

Technical Specification & Acceptance Criteria

This document presents the Technical Specifications/Requirements, Scope of Work and Acceptance Criteria for the fabrication of one set of **“Moulds”** for the Tender of **“Fabrication and Supply of Moulding Tools for PS3A”**.

A. ONE SET OF “ MOULDING TOOLS FOR PS3A ” :

One set of **“Moulds”** (with 7 different types) are to be fabricated by Vendor as per the respective drawings and specified quantities as mentioned in the following Table No-1

Table No-1 : Moulds to be fabricated by Vendor

Sl No	Part Name [Name of the Mould]	Drawing No	Quantity (Nos)	Remarks on Drawings of Sub Parts
1.	MOULD (P+) FOR PS3 ADAPTOR FOR PSLV	Drg No-Mould-1-Assembly-PP-23 Sheet-1 and 2. (This is a draft drawing. Minor changes expected. Final approved drawing will be provided along with Purchase Order)	1 No	For this Mould-1 assembly, parts drawings are as shown in the Table No-2
2.	MOULD (P-) FOR PS3 ADAPTOR FOR PSLV	Drg No- Mould-2-Assembly-PM-24 Sheet-1 and 2. (This is draft drawing. Minor changes expected. Final approved drawing will be provided along with Purchase Order)	1 No	For this Mould-2 assembly, parts drawings are as shown in the Table No-2
3.	MOULD (Y+/Y-) FOR PS3 ADAPTOR FOR PSLV	Drg No- Mould-3-Assembly-YPM-22 Sheet-1 and 2. (This is draft drawing. Minor changes expected. Final approved drawing will be provided along with Purchase Order)	1 No	For this Mould-3 assembly, parts drawings are as shown in the Table No-2
4.	MOULD FOR PS3A CIRCULAR ANGULAR BRACKET	Drg No- Mould-4-Assembly-CAB-09 (This is Final drawing)	1 No	
5.	MOULD FOR CIRCULAR ANGULAR BRACKET (TYPE-II) FOR PS3 ADAPTOR	Drg No- Mould-5-Assembly-CAB-04 (This is Final drawing)	1 No	
6.	MOULD FOR CFRP ANGULAR BRACKET FOR PS3 ADAPTOR	Drg No- Mould-6-CF-AB-07 (This is Final drawing)	3 Nos	
7.	HAT STIFFENER MOULD FOR PS3A ADAPTOR	Drg No- Mould-7-HM-10 (This is draft drawing. Minor changes expected. Final approved drawing will be provided along with Purchase Order)	62 Nos	

Note: All the dimensions are in mm for all the drawings

Table No-2 : Details of Sub Parts

Sl. No	Name of the Mould Assembly	Details Sub Parts to be fabricated		
		Name of the Sub Parts	Drawing No for Sub Parts	Qty (Nos)
1.	MOULD (P+) FOR PS3 ADAPTOR FOR PSLV	CIRCULAR STIFFENER-1	P1-CS-1-23-1	1 No
		CIRCULAR STIFFENER-2	P2-CS-2-23-2	1 No
		CIRCULAR STIFFENER-3	P3-CS-3-23-3	1 No
		WEB-1	P4-W-1-23-4	6 Nos
		WEB-2	P5-W-2-23-5	6 Nos
		WEB-3	P6-W-3-23-6	6 Nos
		WEB-4	P7-W-4-23-7	6 Nos
		SQUARE SECTION WITH EYE BOLT	SS-W-EB-1	4 Nos
2.	MOULD (P-) FOR PS3 ADAPTOR FOR PSLV	CIRCULAR STIFFENER-1	P1-CS-1-23-1	1 No
		CIRCULAR STIFFENER-2	P2-CS-2-23-2	1 No
		CIRCULAR STIFFENER-3	P3-CS-3-23-3	1 No
		WEB-1	P4-W-1-23-4	6 Nos
		WEB-2	P5-W-2-23-5	6 Nos
		WEB-3	P6-W-3-23-6	6 Nos
		WEB-4	P7-W-4-23-7	6 Nos
		SQUARE SECTION WITH EYE BOLT	SS-W-EB-1	4 Nos
3.	MOULD (Y+/Y-) FOR PS3 ADAPTOR FOR PSLV	CIRCULAR STIFFENER-1	P1-CS-1-22-1	1 No
		CIRCULAR STIFFENER-2	P2-CS-2-22-2	1 No
		CIRCULAR STIFFENER-3	P3-CS-3-22-3	1 No
		WEB-1	P4-W-1-22-4	2 Nos
		WEB-2	P5-W-2-22-5	2 Nos
		WEB-3	P6-W-3-22-6	2 Nos
		WEB-4	P7-W-4-22-7	2 Nos
		SQUARE SECTION WITH EYE BOLT	SS-W-EB-1	4 Nos

