

Dr. Srikrishna Sahu
Assistant Professor



206 A, Thermodynamics and
Combustion Engineering Laboratory
Department of Mechanical Engineering
Indian Institute of Technology Madras
Chennai 600 036 India

Form for Inviting Quotations

Reference No. MEE1617355ARDBSRIS

Date: 02-11-2017

Subject: Supply and Installation of single pulsed Nd:YAG laser for lab use by Indian Institute of Technology Madras

Dear Sir,

Due Date: 30.11.2017

Quotations are invited (technical bid and financial bid separately) for supply and installation of the equipment as per details in Annexure-I under the following terms and conditions.

1. Quotations are invited **in duplicate** for the supply of **single pulsed Nd:YAG laser, and accessories** details of which are shown in overleaf.
2. The Quotations **duly sealed and superscribed on the envelope** with the reference No. and due date, should be addressed to the undersigned so as to reach him on or before the due date stipulated above.
3. The Quotations should be **valid for sixty days** from the due date and the period of delivery required should also be clearly indicated.
4. If the item is under DGS&D Rate Contract, Rate Contract Number and the price must be mentioned. It may also please be indicated whether the supply can be made direct to us at the Rate Contract price. If so, please send copy of the R. C. (Please note that we are not Direct Demanding Officers).
5. Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be sent along with the Quotations, wherever applicable. Samples if called for, should be submitted free of charges, and collected back at the supplier's expenses.
6. **Local Firms:** Quotations should be for free delivery to this Institute, if Quotations are for Ex-Godown delivery charges should be indicated separately.
7. **Firms Outside Madras:** Quotations should be F.O.B. Madras. If F.O.B. consignor station, freight charges by passenger train / lorry transport must be indicated. If Ex-Godown, packing, forwarding and freight charges must be indicated. The following set of documents is required in all cases: a. Complete set of Clean Bill of Lading / Airway Bill / Air or surface Parcel Receipt, showing that the goods have been shipped and freight prepaid. b. Insurance Policies / Certificates in duplicate covering Marine Insurance as per Institute Cargo Clauses (All risks) and perils as per Institute Strikes, Riots and Civil Commotion Clauses, War risks as per Institute, Clauses. Cover for CIF value plus 10 percent.
8. The rate of Sales / General Taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, no claim for Sales / General Taxes will be admitted at any stage and on any ground whatsoever. **The taxes leviable should take into consideration that we are entitled to have Concessional Sales Tax applicable to non-Government Educational Institutions run with no profit motive for which a concessional. Sales Tax Certificate will be issued at the time of final settlement of the bill.**
9. Goods should be supplied carriage paid and insured.
10. Goods shall not be supplied without an official supply order.
11. **Payment:** Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.

Yours sincerely,

Dr.Srikrishna Sahu,
206 A, Thermodynamics and
Combustion Engineering Laboratory
Department of Mechanical Engineering
Indian Institute of Technology Madras
Chennai-600036, Tamil Nadu, India
Phone: +91-44-2257 4713
Mobile: +91-9566246096
Fax: +91-44-2257 4652
E-mail: ssahu@iitm.ac.in

Annexure-I

PULSED Nd:YAG LASER AND ACCESSORIES

Laser requirement:

- Single pulse Nd:YAG laser with wavelength: 532 nm; 355 nm; 266 nm (the laser should produce one of the three as and when required)
- Pumping source: Flash Lamp
- Pump chamber and rod assembly: Should be removable type for easy field serviceability. Should be able to change this without further optical realignment inside the cavity.
- Construction: Monolithic with possibility to provide temperature stability to the entire cavity (not only to the pumping chamber). Oscillator design should be based on single Nd: YAG rod.
- Pulse width ≤ 8 ns
- Pulse energy: 200-250 mJ per pulse @ 532 nm wavelength; 100-150 mJ per pulse @ 355 nm wavelength; 50-100 mJ per pulse @ 266 nm wavelength;
- Harmonic generators and Installations: Should be easy to attach with the fundamental/ previous harmonic modules. Plug and play type. Direct mechanical coupling between the fundamental module and harmonic generator modules is preferred. The insertion and removal of harmonic generators should be user friendly and without the requirement of any optical realignment. All harmonics should have electronic temperature stabilization for better energy stability. There should be only one crystal per each harmonic module.
- Harmonic phase matching: Should be fully automatic and hands free. System should be able to do phase matching by its own after the user gives a command from the remote controller/ computer. All harmonic modules should have this feature. There should be an option to monitor the peak in the remote controller.
- Repetition rate: ≤ 15 Hz
- Divergence: ≤ 0.5 mrad
- Near field beam diameter: < 10 mm
- Pulse to pulse energy stability $< 2\%$ RMS @1064 nm
- Pointing stability: $< 40(\pm 20 \mu\text{rad})$ at all wavelengths
- Jitter: $\leq \pm 0.5$ ns
- Linewidth: $\leq 0.7 \text{ cm}^{-1}$
- Cooling: Integrated cooling; coolant-Distilled/Deionized water; closed loop water-air heat exchanger built in to the power supply without the requirement of any external chilled water supply;
- Flash lamp life time: > 100 million shots
- Ability to use laser head in non-horizontal orientations
- Polarization: Linearly polarized, Horizontal for 1064nm & 355nm and vertical for 532 nm
- Control: through TTL signal (external control of Q-switch and flash lamp separately through TTL signal should be possible)
- Operating temperature: up to 20-28 degrees C ambient temperature
- Power requirements: should be able to work with 220-250 VAC, 50 Hz AC power supply
- Weight of laser head $< 10\text{kg}$, weight of power supply $< 30\text{kg}$
- Communication with the PC: Ethernet/ USB
- Cables: Quick connect electrical cable and coolant lines with at least 3m length. Should be able to remove it from both power supply side and optical head side for easy transportability.
- Software: Manufacturer should provide full function PC software
- Warranty for 2 year (including optics)

Additional features required:

1. Provide near-field and far-field beam profile
2. Adjustable delay (by using internal delay generator) of the Q Switch output synchronization signal with respect to opening of the Q-Switch (+/- 500ns) is required for easy synchronization of the Laser with other equipment.
3. External control through USB/Ethernet and hand held remote control
4. Should be able to change the flash lamp without any requirement of cavity optics re-alignment
5. Should be possible to control output energy by varying the delay between the flash lamp and Q Switch and not by adjusting the flash lamp voltage.

Each quotation of Laser should also include a catalogue, containing technical specification of the Laser offered, failing which the offer is liable to be rejected. Also, include the offer for the provision to extend warranty to 1 and 2 years.

Accessories:

Accessories should include details and pricing information (if applicable) of the following items:

- Protective Laser-safety goggles with sufficiently high OD to covering the range of wave lengths of a Nd:YAG laser (532 nm, 355 nm, 266 nm)
- DI cartridge