पी डी आई एल PDIL	INSTRUMENT AIR & PLANT AIR SYSTEM FOR TALCHER FERTILIZERS LTD. (TFL) AT TALCHER, ODISHA	Talcher Fertilizers

Date: 07.07.2021

AMENDMENT – III

NIT, No. PNMM/PC-183/E-4008/NCB Dated 24.05.2021

Sub.: Instrument Air & Plant Air System for Talcher Fertilizers Ltd. (TFL) at Talcher, Odisha

This is for information to all Bidders who are willing to participate in the subject NIT, that Amendment-III date 07.07.2021 is being issued and shall be read in conjunction to the NIT and subsequent Amendments issued till date.

***All other terms & conditions of NIT shall be as per original NIT and subsequent Amendment(s).**

For & on behalf of
Talcher Fertilizers Limited

P. R. Sahu
Addl. G.M (M.M)
Projects & Development India Ltd.

INSTRUMENT AIR & PLANT AIR SYSTEM
TALCHER FERTILIZERS LIMITED
NIT NO. : PNMM/PC-183/E- 4008/NCB DATED
Amendment - III dated 07.07.2021

SL. NO.	REFERENCE OF BIDDING DOCUMENT				AMENDMENT TYPE M/D/A	MODIFICATION
	Part/Sec.	Page No.	Clause No.	Description as per NIT		
1.	Amendment I dated 05.07.2021	10 of 58	29		D	Following Attachment has been deleted : PC183-TS-0820A Technical Specification – High Voltage Variable Frequency Drives
2.	PC150/E/4004/P-VI-3.3 Design Specification-Electrical	3 of 34			A	Following Attachment has been added : PC183-TS-0828 Technical Specification – Soft Starter
3.	PC150/E/4004/P-VI-3.3 Design Specification-Electrical	4 of 34	1.3		M	HV Motor VFD ***To be read as…….*** HV Motor Soft Starter *Remaining part of clause shall remain unchanged*
	Amendment I dated 05.07.2021	10 of 58	30			
4.	PC150/E/4004/P-VI-3.3 Design Specification-Electrical	16 to 18 of 34	5.6	HV Motor Starter	D	Complete clause 5.6 and 5.7 deleted.
5.	Amendment I dated 05.07.2021	11 & 12 of 58	32		D	Following Attachment has been deleted : New Clause 5.11
6.	PC150/E/4004/P-VI-3.3 Design Specification-Electrical				A	New Clause 5.12 5.12 Soft Starter 5.12.1 The soft starters shall be Thyristor / IGBT type with self torque adjustment (during controlled start) feature with bypass contactor. Soft starters shall be communicable type and shall be able to communicate with ECMS. 5.12.2 Soft starter shall be designed with starting current limited to 250% to 300% (However Contractor shall ensure that this reduced starting voltage is suitable to develop necessary starting torque requirement of the respective motor). The soft starters shall be designed for the optimum voltage drop during starting such that the drive motor and the load get the required accelerating torque. 5.12.3 Soft starter shall be as per standards IEC 34/BS 4999/IS 325/BS 5000. 5.12.4 The Contractor shall super impose the motor torque vs speed curve at reduced voltage (to motor terminals at starting) on torque vs speed characteristics of the driven equipment to confirm correct operation i.e. acceleration to rated speed. The Contractor shall also calculate acceleration time at reduced voltage (based on these torque vs speed curves) required for accelerating the drive, to full rated speed. This acceleration time shall be sufficiently less than the hot withstand time of the motor. 5.12.5 For all other specifications, refer PC183-TS-0828.
7.	Amendment I dated 05.07.2021	13 of 58	33		M	5.0 VARIABLE FREQUENCY DRIVES A. Complete unit of each type – 1 No. B. Set of fuses of all types & sizes used in system – 5 Sets C. Software for parameter setting each type – 1 Set ***To be read as…….*** 5.0 SOFT STARTER A. Vacuum Contactor – 2 Nos. B. Control Cards – 1 Set C. Power Card – 1 Set D. Set of fuses of all types & sizes used in system – 2 Sets E. Thyristor / IGBT of each type – 1 Set F. Motor Protection Device – 1 Set