Note: All the dimensions are in mm for all the drawings

B. MAJOR FACILITIES REQUIRED FOR THE FABRICATION OF MOULDS AND FOR ACCEPTANCE TESTS

Table No-3 :

Sl.No	Name of Major Facility / Major Activities
1)	Rolling of metals
2)	Welding
3)	NDT (DP) – DP: Dye Penetrant Test
4)	Heat treatment at higher temperature (for Stress relieving)
5)	Grit blasting
6)	Heat resistant (resisting 200 deg C) painting
7)	5 Axes CNC Machine
8)	Dimensional Inspection facility including 3D-CMM (Co-ordinate Measuring Machine) or Laser Tracker
9)	Vacuum leak check test facility
10)	Autoclave facility

C. VENDOR ELIGIBILITY CRITERIA:

- 1) Vendor shall have the machining facility including **5 Axes CNC Machine which is mandatory**
5 Axes CNC Machine shall cater to achieving all the dimensional and geometrical requirements within the tolerance limit as mentioned in the drawings.
- 2) Vendor shall have an ISO certified quality system.
- 3) Vendor shall have previous experience in machining of similar items using 5 Axes CNC Machine. Vendor has to provide the evidence (Previous Purchase order and Photo) for this previous experience.
- 4) Subcontracting is not allowed for machining activities.
- 5) Subcontracting is allowed for Rolling of metals, Welding, NDT (DP), Grit blasting, Heat treatment at higher temperature (for Stress relieving), painting, dimensional inspection by 3D CMM or Laser Tracker, Vacuum leak check test and acceptance test using Autoclave facility.
- 6) Vendor has to accept all the **“ TECHNICAL REQUIREMENTS / SCOPE OF WORK ”** mentioned in the **Section-D** herewith provided below.
- 7) Vendor has to accept all the **“ Acceptance procedures (Acceptance Criteria-1 to 5) ”** mentioned in the **Section-E** herewith provided below.

D. TECHNICAL REQUIREMENTS / SCOPE OF WORK

Vendor has to fabricate the moulds with required quantities as per the specified drawings as mentioned in the Table No-1 in the above section-A.

1) For Fabrication of MOULD (P+) FOR PS3 ADAPTOR FOR PSLV, MOULD (P-) FOR PS3 ADAPTOR FOR PSLV & MOULD (Y+/Y-) FOR PS3 ADAPTOR FOR PSLV

a) Fabrication of Conical Shell

Rolling of Metal:

- Rolling of metal plate is to form a conical shell.
- **Single plate only to be used for rolling into the form of conical shell.**
(Note that two or more plates rolling and then joining by welding is not allowed)
- Thickness of the metal plate to be selected by vendor in such a way that considering all required allowances including machining allowances shall be achieved.
- After metal plate rolling into the conical shell, appropriate stress relieving process to be done.

b) Welding

- i) All the welding activities to be done before machining.
- ii) NDT-DP test to be done for the welded portions. And ensure no defect in the NDT-DP test

c) Stress Relieving:

- i) The entire assembly is to be stress relieved before machining.
- ii) Stress relieving has to be done only by heating method.

