Standard Bidding Document

PMU-212/26-27 Procurement of Hardware Material (Goods)

National

Single Stage-One Envelope

September 02, 2026

PMU HESCO (Hyderabad Electric Supply Company (HESCO)),Assistant Manager Procurement
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REQUEST FOR BIDS

PROCUREMENT OF GOODS

1. The **PMU HESCO (Hyderabad Electric Supply Company (HESCO))** has reserved Funds for the procurement planned for FY **2026-27**. The **PMU HESCO (Hyderabad Electric Supply Company (HESCO))** intends to apply part of the proceeds of this Fund to cover eligible payments under the contract for the "**PMU-212/26-27 Procurement of Hardware Material**" with the reference of **"P105982"**

2. The **PMU HESCO (Hyderabad Electric Supply Company (HESCO))** invites sealed Bids from eligible Bidders for procurement of goods described in the bidding documents on **EPADS v2.0**.

3. **Single Stage-One Envelope** will be used by adopting **Least Cost Based Selection (LCBS)** Technique for the subject procurement, in line with the Public Procurement Rules, 2004 and any Regulations, Regulatory Guides, Procurement Guidelines or Instructions issued by the Authority from time to time.

4. All Bids must be accompanied by a Bid Security amounting described in Bid Security Section in Bidding Document in the form of **Pay Order, Banker's Cheque, Call at Deposit, Bank Guarantee, Demand Draft** or all bids must be accompanied by bid securing declaration in the format specified in the Bidding documents

5. E-Bidding documents, containing detailed terms & conditions, specifications and requirements etc. are available on **e-Pak Acquisition and Disposal System (EPADS)** at **https://epads.gov.pk/opportunities/federal/procurements/105982** for all the interested bidders registered on **EPADS v2.0**. Bidders are required to get themselves registered on **EPADS v2.0** to participate in Bidding process.

6. The e-bids, prepared in accordance with the instructions in the e-Bidding Documents, must be submitted through **EPADS v2.0** on or before **Tuesday, September 22, 2026 11:30 AM**. E-bids will be opened using **EPADS v2.0** on the same day at **Tuesday, September 22, 2026 12:00 PM**. Manual

submission of Bids shall not be entertained. Those vendors who have not yet registered on the new version of **EPADS v2.0,** may register themselves on **https://vendors.epads.gov.pk/**. A tutorial to explain the registration process is available at **https://www.youtube.com/watch?v=MNW6T38v7tc**

In terms of Rule 48 of Public Procurement Rules, 2004 Grievance Redressal Committee (GRC) is notified for the subject procurement and notification copy is available on the procuring agency's website and on Authority's website at (**www.ppra.org.pk**).

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Instructions to Bidders

A. Introduction

1.Scope of Bids

1.1 The Procuring Agency (PA), as indicated in the **Bids Data Sheet (BDS)** invites Bids **through EPADS v2.0** for the provision of Goods for as specified in the BDS and **in Section V – Evaluation Criteria, Specifications & Schedule of Requirements**. The name, identification, and number of items/deliverables are provided in the **BDS**. The successful Bidders will be expected to provide the goods within the specified period and timeline(s) as stated in the **BDS**.

2. Source of Funds

2.1 Source of funds is referred in Clause-1 of Invitation for Bids.

3. Eligible Bidders

3.1 A Bidder may be natural person, company or firm or public or semi-public agency of Pakistan or any foreign country**,** or any combination of them with a formal existing agreement (on Judicial Papers) in the form of a joint venture, consortium, or association. In the case of a joint venture, consortium, or association, all members shall be jointly and severally liable for the execution of the Contract in accordance with the terms and conditions of the Contract. The joint venture, consortium, or association shall nominate a Lead Member as nominated in the BDS, who shall have the authority to conduct all business for and on behalf of any and all the members of the joint venture, consortium, or association during the Bidding process, and in case of award of contract, during the execution of the contract.

3.2 Verifiable copy of the agreement that forms a joint venture, consortium or association shall be required to be submitted as part of the Bid.

3.3 The appointment of Lead Member in the joint venture, consortium, or association shall be confirmed by submission of a valid Power of Attorney to the Procuring Agency.

3.4 Any bid submitted by the joint venture, consortium or association shall indicate the part of proposed contract to be performed by each party and each party shall be evaluated (or post qualified if required) with respect to its contribution only, and the responsibilities of each party shall not be substantially altered without prior written approval of the Procuring Agency and in line with

any instructions issued by the Authority.

(The limit on the number of members of JV or Consortium or Association may be prescribed in BDS, in accordance with the guidelines issued by the PPRA).

3.5 The invitation for Bids is open to all prospective suppliers, manufacturers, or authorized agents / dealers subject to any provisions of incorporation or licensing by the respective national incorporating agency or statutory body established for that particular trade or business. Procuring agencies shall specify the registration/licensing requirements for the foreign bidders keeping in view the requirement of that business.

3.6 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest with one or more parties in this Bidding process, if they:

1. are associated or have been associated in the past, directly or indirectly with a firm or any of its affiliates which have been engaged by the Procuring Agency to provide consulting services for the preparation of the design, specifications and other documents to be used for the procurement of the Goods to be purchased under this Invitation for Bids.

2. have controlling shareholders in common; or

3. receive or have received any direct or indirect subsidy from any of them; or

4. have the same legal representative for purposes of this Bid; or

5. have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the Bids of another Bidder, or influence the decisions of the Procuring Agency regarding this Bidding process; or

6. Submit more than one Bid in this Bidding process.

3.7 A Bidder may be ineligible if –

1. he is declared bankrupt or, in the case of company or firm, insolvent;

2. payments in favor of the Bidder is suspended in accordance with the judgment of a court of law other than a judgment declaring bankruptcy and resulting (in accordance with the national laws) in the total or partial loss of the right to administer and dispose of its property;

3. the Bidder is convicted, by a final judgment, of any offence involving professional conduct;

4. the Bidder is blacklisted locally or by international organizations and hence debarred due to involvement in corrupt and fraudulent practices, or performance failure or due to breach of Bid securing declaration.

3.8 As and when required, bidders shall provide to the Procuring Agency evidence of their eligibility, proof of compliance with the necessary legal requirements to carry out the contract effectively.

3.9 Bidders shall submit Bids relating to the nature, conditions and modalities of sub-contracting wherever the sub-contracting of any elements of the contract amounting to more than ten (10) percent of the Bid price is envisaged.

4. Eligible Goods and Related Services

4.1 All goods and related services to be supplied under the contract shall have their origin in eligible source countries, and all expenditures made under the contract will be limited to such goods and services. For purpose of this Bid, ineligible countries are the countries declared ineligible by the Federal Government.

5. One Bid per Bidder

5.1 A bidder shall submit only one Bid, in the same bidding process, either individually as a Bidder or as a member in a joint venture or any similar arrangement.

5.2 The Bidder shall not engage a subcontractor for any portion of the contract if the value of such subcontracting exceeds thirty percent (30%) of the total contract amount.

6. Cost of Bidding

6.1 Any cost incurred by the bidder relating to the preparation and submission of its Bid shall be borne by the bidder, and the Procuring Agency shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

B. Bidding Documents

7. Contents of Bidding Document

7.1 The Goods required, Bidding procedures, and terms and conditions of the contract are prescribed in the Bidding Documents. In addition to the Invitation for Bids, the Bidding documents which should be read in conjunction with any addenda issued in accordance with **ITB 9.1** include:

Section I -Invitation to Bids

Section II Instructions to Bidders (ITB)

Section III Bid Data Sheet (BDS)

Section IV Evaluation Criteria, Specifications, Schedule of Requirements

Section V Bid Forms

Section VI General Conditions of Contract (GCC)

Section VII Special Conditions of Contract (SCC)

Section VIII Contract Forms

7.2 The Bidder is expected to examine all instructions, forms, terms and specifications in the Bidding documents. Failure to furnish all the information required in the Bidding documents through **EPADS v2.0** will be at the Bidder’s risk and may result in the rejection of his Bids.

8. Clarification of Bidding documents

8.1 A prospective Bidder requiring any clarification of the Bidding documents may notify the Procuring Agency through **EPADS v2.0.**

8.2 The Procuring Agency will within three (3) working days after receiving the request for clarification, respond to any request for clarification through **EPADS v2.0** provided that such request is received not later than three (03) days prior to the deadline for the submission of Bids as prescribed in **ITB 22**

8.3 Copies of the Procuring Agency's response will be forwarded to all identified Prospective Bidders through **EPADS v2.0**, including a description of the inquiry, but without identifying its source.

8.4 Should the Procuring Agency deem it necessary to amend the Bidding document as a result of a clarification, it shall do so following the procedure under **ITB 9.**

8.5 If indicated **in the BDS**, the Bidder's designated representative is invited at the Bidder's cost to attend a pre-Bid meeting at the place, date and time mentioned **in the BDS**. During this pre-Bid meeting, prospective Bidders may request clarification of the schedule of requirement, the Evaluation Criteria or any other aspects of the Bidding document.

8.6 Minutes of the pre-Bid meeting, if applicable, including the text of the questions asked by Bidders, including those during the meeting (without identifying the source) and the responses given, together with any responses prepared after the meeting will be uploaded on **EPADS v2.0**. Any modification to the Bidding documents that may become necessary as a result of the pre-Bid meeting shall be made by the Procuring Agency exclusively through the use of an Addendum pursuant to **ITB 9**. Non-attendance at the pre-Bid meeting will not be a cause for disqualification of a Bidder.

9. Amendment of Bidding documents

9.1 Before the deadline for submission of Bids, the Procuring Agency for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder or Pre-Bid meeting may modify the Bidding documents by issuing addenda through **EPADS v2.0**.

9.2 The Procuring Agency shall promptly publish the addendum through **EPADS v2.0**.

9.3 Any addendum issued including the notice of any extension of the deadline shall also be communicated through EPADS v2.0 to all the bidders who have already submitted their bids. Such bidders shall have the right to withdraw their already submitted bid and re-submit the revised bid prior to the original or extended bid submission deadline.

9.4 To give prospective Bidders reasonable time in which to take an addendum/corrigendum into account in preparing their Bids, the Procuring Agency may, at its discretion, extend the deadline for the submission of Bids through **EPADS v2.0**:

Provided that the Procuring Agency shall extend the deadline for submission of Bids, if such an addendum is issued within last three (03) days of the Bids submission deadline.

C. Preparation of Bids

10. Language of Bid

10.1 The Bid prepared by the bidder, as well as all correspondence and documents relating to the Bids exchanged by the Bidder and the Procuring Agency shall be written in the English language unless otherwise specified in the BDS**.** Supporting documents and printed literature furnished by the Bidder may be in another language provided they are accompanied by an accurate translation of the relevant pages in the English language unless otherwise specified in the **BDS**, in which case, for purposes of interpretation of the Bidder, the translation shall govern.

11. Documents and samples Constituting the Bid

11.1 The Bid prepared by the Bidder shall constitute thedocuments required in the **BDS**.

Details of sample(s) where applicable and requested in the BDS.

