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| **Dr.K.Srinivas Reddy** | **#204, Heat Transfer&Thermal Power Laboratory**  |
| **Professor** | **Department of Mechanical Engineering** |
|  | **Indian Institute of Technology Madras** |
|  | **Chennai-600 036** |



**Form for Inviting Quotations**

**Reference No. MEE/12-13/303/DSTX/KSRS /V** **Date: 12**-12-2014

**Subject: Supply of Dual axis automatic Solar Tracking system for solar Dish concentrator ,Project No: MEE/12-13/303/DSTX/KSRS**

**Due Date: 19- 01-2015**

Dear Sir,

1. Quotations are invited in **duplicate** for the supply of  **Dual Axis automatic Solar Tracking system for Solar Dish concentrator** and Specification of which are shown in overleaf.
2. The Quotations **duly sealed and super scribed on the envelope** with the reference No. and due date, should be addressed to the undersigned 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 free delivery to this Institute, if Quotations are for Ex-Godown delivery charges should be indicatedseparately.
7. **Firms outside Madras**: Quotations should be F.O.B. Madras. If F.O.B. consignor station, freight charges by passenger train / lorry transportmust 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.**

1. Goods should be supplied carriage paid and insured.
2. Goods shall not be supplied without an official supply order.
3. **Payment**: Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever islater.

Quotation can be sent addressing:

**“Dr.K.Srinivas Reddy**

**Professor**

**#204, Heat Transfer and Thermal Power Laboratory**

**Department of Mechanical Engineering**

**Indian Institute of Technology, Madras- 600 036”**

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| **Technical Specification for Tracking System :** |  |  |  |  |
|  |  |  |  |  |  |
| Application : | Dish type CSP |  |  |  |  |
| Tracking Type : | Dual Axis Automatic |  |  |  |
| Dia of the Dish : | 7.14m |  |  |  |  |
|  |  |  |  |  |  |
| **Azimuth Drive :** |   |  |  |  |  |
| Range of motion | ± 170 ° azimuth |  |  |  |  |
| Backlash | 0,1 ° maximum |  |  |  |  |
| Step Size | 0.5 ° |  |  |  |  |
| Drive : | DC Motor |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **Elevation Drive :** |   |  |  |  |  |
| Range of motion | ± 90 ° azimuth |  |  |  |  |
| Backlash | 0,1 ° maximum |  |  |  |  |
| Step Size | 0.5 ° |  |  |  |  |
| Drive : | DC Motor |  |  |  |  |
|  |  |  |  |  |  |
| **Tracking Control Unit:** |   |  |  |  |  |
| For both Azimuth and Elevation drive |  |  |  |  |
| Open & Closed loop with Encoder/Sensors |  |  |  |  |
| Weather Proof Control unit |  |  |  |  |
|  |  |  |  |  |  |
| **Environmental conditions** |  |  |  |  |  |
| Maximum allowable wind speed during tracking  | 10 m/s  |  |  |  |  |
|  |  |  |  |
| Maximum allowable wind speed in stow |  40 m/s  |  |  |  |  |
|  |  |  |  |
| Temperature operational range | 0 °C to +50 °C |  |  |  |  |
| Temperature survival range | 0 °C to +60 °C |  |  |  |  |
| Stow Time | max. 10 min |  |  |  |  |
|  |  |  |  |  |  |
| Drives should be Self Locking and lifetime lubricated |  |  |  |
| Designed for 25 years lifetime. |  |  |  |  |
|  |  |  |  |  |  |
| **Load Condition :** |   |  |  |  |  |
| wind speed | Um10 | m/s | 10 | 14 | 40 |
| Drag Force | FX | kN | 10.7 | 21 | 1 |
| Lift force | FZ | kN | 10.4 | 20 | 1 |
| Azimuthal Moment | MZ | kNm | 10.1 | 20 | 3.7 |
| Hinge Moment | MHy | kNm | -13 | -26 | 11.2 |
| Base Moment | MY | kNm | 82.2 | 161 | 18.4 |

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| **5. Definition of forces in coordinates** |
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