qty:30 (Copper =10, Mild Steel=10 and SS304 =10)

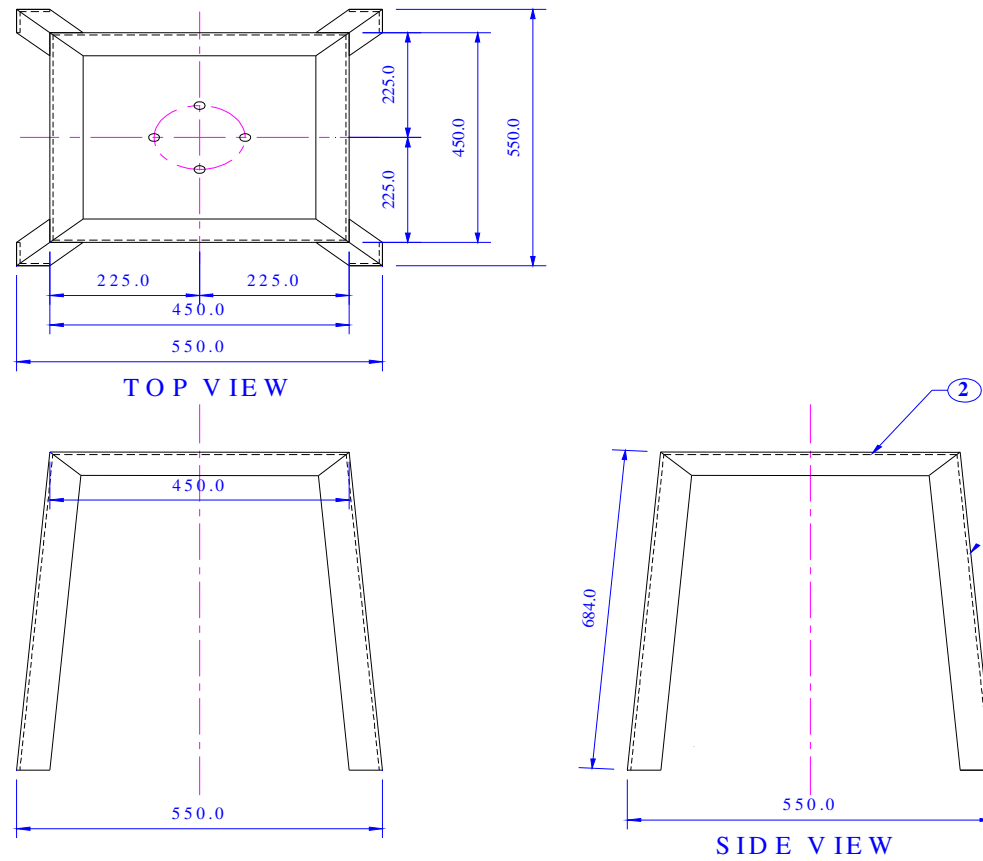


Figure 6: Coil support with Delrin Top