1. Documentary evidence established in accordance with ITB that the Bidder is eligible and/or qualified for the subject bidding process;

2. Documentary evidence establish that the Bidder has been authorized by the manufacturer to deliver the goods into Pakistan, where required and where the supplier is not the manufacturer of those goods;

3. Documentary evidence establish that the goods and related services to be supplied by the Bidder are eligible goods and services, and conform to the Bidding Documents;

4. Bid security or Bid Securing Declaration furnished in accordance with **ITB 18.**

12. Documents Establishing Eligibility of the Goods and Conformity to Bidding documents

12.1 To establish the conformity of the bidder to the Bidding document, the Bidder shall furnish as part of its Bids the documentary evidence that Goods provided conform to the technical specifications and standards.

13. Documents Establishing Eligibility and Qualification of the Bidder

13.1 The Bidder shall furnish, as part of itsBid, all those documents establishing the Bidder's eligibility to participate in the Bidding process and/or its qualification to perform the contract if its Bid is accepted.

14. Form of Bids

14.1 The Bidder shall fill the Form of Bid furnished in the Bidding documents.The Bids Form must be completed without any alterations to its format and no substitute shall be accepted.

15. Bids Prices

15.1 The Bids Prices quoted by the Bidder in the Form of Bid and in the Price Schedules shall conform to the requirements specified below or exclusively mentioned hereafter in the Bidding documents.

15.2 All items in the Schedule of Requirement must be listed and priced separately in the Price Schedule(s). If a Price Schedule shows items listed but not priced and neither explicitly denied, their prices shall be construed to be included in the prices of other items.

15.3 Items not listed in the Price Schedule shall be assumed not to be included in the Bid, and provided that the Bid is still substantially responsive in their absence or due to their nominal nature, the corresponding average price of the respective item(s) of the remaining substantially responsive Bidder(s) shall be construed to be the price of those missing item(s)

15.4 The Bid price to be quoted in the Form of Bid in accordance with **ITB 14.1** shall be the total price of the Bid.

15.5 The Bidder shall indicate on the appropriate Price Schedule, the unit prices (where applicable) and total Bid price of the Goods it proposes to provide under the contract.

15.6 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A Bid submitted with an adjustable price will be treated as non-responsive and shall be rejected.

16. Bids Currencies

16.1 Prices shall be quoted in Pakistani Rupees unless otherwise specified in the BDS in accordance with Rule 30 (2) of the Public Procurement Rules, 2004.

17. Bids Validity Period

17.1 Bids shall remain valid for the period specified in the **BDS** after the Bid submission deadline prescribed by the Procuring Agency. A Bid valid for a shorter period shall be rejected by the Procuring Agency as non-responsive**.** The period of Bid validity will be determined from the complementary Bid securing instrument, i.e. the expiry period of Bid Security or Bids Securing Declaration as the case may be.

17.2 The procuring agency shall ordinarily be under an obligation to process and evaluate the bid and to issue letter of award within the stipulated bid validity period.

17.3 Under exceptional circumstances, prior to the expiration of the initial Bid validity period, the Procuring Agency may request the Bidders' consent to an extension of the period of validity of their Bids only once through **EPADS v2.0**, for the period not more than the period of initial bid validity. The Bid Security provided under **ITB 18** shall also be suitably extended. A Bidder may refuse the request without forfeiting its Bid security or causing to be executed its Bid Securing Declaration. A Bidder agreeing to the request will not be required nor permitted to modify its Bid, but will be required to extend the validity of its Bid Security or Bid Securing Declaration for the period of the extension.

18. Bid Security or Bid Securing Declaration

18.1 The Bidder shall furnish as part of its Bid, a Bid Security in accordance with Rule 25 of the Public Procurement Rules, 2004.

18.2 The original Bid Security shall be enclosed within the sealed envelope and to be submitted physically before closing time for submission of bids. Whereas, scanned copy of bid security shall be uploaded electronically through EPADS v2.0 before closing hours for submission of bids.

18.3 The Bidder who failed to submit the original Bids security before the submission deadline shall be disqualified straightaway.

18.4 The Bid Security or Bid Securing Declaration is required to protect the Procuring Agency against the risk of Bidder's conduct which would warrant the security's forfeiture, pursuant to **ITB 18.7.**

18.5 The Bid Security shall be denominated in the local currency, and it shall be a Bank Draft in the name of the Procuring Agency and valid for twenty-eight (28) days beyond the end of the validity of the Bid. This shall also apply if the period

for Bids/Bid Validity is extended. In either case, the form must include the complete name of the Bidder.

18.6 The Bid Security shall be payable promptly upon written demand by the Procuring Agency in case any of the conditions listed in **ITB 18** are invoked.

18.7 Unsuccessful Bidders' Bid Security will be discharged or returned as promptly as possible, however in no case later than thirty (30) days after the expiration of the period of Bids Validity prescribed by the Procuring Agency pursuant to **ITB 17**. The Procuring Agency shall make no claim to the amount of the Bid Security, and shall promptly return the Bid Security document, after whichever of the following that occurs earliest:

a. the expiry of the Bid Security;

b. the entry into force of a procurement contract and the provision of a Performance Guarantee, for the performance of the contract if such a guarantee, is required by the Bid documents;

c. the rejection by the Procuring Agency of all Bids;

d. the withdrawal of the Bids prior to the deadline for the submission of Bids, unless the Bids documents stipulate that no such withdrawal is permitted.

18.8 The successful Bidder's Bids Security will be discharged upon the Bidder signing the contract**,** or furnishing the Performance Guarantee.

18.9 The Bid Security may be forfeited or the Bid Securing Declaration executed:

a. if a Bidder:

b. withdraws its Bid during the period of Bid Validity as specified by the Procuring Agency, and referred by the Bidder on the Form of Bids except as provided for in **ITB 17.2**; or

c. does not accept the correction of errors**;** or

d. in the case of a successful Bidder, if the Bidder fails:

e. to sign the contract; or

f. to furnish Performance Guarantee**.**

19. Withdrawal, Substitution, and Modification of Bid

19.1 Before Bid submission deadline, any Bidder may withdraw, substitute, or modify its Bid after it has been submitted through EPADS v2.0. Bids requested to be withdrawn, shall be returned unopened to the Bidders through **EPADS v2.0**.

20. Format and Signing of Bid

20.1 The Bidder shall prepare and submit Bids with due diligence after carefully reading all the terms and condition **before bid submission deadline** through EPADS v2.0.

D. Submission of Bids

21. Submission of Bids through EPADS v2.0

21.1 The Technical and Financial Bids if required to submitted, shall be submitted on **EPADS v2.0**.

22. Deadline for Submission of Bids

22.1 Bids shall be received by the Procuring Agency through **EPADS v2.0** before bid submission deadline.

22.2 The Procuring Agency may, under exceptional circumstances, extend the deadline for the submission of Bids, after recording reasons in writing and in an equal opportunity manner.

In such case, all rights and obligations of the Procuring Agency and the Bidders that were previously governed by the original deadline shall thereafter be subject to the revised deadline.

E. Opening and Evaluation of Bids

23. Opening of Bids

23.1 The Bid Evaluation Committee of the Procuring Agency shall open all Bids through the EPADS v2.0, on the date and time specified in the Bid Data Sheet (BDS).

23.2 The Bid Evaluation Committee **shall generate minutes through EPADS v2.0 containing brief details of bid opening process.** The record of the Bid opening shall include, as a minimum: the name of the Bidder, the Bid price if applicable, and the presence or absence of a Bid Security or Bid Securing Declaration.

23.3 The procuring agency shall live broadcast the opening of bids on national media or on their website or digital channels, if the volume of procurement exceeds five hundred million rupees in case of goods and services and one thousand million rupees in case of works.

23.4 In case the date of opening of bid has been declared as public holiday or the procuring agency fail to open bid due to any EPADS v2.0 related issues, the submission and opening of bids shall be shifted to the next working day on the same time.

23.5 In case of Single Stage One Envelope Procedure, the Bidders names, the Bid prices, the total amount of each Bid and, the presence or absence of Bid Security, Bid Securing Declaration and such other details as the Procuring Agency may consider appropriate, will be announced by the Bid Evaluation Committee.

24. Clarification of Bids

24.1 To assist in the examination, evaluation and comparison of Bids of the Bidders, the Procuring Agency may, ask any Bidder for a clarification of its Bid including breakdown of prices.

24.2 The request for clarification and the response shall be sought through EPADS v2.0 before **three days prior to the deadline for submission of bids.** No change in the prices or substance of the Bids shall be sought, offered, or permitted.

24.3 The alteration or modification in the BIDS which in any way affect the following parameters will be considered as a change in the substance of a Bids:

1. evaluation & qualification criteria;
2. required scope of work or specifications;
3. all securities requirements;
4. tax requirements;

5. terms and conditions of Bidding documents.

6. change in the ranking of the Bidder

24.4 From the time of Bids opening to the time of Contract award if any Bidder wishes to contact the Procuring Agency on any matter related to the Bids it should do so through **EPADS v2.0**.

25. Preliminary Examination of Bids

25.1 Prior to the detailed evaluation of Bids, the Procuring Agency will determine whether each Bid:

1. meets the eligibility criteria defined in **ITB 3**;

2. has been prepared as per the format and contents defined by the Procuring Agency in the Bidding documents;

3. is accompanied by the required securities; and

4. is substantially responsive to the requirements of the Bidding documents.

25.2 The Procuring Agency's determination of a Bid's responsiveness will be based on the contents of the Bid itself.

25.3 A substantially responsive Bid is one which conforms to all the terms, conditions, and specifications of the Bidding documents, without material deviation or reservation. A material deviation or reservation is one that: -

1. affects in any substantial way the scope, quality, or performance of the Goods;

2. limits in any substantial way, inconsistent with the Bidding documents, the Procuring Agency's rights or the Bidders obligations under the Contract; or

3. if rectified, would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.

25.3 If a Bids is not substantially responsive, it will be rejected by the Procuring Agency and may not subsequently be evaluated for complete technical responsiveness.

26. Examination of Terms and Conditions; Technical Evaluation

26.1 The Procuring Agency shall examine the Bids to confirm that all terms and conditions specified in the **GCC** and the **SCC** have been accepted by the Bidder without any material deviation or reservation.

26.2 The Procuring Agency shall evaluate the technical aspects of the Bids submitted, to confirm that all requirements specified in Schedule of Requirements and Technical Specifications of the Bidding documents have been met without material deviation or reservation.

26.3 If after the examination of the terms and conditions and the technical evaluation, the Procuring Agency determines that the Bid is not substantially responsive in accordance with **ITB 25.2,** it shall reject the Bid.

