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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document ID 0215-ELT-000-EC-0021 | Contract No. 66-0215 | |
|  | TECHNICAL SPECIFICATIONS – DC SHUNT | | |  | |
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|--|---|
| <p>TKIS - India / Vendor</p> <p>Category Codes (Submission Purpose)</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 For Approval <input type="checkbox"/> 2 For Review / Comments <input type="checkbox"/> 3 For Information <input type="checkbox"/> 4 For Engineering <input type="checkbox"/> 5 For Enquiry <input type="checkbox"/> 6 For Order Placement <input type="checkbox"/> 7 Final & Approved <input type="checkbox"/> 8 Released for Construction <hr/> <p>Acceptance Codes (Approval Codes)</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 Approved <input type="checkbox"/> 2 Approved for Manufacturing / Fabrication with Comments as marked <input type="checkbox"/> 3 Not Approved / Resubmit <input type="checkbox"/> 4 Retained for Information / Records <input type="checkbox"/> 5 Reviewed <input type="checkbox"/> 6 Reviewed as Noted / Resubmit <p>Remarks for AC2 : This marked-up drawings is hereby approved for fabrication / manufacturing and shall be re-submitted after revision. This drawing should be revised only to the extent of TKIS - India / Owner / Client comments. Any other changes made by you will not be considered unless clearly highlighted in covering letter asking for approval.</p> <p>This approval / review does not absolve the supplier from the full responsibility for design and fabrication.</p> <p>Date : ___/___/___ Name : _____</p> | <p>TKIS - India / Owner / Client</p> <p>Category Codes (Submission Purpose)</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 For Approval <input type="checkbox"/> 2 For Review / Comments <input type="checkbox"/> 3 For Information <input type="checkbox"/> 4 For Engineering <input checked="" type="checkbox"/> 5 For Enquiry <input type="checkbox"/> 6 For Order Placement <input type="checkbox"/> 7 Final & Approved <input type="checkbox"/> 8 Released for Construction <hr/> <p>Acceptance Codes (Approval Codes)</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1 Approved <input type="checkbox"/> 2 Approved for Manufacturing / Fabrication with Comments as marked <input type="checkbox"/> 3 Not Approved / Resubmit <input type="checkbox"/> 4 Retained for Information / Records <input type="checkbox"/> 5 Reviewed <input type="checkbox"/> 6 Reviewed as Noted / Resubmit <p>Date : ___/___/___ Name : _____</p> |
|--|---|

| 0 | IFI | Release for Enquiry | 14/12/18 | SSS | 14/12/18 | HGG | 14/12/18 | RBU | - | |
|---|--------|---------------------|----------|---|----------|---------|----------|----------|----|---------------------|
| Rev. | Status | Description | Date | Prepared | Date | Checked | Date | Approved | AC | |
| Based on: PIN-LES-ELT-1108, Rev.0, 12-2015 | | | | <div style="font-size: 2em; font-weight: bold;">Barcode</div> | | | | | | Category Code: - 05 |
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INDEX SHEET

The document Cover Sheet indicates revisions made in this document along with the purpose of issue of the revised document. The details of revisions made in the enclosures of this document are listed in the table of *Contents* below and the enclosures listed therein are an integral part of this document.



