

**ANNEXURE TO TENDER NO: DPS/MRPU/1/4/1729/PT/696**  
**SPECIFICATION OF CENTRIFUGAL PUMPSETS**

**I. Scope:**

1. Design, factory testing, supply, loading, unloading at site of Split coupled, outside mounted mechanical seal type **Vertical-inline centrifugal pumpsets** along with suction diffuser cum strainer, triple duty valve as per the detailed technical specification.
  
2. Design, factory testing, supply, loading, unloading at site long coupled **End suction centrifugal pumpsets** with mechanical seal along with suction diffuser cum strainer, triple duty valve as per the detailed technical specification.

**II. Qualification criteria for the bidders**

Supplier shall have the following minimum requirement to meet the eligibility criteria for participating in the tender.

- a) Bidder shall be a pump manufacturer/an authorised pump dealer/ HVAC vendor
- b) Bidder should have minimum five years experience in supply of pumps.
- c) Bidder shall supply pumps manufactured from an ISO certified company.
- d) Bidder shall quote for pump brand which is in good standing in the HVAC market for the past 3 years or more. The pumps offered shall have after sales service preferably in Chennai.
- e) Bidder shall have good financial standing and should not have incurred loss in the last five years. Audited annual report for the past five financial years ending 2019 – 20 shall be submitted.

**III. Evaluation criteria:**

1. Incomplete or partial offers will not be considered for evaluation.
2. Only complete offers meeting all technical specifications with all accessories included will be taken for evaluation.
3. The pumps shall be offered with best efficiency at the duty point.
4. The orders shall be evaluated on overall lowest offer.

The bidder's offer shall be evaluated technically to see compliance to the technical specification based on data's furnished in the questionnaire and their selected data sheet submitted to department. Following documents shall be submitted along with the offer for assessment of firm's technical and financial capability, without which offer will not be considered for evaluation.

- Copies of purchase orders and list of customers with contact details for who similar tendered items has been executed along with the satisfactory performance report from the users.
- Company's profile with list of machineries and tools, inspection and performance testing facilities.

- GA drawings and technical datasheet for pumps shall be submitted along with offer. Relevant catalogues for pumps, past performance etc shall also be submitted for evaluation.
- Quality Assurance Plan
- Audited annual report for the past five financial years ending 2019 - 20. The firm should not have incurred any loss during last five consecutive balance sheets & financial net worth (cumulative) of the firm should not be negative.
- 'Questionnaire' duly filled with all technical details as per format