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<tr><th rowspan="2">SL. NO.</th><th colspan="4">REFERENCE OF BIDDING DOCUMENT</th><th rowspan="2">AMENDMENT TYPE M/D/A</th><th rowspan="2">MODIFICATION</th></tr>
<tr><th>Part/Sec.</th><th>Page No.</th><th>Clause No.</th><th>Description as per NIT</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>
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<tr><td>G.</td><td>Signal Lamps of each colour & voltage</td><td>1 Set</td></tr>
<tr><td>H.</td><td>Cooling Fan</td><td>2 Sets</td></tr>
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<tr><td>8.</td><td>Amendment I dated 05.07.2021</td><td>14 of 58</td><td>34</td><td></td><td>M</td><td>
<table>
<tr><td colspan="2">VARIABLE SPEED MOTOR PACKAGE (HV MOTORS)</td></tr>
<tr><td>Asea Brown Boveri Ltd.</td><td>Finland</td></tr>
<tr><td>BHEL (Electrical Machines Divn.)</td><td>India</td></tr>
<tr><td>Danfoss Industries Pvt. Ltd. (Upto 1400 KW)</td><td>India</td></tr>
<tr><td>Alsthom Atlantique</td><td>France</td></tr>
<tr><td>Siemens AG</td><td>Germany</td></tr>
<tr><td>Ansaldo Robicon</td><td>Italy</td></tr>
<tr><td>Fuji Electric Systems Co. Ltd.</td><td>Japan</td></tr>
<tr><td>Toshiba Mitsubishi Electric Industrial Systems Corporation</td><td>Japan</td></tr>
<tr><td>GEC Industrial Control Ltd.</td><td>UK</td></tr>
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To be read as…….

<table>
<tr><td colspan="2">SOFT STARTER (HV MOTORS)</td></tr>
<tr><td>Amtech Electronics (India) Ltd.</td><td>India</td></tr>
<tr><td>Danfoss Industries Pvt. Ltd. (Upto 800 KW)</td><td>India</td></tr>
<tr><td>Jayashree Electron Pvt. Ltd</td><td>India</td></tr>
<tr><td>Kimo Electronics Pvt. Ltd.</td><td>India</td></tr>
<tr><td>Rockwell Automation India Pvt. Ltd.</td><td>India</td></tr>
<tr><td>Siemens Ltd.</td><td>India</td></tr>
<tr><td>TMEIC Industrial Systems India Private Limited</td><td>India</td></tr>
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LEGEND:
M: MODIFICATION, A: ADDITION, D: DELETION

TECHNICAL SPECIFICATION

SOFT STARTER

CONTENTS

1.0 GENERAL

1.1 Scope

This specification covers the general requirements for design, manufacture, assembly, inspection and testing at the Manufacturer's works of high voltage indoor soft starters above 1100V grade.

1.2 Data sheet

Contractor shall submit the data sheet in the Bid .

1.3 Codes and standards

The design, manufacture, testing and performance of soft starter panel shall comply with all current statutes, regulations and safety codes in the locality where the equipment will be installed.

Unless otherwise specified, the soft starter shall confirm to the relevant Indian, IEC or British Standards. Nothing in this specification shall be construed to relieve the Contractor of his responsibility. The relevant Standards are:

1.	IS: 2705 (1992)	Current Transformers. (Part - I to IV)
2.	IS: 3156 (1992)	Voltage Transformers. (Part - I to IV)
3.	IS: 1248 (1993)	Direct acting indicating analogue electrical measuring instruments and their accessories. (Part - I to IV)
4.	IS: 13703 (1993)	Low Voltage fuses for voltages not exceeding 1000V Ac. (Part - I and II)
5.	IS: 5578 (1985)	Guide for marking of insulated conductors.
6.	IS: 11353 (1985)	Guide for uniform system of marking and identification of conductors and apparatus terminals.
7.	IS: 694 (1990)	PVC insulated cables for working voltage upto and including 1100V.
8.	IS: 6875 (1973)	Control switches for voltages upto and including1000VAC and 1200V DC. (Part - I to IV)
9.	IS: 3700 (1972)	Essential ratings and characteristics of semi-conductor devices.
10.	IS: 4411 (1967)	Codes of designation of semi-conductor devices.
11.	IS: 5469 (1969)	Codes of practice for use of semi-conductor junction devices.
12.	IS: 10482 (1983)	Connectors for printed wiring board.
13.	IS: 12448 (1988)	Basic testing procedures and measuring methods for Electro-mechanical components for electronic equipment.
14.	IS:12970 (1990)	Semi-conductor devices – Integrated circuits.
15.	IS:13648 (1993)	Power electronic capacitors.
16.	IEC 297	Dimensions of panels and racks.
17.	IEC352	Solderless wrapped connections.
18.	IEC 446	Semi-conductor converters.
19.	IEEE 444	Protection standards for Thyristor converters.