27. Correction of Errors

27.1 Bids determined to be substantially responsive will be checked for any arithmetic errors. Errors will be corrected as follows: -

1. if there is a discrepancy between unit prices and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail, and the total price shall be corrected, unless in the opinion of the Procuring Agency there is an obvious misplacement of the decimal point in the unit price, in which the total price as quoted shall govern and the unit price shall be corrected;

2. if there is an error in a total corresponding to the addition or subtraction of sub-totals, the sub-totals shall prevail and the total shall be corrected; and

3. where there is a discrepancy between the amounts in figures and in words, the amount in words will govern.

4. Where there is discrepancy between grand total of price schedule and amount mentioned on the Form of Bids, the amount referred in Price Schedule shall be treated as correct subject to elimination of other errors.

27.2 The amount stated in the Bid will, be adjusted by the Procuring Agency in accordance with the above procedure for the correction of errors and, with the concurrence of the Bidder, shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount, its Bid will then be rejected, and the Bid Security may be forfeited or the Bids Securing Declaration may be executed.

28. Conversion to Single Currency

28.1 To facilitate evaluation and comparison, the Procuring Agency will convert all Bids prices expressed in the amounts in various currencies in which the Bids prices are payable. For the purposes of comparison of bids quoted in different currencies, the price shall be converted into a single currency specified in the bidding documents. The rate of exchange shall be the selling rate prevailing on the date of opening of financial bids specified in the bidding documents, in accordance with weighted average customer exchange rates list issued by the State Bank of Pakistan on that day.

29. Evaluation of Bids

29.1 The Bids, quotations, or proposals shall be evaluated by the respective evaluation committees as per evaluation criteria described in the Bidding Documents in accordance with Rule 29 and 30 of the Public Procurement Rules, 2004.

1. Least Cost Based Selection (LCBS)
After meeting the requirements of eligibility, qualification and substantial responsiveness, the bid in compliance with all the mandatory (technical) specifications/requirements and/or requisite quality threshold (if any), and having lowest evaluated cost (or financial proposal) shall be considered Successful Bid.

2. Quality and Cost Based Selection (QCBS)
In such combination, there shall be some specific weightage of both the technical features and financial aspects of the proposal. The financial marks shall be awarded on the basis of inverse proportion calculations. The successful bid shall be declared, on the basis of combined evaluation.

3. Quality Based Selection (QBS)
Atter meeting the requirements of eligibility, qualification and substantial responsiveness the bid in compliance with all the mandatory (technical) specifications/requirements and attaining highest marks in the Technical Evaluation considering all other qualitative and/or quantitative parameters (or point rated criteria) for technical proposal(s) such as working methodology, implementation plan, resource allocation, additional functionalities, risk management approach, knowledge transfer techniques, post implementation methodology etc. shall be treated as highest ranked bid. Later on, the financial proposal of highest ranked bidder shall be opened, however, in case of failure to proceed further with such a bidder, the procuring agency may resort to second

highest bidder and so on.

29.2 In case of tie of bids, the bidders shall be provided an opportunity to offer their best and final monetary offer through EPADS v2.0. However, in no case the rates shall be higher than the original financial bids.

30. Domestic Preference

30.1 The procuring agency shall evaluate and compare bids, allow for preference to domestic bidders, while competing with the international bidders in accordance with the policies of Federal Government.

The percentage of preference, to be accorded shall be clearly mentioned in the bidding documents under the bid evaluation criteria.

31. Determination of Successful Bid

31.1 Selection technique will be adopted for determining the Successful Bid in accordance with the criteria referred in the BDS or prescribed in the separate section titled as Evaluation Criteria.

31.2 In case where the Procuring Agency adopts the Cost Based Evaluation Technique and, the Bid with the lowest evaluated price from amongst those which are eligible, compliant and substantially responsive shall be the Successful Bid.

31.3 The Procuring Agency may adopt the Quality & Cost Based Selection Technique due to the following two reasons:

1. Where the Procuring Agency knows about the main features, usage and output of the products; however not clear about the complete features, technical specifications and functionalities of the goods to be procured and requires the bidders to submit their proposals defining those features, specifications and functionalities; or

2. Where the Procuring Agency, in addition to the mandatory requirements and mandatory technical specifications, requires parameters specified in Evaluation Criteria to be evaluated while determining the quality of the goods.

31.4 In such cases, the Procuring Agency may allocate certain weightage to these factors as a part of Evaluation Criteria, and may determine the ranking of the bidders on the basis of combined evaluation in accordance with provisions of Rule 2(1)(h) of the Public Procurement Rules, 2004.

32. Abnormally Low Financial Bids

32.1Where the Bid price is considered to be abnormally low, the Procuring Agency shall perform price analysis either during determination of Successful Bids or as a part of the post-qualification process.

32.2 The Procuring Agency may reject an Abnormally low financial bids.

32.3 In order to identify the Abnormally Low Bids (ALB) following approaches can be considered to minimize the scope of subjectivity:

1. Comparing the Bids price with the cost estimate;

2. Comparing the Bids price with the Bids offered by other Bidders submitting substantially responsive Bids; and

3. Comparing the Bids price with prices paid in similar contracts in the recent past either government- or development partner-funded.

32.4 The Procuring Agency will determine to its satisfaction whether the Bidder that is selected as having submitted the successful bid is qualified to perform the contract satisfactorily.

32.5 The determination will take into account the Bidder's financial, technical, and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, as well as such other information as the Procuring Agency deems necessary and appropriate. Factors not included in these Bidding documents shall not be used in the evaluation of the Bidders' qualifications.

32.6 Procuring Agency may seek "Certificate for Independent Price Determination" from the Bidder and the results of reference checks may be used in determining an award of contract.

Explanation: The Certificate shall be furnished by the Bidder. The Bidder shall certify that the price is determined keeping in view of all the essential aspects such as raw material, its processing, value addition, optimization of resources due to economy of scale, transportation, insurance and margin of profit etc.

32.7 An affirmative determination will be a prerequisite for award of the contract to the Bidder. A negative determination will result in rejection of the Bidder's Bids, in which event the Procuring Agency will proceed to the next ranked Bidder to make a similar determination of that Bidder's capabilities to

perform satisfactorily.

F. Award of Contract

33. Criteria of Award

33.1 The Procuring Agency will award the Contract to the Bidder whose Bids has been determined to be substantially responsive to the Bidding documents and who has been declared as Most Advantageous Bidder.

34. Negotiations

34.1 The procuring agency shall not engage in negotiations with respect to scope and price with the bidder except when the procuring agency conducts a procurement using direct **or negotiated** contracting or a request for proposals with evaluation based on quality alone.

34.2 The procuring agency may negotiate with the most advantageous bid with a view to streamline the work or task execution, at the time of contract finalization on methodology, work plan, staffing, finalizing payment arrangements, delivery arrangements, minor amendments to the special conditions of the contract.

35. Procuring Agency Right to reject all bids

35.1 The Procuring Agency reserves the right to reject all bids or proposals at any time prior to the issuance of the Letter of Award, without incurring any liability, in accordance with Rule 33 of the Public Procurement Rules, 2004.

36. Procuring Agency’s Right to Vary Quantities at the Time of Award

36.1 The Procuring Agency reserves the right at the time of contract award to increase or decrease the **quantity of** Goods originally specified in these Bidding documents provided this does not exceed **by** 15%, without any change in unit price or other terms and conditions of the Bids and Bidding documents.

37. Notification of Award

37.1 Prior to the award of contract, the procuring agency shall announce and publish the result of bid evaluation on **EPADS v2.0** in accordance with Rule 35

of the Public Procurement Rules, 2004.

37.2 The Bidder whose Bids has been accepted will be notified of the award by the Procuring Agency prior to expiration of the Bids/Bid Validity period. The Letter of Award will state the sum that the Procuring Agency will pay the successful Bidder in consideration for the delivery of Goods as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price).

37.3 The Letter of award will constitute the formation of the Contract, subject to the Bidder furnishing the Performance Guarantee and signing of the contract.

38. Signing of Contract

38.1 Promptly after issuance of Letter of award, Procuring Agency shall send the successful Bidder the draft Contract, incorporating all terms and conditions as agreed by the parties to the contract.

38.2 Immediately after the Redressal of grievance by the GRC (if any), mandatory standstill period in accordance with Rule 35 of the Public Procurement Rules, 2004 and **after fulfillment of all condition's precedent** of the Contract Form, the successful Bidder and the Procuring Agency shall sign the Contract.

39. Corrupt & Fraudulent Practices

39.1 Procuring Agencies (including beneficiaries of Government funded projects and procurement) as well as Bidders/Contractors under Government financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts, and will avoid to engage in any corrupt and fraudulent practices.

F. Grievance Redressal & Complaint Review Mechanism

40. Constitution of Grievance Redressal

40.1 The Grievance Redressal Committee shall address the grievance, if any submitted by any party, including the bidder, in accordance with Rule 48 of the Public Procurement Rules, 2004 to be read with Redressal of Grievances Regulations, 2021.

40.2 In case if any party or the bidder is not satisfied with the decision of the GRC or if it fails to decide within ten days, the bidder or the party may file an appeal before the Appellate Committee of the Authority in accordance with Rule 48 of the Public Procurement Rules, 2004 to be read with Redressal of Grievances Regulations, 2021.

G. Mechanism of Blacklisting

41. Mechanism of Blacklisting

41.1 The Procuring Agency shall initiate blacklisting proceedings against any bidder, supplier, or contractor in accordance with the Mechanism for Blacklisting Regulations, 2024, read with Rule 19 of the Public Procurement Rules, 2004.

41.2 The blacklisted/debarred bidder may file the review petition before the Authority in accordance with Rule 19 of the Public Procurement Rules, 2004 to be read with Procedure of filing and disposal of Review Petitions Regulations, 2021.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Bid Data Sheet

Bids Data Sheet (BDS)

The following specific data for the procurement of Goods to be procured shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions herein shall prevail over those in ITB.

BDS Clause Number
ITB Number
Amendments of, and Supplements to, Clauses in the Instruction to Bidders

A. Introduction

BDS Clause Number 1
ITB Number 1.1

Name of Procuring Agency: **PMU HESCO (Hyderabad Electric Supply Company (HESCO))**

The subject of procurement is: **PMU-212/26-27 Procurement of Hardware Material**

Expected commencement date: **Friday, October 30, 2026**

BDS Clause Number 2
ITB Number 2.1

Financial year for the operations of the Procuring Agency: **2026-27**

Name and identification number of the Contract: **P105982**

BDS Clause Number 3
ITB Clause Number 3.1

JV/Consortium or Association Allowed: **Yes**
Number of JV/Consortium Members: **3**
see section of eligibility criteria.

B. Bidding Documents

BDS Clause Number 4
ITB Number 8.1

The Bidders may seek clarifications through **EPADS v2.0** : Clarification Date: Thursday, September 10, 2026

C. Preparation of Bids

BDS Clause Number 5
ITB Number 10.1

The Language of all correspondences and documents related to the Bids shall be in: **English**

List of documents required along with the bid:

1. Previous supply record (along with GRN/ supply Certificates etc
2. Technical data, drawings Brochures, and devitions if any

BDS Clause Number 6
ITB Number 11.1
Items/Lots and threre related documents:
See section items and Lots

BDS Clause Number 7
ITB Number 12.1

Items / Lots Specifications:

see section of items specifications.

