

### Addendum 03

With reference to the tender notification for “3D PIV with LDV/PDPA System” (Tender Notification No.: NITK/CRF/3D PIV/04, Dated: 12/05/2020), Please note the following changes

Sl. No	Actual specification	Revised specification
1.	The output energy $\geq$ 1kHz	<p><b>The following specification of the laser mentioned in Addendum02, the modified Sl. No. 1 is now revised as:</b></p> <p>PIV laser with the most efficient compact monolithic dual cavity laser heads and it is optimized for PIV applications. <b>The output energy <math>\geq</math> 1kHz @ 527nm is <math>\geq</math> 2 x 20 mJ.</b> The repetition rate can be changed from single shot to 10 kHz and the laser is characterized by an excellent pulse to pulse stability and a uniform beam profile. Laser Class 4</p> <p>Optional: The vendors are requested to quote for 2 x 30mJ separately.</p>
2.	The compact volume illumination optics should be able to create a divergent light bundle for volume illumination, output aperture adjustable 15mm x 15mm to 150mm x 150mm, aspect ratios from 1:2 to 1:8 can be achieved.	<p><b>The specification mentioned in Addendum01, Page. No. 02 of 20, the modified Sl.no 5 is now revised as:</b></p> <p>The compact volume illumination optics should be able to create a divergent light bundle for volume illumination, output aperture adjustable 15mm x 15mm to 150mm x 150mm with appropriate aspect ratios.</p>
3.	Combination of spherical and cylindrical lens with suitable divergence angles that generate parallel and divergent light sheet.	<p><b>The specification mentioned in Addendum01, Page. No. 11 of 20, Sl.no 26 is now revised as:</b></p> <p>Combination of spherical and cylindrical lens with suitable divergence <b>angles that generate divergent light sheet. Divergence angles between 10- 30°.</b></p>
4.	Software for 3D shadowgraphy	<p>Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module I, Sl. No. 03, Page No. 33 of 39, is now revised and made as optional.</p> <p>Optional: The following specifications can be quoted separately as an optional item. Time resolved 3D imaging of bubbly flows is sought. The behaviour of dispersed multiphase</p>

		flows featuring 3-dimensional fluid mechanical processes. Velocity measure for both liquid and air bubbles will be more than 10m/s. Simultaneous measurement of 1. 3D liquid phase velocity (3D3C velocity vectors) 2. 3D position and shape of the air bubbles 3. Velocity and size of the air bubbles. Appropriate software for 3D shadowgraphy. Tomographic reconstruction.
5.	Mounting accessories: Includes 1000mm X95 profile (qty 1), X 95 carriers (qty 3), 12kg gear heads (qty 3)	The specification mentioned in Addendum01, Page No. 04of 20, Sl.no 12 is now revised as:  <b>Mounting accessories: Includes 1000mm suitable Rail 90x90 or X95 profile (qty 1), suitable carriers (qty 3), compatible gear heads (qty 3).</b>
6.	Synchronization unit: Time resolution: 10ns	Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module I, Sl. No. 05, Page No. 34 of 39,  Synchronization unit: <b>Time resolution: ≤ 10ns.</b>
7.	Helium soap or hydrogen filled bubble generator with microns ≥ 200 and 20 nos of nozzles and appropriate controller and accessories	<b>The specification mentioned in Addendum01, Sl.no 17 is now removed from the specifications.</b>
8.	Small and portable devices. High safety standard • Non-hazardous fog fluids • Variable fog output quantity, Variable fog durability, Tube adapter and flexible tube, Remote quantity control, Remote fog control, Fog injection nozzles	Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module II, Sl. No. 05, Page No. 36 of 39, under 4.3, the following is being removed:  Small and portable devices High safety standard Non-hazardous fog fluids Variable fog output quantity Variable fog durability Tube adapter and flexible tube Remote quantity control Remote fog control Fog injection nozzles
9.	Aerosol generator for seeding particle generator and atleast 10 litre of fog fluid	Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module II, Sl. No. 03, Page No. 35 of 39, under 4.2, is changed to Gas phase PIV experiments: <b>Suitable Aerosol generator for PIV experiments with appropriate seeding particle ≥ 1micron. Seeding fluid ≥ 5 litres. Air supply: Max ≥ 5 bar</b>

10.	Computers	<p><b>The specification mentioned in Addendum02, Sl.no 9 is being considered and revised as:</b></p> <p>The additional 2 Nos of computers specified in the addendum02 is now considered. Vendors are requested to quote for this.</p> <p><b>Optional: The vendors are requested to quote separately for 2 more computers for the specification mentioned above.</b></p>
11.	Appropriate backlight blue LED illumination (qty 1)	<p><b>The specification mentioned in Addendum01, Page No. 05 of 20, Sl.no 15 is revised as:</b></p> <p><b>Appropriate backlight LED and suitable filters for performing simultaneous PIV and 2D shadowgraphy.</b></p>
12.	High speed camera: 4GB or better, 4000FPS or higher @1Megapixel. More than 8,00,000 FPS at reduced resolution.	<p><b>The specification mentioned in Addendum02, Sl.no 13 that refers the Addendum01, Page 16 of 20, Sl.no 11 is completely replaced by the following:</b></p> <p>High speed monochrome camera.  Internal recording memory: <math>\geq 16\text{GB}</math>  Maximum frame rate at full resolution: <math>\geq 5000\text{FPS}</math> at 1 Megapixel. <math>\geq 600000</math> FPS at reduced resolution.  Control software, documentation, power cables and accessories  12bit monochrome, Global electronic shutter: <math>1\mu\text{s}</math>,  Lens options: Appropriate C or F mounts.  AVI, Image sequence: BMP, JPG, PNG, TIF  Accessories: Adjustable Portable and foldable tribot stand.</p> <p>Optional: The vendors are requested to quote 32GB separately.</p>
13	3D Shadowgraphy diffused backlight (appropriate colour) illumination from Laser source: to split the laser into three passes and generate three backlight illuminations for each camera include: ➤ Optics for beam splitting 3 diffusing optics ➤	<p>Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module I, Sl. No. 1, under 1.3.1 Page No. 31 of 39</p> <p><b>This item has to be quoted under optional. But, the following specification is retained.</b></p> <p>Maintenance kit: for laser, filters, corrosion inhibitor and desiccants.</p>
14	Upto 16 independent channels	<p>Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module I, Sl. No. 5, Page No. 33 of 39.</p>

		<b>Up to 16 independent channels is now changed as <math>\geq</math> 16 independent channels. Other specifications are retained as it is.</b>
15	Additional Point need to be considered while quoting the bid.	Branded and reputed firms/manufacturers/retailers/authorised dealers of Split Air Conditioners 2 Tons with 3 Star rating and wall mounted stabilizers of 5 KVA with 5-year warranty for AC (2 Nos).
16	Laser power meter	Suitable power meter for quoted laser
17	Fluorescent particles of approximately 30 micron size	Under Tender Document, Annexure-H, under Detailed Technical Specifications, Under Module I, Sl. No. 3, sub division 4.3, Page No. 36 of 39 is now revised as:  Fluorescent particles of approximately 30 micron for macro PIV application with suitable edge filter for camera.

**Note: Optional items should be quoted separately.**

**Sd/-  
Buyer  
(Dr. Gnanasekaran)**

**Sd/-  
Chairman  
Central Research Facility  
NITK, Surathkal**