2.0 GENERAL TECHNICAL REQUIREMENTS

2.1 Design features

(1) The thyristorised / IGBT starter shall be used for starting of large induction motors.

(2) The soft starter shall give an excellent voltage control during soft starts, smooth steeples acceleration.

(3) The soft starter shall be used during starting for smooth and step-less acceleration only. Once motor gains its full speed bypass vacuum contactor shall be operated to bypass thyristors / IGBT. The thyristor /IGBT shall be short time rated (2 min.).

(4) The soft starter drive shall consist of the following.

- Isolation vacuum contactor.
- Bypass vacuum contactor.
- Thyristor unit / IGBT unit
- Motor protective devices.
- Indicating / Metering / Control circuits and accessories.
- Cooling / ventilation equipments / accessories.

(5) Soft starter shall have following minimum in built protection and alarm, but not limited to,

- Electronic over load.
- Line fault.
- Under voltage.
- Over voltage.
- Stall.
- Phase reversal.
- Open gate for thyristor.
- Over temperature for thyristor.
- Over load for thyristor.

(6) Soft starter panel shall be provided with following indicating, metering and control devices.

Motor starting / protection devices.

Selector switch – Auto / Manual.

Start / Stop push buttons for manual operation.

- Input voltmeter and ammeter.
- Meters to indicate power in MW.
- Current and potential transformers.
- Auxiliary relays.
- Audio-visual alarms / fault indicators.
- Alarm acknowledge / reset / test push buttons.
- Provision for wiring external sequential / process interlock / signals for starting / running / tripping.
- Terminals for remote control / indication.
- Space heater and ventilating fans / cooler, if required.

2.2 Performance requirement

Soft starter panel shall be designed for operation at design temperature of 50°C. Contractor shall provide the necessary arrangement within the panel for satisfactory operation of soft starter.

2.3 Construction

(1) Soft starter panel shall be industrial type (Non-hazardous), totally enclosed, dust and vermin proof, floor mounted, free standing cubicle type of construction.

(2) The panel cubicle shall comprise rigidly welded structural frame enclosed completely by sheet steel of minimum 14 SWG (cold rolled) thickness, smooth finished, leveled and free from flaws. All doors and removable covers shall be provided with neoprene gasket all around to make the cubical dust and vermin proof.

(3) The panel shall be provided with bottom sheet steel plates of minimum 2mm thick. Panel shall be fitted with removable gland plates of sufficient thickness at the bottom of the panel for fixing cable glands for power and control cable termination. Sufficient space shall be provided for termination of power cable sizes, as specified in data sheet.

(4) Louvers shall be provided at front, rear, top and bottom of the panel to dissipate heat developed inside. Redundant fans shall be provided.

(5) Degree of protection shall not be less than IP 4X.

(6) Panel shall be fitted with a label and serial number on the front and rear. In addition, panel shall be fitted with a label indicating panel designation and rating. All devices shall be provided with separate labels to indicate the function and also device numbers as marked in wiring diagrams.

(7) Main equipment of the panel shall be accessible for maintenance from the front and rear. All insulating material shall be flame resistant, non-hygroscopic and antitracking.

(8) All hardware's used inside the panel shall be zinc passivated or cadmium plated.

3.0 EQUIPMENT SPECIFICATIONS

3.1 HT Fuses

(1) High voltage fuses shall be of HRC link type and shall comply with the requirements of relevant standards.

