



# सीएसआईआर-केन्द्रीय खनन एवं ईंधन अनुसंधान संस्थान

CSIR-CENTRAL INSTITUTE OF MINING & FUEL RESEARCH

(बरवा रोड परिसर, धनबाद-८२६००१, झारखण्ड, भारत)

Barwa Road Campus, Dhanbad – 826 001 (Jharkhand), India

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☎ : 0326-2296003/04/27/28

☎ : 0326-2296030 / 2396018

## आशय पत्र सह क्रय आदेश (Letter of Intent -cum- PURCHASE ORDER)

मिसिल सं./ File No. CIMFR/PUR- 14(02)2019

दिनांक/ Date: 24.02.2020

सेवा में/ To,

M/s FORM+Test Seidner & Co.,  
GmbH, Zwiefalter Str. 20, 88499,  
Riedlingen, Germany.  
Phone: +49 7371 9302-0  
E-Mail: [info@formtest.de](mailto:info@formtest.de)

Copy to:- M/s Techmark Engineers & Consultants,  
2/5, G.F., Gupta Market, Lajpat Nagar-IV,  
New Delhi -110024,  
Phone: 011- 46570392,  
E-Mail: [info@techmark.co.in](mailto:info@techmark.co.in)

### Sub.: Purchase of 1000Ton/ 10,000 kN Computerised Horizontal Tensile Testing Machine.

संदर्भ: Offer No.: MA/JGD/19-20/9000 Dt. 18.11.2019

प्रिय महोदय/ Dear Sirs,

कृपया निम्नलिखित समग्रियों को नीचे और दूसरी ओर बताए नियम व शर्तों के अनुसार आपूर्ति की व्यवस्था करें/ Please arrange to supply the following articles in the terms & conditions stated below and on the overleaf:

Offer No.: MA/JGD/19-20/9000 Dt. 18.11.2019				
S. N.	Description	Qty.	Disc. Unit price	Disc. Total Price
1.	Horizontal Testing Frame Type UP 10000 HK 4S incl. Hydraulic Cylinder EPZ-D, Two Servo-Valves, Protecting grid, Single load cell (class I), Hydraulically clamped cross-head with automatic adjustment.	01 (One) complete set	EURO11,22,000.00	EURO11,22,000.00
2.	Grips and adapters: for several relevant specimen setups			
3.	Control Station AS C30-N-PC incl. Digital Controller DIGIMAXX C30, Digital hand wheel, Personal Computer			
4.	Hydraulic Pump Aggregate Type PA 120-280 bar-WKN DU incl.: Sound Protection hood, Independent Water Cooler			
5.	PROTEUS <sup>MT</sup> Software Base Module, Module Universal, Module Rope Testing, Module Calibration			
6.	Installation, Commissioning, Training			
7.	Project Management: Incl. advising basement preparations.			
8.	Calibration Certificate			
9.	Packing			
Discounted Ex- works Price				EURO 9,42,480.00
10.	Calibration Rod Set Class 1 Range up to 10000kN @ EURO31,500.00			EURO 31,500.00
11.	Annual re-calibration once a year for next three years up to 10000kN @ EURO7,650.00/ year			EURO 22,950.00
Add (+) Terminal Charges and loading on vassal				EURO 3,456.00
FOB Hamburg Sea Port Price				EURO 10,00,386.00

### Terms & Conditions:

1. Inco-term	FOB, Hamburg.
2. Destination	FOR CSIR-CIMFR, Barwa Road Campus, Dhanbad- 826001, Jharkhand. ( FOB Hamburg to FOR destination by CSIR-CIMFR C&F agent)
3. Deliver and completion	52 weeks from the date of receipt of Purchase Order.
4. Warranty	02 Years free warranty in allied details against any manufacturing defects
5. Installation & Commissioning charges: Included.	
6. Detail terms & conditions are as per Annexure-I and detail specifications are as per Annexure-II attached.	

Yours faithfully,

Stores & Purchase Officer  
CSIR-CIMFR

प्रतिलिपि/ Copy to: (i) I.O.: Mr. Suarjit Dey, Sr. Technical Officer; (ii) Stores; (iii) Accounts; (iv) Office Copy;

बजट का मद/ Budget Head: MLP-84/2019-20.

**TERMS & CONDITIONS****1. GENERAL:**

- (i) Supplier has to submit acknowledgement cum Proforma Invoice with bank details in hard copy also within 15 days from the date of Purchase Order. CIMFR will not be responsible for any payment before successful installation, commissioning, training & final acceptance of the ordered items.
- (ii) The order materials must comply strictly with the Specification as mentioned in the LOI cum Purchase Order and your Offer.

**2. DELIVERY:**

- (i) Ordered materials should be dispatched in **FOB, Hamburg Sea Port** within **52 weeks** from the date of receipt of Purchase Order.
- (ii) Firm will handover complete set to the overseas agent of M/s Balmer Lawrie & Co. Ltd. at FOB, Hamburg and M/s Balmer Lawrie & Co. Ltd. will deliver at the following address:-

**Mr. Surajit Dey, Senior Technical Officer. Mob- 9431160729, E-Mail- [surajitcmr@gmail.com](mailto:surajitcmr@gmail.com) / [surajitdev@cimfr.nic.in](mailto:surajitdev@cimfr.nic.in)  
Barwa Road Campus, Dhanbad-826001, State: Jharkhand.**

*Note:- In case of wrong delivery the delivery charges up to correct destination will be deducted from the bill.*

**3. WARRANTY:**

- (a) The ordered materials should be warranted on site comprehensive against any defects for a period of **02 (Two) years from the date of its installation, successful commissioning and final acceptance by the user Scientist. The warranty period shall be automatically extended for such period for which the equipment is not attended installation of our written request. Spare parts must be made available at least for 10 years of placement of order. Declaration of consumables of any component after order is not accepted.**
- (b) On receipt of the Cargo by the Buyer if it is found that the same has either been wrongly shipped or damaged in transit for inadequate packing for which the Insurance Company does not take any responsibility, the supplier has to arrange for FREE REPLACEMENT including TO and FRO (where applicable) charges of freight forwarder, insurance premium and charges for clearing at Kolkata Port.

**4. PAYMENT:**

The Buyer will establish a Letter of Credit for FOB Price of **EURO10,00,386.00 (EURO Ten Lakh Three Hundred Eighty Six Only)** in favour of the supplier on receipt of the ORDER ACCEPTANCE.  
Letter of Credit is to be opened for 100% of the order value, 80% payment will be released on shipment against requisite documents & 20% after verification of successful installation & commissioning of the equipment at our site and 10% PBG as per clause no. 12 of this condition.