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| Part | Docu Size | Description | No. Of Pages | Rev. No. | Revised Clauses |
|----------|-----------|--|--------------|----------|-----------------|
| | A4 | Index sheet and status of revision | 2 | 0 | - |
| | A4 | Site Conditions | 1 | 0 | - |
| Part-I | A4 | Technical specification for DC shunt | 2 | 0 | - |
| Part-IIA | A4 | Notes on Method of Offer Submission | 1 | 0 | - |
| Part-IIB | A4 | Scope of Supply & Price Schedule | 1 | 0 | - |
| Part-III | A4 | Drawings & documents enclosed | 1 | 0 | - |
| Part-IV | A4 | Compliance Declaration | 2 | 0 | - |
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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document ID 0215-ELT-000-EC-0021 | Contract No. 66-0215 | |
|  | TECHNICAL SPECIFICATION POLARISATION RECTIFIER | | |  | |
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| Sr. No. | Description | Site Condition |
|---------|---|---|
| 1. | Location | Naya Nangal, Punjab |
| 2. | Altitude | 346 meters above MSL |
| 3. | Ambient Temperature - Maximum | 48 Deg C |
| 4. | Ambient Temperature – Minimum | 4 Deg C |
| 5. | Design Ambient Temperature (For Electrical Equipment) | 50 Deg C |
| 6. | Max. Relative Air Humidity | 95 % at 50 Deg C |
| 7. | Rainfall (Max.) | 50 mm per hour |
| 8. | Seismic Zone | Zone-IV as per Part-4 of IS-1893 |
| 9. | Soil Resistivity | ** Ohm-meter |
| 10. | Thermal Resistivity of soil | ** Deg. K.m/watt |
| 11. | Presence of Corrosive atmosphere | Yes, Highly Corrosive, laden with traces of sulphur di/tri-oxide. Abrasive dust and coal particles (5-100 microns) with traces of Cl ₂ |
| 12. | Tropicalizing required | Yes |

** : Data to be provided later by tkIS-India

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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document ID 0215-ELT-000-EC-0021 | Contract No. 66-0215 |
|  | DC SHUNT Part-I - General Specifications | | |  |
| | | | | Rev |

1.0 SCOPE



This specification covers the design, manufacturing, testing at factory of DC shunt for DC current measurement of a electrolyser system. DC shunt shall comply with all currently applicable Standards specified in this specification. Where conflict arises between the various parts of this specification and standards, the stringent one shall prevail.

2.0 GENERAL

- 2.1 The system shall be designed and rated according to the standards, site conditions and data specified.
- 2.2 The latest editions of the standards shall apply.
- 2.3 All devices required for the proper functioning shall be included in the scope of supply even if they are not specifically indicated herein.
- 2.4 The shunt will be installed indoor, in line with the **Existing** DC busbars from the electrolysers.



3.0 TECHNICAL PARTICULARS

| | | | | |
|------|---------------------------------|---|--|---|
| 3.1 | Type & Standard | : | Open type confirming to IEC 60051/ DIN / VDE R IS 1248-8 The standards shall be suitably applied for the rating mentioned below) | |
| 3.2 | Make | : | | * |
| 3.3 | Location | : | Indoor | |
| 3.4 | Installation & Connection | : | Shunt shall be installed without any external support, directly on the main busbars by bolted connection for incoming & outgoing. | |
| 3.5 | Arrangement | : | Horizontal shall be preferred for existing bus bar | |
| 3.6 | Material of connection | : | Copper | |
| 3.7 | Contact surface Plainness | : | Plainness of contact surface area ± 0.1 mm. | |
| 3.8 | Output Terminals | : | 2 nos. terminals shall be provided with copper lugs suitable for termination of 2.5 mm ² copper cable for carrying the voltage (60mV) signal. | |
| 3.9 | Rated current | : | 24000 A DC | |
| 3.10 | Quantity | : | 6 nos. As per part-IIB | |
| 3.11 | Voltage drop at rated current | : | 60 mV | |
| 3.12 | Accuracy class at rated current | : | 0.5 % | |
| 3.13 | Permissible continuous Overload | : | ___ kA / ___ % | * |
| 3.14 | Temperature at rated load | : | ___ °C | * |
| 3.15 | Dimensions | : | ___ mm (Length) x ___ mm (Width) x ___ mm (Height) | * |
| 3.16 | Weight | : | ___ kgs | * |
| 3.17 | Language | : | All inscriptions, lettering and instruction shall be ' English ' | |