(2) The fuse link shall have a striker pin for indication and also for trip mechanism.

(3) It is Contractor's responsibility to precisely co-ordinate these fuses with contactors and upstream protective devices in the same system and shall be adequately rated for short circuit capacity.

(4) The type of fuse chosen by Contractor shall subject to approval by the Owner/Consultant. Contractor to furnish fuse pre-arcing time shall be furnished by along with the offer.

(5) Thyristor units / IGBT units shall be protected by fast acting semiconductor fuses

3.2 Vacuum contactors

(1) Vacuum contactors of adequate rating for the compressor motor starting at 11kV/3.3kV Voltage to match the bypass & isolation application and shall conform to relevant India / IEC standards.

(2) Vacuum contactor shall be provided with properly designed and co-ordinated HRC fuses as mentioned in clause no. 3.1 above.

(3) DC operating coill shall be rated to operate satisfactorily between 80% and 110 % of the rated voltage. The contactor shall not drop out, if the voltage drops to 70% of

rated voltage shall make arrangements to derive the auxiliary power, using necessary control transformer, for operating the contactor.

(4) The vacuum contactors shall have exclusively for Owners use minimum 1 NO & 1 NC auxiliary potential free contacts, rated for 10 amps, 240V AC and 0.5 Amp (inductive breaking) 110V DC or as specified and shall be wired upto the terminal blocks.

3.3 **Instrument transformers**

(1) The current transformers and Voltage transformers shall conform to the requirements stipulated in relevant standards. It shall Contractor's responsibility to ensure adequate size of CT & VT

(2) The CTs & VTs shall be of cast resin type (insulation class "E" or better) and shall be able to withstand the thermal and mechanical stress resulting from the maximum short circuit and momentary current ratings of the switchgear.

(3) CTs shall have polarity mrks on each transformer and at the associated terminal block Facility shall be provided for short-circuit and earthing the CT secondary at the terminal blocks.

(4) VTs shall be protected on the primary side by limiting fused and by MCBs on secondary side with 9kA interrupting ratings.

(5) The MCBs shall have min 1 NO + NC auxiliary potential free contacts, for

annunication and interlocks.

(6) CTs shall withstand specified system fault current for 1 sec.

3.4 **Measuring and recording instruments**

(1) Microprocessor based measuring and recording instruments shall be provided. The unit shall have RS-485 port at the output for serial communication fro remote monitoring at ECMS.

(2) These instruments shall be standalone type, shall be configurable and shall be compatible with higher level computer.

(3) The instrument shall be rectangular in shape and not greater than 150mm (W) x 150mm (H). The accuracy class shall be as per IS or international standards.

3.5 **Control wiring and terminals**

(1) Feeders for Control (DC) / Auxiliary supply shall be provided at one point of the panel and voltage level shall be as specified in data sheet. Terminals to receive AC/DC control and auxiliary power shall be provided in cubicle and the terminals shall adequately rated (min. 20A).

(2) Adequate rated 2 pole MCBs shall be provided for each of the AC/DC control circuits.

(3) Internal wiring shall be done with 650V grade PVC insulated, stranded copper conductor of minimum size 2.5mm2 size.

(4) Separate colour coding shall be used for AC / DC control and power circuits and earth wire.

(5) All incoming and outgoing and control wire connection shall be wired to adequately rated (min.20A), elmex type terminal blocks about 20% spare terminals shall be provided in cubicle. All terminals shall be easily accessible.

(6) All wire shall be bunched together and routed through wire ways inside cubicle.

(7) Separate schematics, wiring diagrams and termination schedule for external and internal cable/wire connections shall be furnished by the Contractor. External connections shall include Owner's remote equipment, which will be furnished by

Owner to the Contractor.

(8) Low watt consumption LED type indicating lamps shall be provided.

(9) All wires, terminals and all other devices shall be provided with appropriate ferrules to correspond with wiring diagrams, for circuit identifications Termination lugs to be provided wherever necessary.

4.0 EARTHING

(1) An earth bus having cross section as specified in data sheet A shall be provided and extended through the length of the panel. All electrical equipment shall be connected to this earth bus.