- d) Grit blasting and Special painting (Heat resistant paint)
 - i) Except the outer surface of conical shell, Grit blast to be done in the back-up structure. During Grit blasting, the outer surface of the conical shell to be protected.
 - ii) Immediately after Grit blasting, thermal resistance painting to be done on the surfaces excluding the outer surface of the conical shell before machining.
 - iii) Painting by 200°C heat resistant paint [painted with BLUE RAAL 5005 or equivalent (Primer and Finish coat)
 - iv) Painting is not allowed on the region of moulding

e) **CNC Machining:**

- i) Machining to be carried out by a “ 5 axes CNC machine” .
- ii) Based on VSSC drawings, Vendor can generate 3D Model. And 3D model can be used for machining.
- iii) Tool marking to be done only by 3D Model.
- iv) **Shall be achieved Specified profiles, Geometrical parameters and all the dimensions within the tolerance limit as mentioned in the drawings.**

2) For Fabrication of MOULD FOR PS3A CIRCULAR ANGULAR BRACKET and MOULD FOR CIRCULAR ANGULAR BRACKET (TYPE-II) FOR PS3 ADAPTOR

- a) Welding to be done between basic shell and part of Channel section as mentioned in the drawing.
- b) Grit blasting and Special painting (Heat resistant paint) :
 - i) Except the Basic Shell, Grit blast to be done in the back-up structure. During Grit blasting, the entire Basic Shell to be protected.
 - ii) Immediately after Grit blasting, thermal resistance painting to be done on the surfaces excluding the Basic Shell surfaces before machining.
 - iii) Painting by 200°C heat resistant paint [painted with BLUE RAAL 5005 or equivalent (Primer and Finish coat)
 - iv) Painting is not allowed on the region of moulding.
- c) **CNC Machining:** For the basic Shell, CNC Machining to be done to achieve the required profiles, Geometrical parameters all dimensions within the tolerance limit as mentioned in the drawing.

3) For Fabrication of MOULD FOR CFRP ANGULAR BRACKET FOR PS3 ADAPTOR & HAT STIFFENER MOULD FOR PS3A ADAPTOR

- a) CNC Machining to be done to achieve the required profiles, Geometrical parameters and all dimensions within the tolerance limit as mentioned in the drawing.
- b) No Grit blasting and No painting for these moulds.

4) Providing Identifications on the moulds fabricated:

Table No-4

Sl. No	Part Name (Mould Name)	Identification No	Method of providing Identification No
1.	MOULD (P+) FOR PS3 ADAPTOR FOR PSLV	EFCD/PP-MOULD-S2-PS3A/P+ / 01	Identification number to be provided by Metal Tag on the Non-Moulding region
2.	MOULD (P-) FOR PS3 ADAPTOR FOR PSLV	EFCD/ PM-MOULD-S2-PS3A/P- /01	
3.	MOULD (Y+/Y-) FOR PS3 ADAPTOR FOR PSLV	EFCD/ YPM-MOULD-S2-PS3A/Y+ /Y- /01	
4.	MOULD FOR PS3A CIRCULAR ANGULAR BRACKET	EFCD/ MOULD-S2-PS3A/CAB/T1&T4/01	
5.	MOULD FOR CIRCULAR ANGULAR BRACKET (TYPE-II) FOR PS3 ADAPTOR	EFCD/ CAB-T2-T3-MOULD-S2-PS3A/01	
6.	MOULD FOR CFRP ANGULAR BRACKET FOR PS3 ADAPTOR	EFCD/ AB-MOULD-S2-PS3A/01 to 03	
7.	HAT STIFFENER MOULD FOR PS3A ADAPTOR	EFCD/ HAT-PP-MOULD-S2-PS3A/P+ / 01 to 30	Identification number to be provided by scribing at the location near to thro' hole provided/within the 25 mm portion from the end.(Idfn No on the Non-layup region)
		EFCD/ HAT-PM-MOULD-S2-PS3A/P- / 01 to 30	
		EFCD/ HAT-YPM-MOULD-S2-PS3A/Y+ /Y- / 01 to 02	

5) Packing and delivery

- Proper packing to be done by vendor for all the moulds to avoid damage during transportation.(especially more care and proper packing to be done for the moulding regions on each mould)
- Packing and delivery of fabricated moulds to CMSE stores, VSSC, Vattiyoorkavu, Thiruvananthapuram-695013 is under vendor's scope.
- On receipt visual inspection will be done at VSSC by VSSC for the moulds. If and damage observed. Then the mould(s) will be rejected.