#### IV. Detailed Technical Specification:

##### 1. VERTICAL IN LINE CENTRIFUGAL PUMPSET

Type	Factory-assembled and tested, Vertical Inline centrifugal, overhung-impeller, Split- coupled, designed for installation with pump and motor shafts mounted vertically.
Application/medium	Booster pump for handling chilled water at ~7.5°C
Total Head, capacity	Refer to schedule of quantities
Pump efficiency	Pumps to be selected at Best efficiency point. Pumps with higher efficiency shall be preferred.
Quantity	Refer to Schedule of quantities
Factory test with standard	ANSI/HI 1.6 or ISO 9909 or BIS Standards.
Impeller	Axial suction and radial discharge
Drive	Directly coupled to motor Type of motor – 3 phase, IE3 Energy efficiency, Squirrel cage induction motor. Rated voltage =415 V $\pm$ 10 %, Freq. =50 Hz $\pm$ 3 %, Combined variation — the sum of absolute percent variations of V and F not exceeding 10 percent. Type of Enclosure = IP 55, Type of cooling=IC411 as per IS:6362. Duty = Continuous (S1), Insulation Class = F, Speed: 1440/2900 rpm. Motor shall be suitable for VFD and DOL < 5HP, Star delta starting $\geq$ 5HP. SCR=50kA. Ambient Temp = 40 Deg.C. Six terminal of the motor shall be available in the terminal box in case of motor with star delta starting arrangement. Standard: IEC60034-30/IS12615:2011, Dimension as per IS: 1231 & IS 2223
Material of construction	<ul style="list-style-type: none"> <li>• <b>Casing:</b> Radial split, cast iron, with replaceable bronze wear rings, threaded gage tapings at inlet and outlet, and flange connections.</li> <li>• <b>Impeller:</b> Cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance if required.</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Pump Shaft with sleeve:</b> Stainless steel (SS304) shaft, copper-alloy shaft sleeve with rigid coupling.</li> <li>• <b>Mechanical Seal:</b> Outside mounted Carbon rotating ring against a ceramic seat held by a stainless-steel spring.( seal shall be replaced without disturbing the motor and pump)</li> <li>• <b>Pump Bearings:</b> Permanently Lubricated Anti friction bearings of SKF/FAG make.</li> <li>• <b>Motor frame:</b> Cast Iron (with mounting feet integral to the housing - for constructions with feet)</li> </ul>
Vibration and Noise level	<p>Vibration shall conform to IS: 11724 / ISO 2372</p> <p>Sound pressure level shall be less than 80 Db at a distance of 1m from the equipment.</p> <p>The noise level of motors shall be as given in IS 12065.</p>
Witnessing of pump performance test at factory	Required.100% Performance test shall be witnessed by department personnel at Manufacturer's premises. (Boarding and lodging charges of inspectors will be borne by dept.)
Witnessing of motor type test at factory	One motor in each duty shall be subjected to type test in presence of department Engineer in the factory.
Accessories required	
A. Suction diffuser on pump inlet	<p>Location – pump inlet</p> <p>Functions- Strainer, flow straightening</p> <p>Pressure class – CL125</p> <p>Body, cover – CI IS 210 Gr. FG 260</p> <p>Screen with Mesh – SS AISI 304</p> <p>O ring – Nitrile Rubber</p> <p>Nut/ Bolt – ASTM A194 Gr. 2H / ASTM A193 Gr. B7</p> <p>Plug – SS304</p> <p>End Connection – Flanged to ANSI B 16.1 CL250</p> <p>Drilled to ANSI B16.1 CL125/ 250</p> <p>Size- To suit pump suction</p> <p>Matching flanges- to be supplied</p>
B. Triple duty valves on pump discharge	<p>Location – Pump outlet</p> <p>Functions- Balancing, Non-return valve &amp; isolation valve</p> <p>Pressure class – CL 125</p> <p>Body –Cast Iron Grade FG 260, conforming to IS:210</p> <p>Disc – SS ASTM A351 CF8 (for valve size 65 mm, 80 mm and 100 mm) and CI IS: 210 Gr FG260 (for valves 150 mm and 200 mm)</p> <p>Stem – SS ASTM A276 Type 410</p> <p>Seat ring – Nitrile rubber</p> <p>Yoke sleeve – SG Iron IS: 1865 400/15</p> <p>Stem guide bush, spring, yoke nut, gland nut – SS ASTM A276</p>