(2) Suitable clamp type terminals with hardware at each end of the panel shall be provided to suit the size of the OWNER's earthing conductor of size 75 x 10 mm GI

(3) Hinged doors shall be earthed through flexible copper brand of adequate size paint at earthing points shall be removed for proper contact star washers for door earthing are not acceptable.

(4) Bolted joints, splices, taps. etc to the earth bus shall be with at least two bolts

5.0 NAME PLATES AND RATING PLATES

5.1 Name plate

(1) Nameplate with engraved letters shall be provided for both front and rear side of panel function of every instrument, relay fuse etc shall be indicated by labels fixed near each device.

(2) Non-corrosive name plates shall be manufactured in anodized aluminium sheet and the letters shall be engraved on black lettering on white background. The name plates/labels shall be held in position by self-tapping screws.

(3) All devices mounted inside the cubicle and instruments etc., shall be identified by marking the device numbers inside cubicle as per the wiring drawing.

5.2 Rating plates

(1) The panel shall have a rating plate fixed to the non-removable part of the enclosure.

(2) All electrical equipment like VTs, CTs, etc and all other electrical devices shall be provided with rating plate made of stainless steel which can be easily seen.

(3) The rating plates shall give all the relevant information as specified in relevant standards.

(4) Danger boards, caution boards, operating instruction plates, shall be fixed to panel as per the standard engineering practice and regulations.

6.0 ACCESSORIES

6.1 Heater

Soft starter panel shall be equipped with space heaters to prevent moisture condensation within the enclosure and shall be suitable for continuous operation on 240V, 1 phase, 50 Hz AC supply. The space heaters shall be controlled through thermostats. Supply for motor space heater shall be brought to separate terminals in respective cubicle.

6.2 Cooling

Soft starter panel shall be provided with necessary ventilation / cooling equipment's for smooth operation of soft starter at given design temperature. Redundant Cooling Fans shall be considered.

6.3 Plug Point

A 240V, 1 phase, 50Hz AC plug point shall be provided in the interior of each cubicle with an on-off switch.

7.0 PAINTING

(1) Oil grease, dirt and rust from the sheet steelwork shall be thoroughly Cleaned and removed. Rust and scale shall be removes by picking process with dilute acid and alkaline solution. Phospating and thorough rinsing with clear water followed by final rinsing with dilute dichromate solution and oven drying shall follow this.

(2) The under surface shall he prepared by applying a coat of phosphate paint and coat of yellow zinc chromate primer. The under surface shall be made free from all imperfections before under taking the finishing coat.

(3) After application of Primer, two coats of finish epoxy paint shall be applied with each coat followed be stowing. The colour shade for the finish paint shall be shade RAL-7035, unless otherwise specified.

8.0 INSPECTION AND TESTS

(1) Routine tests shall be carried out at works in the presence of OWNER/Consultant/ /Third party inspector as per relevant IS / IEC Standards.

(2) Contractor shall furnish type and routine test certificates for all bought out components for the panel, as per relevant standards.

(3) Test certificates for type test carried out on similar equipment of identical design, if available, shall be submitted along with the offer.

9.0 INFORMATION REQUIRED BY OWNER FROM THE CONTRACTOR

The Contractor shall submit following information in Bid: -

(1) Full technical description and performance details of the equipment accessories and components offered including heat losses for all components in kW.

(2) Overall dimensions and shipping dimensions and weight.

(3) Deviation taken by the Contractor from the requirements of this specification.

(4) Guaranteed technical particulars.

(5) Man-day rates for commissioning supervision.

10.0 MISCELLANEOUS

Each panel shall be provided with the following

(1) Two sets of clearly identifiable key for all panel-locking devices.

(2) Complete set of special tools and equipment for installation maintenance and testing of each panel.

11.0 PACKING

11.1 The Soft Starter shall be properly packed before dispatch to avoid damage during transport, storage and handling.

11.2 The packing box shall contain a copy of the installation, operation and maintenance manual.

11.3 A sign to indicate the upright position of the panels to be placed during transport and storage shall be clearly marked. Also proper arrangement shall be provided to handle the equipment.

12.0 DEVIATIONS

12.1 Deviations, if any, from this standard shall be clearly indicated in the offer with reasoning.