*"If the firm fails to get the equipment installed, commissioned and demonstrated successfully at CIMFR within the schedule, they will have to take back their equipment at their own cost after refunding the entire amount incurred by the Institute for importing the equipment with interest. The firm will also be blacklisted from all CSIR Labs. Both the manufacturer and the I.A. will be held responsible for such failure"*

**5. PACKING & PACKING LIST:**

To be suitably packed in Special Export Packing to withstand Air/ Marine/ Land Transmissions enroute to Destination, India. Copy of Packing List is to be kept in each case/ carton/ package/ box. Packing list should indicate the L/C No., P.O. No., Number of Box, Contents, Gross and Net Weights and Cubic Measurement etc. Supplier has to replace the damaged material due to packing of the material. There should be clear cut marking on the each packed of the consignment about the destination i.e., respective CIMFR Stores as elaborated in delivery clause, Country: India. Any additional expenditure due non-marking/wrong marking about destination will be deducted from the supplier's bill.

**6. CONSIGNEE** : Director, CSIR-CIMFR, Barwa Road Campus, PIN-826001, Distt.: Dhanbad, State: Jharkhand, India.

**7. COUNTRY OF ORIGIN** : Germany.

**8. PORT OF SHIPMENT** : Hamburg Sea Port.

**10. MODE OF SHIPMENT** : By Marine.

**11. IMPORT LICENSE** : Open General License.

**12. PERFORMANCE BANK GUARANTEE:**

An unconditional Performance Bank Guarantee (PBG) for 10% of the total order value i.e., **₹78,65,946.00 (Rupees Seventy Eight Lakh Sixty Five Thousand Nine Hundred Forty Six Only, Exchange rate 1 EURO = 78.6291 INR as on 05.02.2020 from www.xe.com)** issued from an Indian schedule Bank needs to be submitted within 21 days from the date of Purchase Order. The PBG must be valid for a period of **26 (Twenty Six) months i.e. 60 days after the completion of 24 (Twenty Four) months warranty period.**

**13. AGENCY COMMISSION:** Not available.

**14. AMC (For freezing purpose):** Not available.

**15. FOLLOW UP OF PURCHASE ORDER / L/C:**

The Indian Agent will keep in touch with the shipment of the consignment and will be responsible for the follow up of the same with their Principal for ascertaining the dispatch details and informing the same to CIMFR and shall also liaise with CIMFR to ascertain the arrival of the consignment after clearance, so that, immediately thereafter in his presence the consignment could be opened and insurance claim be lodged, if required, without any loss of time. Any delay on the part of Indian Agent would view seriously and he shall be directly responsible for any loss sustained by CIMFR on the event of the delay.

**16. INSTALLATION, COMMISSIONING & TRAINING:**

The consignment must be opened and get inspected by the user Scientist in the presence of the Indian Agent within **3 days** of delivery at Stores. The installation and commissioning shall have to be completed within 30 days of delivery of the consignment by trained engineers of supplier/ Indian Agent at CIMFR as mentioned in the delivery place. The entire job will be sole responsibility of the Indian Agent to be arranged by Indian Agent. The firm must ensure that **FREE ON SITE TRAINING** is imparted to CIMFR personnel regarding operation and preventive maintenance.

**17. BANK CHARGES:**

- i) All Bank Charges in India to be borne by Importer and Foreign Bank Charges to be borne by Beneficiary.
- ii) In case of any amendment the entire charges will be borne by the Beneficiary.
- iii) Banker details: To be submitted in hard copy with the acknowledgment.

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*14/02/2020*

#### 18. FORCE MAJEURE:

The supplier shall not be liable for forfeiture of its performance security liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure. For purposes of this clause, "Force Majeure" means an event beyond the control of the supplier and not involving the supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

If a Force Majeure situation arises, the supplier shall promptly notify the purchaser in writing of such conditions and cause thereof. Unless otherwise directed by the purchaser in writing, the supplier shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event.

#### 19. PENALTY CLAUSE:

Since, time of delivery of the ordered stores is the essence of the contract, The supplier shall arrange to ship the ordered materials as stipulated workout any fail. The same must be got installed & commissioned immediately as per schedule.

However, in case the shipment cannot be made within agreed upon time, CIMFR shall have the right to claim penalty for late delivery and late installation & commissioning @0.5% of the contract value per week subject to a maximum of 10%. The rate of penalty changes may go beyond 10% depending the magnified of delay and non compliance of the commercial terms & conditions. If the delay in shipment and late installation & commissioning of the ordered materials attributable to the supplier exceeds the time period mentioned in the Purchase Order from the date of original agreed upon date of shipment, CIMFR shall have the right to cancel the contract/purchase order. This also applies for violation of any of the contractual terms in any form.

**20. INSURANCE:** Insurance of the Cargo will be arranged by the purchaser. As soon as BILL OF LADING covers the Cargo, the BILL OF LADING number and date should be intimated to us by through E-mail or FAX to cover insurance of the consignment.

#### 21. PROTECTION AGAINST DAMAGE:

The equipment must be capable of withstanding power failures and equipment should not be prone to damage due to power failures and trip outs. The normal voltage and frequency condition available at the site are as follows:

Normal Voltage: 230 +/- 10% on single phase or 415 +/- 10% on 3 phase, frequency 50 +/- 5% Hz

#### 22. DESPATCH OF THE CONSIGNMENT:

The consignment duly packed and labeled/marked about destination i.e.

**Mr. Surajit Dey, Senior Technical Officer. Mob- 9431160729, E-Mail- [surajitcmri@gmail.com](mailto:surajitcmri@gmail.com) / [surajitdev@cimfr.nic.in](mailto:surajitdev@cimfr.nic.in)  
Barwa Road Campus, Dhanbad-826001, State: Jharkhand.**

*Note:- In case of wrong delivery the delivery charges up to correct destination will be deducted from the bill.*

Should be handed over by the supplier to the authorized CHA of the buyer, who will arrange for its clearance, shipment & handling, transportation to Kolkata Port, India.