BDS Clause Number 8
ITB Number 15.6

The price shall be **Fixed**.

BDS Clause Number 9
ITB Number 16.1

Currency of the Bids shall be : **PKR**

BDS Clause Number 10
ITB Number 17.1

The Bids/Bid Validity period shall be: **120 Days**

BDS Clause Number 11
ITB Number 18.1

The amount of Bid Security shall be as defined in Bid Security Section for items and lots given in **BDS 6**
The Bid Security shall be in the form of: **Pay Order, Banker's Cheque, Call at Deposit, Bank Guarantee, Demand Draft**

D. Submission of Bids

BDS Clause Number 12
ITB Number 20.1

Bid shall be submitted online on EPADS v2.0 whereas hard copy of the bid security should be submitted to the following;

PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). before bid submission deadline.

Bids that are not submitted on EPADS v2.0 shall be disqualified.

The deadline for Bids submission is: **Tuesday, September 22, 2026 11:30 AM**

E. Opening and Evaluation of Bids

BDS Clause Number 13
ITB Number 23.1

The Bids opening shall take place on **EPADS v2.0**.

Day *:* ***Tuesday***

Date: ***Tuesday, September 22, 2026***

Time *:* ***12:00 PM***

BDS Clause Number 14
ITB Number 31.1

Selection technique adopted will be: **Least Cost Based Selection (LCBS)**
see Evaluation Criteria

F. Review of Procurement Decisions

BDS Clause Number 15
ITB Number 41.1

Grievence against this procurement shall be submitted online on EPADS v2.0.

Arbitrator shall be appointed by mutual consent of the both parties.

Eligibility Criteria

Bidder's Type	Required Registration
Sole Proprietorship	NADRA CITIZENSHIP (CNIC/NICOP)
Partnership Firm	FBR (NTN)
Company (Private Limited)	FBR (GSTN)
Company (Public Limited)	

Evaluation Criteria

Eligibile bidder(s) with substantially responsive bid(s) offering **Least Cost Based Selection (LCBS)** shall be consider for the award of contract(s).

Least Cost Based Selection (LCBS)

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Items/Lots

Items Without Lots :

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Connector TMLH	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 60/Qty	60/Qty	15000 PKR	Manufacturer Authorization form	2 Years
Connector TM63A	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 27/Qty	27/Qty	30000 PKR	Manufacturer Authorization form	2 Years

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Connector 90B40F	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 21/Qty	21/Qty	15000 PKR	Manufacturer Authorization form	2 Years
Connector TMHH	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 90/Qty	90/Qty	100000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Connector TM40A	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 18/Qty	18/Qty	7000 PKR	Manufacturer Authorization form	2 Years
Connector TM75A	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 30/Qty	30/Qty	10000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Connector 90BH30	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 60/Qty	60/Qty	50000 PKR	Manufacturer Authorization form	2 Years
Connector 90BH40	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 60/Qty	60/Qty	100000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Connector 90B75F	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 6/Qty	6/Qty	7000 PKR	Manufacturer Authorization form	2 Years
Connector 90B63F	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 6/Qty	6/Qty	7000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Connector TM63F	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 3/Qty	3/Qty	5000 PKR	Manufacturer Authorization form	2 Years
Connector TMLL	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 150/Qty	150/Qty	50000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Single Tension Fitting for Lynx Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 99/set	99/set	150000 PKR	Manufacturer Authorization form	2 Years
Single Tension Assembly for Hawthorn Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 33/Qty	33/Qty	50000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Single Suspension Clamp for Greely Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 45/Qty	45/Qty	15000 PKR	Manufacturer Authorization form	2 Years
Single Suspension Clamp for LYNX Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 1500/Qty	1500/Qty	1300000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Single Suspension Clamp for DOG Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 60/Qty	60/Qty	20000 PKR	Manufacturer Authorization form	2 Years
Single Suspension fitting for Lynx Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 391/set	391/set	350000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Single Suspension Fitting for Greely Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 817/set	817/set	250000 PKR	Manufacturer Authorization form	2 Years
Stock Bridge Damper for Lynx Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 2060/Qty	2060/Qty	150000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Stock Bridge Damper for Greely Condutor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 1094/Qty	1094/Qty	700000 PKR	Manufacturer Authorization form	2 Years
Dead end Clamp for Greely Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 30/Qty	30/Qty	15000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Dead end Clamp for LYNX Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 60/Qty	60/Qty	30000 PKR	Manufacturer Authorization form	2 Years
Dead end Clamp for DOG Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 30/Qty	30/Qty	7000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Double Suspension fiiting for Rail Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 6/set	6/set	10000 PKR	Manufacturer Authorization form	2 Years
Double Tension Fitting for Rail Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 18/set	18/set	50000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Mid Span Joint For Lynx Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 60/Qty	60/Qty	7000 PKR	Manufacturer Authorization form	2 Years
Mid Span Joint For Greely Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 367/Qty	367/Qty	200000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Mid Span Joint For Rail Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 10/Qty	10/Qty	7000 PKR	Manufacturer Authorization form	2 Years
Repair Sleeves for Greely Condutor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 165/Qty	165/Qty	7000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
Repair Sleeves for LYNX Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 200/Qty	200/Qty	15000 PKR	Manufacturer Authorization form	2 Years
PG Clamp for LYNX (3-bolted)	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 6000/Qty	6000/Qty	1400000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
P.G Clamps for Dog Conductor (2-bolted)	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 300/Qty	300/Qty	30000 PKR	Manufacturer Authorization form	2 Years
P.G Clamp for Rail Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 183/Qty	183/Qty	15000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
P.G Clamp for Greely Conductor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 1454/Qty	1454/Qty	200000 PKR	Manufacturer Authorization form	2 Years
P.G Clamps for Cairo Condutor	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 236/Qty	236/Qty	30000 PKR	Manufacturer Authorization form	2 Years

Item	UNSPSC	Delivery Schedule	Quantity	Bid Security	Manufacturer / Dealer Authorization	Warranty
U Bolt Zm type Tower	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 120/Qty	120/Qty	20000 PKR	Manufacturer Authorization form	2 Years
Earth Wire Tension Assembly With G Clamp	Point of sale hardware maintenance and support service	**Address:** PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province). **Schedule:** 120 Days **Quantity:** 10/Qty	10/Qty	15000 PKR	Manufacturer Authorization form	2 Years

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Related Services of Goods:

No

Items/Lot Specification

Items Without Lots :

Item: Connector TMLH

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector TM63A

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector 90B40F

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector TMHH

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector TM40A

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector TM75A

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector 90BH30

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector 90BH40

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector 90B75F

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector 90B63F

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector TM63F

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Connector TMLL

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Tension Fitting for Lynx Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Tension Assembly for Hawthorn Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Suspension Clamp for Greely Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Suspension Clamp for LYNX Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Suspension Clamp for DOG Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Suspension fitting for Lynx Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Single Suspension Fitting for Greely Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Stock Bridge Damper for Lynx Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Stock Bridge Damper for Greely Condutor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Dead end Clamp for Greely Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Dead end Clamp for LYNX Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Dead end Clamp for DOG Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Double Suspension fiiting for Rail Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Double Tension Fitting for Rail Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Mid Span Joint For Lynx Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Mid Span Joint For Greely Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Mid Span Joint For Rail Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Repair Sleeves for Greely Condutor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Repair Sleeves for LYNX Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: PG Clamp for LYNX (3-bolted)

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: P.G Clamps for Dog Conductor (2-bolted)

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: P.G Clamp for Rail Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: P.G Clamp for Greely Conductor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: P.G Clamps for Cairo Condutor

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: U Bolt Zm type Tower

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

Item: Earth Wire Tension Assembly With G Clamp

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

UNSPSC: Point of sale hardware maintenance and support service

Specifications / Requirementsss:

as per NTDC/WAPDA Specification documents attached

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Price Schedule

For Individual Items

#	Item Title	Quantity	Unit Price (PKR)	Total Price (PKR)	Delivery Location	Delivery Period / Year	Country of Origin
1							
2							

For Lots

#	Lot Title	Total Lot Price (PKR)	Country of Origin
1	[Lot 1 Title]		

PUBLIC PROCUREMENT REGULATORY AUTHORITY
(PPRA)
EPADS

General Conditions of Contract

A. General

1. Definitions

1.1 Unless the context otherwise requires, the following terms whenever used in this Contract shall have the same meaning and shall be interpreted as indicated

a. “Applicable Law” means the laws and any other instruments having the force of law in the Government’s Country, or in such other country as may be specified in the Special Conditions of the Contract (SC), as they may be issued and in force from time to time;

b. “Procuring Agency” means:-

a. any Ministry, Division, Department or any Office of the Government;

b. any authority, corporation, body or organization established by or under a Law or which is owned or controlled by the Government;.

c. “The Contract” means an agreement enforceable by law;

d. “The Contract Price” means the price payable to the Bidder under the Contract for the full and proper performance of its contractual obligations;

e. “Ancillary Services” means those services ancillary to the provision of Goods, such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training, and other such obligations of the Bidder covered under the Contract;

f. “GCC” means the General Conditions of Contract contained in this section;

g. “SCC” means the Special Conditions of Contract by which the GCC may be amended or supplemented;

h. **“**Day” means calendar day unless indicated otherwise.

i. “Effective Date” means the date on which this Contract comes into force and effect.

j. The Bidder” means the individual or corporate body whose Bids to provide the Goods has been accepted by the Procuring Agency;

k. “The Project Site,” where applicable, means the place or places named in Bids Data Sheet and technical Specifications;

l. “Government” means the Government of Pakistan;

m. “Subcontractor” means any entity to which the Bidder subcontracts any part of the Goods.

n. "Service" means any object of procurement other than goods or works;

o. “Party” means the Procuring Agency or the Bidder, as the case may be, and “Parties” means both of them;

p. “Foreign Currency” means any currency other than the currency of the country of the Procuring Agency;

q. “Completion Date” means the date of completion of the contract by the Bidder as certified by the Procuring Agency;

r. “In Writing” means communicated in written form with proof of receipt;

s. “Local Currency” means the currency of Pakistan;

2. Application and Interpretation

2.1 These General Conditions shall apply to the extent that they are not superseded by provisions of other parts of the Contract.

2.2 In interpreting these Conditions of Contract headings and marginal notes are used for convenience only and shall not affect their interpretations unless specifically stated; references to singular include the plural and vice versa; and masculine include the feminine. Words have their ordinary meaning under the language of the Contract unless specifically defined.

3. Applicable Law

3.1 The contract shall be governed and interpreted in accordance with the laws of Pakistan, unless otherwise specified in SCC.

4. Governing Language

4.1 The Contract as well as all correspondence and documents relating to the Contract exchanged between the Bidder and the Procuring Agency, shall be written in the **English language** unless otherwise stated in the **SCC**. Supporting documents and printed literature that are part of the Contract may be in another language provided these are accompanied by an accurate translation of the relevant passages in English, in which case, for purposes of interpretation of the Contract, this translation shall govern.