	<p>304</p> <p>Clamping ring – SS ASTM A276 304 (for valves size 150 mm and 200 mm)</p> <p>Fasteners – ASTM A193 Gr B7/A94 Gr FG 200</p> <p>Hand wheel – Cast Iron as per IS 210 Gr. FG 200</p> <p>End connection – Flanged, drilled to ANSI B16.1</p> <p>Matching flanges- 2 nos required.</p> <p>Orientation – 90/180 degree</p>
C. Essential spares	<ol style="list-style-type: none"> <li>1. Mechanical seal -1 No. for each pump</li> <li>2. Carbon bush – 2nos for each pump</li> </ol>
D. Matching flanges	Required
Submittals for tender evaluation	<ol style="list-style-type: none"> <li>1. Pump selection sheet</li> <li>2. Pump performance curves</li> <li>3. Motor selection sheet</li> <li>4. Terminal block arrangement</li> </ol>
Submittals after PO	<ol style="list-style-type: none"> <li>1. Pump QAP for approval</li> <li>2. GA drawing showing foundation details of Pumps</li> <li>3. Final Pump selection sheet</li> <li>4. Final Pump performance curves</li> <li>5. Motor Guaranteed Technical Parameters</li> <li>6. Motor curves and QAP for approval</li> </ol>
Submittals during factory testing	<p>All documents and testing reports as per approved QAP not limited to following</p> <ol style="list-style-type: none"> <li>1. Material test certificates for pump components</li> <li>2. Dynamic balancing of rotating assembly</li> <li>3. Performance test report of pumps</li> <li>4. Vibration and sound level reports</li> <li>5. Test for IE3 motors as per IS 12615</li> <li>6. Visual Inspection of suction diffuser</li> <li>7. Visual Inspection &amp; test reports of triple duty valve</li> <li>8. Visual inspection of spares</li> </ol>
Submittals during dispatch	<ol style="list-style-type: none"> <li>1. Packing slip</li> <li>2. Guarantee certificate</li> <li>3. Operation and maintenance manual (2 sets)</li> </ol>
Tolerance and pump acceptance criteria	As per ANSI/HI 14.6 Gr 2B or ISO 9909/IS 9137

## 2. END SUCTION TYPE CENTRIFUGAL PUMPSET

Type of pump	Single Stage end suction centrifugal pump
Medium	Chilled water at 7 °C to 12 °C
Suction	Positive, End suction and Top discharge
Impeller	Bronze as per IS 318,Grade LTB2
Material of Construction	a) Casing : Casting grade FG 200 of IS:210 b) Shaft : High tensile steel shaft with EN-8 c) Sleeve : bronze d) Base frame : Cast Iron/Mild steel
Components	Mechanical Seal, Flanges confirming to BS10 Table D, Priming funnels and air vent cocks
Accessories	Flexible coupling shall be provided with suitable coupling guard
Balancing	The rotating assembly (pump & motor ) shall be dynamically balanced to the quality of G 6.3 as per ISO:1940 / IS:11723
Vibration and Noise level	Vibration shall confirm to IS: 11724, Sound level shall be less than 80 dB at a distance of 1m from the equipment.
Common base frame for pump & motor	MS fabricated with 2 coats of enamel painting over 1 coat of primer.
Witnessing of performance Test at factory	All pumps shall tested as per IS 9137 /ANSI-HI 1.6 standard for performance at factory.
Drive motor	Directly coupled to motor Type of motor – 3 phase, IE3 Energy efficiency, Squirrel cage induction motor. Rated voltage =415 V ± 10 %, Freq. =50 Hz ± 5 %, Combined variation — the sum of absolute percent variations of V and F not exceeding 10 percent. Type of Enclosure = IP 55, Type of cooling=IC411 as per IS:6362. Duty = Continuous (S1), Insulation Class = F, Speed: 1440/2900 rpm. Motor shall be suitable for VFD and DOL < 5HP, Star delta starting >= 5HP . SCR=50kA. Ambient Temp = 40 Deg.C 6 terminal of the motor shall be available in the terminal box in