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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document ID 0215-ELT-000-EC-0021 | Contract No. 66-0215 | |
|  | DC SHUNT Part-I - General Specifications | | |  | |
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Notes :

1. Vendor to furnish data for items marked as ' *'.
2. Vendor shall submit the original catalogue of DC Shunt indicating details such as all dimensions, front view, side view, hole details for copper flexible connection, terminal arrangements for external cable connection etc.
3. Following document shall be submitted either for client review /approval.
 - a)Physical dimension , holes checking with compliance certificate.
 - b) Copper material test certificate for review.
 - c) Temperature rise calculation or test certificate at rated current at site ambient temperature.
 - d) Calibration test shall be conducted at reputed institute or at vendor works at Minimum 5000A DC current on all the DC shunts
4. Vendor shall submit 6 copies of test certificates.



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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document Number 0215-ELT-000-EC-0021 | Contract No. 66-0215 | |
|  | DC SHUNT Part-IIA Notes on Method of Offer Submission | | |  | |
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1. Offer shall be submitted in two parts viz. *Technical* part and *Price* part.
2. Technical part shall consist of following:
 - a. Copy of “**General Specifications**” of this specification with acceptance of all clauses to be indicated by letter 'A' on right side of the specification sheet with seal of the company and initial of authorised person. Deviations, if any, should be indicated by letter 'D'.
 - b. Copy of “**Design Data Sheet**” of this specification duly filled in clearly and legibly in the assigned space against items marked thus '*', along with all documents requested with the offer.
 - c. Copy of “**Scope of Supply & Schedule of Prices**” of this specification marked 'quoted' against each item, to confirm that the vendor is making an offer as per break up requested therein.
 - d. Please refer Part-I with list of testing document to be submitted by vendor.
 - e. Covering letter enclosing above document.
 - f. Filled up “**Compliance Declaration**” of this specification with seal of the company and initial of the authorized person.
3. Price part shall consist of following:
 - a. Copy of “**Scope of Supply & Schedule of Prices**” of this specification with unit rate of each item and total price of each section, with total price of the tender, including supplies and various services as specified or as recommended by the vendor.
 - b. Covering letter enclosing above price part and deviation on commercial terms if any.
4. Both the parts of offer shall be submitted in separate sealed envelope indicating details of offer such as *Technical* or *Price* part, enquiry no. and date of submission.
5. Offer will be evaluated based on above documents only and any other document enclosed with the offer shall not be considered for evaluation of offer.

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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document Number 0215-ELT-000-EC-0021 | Contract No. 66-0215 |
|  | DC SHUNT Part-IIB - Scope of Supply & Schedule of Prices | | |  |
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EQUIPMENT & SERVICES TO BE FURNISHED UNDER THIS SPECIFICATION

| Sr. No. | Description | Quantity | Unit Rate | Total |
|--|---|----------------------------------|--------------------|----------------|
| 1. | Following DC Shunt complete with all accessories in accordance with this specifications' Part-I. Rated system Voltage 425 V DC A) 425 V, 24000 A DC, 60 mV | _ 6 _ Nos. | | |
| 2. | TESTING & INSPECTION | | | |
| | Tests as specified in relevant standard shall be performed in presence of purchaser's representative, if so desired by the purchaser. Extra cost for any of the tests shall be quoted indicating the tests reference item no. and description as per Part-II of this specification. | | | |
| i. | Routine tests | Test Certificate to be Furnished | ncluded in item 1 | |
| ii. | Type tests | Not Applicable | Not Applicable | Not Applicable |
| iii | Refer Part-I Notes for Test required on material & calibration of DC shunt. | Test Certificate to be | Included in item 1 | |
| TOTAL PRICE OF THIS TENDER INCLUDING ALL ABOVE ITEMS. | | | | |

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| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document Number 0215-ELT-000-EC-0021 | Contract No. 66-0215 | |
|  | DC SHUNT Part-III - Drawings & Documents Enclosed | | |  | |
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Following drawing(s)/document(s) is/are enclosed:

| | Drawing no. | Description |
|---|----------------------|--|
| 1 | 0215-ELT-11-EC-0021A | Dimensional drawing for DC Shunt Indeginous(Indian make) |

| | | | | |
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|  | DC SHUNT Part-IV - Compliance Declaration | | |  |
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Compliance Declaration

Please note that vendor shall indicate his replies to the following points without which the offer shall be liable for rejection.