5. Notices

5.1 Any notice, request, or consent made pursuant to this Contract shall be in writing and shall be deemed to have been made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent by registered mail, telex, telegram, or facsimile to such Party at the address specified in the **SCC**.

6. Delivery/Location

6.1 The Goods shall be delivered to such locations as the Procuring Agency may approve and as specified in SCC.

7. Authorized Representatives / Authority of Member in charge

7.1 Any action required or permitted to be taken, and any document required or permitted to be executed, under this Contract by the Procuring Agency or the Bidder may be taken or executed by the officials specified in the **SCC**.

B. Commencement, Completion, Modification, and Termination of Contract

8. Effectiveness of Contract

8.1 This Contract shall come into effect on the date the Contract is signed by both parties and such other later date as may be stated in the SCC.

9. Commencement of Services

9.1 The Bidder shall confirm availability of Key Experts and begin carrying out the Services not later than the number of days after the Effective Date specified in the SCC.

10. Program

10.1 Before commencement of the Services, the Bidder shall submit to the Procuring Agency for approval a Program showing the general methods, arrangements, order and timing for all activities. The Services shall be carried out in accordance with the approved Program as updated.

11. Starting Date/Expiration Date

11.1 The Bidder shall start carrying out the Services Five (05) days after the date the Contract becomes effective, or at such other date as may be specified in the **SCC.**

11.2 Unless terminated earlier pursuant to Clause **GCC 15** hereof, this Contract shall expire at the end of such time period after the Effective Date as specified in the SCC.

12. Entire Agreement

12.1 This Contract contains all covenants, stipulations and provisions agreed by the Parties. No agent or representative of either Party has authority to make, and the Parties shall not be bound by or be liable for, any statement, representation, promise or agreement not set forth herein.

13. Modification

13.1 Any modification or variation of the terms and conditions of this Contract, including any modification or variation of the scope of the Services, may only be made by written agreement between the Parties. However, each Party shall give due consideration to any Bids for modification or variation made by the other Party.

13.2 In cases of any modifications or variations, the prior written consent of the Procuring Agency is required.

14. Force Majeure

14.1 Definition

For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party and which makes a Party's performance of its obligations under the Contract impossible or so impractical as to be considered impossible under the circumstances.

14.2 No Breach of Contract

The failure of a Party to fulfill any of its obligations under the contract shall not be considered to be a breach of, or default under, this Contract in so far as such inability arises from an event of Force Majeure, provided that the Party affected by such an event (a) has taken all reasonable precautions, due care and reasonable alternative measures in order to carry out the terms and conditions of this Contract, and (b) has informed the other Party as soon as possible about the occurrence of such an event.

14.3 Extension of Time

Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result

of Force Majeure.

14.4 Payments

During the period of their inability to perform the Services as a result of an event of Force Majeure, the Bidder shall be entitled to continue to be paid under the terms of this Contract, as well as to be reimbursed for additional costs reasonably and necessarily incurred by them during such period for the purposes of the Services and in reactivating the Service after the end of such period.

15. Termination

15.1 By the Procuring Agency

The Procuring Agency may terminate this Contract in case of the occurrence of any of the events specified in paragraphs (a) through (e) of this Clause. In such an occurrence the Procuring Agency shall give at least thirty (30) calendar days' written notice of termination to the Bidder in case of the events referred to in (a) through (d); at least sixty (60) calendar days' written notice in case of the event referred to in (e);

a. If the Bidder fails to remedy a failure in the performance of its obligations hereunder, as specified in a notice of suspension;

b. If the Bidder becomes (or, if the Bidder consists of more than one entity, if any of its members becomes) insolvent or bankrupt or enter into any agreements with their creditors for relief of debt or take advantage of any law for the benefit of debtors or go into liquidation or receivership whether compulsory or voluntary;

c. If the Bidder fails to comply with any final decision reached as a result of arbitration proceedings;

d. If, as the result of Force Majeure, the Bidder is unable to perform a material portion of the Services for a period of not less than sixty (60) calendar days;

e. If the Procuring Agency, in its sole discretion and for any reason whatsoever, decides to terminate this Contract;

15.2 By the Bidder

The Bidder may terminate this Contract, by not less than thirty (30) calendar days' written notice to the Procuring Agency, in case of the occurrence of any of the events specified in paragraphs (a) through (d) of this Clause.

a. If the Procuring Agency fails to pay any money due to the Bidder pursuant to this Contract and not subject to dispute within forty-five (45) calendar days after receiving written notice from the Bidder that such payment is overdue.

b. If, as the result of Force Majeure, the Bidder is unable to perform a material portion of the Services for a period of not less than sixty (60) calendar days.

c. If the Procuring Agency fails to comply with any final decision reached as a result of arbitration.

d. If the Procuring Agency is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-five (45) days (or such longer period as the Bidder may have subsequently approved in writing) following the receipt by the Procuring Agency of the Bidder's notice specifying such breach.

C. Obligations of the Bidder

16. General

16.1 Standard of Performance

1. The Bidder shall deliver the product and carry out the Services with all due diligence, efficiency and economy, in accordance with generally accepted professional standards and practices, and shall observe sound management practices, and employ appropriate technology and safe and effective equipment, machinery, materials and methods. The Bidder shall always act, in respect of any matter relating to this Contract or to the Services, as a faithful adviser to the Procuring Agency, and shall at all times support and safeguard the Procuring Agency's legitimate interests in any dealings with the third parties.

16.2 Law Applicable to Goods

The Bidder shall deliver the goods in accordance with the Contract and in accordance with the Law of Pakistan and shall take all practicable steps to ensure that any of its Experts and Sub-Bidders, comply with the Applicable Law.

17. Conflict of Interests

17.1 Bidder Not to Benefit from Commissions and Discounts.

The remuneration of the Bidder shall constitute the Bidder's sole remuneration in connection with this Contract or the Services, and the Bidder shall not accept for their own benefit any trade commission, discount, or similar payment in connection with activities pursuant to this Contract or to the Services or in the discharge of their obligations under the Contract, and the Bidder shall use their best efforts to ensure that the Personnel, any Subcontractors, and agents of either of them similarly shall not receive any such additional remuneration.

17.2 Bidder and Affiliates Not to be Otherwise Interested in Project

The Bidder agree that, during the term of this Contract and after its termination, the Bidder and its affiliates, as well as any Subcontractor and any of its affiliates, shall be disqualified from providing Goods for any project resulting from or closely related to the Services.

17.3 Prohibition of Conflicting Activities

Neither the Bidder nor its Subcontractors nor the Personnel shall engage, either directly or indirectly, in any of the following activities:

a. during the term of this Contract, any business or professional activities in the Government's country which would conflict with the activities assigned to them under this Contract;

b. during the term of this Contract, neither the Bidder nor their Subcontractors shall hire public employees in active duty or on any type of leave, to perform any activity under this Contract;

18. Confidentiality

18.1 Except with the prior written consent of the Procuring Agency, the Bidder and the Experts shall not at any time communicate to any person or entity any confidential information acquired in the course of the contract.

19. Insurance to be Taken Out by the Bidder

19.1 The Bidder(a) shall take out and maintain, and shall cause any Subcontractors to take out and maintain, at its (or the Subcontractors', as the case may be) own cost but on terms and conditions approved by the Procuring Agency, insurance against the risks, loss or damage, and for the coverage, as shall be specified in the SCC; and (b) at the Procuring Agency's request, shall provide evidence to the Procuring Agency showing that such insurance has been taken out and maintained and that the current premiums have been paid.

20. Bidder's Actions Requiring Procuring Agency's Prior Approval

20.1 The Bidder shall obtain the Procuring Agency's prior approval in writing before taking any of the following actions:

(a) appointing such members of the Personnel not provided by the Bidder;

(b) changing the Program of activities; and

(c) any other action that may be specified in the SCC.

21. Reporting Obligations

21.1 The Bidder shall submit to the Procuring Agency the reports and documents in the numbers, and within the periods as prescribed by the Procuring Agency.

22. Liquidated Damages

22.1 If the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) specified in the Contract, the Procuring Agency shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in **SCC** of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the performance security (or guarantee) specified in **SCC**. Once the said maximum is reached, the Procuring Agency may consider termination of the Contract pursuant to **GCC Clause 15.**

22.2 Correction for Over-payment

If the Intended Completion Date is extended after liquidated damages have been paid, the Procuring Agency shall correct any overpayment of liquidated damages by the Bidder by adjusting the next payment certificate. The Bidder shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in SCC.

22.3 Lack of performance penalty

If the Bidder has not corrected a Defect within the time specified in the Procuring Agency's notice, a penalty for Lack of performance will be paid by the Bidder. The amount to be paid will be calculated as a percentage of the cost of having the Defect corrected, assessed as specified in the SCC.

23. Performance Guarantee

23.1 Within Seven (07) days from the issuance of acceptance letter from the Procuring Agency, the successful Bidder shall furnish the Performance Guarantee in shape of ------- at the discretion of the PA in the amount **specified in SCC.** In case the amount of Bids security is equal or greater than

23.2 The proceeds of the Performance Guarantee shall be payable to the Procuring agency as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

23.3 The Performance Guarantee shall be denominated in the currency of the Contract, or in a freely convertible currency acceptable to the Procuring agency and shall be in the acceptable form as specified in SCC.

23.4 The Performance Guarantee will be discharged by the Procuring agency and returned to the Supplier not later than thirty (30) days following the date of completion of the Supplier's performance obligations under the Contract, including any warranty obligations, unless otherwise **specified in SCC.**

24. Fraud and Corruption

24.1 The Procuring Agency requires the Supplier to disclose any commissions or fees that may have been paid or are to be paid to agents or any other party with respect to the Bidding process or execution of the Contract. The information disclosed must include at least the name and address of the agent or other party, the amount and currency, and the purpose of the commission, gratuity or fee.

25. Sustainable Procurement

25.1 The Bidder shall conform to the sustainable procurement contractual provisions, if and as specified in the SCC.

D. Bidder's Personnel

26. Description of Personnel

26.1 The titles, agreed job descriptions, minimum qualifications, and estimated periods of engagement in the carrying out of the Services of the Bidder's Key Personnel. The Key Personnel listed by title as well as by name are hereby approved by the Procuring Agency.

27. Removal and/or Replacement of Personnel

27.1 Except as the Procuring Agency may otherwise agree, no changes shall be made in the Key Personnel. If, for any reason beyond the reasonable control of the Bidder, it becomes necessary to replace any of the Key Personnel, the Bidder shall provide as a replacement a person of equivalent or better qualifications.

27.2 If the Procuring Agency finds that any of the Personnel have (i) committed serious misconduct or have been charged with having committed a criminal action, or (ii) have reasonable cause to be dissatisfied with the performance of any of the Personnel, then the Bidder shall, at the Procuring Agency's written request specifying the grounds thereof, provide as a replacement a person with qualifications and experience acceptable to the Procuring Agency.