E.ACCEPTANCE PROCEDURES

Moulds acceptance by VSSC is based on the following Acceptance criteria-1 to 5

1) Acceptance Criteria-1: Verification on Materials used

- Vendor has to use the materials as mentioned in the drawings only.
- Vendor has to submit (to VSSC) the Certificates on the Materials used for fabrication.
- VSSC will verify the Certificates on the Materials used for fabrication.
 - If No deviation observed on the Materials used with respect to drawings, mould(s) will be accepted.
 - If any deviation observed on the Materials used with respect to drawings, mould(s) will be rejected.

2) Acceptance Criteria-2: Verification on Measured dimensions

- Dimensional Inspection to be done by vendor at vendor site.
- Dimensional inspection to be done in 3D CMM / Laser tracker.**
- All the specified profiles, Geometrical parameters and all the dimensions as per the respective drawing to be measured and to be reported. Dimensional inspection report to be sent to VSSC
- VSSC will verify the measured dimensions.

- e) If there is No deviation, mould(s) will be accepted.
- f) If any deviation, the mould will be rejected.

Note:

- If any deviation on the Non-Critical dimension, VSSC will provide the assessment / corrective action if any and further acceptance if possible only after discussing in appropriate committee at VSSC.
- If any minor deviation on the Critical dimension, VSSC will provide the assessment / corrective action if any and further acceptance if possible only after discussing in appropriate committee at VSSC.

3) Acceptance Criteria-3: Vacuum Integrity Test at room temperature

- a) Sub contract is allowed for this activity.
- b) Refer the respective drawings for the region of CFRP Composite moulding on the **“Moulds”**.
- c) Vacuum Integrity Check at Room Temperature to be done at Vendor site / by Vendor in the presence of VSSC representative for each mould on the moulding region.
- d) For this acceptance test, vendor has to be ready with the all required items.
- e) For each fabricated mould, on the region of composite layers lay-up, vacuum bagging will be done.
- f) Connect the vacuum bagging to vacuum pump and 0.8 bar minimum vacuum to be achieved.
- g) Disconnect the vacuum pump. And vacuum leak check to be done.
- h) **The specified acceptable leak rate is <0.05 bar / 10 minutes.**
- i) If the leak rate is within the specified rate, then the mould(s) will be accepted.
- j) If the leak rate is more than the specified rate, then the mould(s) will be rejected.

4) Acceptance Criteria-4: Vacuum Integrity Test at High temperature with 5 bar pressure inside Autoclave

- a) Sub contract is allowed for this activity.
- b) Refer the respective drawings for the region of CFRP Composite moulding on the **“Moulds”**.
- c) For this acceptance test, vendor has to be ready with the all required items.
- d) Vacuum Integrity Test at High temperature with 5 bar pressure inside Autoclave to be done at Vendor site / by Vendor in the presence of VSSC representative for each mould on the moulding region.
- e) This acceptance test will be done inside Autoclave as per the following sequence of activities.
 - Vacuum bagging and providing thermocouples (5 Nos minimum) for the moulding region.
 - Place the mould with vacuum bagging inside Autoclave.
 - Application of Vacuum of 0.8 bar minimum for the vacuum bagging region.
 - Continue the vacuum.
 - Close the door of Autoclave.
 - Application of additional pressure of 5 bar inside autoclave.
 - Gradual heating (3 deg C per minute) the mould upto 180 deg C
 - Dwell at 180 deg C for 2 hours for the mould.
 - Gradual cooling (3 deg C per minute) the mould to room temperature.
 - Release of pressure.
 - Release of vacuum.
- f) During the entire process (inside autoclave) mentioned above, the vacuum level, pressure and temperatures to be monitored continuously.