Once the Cargo is dispatched a complete set of shipping documents viz Original Invoice, BoL, Packing List, Certificate of Origin etc., must be sent by fax/E-mail to the follows:

**Buyer: CSIR-CIMFR, Barwa Road Campus, PIN-826001, Dist.: Dhanbad, State: Jharkhand, Country: INDIA**  
Tele-Fax No.: +91-0326-2296030, E-mail: [spo.cimfr@rediffmail.com](mailto:spo.cimfr@rediffmail.com) / [kumarjijha@gmail.com](mailto:kumarjijha@gmail.com)

**Manager: HDFC Bank, Hirapur, Dhanbad-826001, State: Jharkhand, India**

Mr. Umesh Joshi, Area Sales Head for Foreign Exchange- [umesh.joshi@hdfcbank.com](mailto:umesh.joshi@hdfcbank.com)

Mr. S Dinesh Kumar, Branch Manager- [dineshs.kumar@hdfcbank.com](mailto:dineshs.kumar@hdfcbank.com)

Mr. Pranav Kumar, Trade & Forex Sales Manager- [pranav.kumar3@hdfcbank.com](mailto:pranav.kumar3@hdfcbank.com)

**CHA/Freight Forwarding Agent: M/s Balmer Lawrie & Co. Ltd.,**

Address: 21, Netaji Subhas Road, Kolkata – 700 001 (West Bengal)

Tel- 033-2222 5456 / 457 / 458

Satyajit Shankar Guha, Chief Branch Manager- [guha.ss@balmerlawrie.com](mailto:guha.ss@balmerlawrie.com)

Abhishek Bhattacharya- [bhattacharya.abhishek@balmerlawrie.com](mailto:bhattacharya.abhishek@balmerlawrie.com)

Gopendra N. Chowdhury- Mob: 9831423616, E-Mail- [chowdhury.gn@balmerlawrie.com](mailto:chowdhury.gn@balmerlawrie.com)

**CHA's Overseas Associate- Rafael Beermann, Manager Operations NGL FRA**

Tel.: +49 (0) 6105 / 96 858 18

**NGL Navigator Global Logistics GmbH**

Nordendstr. 76 D-64546 Moersfelden-Walldorf

Tel.: +49 (0) 6105 / 96 858 18, Tel.: +49 (0) 6105 / 96858-11, Fax: +49 (0) 6105 / 96858-15, Mobile: +49 (0) 171 / 6950793

Mail to: [Rafael.Beermann@ngl-germany.eu](mailto:Rafael.Beermann@ngl-germany.eu), Internet: [www.ngl-germany.eu](http://www.ngl-germany.eu)

Registered office: 85445 Oberding (OT Schwaig)

CEO: Mathias Brosowsky, HRB 167673 München, AEO-Zertifikat (DE AEOF 111919)

The same must be sent by courier duly issued to CIMFR, Dhanbad along with the details of the consignment so that necessary documents required could be submitted in time for getting the consignment cleared without the levy of Fine/ Demurrage, in case of the courier agency is not able to arrange for insurance.

#### 23. CLEARANCE OF CONSIGNMENT AT PORT:

The day the Cargo is handed over to forwarding agent for shipment, the same should immediately be intimated to us along with copies of Invoice & Packing List (box wise), Certificate of Origin to enable its clearance at Kolkata Port without any demurrage/port charges.

**24.** The supplier or its Indian representative commits himself to take all measures necessary to prevent corruption. It will not, directly or through any other person or firm will offer, promise or give to any of the CSIR-CIMFR employees involved in the procurement process or execution of the contract or to any third person any material or other benefit which he/she is not legally entitled.

The supplier or its Indian representative will not enter with other bidders into any undisclosed formal/informal agreement or understanding. This applies in particular to the prices, specifications, certificates, subsidiary contracts or any action which restricts the fairness in the procurement process. If it is found at the later stage that the supplier has given the wrong/incorrect information or if the bidder or its Indian representative firm has committed a transgression through the violation of the contents stated as above, or in any other form such as to put his reliability or credibility in question, the purchase is fully

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entitled to disqualify him from the current as well as future procurement process including tender process and award of the contract/purchase order, and no correspondence will be entertained in this regard.

As supplier declared that the rates quoted by them are the same and not higher than those quoted to any other CSIR Labs/ Institutes, Government Public Sector or Private Organization. They have undertaken the their quoted rates are genuine and at any point of time if the rates are found unreasonable and higher in respect to above declaration, the competent authority of CSIR-CIMFR may take deemed fit action against Principal and its Indian agent.

**25. GOVERNING LAW:**

**Jurisdiction:** This contract between the supplier and the buyer shall be governed by the LAWS of India and under this contract shall be taken by the parties only in Dhanbad, India to competent jurisdiction.

**Arbitration:**

All disputes arising out of this contract shall be referred to the sole arbitration of the D, CIMFR or his nominee as per the provisions of Indian Arbitration and reconciliation Act 1996 and his award shall be final and binding on the parties to the dispute. The venue of arbitration shall be decided by the Director of the institute

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Stores & Purchase Officer  
CSIR-CIMFR  
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SI No	Specifications
1	Maximum Load Testing Capacity: 1000 TON / 10000 kN.
2	Accuracy : comply EN ISO 7500-1 , class 1, down to 2 % of maximum load capacity
3	Single load cell should be there for the entire range of testing.
4	Automatic limitation for different load ranges in software ranging from 0 to 1000 Ton.
5	Comply ISO 3108 or equivalent
6	Distance between heads : 200 mm to 10000 mm range of testing length
7	Adjustable Steps : less than 500 mm
8	Automatic crosshead movement should be there.
9	High flexibility in the adaptation and fixing possibilities with good accessibility
10	Control Panel: Digital and Computerized.
11	Bed Clearance ( Width of the bed ) : Minimum 1300 mm
12	Ram Stroke : Minimum 1500 mm
13	The cylinder must have end cushion to minimize force backlash
14	The cylinder bearing must accommodate the deformation of the weight.
15	The OEM/ bidder should have their own production facility of testing machine with load capacities of at least 500 ton.
16	The system must not have leakage oil pump.
17	Height of heads from base : minimum 1000 mm
18	Cross head speed with no load: minimum 250 mm to maximum 500 mm per minute.
19	The test system must also be able to perform pulsating loads of maximum 500 ton with frequency 1 Hz, Displacement 0.5 mm (minimum)
20	1. Load Accuracy and displacement accuracy : As per EN ISO 7500-1 class 1

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SI No	Specifications
21	The control electronics must have minimum 5 kHz of control update rate and minimum 5 kHz of data acquisition rate.
22	LCD panel to be provided to display load and displacement
23	Software : MS Windows based programme for testing and evaluation
24	The software must be able to comply with premature failures of single strings inside the rope and still keep a constant loading rate
25	The software must be developed by the OEM so that utility of software can be enhanced in due course of time.
26	The software has to have a separate application module for calibration.
27	The software must be able to produce specific and customized test reports
28	Calibration: Calibration certificate of the machine should be provided from any internationally recognized agency like NABL in India (ISO / IEC 17025 compliant).
29	Vendor should also quote for calibrated system to be supplied for calibration of the machine in due course of time as a service contract.
30	'U' clamps / Grips / pins: As required to hold the various types of slings, wire ropes, mining and allied engineering components etc.
31	The stress distribution in the grip heads and the rope in the grips must be analysed by adequate FE model to prove the correct applicability for the tests
32	The hydraulic power unit should not have more than 65dB of sound. Suitable enclosure should be provided, if required.
33	Power consumption of the machine should be as low as possible.
34	It is to be ensured that the machine will work smoothly at an ambient temperature maximum 50°C.
35	The bidder should submit the floor area requirement and drawing for foundation etc. The foundation work is to be executed by the bidder at the designated site after due approval of drawings etc. by CIMFR.
36	The bidder must guarantee the service and availability of spare parts for 10 (ten) years
37	The bidder must have supplied minimum five (05) similar (Horizontal) type of machine with at least two (02) machines with load ranges of 500 ton.