	<p>case of motor with star delta starting arrangement.  Standard: IEC60034-30/IS12615:2011  Dimension as per IS: 1231 &amp; IS 2223</p>
Witnessing of motor type test at factory	One motor in each duty shall be subjected to type test in presence of department Engineer in the factory.
Accessories	
A. Suction diffuser on pump inlet	<p>Location – pump inlet  Functions- Strainer, flow straightening  Pressure class – CL125  Body, cover – CI IS 210 Gr. FG 260  Screen with Mesh – SS AISI 304  O ring – Nitrile Rubber  Nut/ Bolt – ASTM A194 Gr. 2H / ASTM A193 Gr. B7  Plug – SS304  End Connection – Flanged to ANSI B 16.1 CL250  Drilled to ANSI B16.1 CL125/ 250  Size- To suit pump suction  Matching flanges- to be supplied</p>
B. Triple duty valves on pump discharge	<p>Location – Pump outlet  Functions- Balancing, Non-return valve &amp; isolation valve  Pressure class – CL 125  Body –Cast Iron Grade FG 260, conforming to IS:210  Disc – SS ASTM A351 CF8 (for valve size 65 mm, 80 mm and 100 mm) and CI IS: 210 Gr FG260 (for valves 150 mm and 200 mm)  Stem – SS ASTM A276 Type 410  Seat ring – Nitrile rubber  Yoke sleeve – SG Iron IS: 1865 400/15  Stem guide bush, spring, yoke nut, gland nut – SS ASTM A276 304  Clamping ring – SS ASTM A276 304 (for valves size 150 mm and 200 mm)  Fasteners – ASTM A193 Gr B7/A94 Gr FG 200  Hand wheel – Cast Iron as per IS 210 Gr. FG 200  End connection – Flanged, drilled to ANSI B16.1  Matching flanges- 2 nos required.  Orientation – 90/180 degree</p>
C. Spares to be supplied along with pump	<ol style="list-style-type: none"> <li>1. Shaft- 1No. for each pump</li> <li>2. Mechanical seal- 1 set for each pump</li> <li>3. Bearing DE &amp; NDE – 1set for each pump</li> </ol>
D. Matching flanges	Required

Submittals for tender evaluation	<ol style="list-style-type: none"> <li>1. Pump selection sheet</li> <li>2. Pump performance curves</li> <li>3. Motor selection sheet</li> <li>4. Terminal block arrangement</li> </ol>
Submittals after PO for approval	<ol style="list-style-type: none"> <li>1. Pump QAP for approval</li> <li>2. GA drawing showing foundation details of Pumps</li> <li>3. Final Pump selection sheet</li> <li>4. Final Pump performance curves</li> <li>5. Motor Guaranteed Technical Parameters</li> <li>6. Motor curves</li> <li>7. Motor QAP for approval</li> </ol>
Submittals during factory testing	<p>All documents and testing reports as per approved QAP not limited to following</p> <ol style="list-style-type: none"> <li>1. Material test certificates for pump components</li> <li>2. Dynamic balancing of rotating assembly</li> <li>3. Performance test report of pumps</li> <li>4. Vibration and sound level reports</li> <li>5. Test for IE3 motors as per IS 12615</li> <li>6. Visual inspection of spares</li> </ol>
Submittals during dispatch	<ol style="list-style-type: none"> <li>1. Packing slip</li> <li>2. Guarantee certificate</li> <li>3. Operation and maintenance manual (2 sets)</li> </ol>
Tolerance and pump acceptance criteria	As per ANSI/HI 14.6 Gr 2B or ISO 9909/IS 9137

## V. Delivery

All items shall be delivered in good condition to Stores Officer, Central Stores, DPS, Indira Gandhi Centre for Atomic Research, Kalpakkam-603 102 within eight (8) months from date of issue of the purchase order.

## VI. Packing and transportation

All items shall be **well packed, protected and insured against damage or breakage during shipment and delivery**. Each box shall be limited to the sizes and weights that are permissible under the existing rail and road limitations.

## VII GUARANTEE

The pumps shall be guaranteed for materials, workmanship, continuously duty operation, meeting the specified performance, vibration and noise parameters as specified for minimum period of 12 months from the date of final acceptance. . If any equipments / major components are replaced, shall be further guaranteed for the performance for a minimum period of 12 months from the date of such replacement.

## **VIII QUESTIONNAIRE**

The vendor is deemed to have examined all the Sections of this tender document and be fully informed as to nature of work and conditions related to its performance. The required data demanded below shall be duly filled and submitted along with the quotation. Questionnaire is attached in annexure.