- g) After application of pressure, the minimum vacuum to be 0.5 bar. Also during the entire process, the minimum vacuum to be 0.5 bar.
- h) During the entire process inside Autoclave mentioned above, if there is no vacuum leak and vacuum is minimum of 0.5 bar, then the mould(s) will be accepted.
- i) During the entire process inside Autoclave mentioned above, if vacuum leak observed, then the mould(s) will be rejected.
- j) During the entire process inside Autoclave mentioned above, if vacuum level is less than 0.5 bar vacuum, then the mould(s) will be rejected.

5) Acceptance Criteria-5: Pre-Delivery inspection by VSSC at Vendor Site

- a) Pre-delivery inspection will be done by VSSC representatives at vendor site.
- b) Only for the critical dimensions, re-inspection to be done in 3D CMM / Laser tracker in the presence of VSSC representatives.
- c) VSSC representatives will verify all the documents of various operations / processing carried out.
- d) Physical verification on the fabricated moulds will be done by VSSC representatives.
- e) During Pre-delivery inspection, suggestions (if any) by VSSC to be incorporated by Vendor
- f) If all are accepted, Clearance will be provided by VSSC for the delivery of mould(s) to VSSC.
- g) If any minor deviation, VSSC will provide the assessment / corrective action if any and further acceptance if possible only after discussing in appropriate committee at VSSC.
- h) If any major deviation observed, mould(s) will be rejected.

F. DELIVERY SCHEDULE:

Following is the delivery schedule where T0 is the date of placement of purchase order (PO).

Table No-5

Sl.No	Activity	Timeline
1	Date of PO	T0
2	Moulds Fabrication completion and readiness for acceptance tests in presence of VSSC representative	T1=T0 + 3 months
3	Acceptance tests in presence of VSSC representative and Pre-delivery inspection by VSSC at Vendor site	T2 = T1 + 20 days
4	During pre-delivery inspection, if the mould(s) are accepted by VSSC, then Packing and delivery by Vendor to CMSE Stores, VSSC, Thiruvananthapuram	T3 = T2 + 10 days

G.INSTRUCTIONS FOR SUBMISSION OF PRICE BID

Price shall be quoted only in the price bid window in e-procurement portal website. It shall not be revealed in any other place.

Table No-6 : Price bid format

	Cost (in Rs)
* Total cost for “ Fabrication and Supply of all the Moulds with specified quantities including specified acceptance tests “	
P&F charges and Transportation Charges	
GST	
Total	

*Total Fabrication cost for all the moulds with specified quantities includes raw materials, all the processing/activities, machining, engineering, documentation, quality control, dimensional inspections, all the acceptance tests at vendor site , etc. (excluding TAX).

H. **COMPLIANCE FORMAT TO BE SUBMITTED BY VENDOR ALONG WITH TECHNICAL BID**

Along with submission of technical bid details, vendor has to submit the following compliance details in tabular format as provided in the Table No-7

Table No-7 :

Sl. No	Clause / Parameters / Specifications /Requirements / Major Equipments / Machineries		Compliance by Vendor		
			(Yes / No)	If No, Remarks	Any other remarks/details
1	5 Axes CNC Machine	Availability with Vendor			
		5 Axes CNC Machine shall cater to achieving all the dimensional and geometrical requirements within the tolerance limit as mentioned in the drawings.			
		Size of 5 Axes CNC Machine			<u>Size:</u>
		Accuracy details of 5 Axes CNC Machine			<u>Accuracy details</u>
		Make of 5 Axes CNC Machine			<u>Make</u>
2	Subcontracting is not allowed for machining activities				
3	Quality Certificate	Vendor shall have an ISO certified quality system			
		ISO Certification attached herewith			

4	Previous experience	Vendor shall have previous experience in machining of similar items using 5 Axes CNC Machine.			
		Vendor has to provide the evidence (Previous Purchase order and Photo) for this previous experience.			
		Previous Purchase order attached herewith			
		Photos attached herewith			
5	Agreement by Vendor on all the TECHNICAL REQUIREMENTS / SCOPE OF WORK mentioned in the Section-D				
6	Agreement by Vendor on all the “Acceptance procedures ” mentioned in the Section-E				
7	Agreement by Vendor on the Delivery Schedule , mentioned in the Section-F				