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Sl no	Basic Requirement
1	Load frame:- The main base of the machine would be of fine grained heavy casting / fabricated free from all defects and extremely rigid construction. The machine would be robust, rigid and sturdy construction. It would be designed to meet the heavy duty load and free from vibration at full load. It will be ergonomically designed, precision aligned and corrosion free. Safety guard during testing should be provided.
2	Software: Software would be Microsoft Windows based. Software would be user friendly. Most function of the analysis and calibration routines should be automated, with prompts to guide the operator through each step of the process. Real time graph is required for load elongation and time. Different load units can be selected like kN, Kg, N, and displacement units should be in MM. Ultimate load / strength, Breaking load / strength, Yield load / strength, numbers of cycles, amplitude vs. frequency are to be provided by the software. Analysis software for stress distribution in the grip heads as mentioned in Sl. No. 31 is also required.
3	Result Format: The analysis screen would display analytical results in a clear or easy to read format. Creation of database records with storage facilities and easy handling of database. The system would have auto as well as manual printing of Test certificate with graph.
4	Calibration:- Certificate of calibration of equipment for the entire range of machine from any internationally recognized laboratory / organization like NABL in India. One calibration bar for tension and compression in class 1 calibration with corresponding calibration certificate is to be provided. Bidder also has to provide re-calibration service for the measurement standards and the machine for three consecutive years after installation of the machine. They should provide the annual costs in the quotation separately.
5	Computer System:- System should be of HP make. Processor Intel core i7 or better, RAM 8GB, HDD 1TB, monitor LED 20", DVD RW, UPS Optical Mouse, Multimedia keyboard with necessary cabling like HP, . One coloured laser printer for printing test reports. HP make.
6	Electronic cabinet and operator terminal should be designed in a compact manner with reference to load frame for easy accessibility to the working areas with cabling. Suitable cabinet should be designed to accommodate control panel and operator terminal besides storage for accessories.

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**Pos. 1: Horizontal Testing Frame Type UP 10000 HK 4-S**

Application	<ul style="list-style-type: none"> <li>♦ for TENSILE TESTS (steel wire ropes, nylon slings, chains, shackles)</li> <li>♦ Stressing and relieving very long test specimens</li> <li>♦ Tensile testing to determine tensile strength, breaking force, strain</li> </ul>
Standards	<ul style="list-style-type: none"> <li>♦ according to DIN EN 12385</li> <li>♦ RD 03-423</li> <li>♦ ISO 3108</li> </ul>
Use	<ul style="list-style-type: none"> <li>♦ Final clearance</li> <li>♦ Quality monitoring</li> <li>♦ Rational routine check testing</li> <li>♦ Material research and development</li> </ul>
Accuracy	♦ according to DIN EN ISO 7500-1, class 1 – accuracy: $\pm 1\%$

**Technical Description and Data**

Frame	<ul style="list-style-type: none"> <li>♦ rigid 4 column load frame, only with highest stiffness, it is possible to gain class 0.5 between lowest loads and highest loads</li> <li>♦ high flexibility in the adaptation and fixing possibilities with good accessibility</li> <li>♦ ergonomic design ensures that users are working in a safe environment and don't suffer fatigue</li> <li>♦ the machine's columns are screwed free from play to the machine's foot</li> <li>♦ all bearing surfaces are mechanically machined</li> <li>♦ seated on elements made of rubber-bonded metal</li> <li>♦ highest manufacturing accuracy for low calibration error</li> </ul>
Adjustment / Clamping	<ul style="list-style-type: none"> <li>♦ the machine is equipped with a stage manual adjustable crosshead for secure and fast set-up of the test structure for different specimen lengths</li> <li>♦ the crosshead is equipped with ball seated rollers which are guided on the two beams. Two additional guiding bushings with sliding rings enable an easy and adjustment of the crosshead. The clamping of the crosshead will be done by two bolts</li> </ul>
Test Cylinder	<ul style="list-style-type: none"> <li>♦ see below</li> <li>♦ with special support due to length</li> </ul>
Data	<ul style="list-style-type: none"> <li>&gt; test load (stat.) max. (F) 10000 kN</li> <li>&gt; measuring range 100,00 ... 10000 kN</li> <li>&gt; clamping head distance min./max. (Ph) 200 ... 10800 mm*</li> <li>*adjustable in 400 mm steps</li> <li>&gt; clear distance (LwZ) 1300 mm</li> <li>&gt; Load measurement via high accuracy load cell</li> </ul>
Dimensions / Weight	<ul style="list-style-type: none"> <li>&gt; width (A) 13900 mm</li> <li>&gt; depth (B) 2400 mm</li> <li>&gt; working height (AH) 1500 mm</li> <li>&gt; height (H) 1800 mm</li> <li>&gt; weight without clamping heads approx. 34000 kg</li> </ul> <p>All measures are approximate estimates</p>
Painting	> grey – green

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## Hydraulically Clamped Cross-Head with Adjustment

Adjustment / clamping	<ul style="list-style-type: none"> <li>the test area height / clamping length can be adjusted (<math>\pm</math>) by remote movement of the crosshead via electromechanical drive or hydraulic cylinder</li> <li>the maximum and minimum position of the cross-head is protected</li> <li>the hydraulic supply is made by a separate hydraulic aggregate or the central hydraulic system</li> <li>the clamping is fixed by hydraulic bolt connection which are placed in the holes from the load frame</li> <li>control via separate unit in the system of the digital controller. During the test the traverse cannot be adjusted.</li> <li>additional operating panel „up“ / „down“ at the machine</li> <li>touch-panel control with input options for the precisely required test area height</li> </ul>
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## Protective grid

Protection device	<ul style="list-style-type: none"> <li>absolutely necessary acc. to the EC machinery directive "equipment safety act"</li> <li>macrolon pane all around, mounted in aluminium profile</li> <li>profile frame door at the front side with pane made of macrolon</li> <li>electric safety switch</li> <li>= the testing machine just works if the door is closed</li> </ul>
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## Individual Test Cylinder Type EPZ-D 10000