**QUESTIONNAIRE TO BE FILLED AND ATTACHED ALONG WITH THE OFFER  
FOR TECHNICAL EVALUATION**

Description of item	Department specification	As offered by the firm
<b>I. VERTICAL INLINE CENTRIFUGAL PUMPSETS</b>		
Type	Factory-assembled and tested, Vertical Inline centrifugal, overhung-impeller, Split- coupled, designed for installation with pump and motor shafts mounted vertically.	
Application/medium	Booster pump for handling chilled water at ~7.5°C	
Total Head	Attach selection sheet	
Capacity	Attach selection sheet	
Pump efficiency	To be selected at BEP	
Factory test with standard	ANSI/HI 1.6 or ISO 9909 or BIS Standards.	
Impeller	Axial suction and radial discharge	
Drive	Directly coupled to motor Type of motor – 3 phase, IE3 Energy efficiency, Squirrel cage induction motor. Rated voltage =415 V $\pm$ 10 %, Freq. =50 Hz $\pm$ 5 %,IP 55,Continuous (S1), Insulation Class = F, Speed: 1440/2900 rpm. Motor shall be suitable for VFD and DOL < 5HP, Star delta starting $\geq$ 5HP . SCR=50kA.Ambient Temp = 40 Deg.C. Six terminals of the motor shall be available in the terminal box in case of motor with star delta starting arrangement.Standard: IEC60034-30/IS12615:201, Dimension as per IS: 1231 & IS 2223	
Material construction of	<ul style="list-style-type: none"> <li>• <b>Casing:</b> Radial split, cast iron, with replaceable bronze wear rings, threaded gage tapings at inlet and outlet, and flange connections.</li> <li>• <b>Impeller:</b> Cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap</li> </ul>	•

	<p>screw. Trim impeller to match specified performance if required.</p> <ul style="list-style-type: none"> <li>• <b>Pump Shaft with sleeve:</b> Stainless steel (SS304) shaft, copper-alloy shaft sleeve with rigid coupling.</li> <li>• <b>Mechanical Seal:</b>Outside mounted Carbon rotating ring against a ceramic seat held by a stainless-steel spring.( seal shall be replaced without disturbing the motor)</li> <li>• <b>Pump Bearings:</b> Permanently Lubricated Anti friction bearings of SKF/FAG make.</li> <li>• <b>Motor frame:</b> Cast Iron (with mounting feet integral to the housing - for constructions with feet)</li> </ul>	
Vibration and Noise level	<p>Vibration shall conform to IS: 11724 / ISO 2372</p> <p>Sound pressure level shall be less than 80 Db at a distance of 1m from the equipment.</p> <p>The noise level of motors shall be as given in IS 12065.</p>	
Witnessing of performance test at factory	<p>Required.100% Performance test shall be witnessed by department personnel at Manufacturer's premises. (Boarding and lodging charges of inspectors will be borne by dept.)</p>	
Accessories required		
A. Suction diffuser cum strainer on pump inlet	Attach catalogue	
B. Triple duty valves on pump discharge	Attach catalogue	
C. Essential spares	<p>1. Mechanical seal -1 No. for each pump</p> <p>2. Carbon bush – 2nos for each pump</p>	
D. Matching flanges	Required	

Tolerance and pump acceptance criteria	As per ANSI/HI 14.6 Gr 2B or ISO 9909/IS 9137	
--	---	--

Description of item	Department specification	As offered by the firm
<b>II. END SUCTION TYPE CENTRIFUGAL PUMPSETS</b>		
Type of pump	Single Stage end suction centrifugal pump with mechanical seal	
Medium	Chilled water at 7 °C to 12 °C	
Suction	Positive, End suction and Top discharge	
Impeller	Bronze as per IS 318,Grade LTB2	
Material of Construction	a) Casing : Casting grade FG 200 of IS:210 b) Shaft : High tensile steel shaft with EN-8 c) Sleeve : bronze d) Base frame : Cast Iron/Mild steel	
Components	Mechanical Seal, Flanges confirming to BS10 Table D, Priming funnels and air vent cocks	
Accessories	Flexible coupling shall be provided with suitable coupling guard	
Balancing	The rotating assembly (pump & motor ) shall be dynamically balanced to the quality of G 6.3 as per ISO:1940 / IS:11723	
Vibration and Noise level	Vibration shall confirm to IS: 11724, Sound level shall be less than 80 dB at a distance of 1m from the equipment.	