27.3 The Bidder shall have no claim for additional costs arising out of or incidental to any removal and/or replacement of Personnel.

E. Obligations of the Procuring Agency

28. Assistance and Exemptions

28.1 The Procuring Agency shall use its best efforts to ensure that the Government shall provide the Bidder such assistance and exemptions as specified in the SCC.

29. Change in the Applicable Law

29.1 If, after the date of this Contract, there is any change in the Applicable Law with respect to taxes and duties which increases or decreases the cost of the related Services rendered by the Bidder, then the remuneration and reimbursable expenses otherwise payable to the Bidder under this Contract shall be increased or decreased accordingly by agreement between the Parties, and corresponding adjustments shall be made to the amounts referred in the SCC.

30. Services and Facilities

30.1 The Procuring Agency shall make available to the Bidder and the Experts, for the purposes of the Services and free of any charge, the services, facilities and property described , at the times and in the manner specified in the SCC or terms of reference.

30.2 In case that such services, facilities and property shall not be made available to the Bidder, the Parties shall agree on (i) any time extension that it may be appropriate to grant to the Bidder for the performance of the Services, (ii) the manner in which the Bidder shall procure any such services, facilities and property from other sources, and (iii) the additional payments, if any, to be made to the Bidder as a result thereof.

F. Payments to the Bidder

31. Contract Price

31.1 The price payable shall be in Pakistani Rupees unless otherwise specified in the SCC. Prices charged by the Supplier for Goods delivered under the Contract shall not vary from the prices quoted by the Supplier in its Bid.

32. Terms and Conditions of Payment

32.1 Payments will be made to the Bidder according to the payment schedule stated in the SCC and as per actual invoice submitted by the Bidder.

32.2 Unless otherwise stated in the SCC, the advance payment shall be made against the provision by the Bidder of a bank guarantee for the same amount, and shall be valid for the period stated in the SCC. Any other payment shall be made after the conditions listed in the SCC for such payment have been met, and the Bidder have submitted an invoice to the Procuring Agency specifying the amount due.

33. Currency of Payment

33.1 Any payment under this Contract shall be made in the currency(ies) specified in the SCC.

G. Quality Control

34. Identifying Defects

34.1 The principle and modalities of Inspection of the Goods by the Procuring Agency shall be as indicated in the SCC. The Procuring Agency shall check the Bidder’s performance and notify him of any Defects that are found. Such checking shall not affect the Bidder’s responsibilities. The Procuring Agency may instruct the Bidder to search for a Defect and to uncover and test any service that the Procuring Agency considers may have a Defect. Defect Liability Period is as defined in the SCC.

35. Correction of Defects,and

Lack of Performance Penalty

35.1 The Procuring Agency shall give notice to the Bidder of any Defects before the end of the Contract. The Defects liability period shall be extended for as long as Defects remain to be corrected.

35.2 Every time notice a Defect is given, the Bidder shall correct the notified Defect within the length of time specified by the Procuring Agency's notice.

35.3 If the Bidder has not corrected a Defect within the time specified in the Procuring Agency's notice, the Procuring Agency will assess the cost of having the Defect corrected, the Bidder will pay this amount, and a Penalty for Lack of Performance.

36. Taxes and Duties

36.1 A Supplier shall be entirely responsible for all taxes, duties, fees, etc., incurred until delivery of the contracted Goods to the Procuring Agency.

H. Settlement of Disputes

37. Alternate Dispute Resolution

37.1 The disputes between the parties to the contract may be settled in accordance with Public Procurement Rules, 2004.

37.2 The procuring agency shall refer the matter to the Chief Justice Islamabad High Court or Managing Director PPRA or the Secretary Ministry of Law & Justice for appointment of Arbitrator.

37.3 The fee for the Arbitrator shall be specified in Pak Rupees as determined by the appointing authority which shall be borne and shared equally by the contracting parties.

Special Conditions of Contract

SECTION VIII. SPECIAL CONDITIONS OF CONTRACT

The following Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the Conditions of Contract. The corresponding clause number of the GCC is indicated in parentheses.

Number of GC Clause

Amendments of, and Supplements to, Clauses in the General Conditions of Contract

Number of GC Clause 1

Definitions

The Procuring Agency is: PMU HESCO (Hyderabad Electric Supply Company (HESCO)), Assistant Manager Procurement PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province).

The Supplier is:

The title of the subject procurement is: PMU-212/26-27 Procurement of Hardware Material

Number of GC Clause 3

Applicable/Governing Law:

The Contract shall be interpreted in accordance with the laws of Islamic Republic of Pakistan

Number of GC Clause 4

Language:

The language of the Contract, all correspondence and communications to be given, and all other documentation to be prepared and supplied under the Contract shall be in **English.**

Number of GC Clause 5

Notices:

The addresses for the notices are:

Procuring Agency:

PMU HESCO (Hyderabad Electric Supply Company (HESCO)), Assistant Manager Procurement
PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province).
+92-337-219-2717
amprocpmu@hesco.gov.pk

Contractor/ Bidder:

[Name, address and telephone number].

The Contractor/ Bidder’s Representative(s)

[Name, address, telephone number and e-mail address]

Number of GC Clause 7.1

The Authorized Representatives are:

For the Procuring Agency:

PMU HESCO (Hyderabad Electric Supply Company (HESCO)), Assistant Manager Procurement
PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province).
+92-337-219-2717
amprocpmu@hesco.gov.pk

For the Bidder:

Name: ……

Designation: ……..

Address: ……..

Number of GC Clause 8

Effectiveness of the contract

Number of GC Clause 9

Commencement of Contract:

Number of GC Clause 11.2

Expiration of Contract:

Number of GC Clause 15

Termination

In the event of termination of the contract due to any reason as already defined in the General Conditions of Contract, the Bidder shall be responsible for providing to the Authority the Goods till the time of alternate arrangements.

Number of GC Clause 17

Conflict of Interest:

The Procuring Agency reserves the right to determine on a case-by-case basis whether the Bidder should be disqualified from providing goods or services due to a conflict of a nature described in Clause GCC 17**.**

Number of GC Clause 22

Liquidated Damages

If the Bidder fails to provide services as required under the contract or in case of any data loss/data breach or any incident compromising the data security or other such failures related to any services, the Bidder shall pay to the Procuring Agency as Liquidated Damages at a rate of **0.06%** to **10.00%** of the Contract value, in

accordance with the extent of performance failure & the cost of investigating such incidents as judged by the Authority.

Number of GC Clause 23

Performance Guarantee:

The amount of performance guarantee shall be **10.00%** of the contract price in acceptable form of **Bank Guarantee**

Number of GC Clause 32

Payment terms:

Payment will be made to the Bidder against the procured Goods and services according to the actual invoice or running bills submitted by the Bidder against the services provided within the time given in the conditions of the contract.

Number of GC Clause 33

Currency of Payment:

All the payment to be released to the contractor/Bidder shall be in Pakistani Rupees.

Number of GC Clause 34

Identifying Defects:

The Authority reserves the right at any time to inspect the premises of the provider to inspect the goods and monitor the goods being provided.

Inspections & Tests Requirements

For being Brand New, bearing relevant reference numbers of the equipment (Certificate from supplier)

For the Country of Origin as quoted by the Supplier (Certificate from manufacturer)

For conformance to specifications and performance parameters, through Prior to delivery inspection (Inspection Report by Procurement Committee / Inspection Team)

Two authorized representatives of Director General (Procurement) will carry out pre delivery inspection at manufacturer works at supplier expenses including travelling (return air tickets for places of inspection located out of Hyderabad), local transportation, boarding & lodging in any A class accommodation and daily allowance (including travel time), as per Govt. of Pakistan Policy. The said payment will be made to the inspectors before issuance of Inspection Certificate.

Delivery & Documents

Supplier’s invoice in triplicate showing Goods’ description, quantity, unit price, and total amount

Delivery Challan duly acknowledged and signed by the consignee.

GRN issued by concerned Deputy Manager, Regional Store HESCO MCPL Workshop Jamshoro.

Warranty Certificate as per warranty clause.

Inspection Certificate as per inspection clause

Confirmation letter of acceptance of performance Bond/Security by the Manager (Procurement) PMU HESCO.

Certificate to the effect that the billed amount has not been claimed or received earlier (Non-payment certificate).

Professional Tax paid certificate by the firm (if applicable).

All Federal & Provincial Taxes will be applied as per prevailing laws.

Copy of General Sales Tax/Excise Duty Invoice.

the manufacturer/supplier in its invoices shall also give an undertaking, in case of omission of any deductible amount; HESCO's claim at any later stage (through pre-audit / post audit) shall be acceptable to them.

As per directions of FBR dated. 3.9.2015 conveyed vide C.E (Operation) PEPCO vide letter No. 1918-28 dated. 17.09.2015, the payment to the registered persons may be linked with the active taxpayer status of the suppliers as per FBR database.

Integrity pact (if applicable) on prescribed Performa duly signed and stamp.

Visual inspection certificate issued by inspector at the time of delivery in store.

Visual inspection certificate confirming the quantity, accessories (if any), packaging etc are consistent with relevant contract Clauses issued by Deputy Manager Regional Store at the time of delivery in store.

Sales Tax return cum payment Challan for the month of delivery of material.

Copy of GRN duly stamped and signed by the respective consignees.

Sales Tax Invoice as per GRN above.

Any increase/decrease in the existing tariff of custom duty/Sales tax or any other tax is imposed or charged by the Government of Pakistan/Provincial Government, the same will be adjusted by the Manager Project Financing PMU on production of documentary evidence.

Number of GC Clause 37

Following is the guidance for Dispute Resolution

i. If any dispute of any kind whatsoever shall arise between the Authority and the Bidder in connection with or arising out of the Contract, including without prejudice to the generality of foregoing, any question regarding its existence, validity, termination and the execution of the Contract – whether during developing phase or after their completion and whether before or after the termination, abandonment or breach of the Contract – the parties shall seek to resolve any such dispute or difference by mutual diligent negotiations in good faith within 14 (fourteen) days following a notice sent by one Party to the other Party in this regard**.**

ii. At future of negotiation the dispute shall be resolved through mediation and mediator shall be appointed with the mutual consent of the both parties**.**

iii. At the event of failure of mediation to resolve the dispute relating to this contract such dispute shall finally be resolved through binding Arbitration by sole arbitrator in accordance with Arbitration Act 1940. The arbitrator shall be appointed by mutual consent of the both parties**.** The Arbitration shall take place in Islamabad, Pakistan and proceedings will be conducted in English language.

iv. The cost of the mediation and arbitration shall be shared by the parties in equal proportion however the both parties shall bear their own costs and lawyer's fees regarding their own participation in the mediation and arbitration. However, the Arbitrator may make an award of costs upon the conclusion of the arbitration making any party to the dispute liable to pay the costs of another party to the dispute**.**

v. Arbitration proceedings as mentioned in the above clause regarding resolution of disputes may be commenced prior to, during or after completion of the contract.