Use	<ul style="list-style-type: none"><li>♦ for use acc. to respective application for static testing of materials and components as an individual test cylinder or in combination with a test frame or test portal</li><li>♦ for the installation in the upper cross head of the universal testing machine</li></ul>																					
Characteristics	<ul style="list-style-type: none"><li>♦ Differential cylinder</li><li>♦ double-action cylinder</li><li>♦ low friction, special designed sealing system for minimised friction parts</li><li>♦ little wear and tear</li><li>♦ highest finish accuracy ⇒ small guide play ⇒ minimal leakage of oil</li><li>♦ integrated displacement transducer system</li><li>♦ <b>end cushion to minimise force backlash</b></li><li>♦ <b>without leakage oil pump</b></li></ul>																					
Fastening	<ul style="list-style-type: none"><li>♦ foot flange</li><li>♦ piston rod after definition</li></ul>																					
Description	<ul style="list-style-type: none"><li>♦ ultrafine-ground piston, hard-chromium plated and with plastic coating</li><li>♦ bearing surfaces are face-ground</li><li>♦ cylinder tube in honed execution</li><li>♦ the test cylinder is delivered after a rinsing process and a functional test</li></ul>																					
Data	<table><tr><td>&gt; tension force static (280 bar)</td><td>10000</td><td>kN</td></tr><tr><td>&gt; <b>piston stroke</b></td><td><b>1500</b></td><td><b>mm</b></td></tr><tr><td>&gt; <b>piston speed</b></td><td><b>800</b></td><td><b>mm/min</b></td></tr><tr><td>&gt; stroke measurement accuracy</td><td>0.1</td><td>mm</td></tr><tr><td>&gt; shear force max.</td><td>50</td><td>kN</td></tr><tr><td>&gt; resolution displacement transducer</td><td>1</td><td>µm</td></tr><tr><td>&gt; system pressure</td><td>280</td><td>bar</td></tr></table>	> tension force static (280 bar)	10000	kN	> <b>piston stroke</b>	<b>1500</b>	<b>mm</b>	> <b>piston speed</b>	<b>800</b>	<b>mm/min</b>	> stroke measurement accuracy	0.1	mm	> shear force max.	50	kN	> resolution displacement transducer	1	µm	> system pressure	280	bar
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> resolution displacement transducer	1	µm																				
> system pressure	280	bar																				

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Dimensions	>	length	2930	mm
	>	cylinder diameter	480	mm
	>	piston rod-Ø	200	mm
	>	piston-Ø	370	mm
	>	flange adapter diameter	820	mm
	>	weight approx.	8000	kg
Scope of delivery	♦	valve block for 2 servo-valve		
	♦	2 servo-valves (Moog) for highest control accuracy		
	♦	4 pressure accumulators to reduce backlash force		
	♦	technical documentation in English – 1x on data medium		
	♦	Painting: RAL 7038		
	♦	hydraulic hose kit		
	♦	fast couplings		
	♦	factory calibration		
	♦	pre-acceptance test at Form+Test		

#### Load Cell Series KMD 10000 kN

Description	♦	robust universal load cell to measure static/dynamic tensile loads combined with digital measuring electronics		
	♦	precise conversion of physical force into electrical tension		
	♦	mechanic deforming body with attached expansion measuring tapes		
	♦	fatigue endurable for static and dynamic material testing (tension/compression)		
	♦	polarity change in measuring tension with tensile or compressive load		
	♦	high accuracies, minimal temperature effect		
	♦	insensitive against lateral forces / eccentric load application		
	♦	compact design incl. adapter plate		
	♦	requires special calibration procedure and high resolution measurement boxes (included in supply)		
Features	♦	one load cell for highest loading up to 10000 MN. Load cell is calibrated down to lowest loadings		
	♦	Controller automatically sets limit if smaller load cell is detected.		
Execution	♦	acc. to catalogue PM 1000.01 – page 121		
Data	>	nominal strength tension / compression	± 10000	kN
	>	accuracy class (between 100 kN and 10000 kN)	± 1	%
	>	linearity max.	± 0,05	%
	>	output signal	2,0	mV/V
	>	cable length min.	10	m

#### Pos. 2: Grips and adapters

Description	♦	in U-shape		
	♦	for various types of ropes and slings		
	♦	with bolt type connection		
	♦	Adapters to cylinder and main frame		
	♦	endurable for tests at maximum loading		
	♦	can carry load shocks during rope / wire failure		
Feature	♦	Grips and adapters for optimal test results		
	♦	Providing FE calculation of proof of stress distribution		

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**Pos. 3: CONTROL Station Type AS-C30-N-PC**

Control modes	<input type="checkbox"/> for load-, displacement or deformation control in the closed loop of the servo hydraulics
Use	<ul style="list-style-type: none"> <li>static, quasi-static or dynamic tests acc. to accessories</li> <li>for load-, displacement- or deformation control – acc. to stage of extension – in the closed loop of servo hydraulics with high resolution and shockproof switching- over in the test procedure</li> <li>control of up to 4 servo hydraulic testing machines / test cylinders with independent adjustment (parallel operation as an option)</li> <li>testing of construction elements, components and complete structures</li> </ul>
Amplification	<ul style="list-style-type: none"> <li>control of up to 4 hydraulic load frames in closed loop with the corresponding measurement chains (no parallel operation)</li> </ul>
Construction	<ul style="list-style-type: none"> <li>Drive Station Type AS-C20-N-PC in 19"-housing on transport</li> </ul>
Leaflet	<p>A 200.02", Position 1+2 AS-C20-N-PC Display and Control in 19"-housing</p> <p>Position 6 Display DIGIMAXX® C-20</p>

**Digital Measuring and Control Electronic DIGIMAXX® C-30**

Description	<ul style="list-style-type: none"> <li>digital control system for maximum performance – even with high test frequencies - combined with a high degree of reproducibility and accuracy</li> <li>PID-controller with DSP-processor for controlling and for digital signal processing</li> <li>modular system which can be extended for specific applications for several closed loops</li> <li>optional hand wheel for an easy operation in the setting mode</li> <li>the test software PROTEUS MT is used for the program controlled execution of the test, data logging and evaluation</li> <li>any transducer is applicable for control and measuring</li> <li>8 control and measuring channels per closed loop with a 24 bit resolution</li> <li>connection of external instruments (Digital I/O) and transducer <math>\pm 10</math> V</li> <li>control of safety door</li> </ul>
Functions	<ul style="list-style-type: none"> <li>Peak value controller</li> <li>freely programmable test procedure – ramp function (cycle adjustment), rectangle, triangle, sine, etc.</li> <li>break detection</li> <li>optimization of closed loop – the optimization of the closed loop is done by adjustment of the P, I, D rate</li> <li>control of hydraulics and safety circuits</li> <li>peak value-, limit value- and event detectors for test monitoring (min, max, amplitude, average value)</li> <li>cycle counter</li> <li>linearization function for all channels</li> </ul>
Assembly	1. stationary execution integrated in 19"-cabinet
Data	<ul style="list-style-type: none"> <li>measuring and control cycle 8kHz</li> <li>transmission of instrument readings up to 5 kHz</li> <li>Highest control speed for minimum backlash a specimen fracture (&lt; 2 mm)</li> <li>number of control channels 1 to 8 (DMS, LVDT and digital transducers)</li> <li>Control modes: all connected inputs (load, displacement, strain etc.)</li> <li>Number of measuring channels: up to 16 (displacement, temperature, pressure, 12 V)</li> <li>PC-interfaces: Ethernet / LAN</li> <li>carrier frequency 5 kHz</li> </ul>