Deviations if any from this specification shall be listed in the enclosed format (List of Deviations) indicating the applicable specification clause. The vendor will be made liable for full compliance with the specification requirements, if deviations are not listed in "List of Deviations" as it will be deemed as "No deviation".

| S.NO | DESCRIPTION | EXPECTED REPLY | CONFIRMATION BY VENDOR | REMARKS |
|------|---|---------------------|------------------------|---------|
| 1. | Confirm that all deviations against this specifications are consolidated under "List of Deviations". Deviations mentioned elsewhere will not be taken into consideration. | No Deviation | | |
| 2. | Confirm that there is no discrepancy in the technical details outlined in the specification and the technical bid data. | No Discrepancy | | |
| 3. | Relevant Catalogues/ literature giving specifications for all models offered including sizing data is enclosed with the offer. | Yes | | |
| 4. | Relevant Catalogues/ specifications of all bought out items are enclosed with the offer. | Yes | | |
| 5. | Quoted for "Spare parts recommended for 2 years continuous trouble-free operation" along with listing | Quoted | | |
| 6. | Quoted and offered recommended Commissioning spares along with listing | Quoted | | |
| 7. | Quoted for "Mandatory spares" | Quoted | | |
| | | | | |



(Signature of Vendor)

Name:

Designation :

Date :

(Company Seal)