Notwithstanding any reference to the arbitration herein, the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree that the Authority shall pay the Bidder any monies due to the Bidder.

Rules of procedure for arbitration proceedings:

Any dispute between the Authority and a Bidder who is a national of the Islamic Republic of Pakistan arising in connection with the present Contract shall be referred to adjudication or arbitration in accordance with the laws of the Islamic Republic of Pakistan including Arbitration Act 1940, however above provision shall prevail in referring the case to the Arbitrator.

Place of Arbitration and Award:

The arbitration shall be conducted in English language and place of arbitration shall be at Islamabad. The award of the arbitrator shall be final and shall be binding on the parties.

Bid Securing Declaration

Form 9: Bid Securing Declaration

Date: *[insert date (as day, month and year)]*

Bid No.:***P105982***

To: **PMU HESCO (Hyderabad Electric Supply Company (HESCO)), Assistant Manager Procurement PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province).**

We, the undersigned, declare that:

We understand that, according to your conditions, Bids must be supported by a Bid Securing Declaration.

We accept that we will be blacklisted and henceforth cross debarred for participating in respective category of public procurement proceedings for a period of (not more than) six months, if fail to abide with a bid securing declaration, however without indulging in corrupt and fraudulent practices, if we are in breach of our obligation(s) under the Bid conditions, because we:

1. have withdrawn or modified our Bid during the period of Bid Validity specified in the Form of Bid;

2. Disagreement to arithmetical correction made to the Bid price; or

3. having been notified of the acceptance of our Bid by the Procuring Agency during the period of Bid Validity, (i) failure to sign the contract if required by Procuring Agency to do so or (ii) fail or refuse to furnish the Performance Security or to comply with any other condition precedent to signing the contract specified in the Bidding Documents.

We understand this Bid Securing Declaration shall expire if we are not the successful

Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight (28) days after the expiration of our Bid.

Contract Form

SECTION IX: CONTRACT FORMS

THIS AGREEMENT made the _____ day of _____ 20_____ between **PMU HESCO (Hyderabad Electric Supply Company (HESCO)), Assistant Manager Procurement PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province).**

(hereinafter called "the Procuring Agency") of the one part and *[name of Bidder]* of *[city and country of Bidder]* (hereinafter called "the Bidder") of the other part:

WHEREAS the Procuring Agency invited Bids for provision of goods, viz., **PMU-212/26-27 Procurement of Hardware Material (*P105982*)** and has accepted a Bids by the Bidder for the provision of Goods in the sum of *[contract price in words and figures]* (hereinafter called "the Contract Price").

NOW THIS CONTRACT WITNESSETH AS FOLLOWS:

1. In this Contract words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Contract, In the event of any ambiguity or conflict between the Contract Documents listed below, the order of precedence shall be the order in which the Contract Documents are listed below:-

1. This form of Contract;
2. the Form of Bids and the Price Schedule submitted by the Bidder;
3. the Schedule of Requirements;
4. the Technical Specifications;
5. the Special Conditions of Contract;
6. the General Conditions of the Contract;
7. the Procuring Agency's Letter of Acceptance; and
8. [*add here: any other documents*]

3. In consideration of the payments to be made by the Procuring Agency to the Bidder as hereinafter mentioned, the Bidder hereby covenants with the Procuring Agency to provide the Goods related services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Procuring Agency hereby covenants to pay the Bidder in consideration of the provision of Goods and the remedying of defects therein, the Contract Price or such other sum as may become payable under the

provisions of the contract at the times and in the manner prescribed by the contract.

IN WITNESS whereof the parties hereto have caused this Contract to be executed in accordance with their respective laws the day and year first above written.

Signed, sealed, delivered by _____the _____ (for the Procuring Agency)

Witness to the signatures of the Procuring Agency:

……

Signed, sealed, delivered by _____the _____ (for the Procuring Agency)

Witness to the signatures of the Bidder: ……

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

Integrity Pact

Integrity Pact

DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC. PAYABLE BYTHE SUPPLIERS OF GOODS, SERVICES & WORKS IN CONTRACTS WORTH RS.10.00 MILLION OR MORE

Contract Number: Contract Value: Contract Title:

Dated:

[Name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan or any administrative subdivision or agency thereof or any other entity owned or controlled by it (GoP) through any corrupt business practice.

Without limiting the generality of the foregoing [Name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fee etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultations fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.

[Name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representative or warranty.

[Name of Supplier] accepts full responsibility and strict liability for making and false declaration, not making full disclosure, misrepresenting fact or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, [Name of Supplier] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by [Name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

Performance Guarantee Form

Performance Guarantee Form

To: **PMU HESCO (Hyderabad Electric Supply Company (HESCO)), Assistant Manager Procurement PMU Office, Banglow No. A-1, Power Wing Colony, Hussainabad., Hyderabad, Hyderabad (District), Hyderabad (Division), Sindh (Province).**

WHEREAS *[name of Bidder]* (hereinafter called "the Bidder") has undertaken, in pursuance of Contract No. *[reference number of the contract]* dated *[insert date]* for provision of Goods*(*hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Bidder shall furnish you with a Bank Guarantee by a reputable bank for the sum specified therein as security for compliance with the Bidder's performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Bidders guarantee:

THEREFORE, WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Bidder, up to a total of *[amount of the guarantee in words and figures]*, and we undertake to pay you, upon your first written demand declaring the Bidder to be in default under the Contract and without cavil or argument, any sum or sums within the limits of *[amount of guarantee]* as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the: *[insert date]*

Signature and seal of the Guarantors

_____

[name of bank or financial institution]

_____

[address]

_____

[date}

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Annexure

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Technical Specifications/requirement

Bidder offer the material as per the specification/requirement attached.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifications/requirement** (page number: 97)

Technical Specifications/requirement

Bidder offer the material as per the specification/requirement attached.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifications/requirement** (page number: 99)

Technical Specifications/requirement

Bidder offer the material as per the specification/requirement attached.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifications/requirement** (page number: 115)

Technical Specifications/requirement

Bidder offer the material as per the specification/requirement attached.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifications/requirement** (page number: 163)

Technical Specifications/requirement

Bidder offer the material as per the specification/requirement attached.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifications/requirement** (page number: 174)

Technical Specifications/requirement

Bidder offer the material as per the specification/requirement attached.

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Technical Specifications/requirement** (page number: 200)

Price Schedule for Tender

The**Grand Total Price**must be same as the Bid Quoted Price

Financial Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Price Schedule for Tender** (page number: 253)

Past Experience and Completed Contracts

annexure forPast Experience and Completed Contracts

Technical Submission (Vendor)

Document Required

See Form Under Additional Forms and Documents: **Past Experience and Completed Contracts** (page number: 256)

Procurement Forms

Past Experience and Completed Contracts

For the qualification of the bidder regarding thepast experienceandcompleted contracts detailed document is attached in the Annexures attached at the end.

See Form Under Additional Forms and Documents: **Past Experience and Completed Contracts** (page number: 257)

Historical Contract Non-Performance, and Pending Litigation and Litigation History

Litigation History

Bidders are requested to submit details of all litigation, arbitration and other claims whether pending, threatened or resolved in the last five years. The above stated information should be completed as per prescribed format and submitted along with required attachments.

The missing or incomplete information / documents may render the bid substantially non-responsive. In this regard, the Purchaser does not have an obligation to request any document / certificates.

See Form Under Additional Forms and Documents: **Historical Contract Non-Performance, and Pending Litigation and Litigation History** (page number: 258)

Financial Capacity and Net Worth Evaluation Form

Financial Criteria

-The bidder should have sound financial health. In order to determine the same, the bidder shall provide its up to date audited financial statements/ other financial statements acceptable to employer i.e. balance sheet, income statement, and cash flow statements for the last 3 years (three years). The bidder’s Net worth for each last 3 years should be positive. In this context the bidder is required to fill in the relevant forms of this bidding document and submit the same with the bid.

-A bidder/or all partners combined in case of JV has to have sufficient financing sources, liquid assets, unencumbered real assets, lines of credit, available to meet the total cash flow demands of the contract. The cash flow availability be at least 25% of the estimated amount.

See Form Under Additional Forms and Documents: **Financial Capacity and Net Worth Evaluation Form** (page number: 260)

Average Annual Turnover

The bidder shall have an *average annual turnover in the last 3 years equal to or more than that 1.5 times of the estimated price*. The annual turnover of partners in a JV shall be calculated by summing their individual turnovers. In case of JV, all JV partners shall combine meet the said requirement

See Form Under Additional Forms and Documents: **Average Annual Turnover** (page number: 262)

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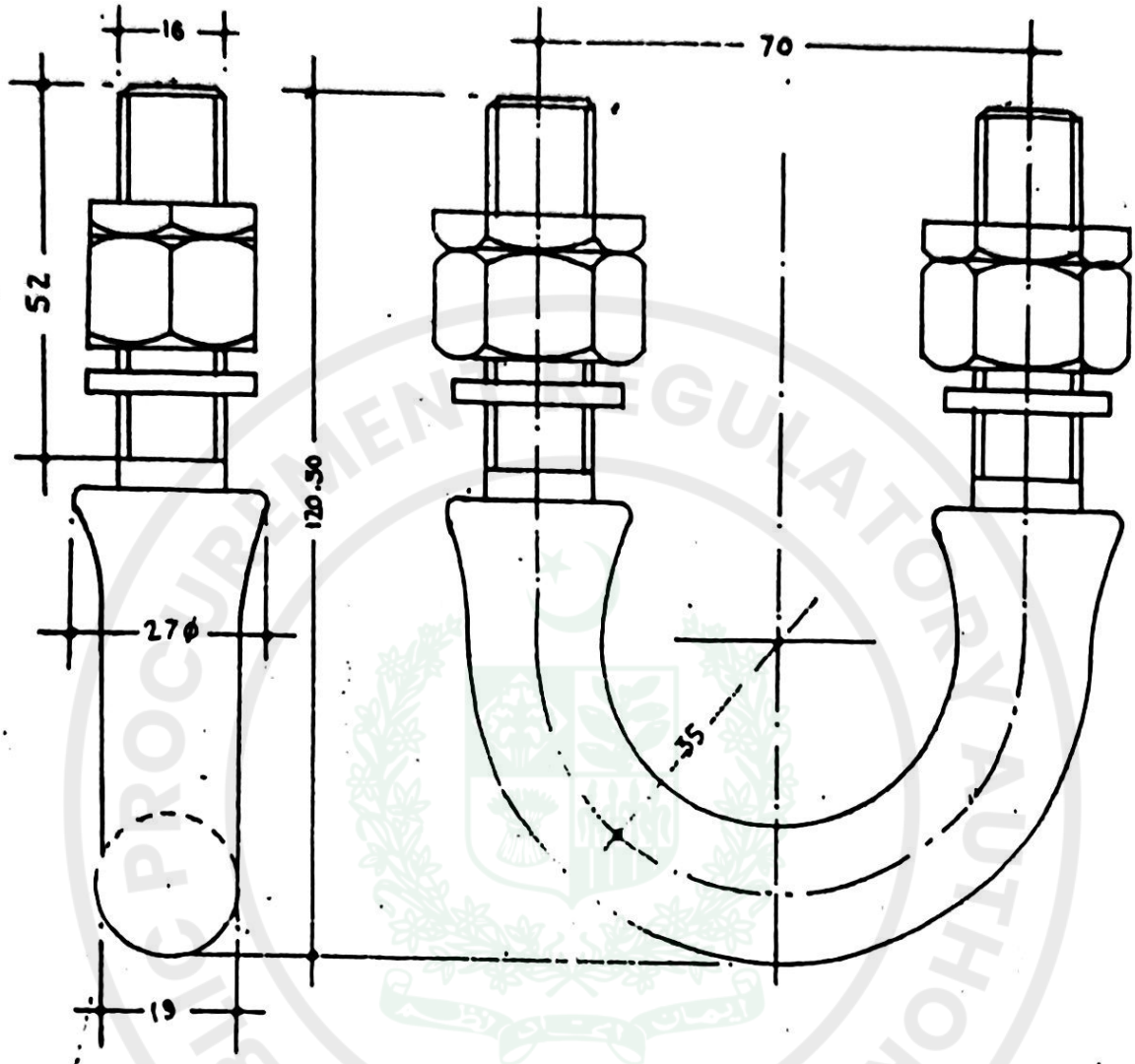
Additional Forms and Documents