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Current Supply and Environmental Conditions	<ul style="list-style-type: none"> <li>♦ voltage 200 - 240 V</li> <li>♦ frequency up to 60 Hz</li> <li>♦ operating temperature 10 ... 50° C</li> <li>♦ air humidity from 10% to 90% - non-condensing</li> </ul>
Personal Computer	<ul style="list-style-type: none"> <li>♦ integrated in 19" rack</li> <li>♦ Intel-Core-i-Series i7 CPU <sup>1</sup></li> <li>♦ 8 GB DDR <sup>1</sup></li> <li>♦ 1 TB SATA-III hard disc with two partitions is recommended <sup>1</sup></li> <li>♦ English keyboard &amp; mouse</li> <li>♦ USB interfaces <sup>1</sup></li> <li>♦ 2* network data interface Ethernet 1000 Mbit <sup>1</sup></li> <li>♦ Operating system: Microsoft Windows 10 Professional in English <sup>1</sup></li> <li>♦ 22" LCD monitor with 1920 x 1440 screen resolution <sup>1</sup></li> <li>♦ Internet connection is required for the support and implementation</li> <li>♦ For certain features of the software is Microsoft Excel required</li> <li>♦ Administrator rights are needed for the installation process. It is recommended to back-up system and data before you remove or install software</li> <li>♦ Inclusive adjustment on the testing machine, with installation of Hard- and Software</li> <li>♦ Data backup is to be performed by the customer</li> <li>♦ Color Laser Printer</li> </ul> <p>1 The mentioned specifications are minimum requirements and could be the same or higher</p>
Display and Keyboard	<ul style="list-style-type: none"> <li>♦ integrated in 19"-rack</li> <li>♦ TFT monitor, which is compatible to the testing software</li> <li>♦ keyboard with touchpad</li> </ul>
Dimensions / Weight	<ul style="list-style-type: none"> <li>&gt; width 600 mm</li> <li>&gt; depth 800 mm</li> <li>&gt; height 2000 mm</li> <li>&gt; weight approx. 220 kg</li> </ul>

**Pos. 4: Hydraulic Pump Aggregate Type PA 120-280bar-WKN DU**

Execution	♦ similar to catalogue PM 1000.01 – pages 117-118
Performance	♦ ± 3 mm @ 1 Hz. Please note that smaller amplitudes than 1 mm require hydrostatic bearing cylinder
Use	<ul style="list-style-type: none"> <li>♦ for oil supply to servo-hydraulic test systems</li> <li>♦ designed for dynamic tests or static tests with high load increasing rates</li> <li>♦ modular construction for extension options such as noise protection, pressure storage, oil tray and control</li> <li>♦ easy servicing due to good accessibility</li> <li>♦ for application with high demands, reduction of noise , small utility space, optimized energy consumption and filter cycle of the pressure oil</li> </ul>

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Description hydraulic aggregate	<ul style="list-style-type: none"> <li>• tank incl. sling, cleaning openings, air bleeding filter, drain screw, oil level glass and tank cap with edge for leak oil</li> <li>• <b>energy saving by use of output-regulated axial piston pump den for a variable flow rate acc. to the required performance</b></li> <li>• pressure-less circulation</li> <li>• pump unit and motor are low-noise coupled at the tank cap via a coupling and a pump support</li> <li>• oil pressure gauge + Minimesse-connections</li> <li>• bypass flow cooling via circulating pump</li> <li>• pressure filter to keep the oil clean and to thereby reduce the oil change intervals</li> <li>• all service components (electrical and hydraulic connections / filters etc.) are easily accessible</li> <li>• incl. oil filling HLP 46</li> <li>• filter cycle to ensure the hydraulic oil is clean and lasts a long time</li> <li>• 2 spare filter elements (pressure filter / return flow filter) are supplied</li> </ul>
Description control box	<ul style="list-style-type: none"> <li>• designed and adapted exactly to the hydraulic aggregate</li> <li>• incl. control of all optional extras</li> <li>• PLC-control for the control and status report of all control functions</li> <li>• control box</li> <li>• socket for 230V power supply electronic system</li> <li>• safety circuit with emergency-stop relay</li> <li>• interfaces to controller and test frame</li> <li>• easy operation of all relevant functions</li> <li>• control functions / display: <ul style="list-style-type: none"> <li>oil temperature max. <ul style="list-style-type: none"> <li>➢ oil filter contaminated</li> <li>➢ oil level min. and max.</li> <li>➢ malfunctions of motors</li> <li>➢ pressure min.</li> <li>➢ flushing on</li> <li>➢ operating hours counter</li> </ul> </li> </ul> </li> </ul>
Data	<ul style="list-style-type: none"> <li>➢ nominal flow rate 120 l/min</li> <li>➢ continuous operating pressure 280 bar</li> <li>➢ volume oil tank 752 l</li> <li>➢ drive power 75 kW</li> <li>➢ fuse protection 160 A</li> <li>➢ connected load 60 kVA</li> <li>➢ voltage 3 x 400 V, AC, 50 Hz</li> <li>➢ press filter 3 µm</li> <li>➢ protection class 54 IP</li> <li>➢ noise level (distance 1 m) ≤ 73 dB(A)</li> <li>➢ radiation heat approx. 9 kW</li> </ul>
Connections	<ul style="list-style-type: none"> <li>➢ 1x connection high pressure P nominal width G 1 1/4 "</li> <li>➢ 1x connection return oil T nominal width G 1 1/2 "</li> <li>➢ 1x leak oil L nominal width G 1 "</li> </ul>
Dimensions with water cooler	<ul style="list-style-type: none"> <li>➢ width 2100 mm</li> <li>➢ depth 1200 mm</li> <li>➢ total height 1500 mm</li> <li>➢ weight without oil filling 1350 kg</li> </ul>
Finishing	➢ RAL 7038
Mounting conditions	<ul style="list-style-type: none"> <li>• provision of connections (power supply / water) acc. to the given data</li> <li>• appropriate installation area or separate aggregate room with ventilation</li> </ul>
Cooling	• Independent water cooler and chiller

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### Sound Protection Hood PA 120