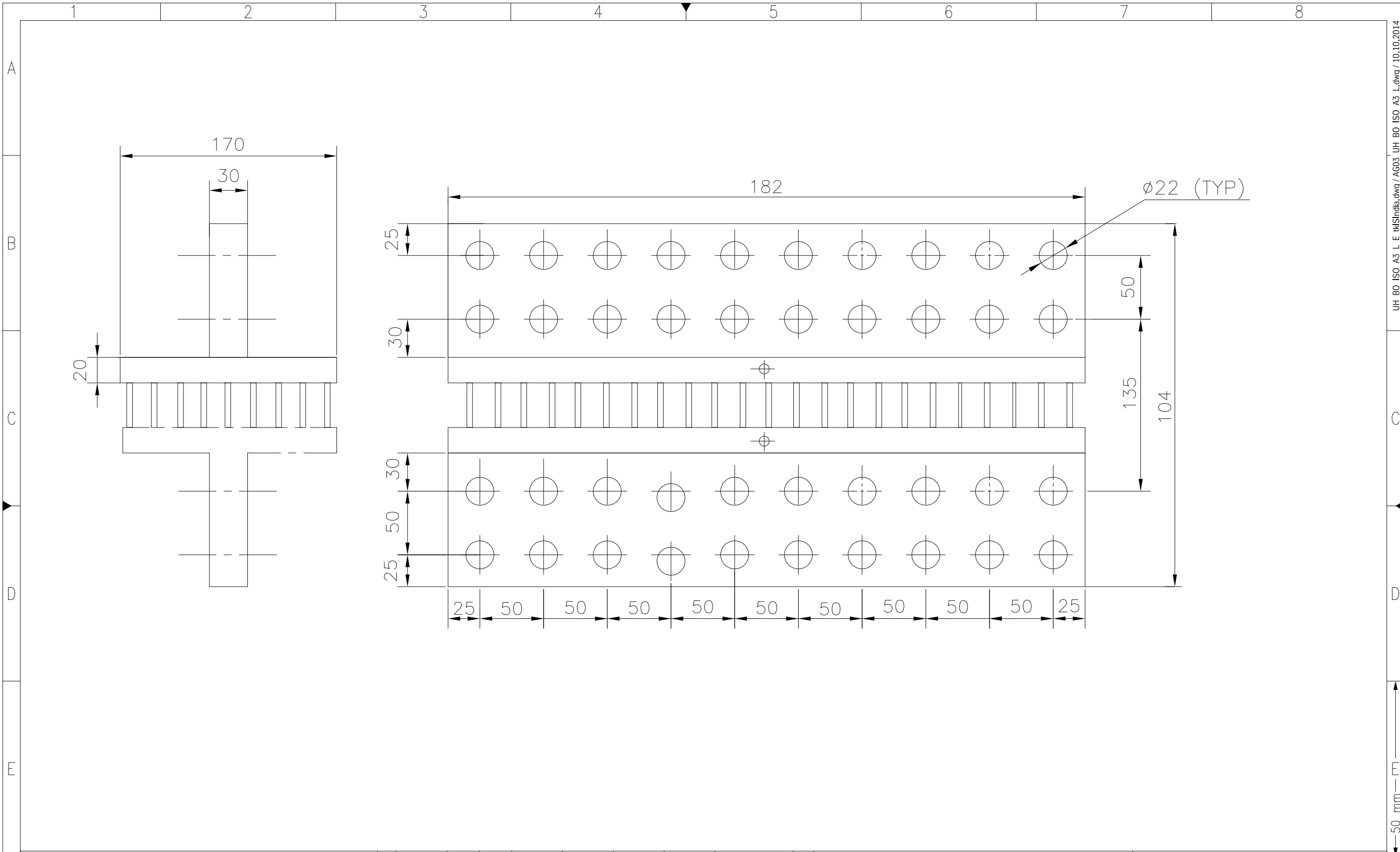
| | | | | |
|---|--|------------------------------|--|---|
| Plant CAUSTIC SODA | Client Punjab Alkali | Contract Code PACL | Document ID 0215-ELT-000-EC-0021 | Contract No. 66-0215 |
|  | DC SHUNT Part-IV - Compliance Declaration | | |  |
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LIST OF DEVIATIONS

| Doc. No: | | | | |
|----------|-----------|---------|-----------------------|-----------|
| Sr. No. | Clause No | Page No | Subject / Description | Deviation |
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(Signature of Vendor)
Name:
Designation :
Date :

(Company Seal)



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|---|------------------|---|----------|---|-----------|----------|------|--|-------------|---|--------------------------|------------|---|---------|------------|---------|---|------------|---|
| BAR-Code | | 00 | 10.12.18 | DDD | SSS | 11.12.18 | HGG | 11.12.18 | RBU | ISSUED FOR ENQUIRY | Contract No. 66-0215-700 | | Code Document ID 0215-ELT-00-EC-0021-A | | Part 000 | Rev. 00 | <small>© thyssenkrupp Industrial Solutions (India) Private Limited 2017</small> | | |
| Rev. | Date | Name | Date | Name | Date | Name | Date | Name | Description | Acc. Code | Date | Name | Description | | | | | | |
| Pro. Unit | TON | Group | | Cat. Code | Acc. Code | Status | Date | | Name | PUNJAB ALKALIES & CHEMICAL LIMITED NAYA NANGAL | | | | | | | | | |
| Con. Unit | Type of Document | Order No. | Scale | Sheet | Date | | Name | PROJECT: 200 TO 350 TPD UPGRADATION & EXPANSION SCHEME FOR DC SHUNT | | | | | | | | | | | |
| Store Location: Server/Share \\p660215-MPE | | Store Location: Folder \\660215-MPE\Electrical | | Store Name 0215-ELT-00-EC-0021-A.dwg | | 1 / 1 | | Drawn | 20.11.2018 | - | Prepared | 20.11.2018 | - | Checked | 20.11.2018 | - | Approved | 20.11.2018 | - |

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