Common base frame for pump & motor	MS fabricated with 2 coats of enamel painting over 1 coat of primer.	
Testing	All pumps shall tested as per IS 9137 /ANSI-HI 1.6 standard for performance at factory.	
Drive motor	<p>Directly coupled to motor</p> <p>Type of motor – 3 phase, IE3 Energy efficiency, Squirrel cage induction motor.</p> <p>Rated voltage =415 V <math>\pm</math> 10 %,</p> <p>Freq. =50 Hz <math>\pm</math> 5 %,</p> <p>IP 55,Continuous (S1),</p> <p>Insulation Class = F,</p> <p>Speed: 1440/2900 rpm.</p> <p>Motor shall be suitable for VFD and DOL &lt; 5HP, Star delta starting <math>\geq</math> 5HP . SCR=50kA.</p> <p>Ambient Temp = 40 Deg.C</p> <p>6 terminal of the motor shall be available in the terminal box in case of motor with star delta starting arrangement.</p> <p>Standard: IEC60034-30/IS12615:2011</p> <p>Dimension as per IS: 1231 &amp; IS 2223</p>	
Accessories		
A. Suction diffuser in pump inlet	<p>Location – pump inlet</p> <p>Functions- Strainer, flow straightening</p> <p>Pressure class – CL125</p> <p>Body, cover – CI IS 210 Gr. FG 260</p> <p>Screen with Mesh – SS AISI 304</p> <p>O ring – Nitrile Rubber</p> <p>Nut/ Bolt – ASTM A194 Gr. 2H / ASTM A193 Gr. B7</p> <p>Plug – SS304</p> <p>End Connection – Flanged to ANSI B 16.1 CL250</p> <p>Drilled to ANSI B16.1 CL125/ 250</p> <p>Size- To suit pump suction</p> <p>Matching flanges- to be supplied</p>	

<p>B. Triple duty valves in pump discharge</p>	<p>Location – Pump outlet          Functions- Balancing, Non-return valve &amp; isolation valve          Pressure class – CL 125          Body –Cast Iron Grade FG 260, conforming to IS:210          Disc – SS ASTM A351 CF8 (for valve size 65 mm, 80 mm and 100 mm) and CI IS: 210 Gr FG260 (for valves 150 mm and 200 mm)          Stem – SS ASTM A276 Type 410          Seat ring – Nitrile rubber          Yoke sleeve – SG Iron IS: 1865 400/15          Stem guide bush, spring, yoke nut, gland nut – SS ASTM A276 304          Clamping ring – SS ASTM A276 304 (for valves size 150 mm and 200 mm)          Fasteners – ASTM A193 Gr B7/A94 Gr FG 200          Hand wheel – Cast Iron as per IS 210 Gr. FG 200          End connection – Flanged, drilled to ANSI B16.1          Matching flanges- 2 nos required.          Orientation – 90/180 degree</p>	
<p>C. Spares to be supplied along with pump</p>	<ol style="list-style-type: none"> <li>1. Shaft- 1No. for each pump</li> <li>2. Mechanical seal- 1 set for each pump</li> <li>3. Bearing DE &amp; NDE – 1set for each pump</li> <li>4. Coupling &amp; spider – 1 set for each pump</li> </ol>	
<p>D. Matching flanges</p>	<p>Required</p>	
<p>Tolerance and pump acceptance criteria</p>	<p>As per ANSI/HI 14.6 Gr 2B or ISO 9909/IS 9137</p>	