Use	<ul style="list-style-type: none"> <li>• for reduction of the noise of the pump unit PA 120</li> <li>• reduction approx. 15-20 dB(A)</li> </ul>
Data	<ul style="list-style-type: none"> <li>&gt; length* 2600 mm</li> <li>&gt; depth* 1700 mm</li> <li>&gt; height* 1900 mm</li> </ul> <p>* depending on pump min. measures</p>

### Independent Hydraulic Pump cooler

Description	<ul style="list-style-type: none"> <li>• separate cooling circuit</li> <li>• no external water required</li> <li>• additional cooling fan to be installed in separate room or outside</li> </ul>
Data	<ul style="list-style-type: none"> <li>&gt; difference in pressure water inlet → water outlet max. &lt; 2 bar</li> <li>&gt; max. water inlet temperature 32 °C</li> <li>&gt; max. ambient temperature 50 °C</li> <li>&gt; average cooling rate 25 kW</li> <li>&gt; water circulation approx. 40 l/min</li> </ul>
Connections	<ul style="list-style-type: none"> <li>&gt; 1x cooling water inlet V nominal width G 1/2 "</li> <li>&gt; 1x cooling water outlet R nominal width G 1/2 "</li> </ul>

### Pos. 5: PROTEUS<sup>MT</sup> Software

#### PROTEUS<sup>MT</sup>-Basic Software Module

Application	<ul style="list-style-type: none"> <li>• Simple test software for quick realisation of material test applications of any kind</li> <li>• For test programming, evaluation and logging using a Windows user interface combined with DIGIMAXX<sup>®</sup> C-20/C-30 - PC</li> </ul>
Description	<ul style="list-style-type: none"> <li>• <b>Basic platform for starting your applications and managing your test results <u>without</u> test packages and modules</b> – The basic software is only run-capable in conjunction with one or more test modules and structures how they work</li> <li>• For all lab data the user uses a database (base: Microsoft SQL Server) for the test design up to the administration of the test results</li> <li>• MS SQL Server Express is included</li> <li>• Data base extension by means of lab data</li> <li>• Simple creation of a database by means of templates</li> <li>• Connection of several control units or displays possible with up to 4 machines each</li> <li>• Graphic and numeric recording up to 8 (optionally 20) channels</li> <li>• Memorises all standard measuring instruments such as sliding caliper, balance, gauge and digital measuring station</li> <li>• Test templates are made by means of a wizard and simplify the testing considerably</li> <li>• Universal test sequences for special tests can be customized with test elements</li> <li>• Automatic test sequences for routine tests can be easily realised</li> <li>• password protection / user management for the laboratory head such as. creation of test templates, hardware configuration, etc.</li> <li>• programme for machine calibration with DIGIMAXX<sup>®</sup> is included</li> </ul>

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Functions	<ul style="list-style-type: none"> <li>• Configuration of several machines with different measuring and control channels</li> <li>• User management</li> <li>• Project definition via lab database for tasks and series (lab data) incl. corresponding templates</li> <li>• Specimen management with creation of task data and definition / configuration of the data fields regarding format, unit, digits and output of results</li> <li>• Signal processing with choice of measuring equipment</li> <li>• Control of the test sequence (testing sequence, limit values, parameters, storing of measuring point, etc.)</li> <li>• Modifications of the settings in the test - test and control parameter, limit settings, characteristics, peak control</li> <li>• Test evaluation</li> <li>• Archiving and search function</li> <li>• Protocol print-out freely configurable and available in several languages. Several protocol company letterheads are possible and can be composed by templates</li> <li>• Free choice of export format (data export in ASCII-file, Excel or XML-file)</li> </ul>
Individual tests	<ul style="list-style-type: none"> <li>• Universal test with freely programmable test procedure</li> <li>• Cyclic tests with changeable parameters and sequences during the test</li> <li>• Multitude of standard tests, examinations and testing available on request</li> </ul>
Options	<ul style="list-style-type: none"> <li>• 2. license for installation on an office PC</li> <li>• License for several machines</li> <li>• Data interfaces to other programs</li> </ul>
Operating system	<ul style="list-style-type: none"> <li>• Approved for Windows 7, 8.1 and 10 – 64 Bit</li> </ul>

#### PROTEUS<sup>MT</sup> –Software Module „Universal“

Application	<ul style="list-style-type: none"> <li>• For the execution of static and dynamic test for material testing in connection with DIGIMAXX<sup>®</sup> C-30</li> </ul>
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Description	<p><b>Module Description</b></p> <ul style="list-style-type: none"> <li>• setting mode with digital hand-wheel</li> <li>• free test programming for force-, distance- or strain-controlled tests with smooth control parameter during testing for the implementation of universal tests</li> </ul> <p><b>Test Sequence</b></p> <ul style="list-style-type: none"> <li>• specimen setup by digital hand-wheel (option - PM if available)</li> <li>• sequences run automatically via displacement transducer (option - PM if available)</li> <li>• zeroing of all measurement transducers in the software</li> <li>• it is possible to run a test of several ramps with different control parameters, cycles, holding times, limit values</li> <li>• online status-display of test procedure</li> <li>• an intervention in the test procedure with cancelling, pausing, continuing or jumping to the next element is possible at any time</li> <li>• possibility of online change of all parameters during the test procedure</li> <li>• at the end of the test, after cancellation process or after fracture of the specimen the equipment returns to its starting position via the displacement transducer</li> </ul> <p><b>Programming:</b></p> <ul style="list-style-type: none"> <li>• each ramp element with speed, control parameter and end value</li> <li>• ramp elements with or without recording</li> <li>• cycles with free number of repeats and ramps within a cycle</li> <li>• sine-, triangular- or trapeze wave form</li> <li>• max./min. limit values for controlling the test sequence</li> <li>• recording of a test in a preview</li> <li>• channels can be hidden or shown</li> </ul> <p><b>Evaluation:</b></p> <ul style="list-style-type: none"> <li>• graphical recording of up to 20 measuring channels</li> <li>• time-force-displacement diagram or stress-strain diagram</li> <li>• single or multiple diagrams</li> <li>• choice of cycles</li> <li>• determination of minimum and maximum values of each measuring channel</li> <li>• storing and editing of all test sequences</li> <li>• export of all measuring data with one template</li> </ul>
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**PROTEUS<sup>MT</sup> –Software Module „Rope Testing“**

Application	<ul style="list-style-type: none"> <li>• For the execution of static and dynamic test for material testing in connection with DIGIMAXX<sup>®</sup> C-30</li> </ul>
Standards	<ul style="list-style-type: none"> <li>• ISO 3108</li> <li>• ISO 19427</li> </ul>

Description	<p><b>Module Description</b></p> <ul style="list-style-type: none"> <li>• setting mode with digital hand-wheel</li> <li>• Pre-test conditioning and check of safe rope grip</li> <li>• Tensile test until fracture or defined maximum force</li> <li>• Evaluation of tensile strength</li> <li>• Measurement of maximum elongation</li> </ul> <p><b>Test Sequence</b></p> <ul style="list-style-type: none"> <li>• specimen setup by digital hand-wheel (option - PM if available)</li> <li>• Pre-set-up to check grip of rope (additional LVDT at grip to measure relative movement in machine frame included). This function is optional if required</li> <li>• Loading of rope until fracture at a certain given slope of force or deflection</li> <li>• Analyses of pre-mature failure of single cords, e.g. Force at breaking of the first wire</li> <li>• Measurement of minimum force at fracture</li> </ul>
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	<b>Evaluation:</b> <ul style="list-style-type: none"> <li>graphical recording of <del>up to 10</del> measuring channels</li> <li>time-force-displacement diagram or stress-strain diagram</li> <li>single or multiple diagrams</li> <li>determination of minimum and maximum values of each measuring channel</li> <li>storing and editing of all test sequences</li> <li>export of all measuring data with one template</li> </ul>
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#### PROTEUS-Software module „Cell-Calibration“

Description	<ul style="list-style-type: none"> <li>Continuous calibration with failure handling</li> <li>Step by Step calibration with protocol</li> <li>Registration of the reference-cell</li> <li>Acquisition of the signal from the cell</li> </ul>
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#### Pos. 6: Installation, Commissioning, Training

Scope FTS	<ul style="list-style-type: none"> <li>Control if shipment is complete</li> <li>Foundation work of floor area</li> <li>Assembly and installation of the testing system by skilled technical staff on site</li> <li>Commission, configuration und test of the components</li> <li>Execution of the test with the installed components</li> <li>Making of the required testing drafts</li> <li>Training of the operating personal in functionality, safety and maintenance</li> <li>Delivery of the complete technical documentation (for all components)</li> </ul>
Precondition	<ul style="list-style-type: none"> <li>Delivery is effected by truck</li> <li>Unloading and transport of the testing facility is not included in the scope of supply and services. The customer only is responsible for the unloading and transport to the final place of installation</li> <li>The assembly is effected acc. to the well-known floor plan and acc. to the installation plan of Messrs. FORM+TEST</li> <li>Provision of electrical connections</li> <li>Provision of specimens for the test</li> </ul>
Installation conditions	<ul style="list-style-type: none"> <li>Room temperature between 15°C-50°C</li> <li>Variations in temperature during the test max. 2°C</li> <li>Air humidity: 20% - 90 %</li> <li>Possibility of discharging heat</li> <li>Vibrations and corrosion must be avoided in case of storage</li> </ul>
Advantage	<ul style="list-style-type: none"> <li>In the course of the installation and commissioning other services (e.g. DKD-calibration/ training) can be carried out by our service technician</li> </ul>

#### Pos. 7: Project management

Scope	<ul style="list-style-type: none"> <li>Project management after order</li> <li>Project meetings with all relevant engineers</li> <li>Support on technical issues concerning installation and preparation of the basement</li> <li>Set-up of a project plan</li> <li>Meeting with the customer for discussion of relevant parameters (one meeting at FTS and one meeting at customer site) and discussion of final design</li> <li>Status reports</li> <li>Advising upon request with other test labs with large tensile test machines, e.g. MPA Stuttgart with a 10.000 kN horizontal test machine with 13 m test specimen size, e.g. used for large rope testing</li> </ul>
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Not in scope	<ul style="list-style-type: none"> <li>• Discussion and meetings with the local constructing company and architect for erecting the test hall</li> </ul>
Benefit	<ul style="list-style-type: none"> <li>• Preparation of matching construction</li> <li>• Clarification of relevant details</li> <li>• Direct involvement of customer during project period</li> <li>• Direct insert of customer specific aspects and demands</li> </ul>

#### Pos. 8: Calibration Certificate

Description	<ul style="list-style-type: none"><li>• according DIN EN ISO 7500 / DIN EN ISO 376 for force measurement standards</li><li>• according DIN EN ISO 9513 for stroke</li><li>• force calibration in tension and compression</li><li>• Alternatively organisation of calibration on customer site with local Indian calibration company if available load capacity (after pre-acceptance test at FTS premises)</li><li>• Calibration is recommended to be done with calibration measurement rods which are further used by the CIMFR in parallel during training in pre-acceptance tests</li></ul>									
Data	<table><tr><td>&gt; 10 steps</td><td>1, 2, 10, 20, 30, 40, 50, 60, 80, 100</td><td>%</td></tr><tr><td>&gt; range</td><td></td><td>± 10000 kN</td></tr><tr><td></td><td></td><td>0..1500 mm</td></tr></table>	> 10 steps	1, 2, 10, 20, 30, 40, 50, 60, 80, 100	%	> range		± 10000 kN			0..1500 mm
> 10 steps	1, 2, 10, 20, 30, 40, 50, 60, 80, 100	%								
> range		± 10000 kN								
		0..1500 mm								

#### Options :

##### Calibration rods

Description	<ul style="list-style-type: none"><li>• robust universal tensile rod for high accurate calibration of the test machine</li><li>• complete coverage of load range between 10000 kN and 500 kN (this requires several calibration rods)</li><li>• including high accurate measurement electronics (24 bit resolution)</li><li>• compact design incl. adapter plate</li><li>• Each type of rod should be provided twice for ability of continuous re-calibration and validation of the machine on-site (to be conducted by CIMFR staff)</li><li>• Optimal construction for stable shipment</li><li>• Incl. transportation case</li><li>• Incl. initial calibration certificates</li></ul>												
Data	<table><tr><td>&gt; upper range (tension)</td><td>500...10000</td><td>kN</td></tr><tr><td>&gt; lower range (tension)</td><td>1...500</td><td>kN</td></tr><tr><td>&gt; calibration class</td><td>0</td><td></td></tr><tr><td>&gt; accuracy class for the calibrated load cell</td><td>0.5 or 1</td><td></td></tr></table>	> upper range (tension)	500...10000	kN	> lower range (tension)	1...500	kN	> calibration class	0		> accuracy class for the calibrated load cell	0.5 or 1	
> upper range (tension)	500...10000	kN											
> lower range (tension)	1...500	kN											
> calibration class	0												
> accuracy class for the calibrated load cell	0.5 or 1												

##### Annual re-calibration

Description	<ul style="list-style-type: none"> <li>• Organisation of annual calibration of calibration rod</li> <li>• Organisation of shipment and re-calibration in international accredited calibration lab (incl. shipment of calibration rod)</li> <li>• Provision of calibration certificates according to DIN EN ISO 376</li> <li>• Annual service of test machine</li> <li>• Support of machine re-calibration</li> <li>• Return to India</li> </ul>
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Stores & Purchase Officer  
CSIR-CIMFR

राकेश सिंह  
24/02/2020