DIMENSIONS SHOWN IN MILLIMETRES

(ALL DIMENSIONS ARE BINDING)

U.T.S.=12000 kg

NOTE:- TO BE SUPPLIED WITH TOWER/POLE

WEST PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY	ENGINEERING DEPARTMENT.
132 KV U-BOLT FOR SUSPENSION STRINGS	
DWN.	SCALE — DATE
TCD	DWG NO. EW/TF-11
CKD	APPVD

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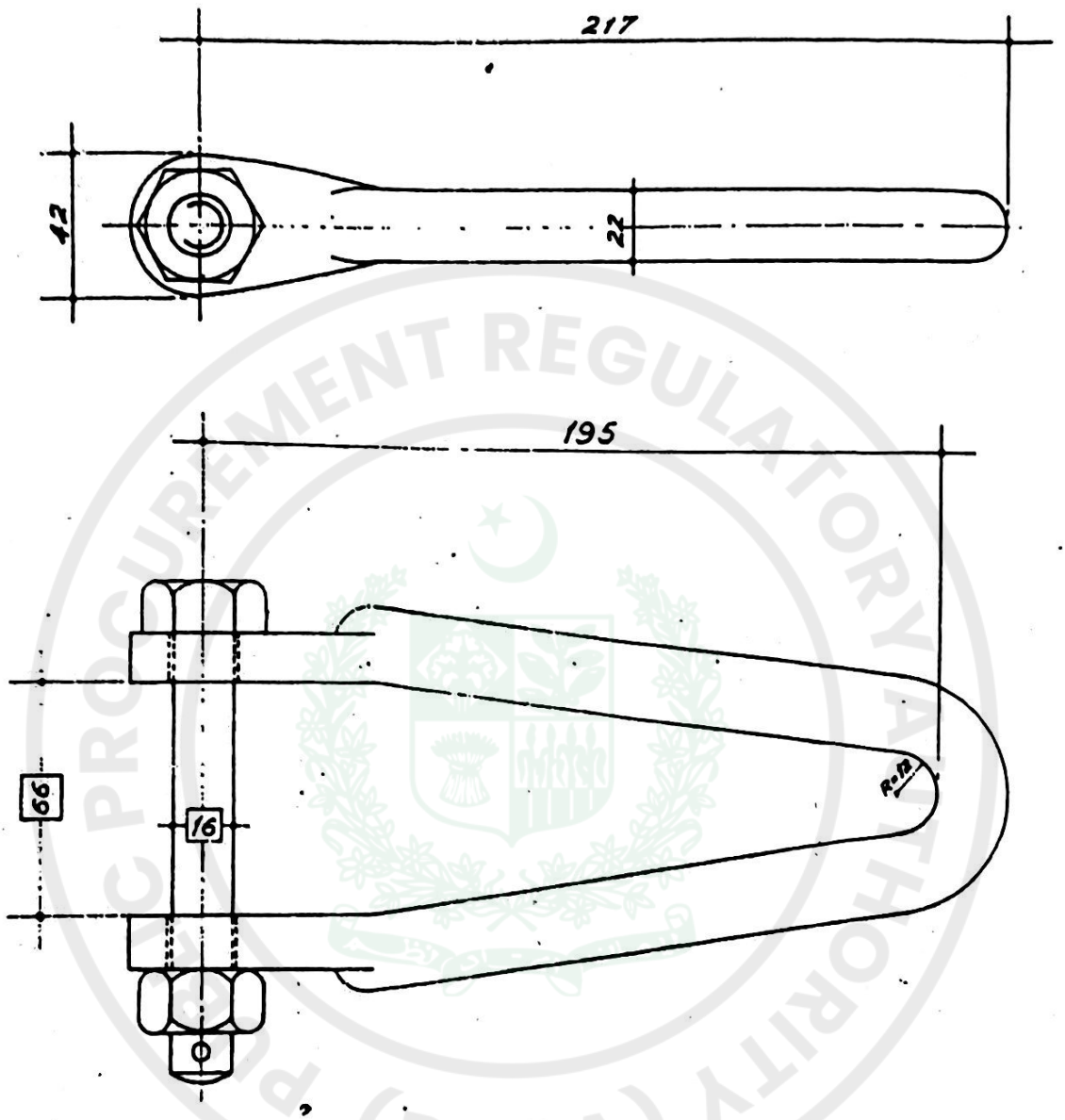

(DIMENSIONS SHOWN IN MILLIMETRES)

NOTE:- TO BE SUPPLIED WITH TOWER.

(U.T.S = 12000 kg)

			WEST PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY		P. AND D. DEPARTMENT
			SHACKLE FOR TENSION STRINGS. (132kV)		
			DWN [illegible]		SCALE.. DATE.. 22.9.71
			TCD [illegible]	1	DWG. NO. EW/TF-12
NO	DATE	REVISION	CKD	APPVD.	

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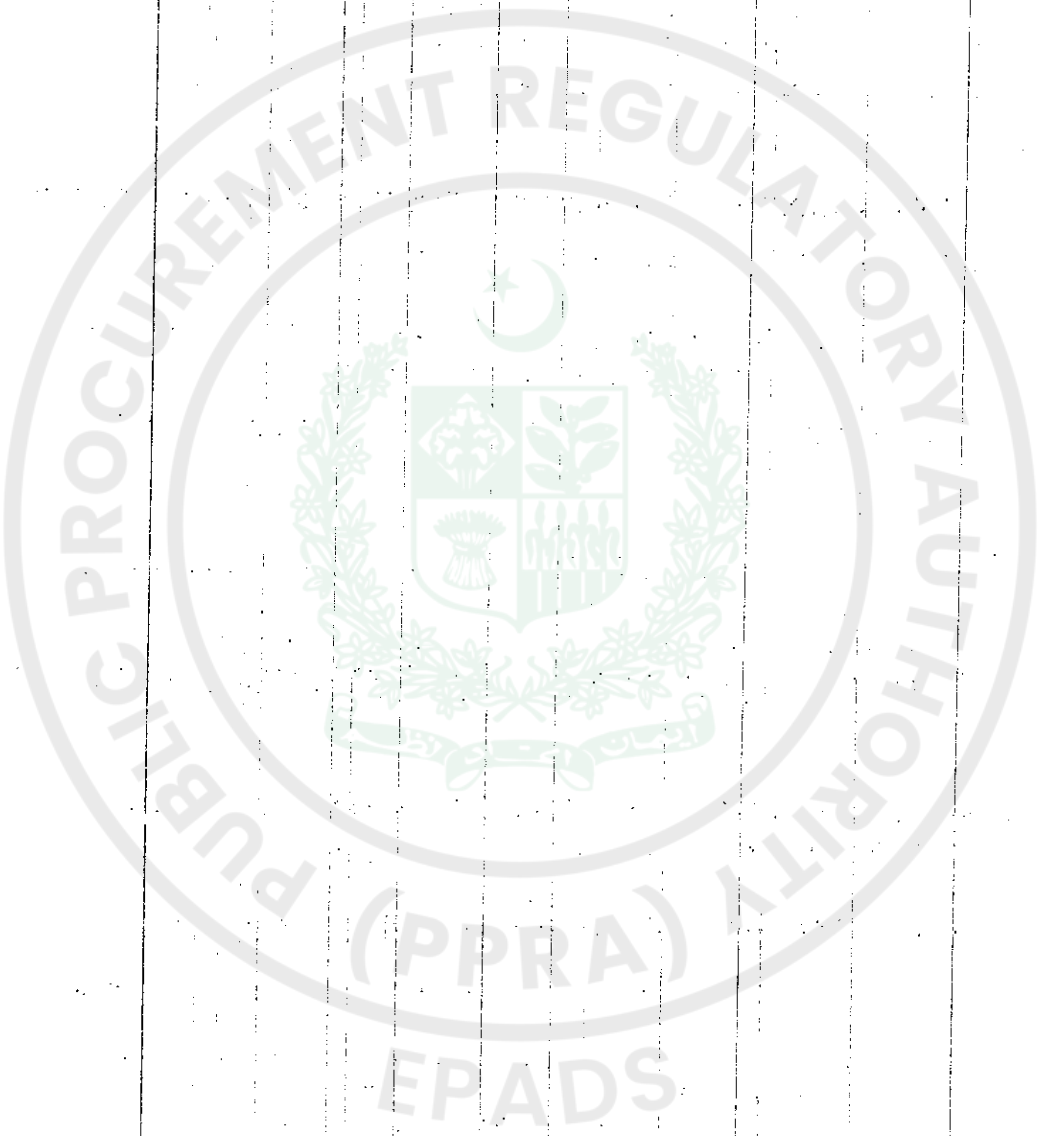
SPECIFICATION P-144: 80

MID SPAN JOINTS AND REPAIR SLEEVES FOR TRANSMISSION LINES

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY
DESIGN DEPARTMENT (T&G) POWER

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA)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SPECIFICATION P-144: 80

MIDSPAN JOINTS AND REPAIR SLEEVES FOR TRANSMISSION LINES

AMENDMENT NO. 1 DATED DEC. 1982.

1. Replace Table-I of subclause 2.1 with the following:

	Description	Desig-nation	Cond. OD (mm)
a)	Mid span joint for DOG	MS-D	14.2
b)	Mid span joint for LYNX	MS-L	19.5
c)	Mid span joint for CUCKOO	MS-C	27.7
d)	Mid span joint for RAIL	MS-R	29.6
e)	Mid span joint for CARDINAL	MS-CA	30.4
f)	Repair sleeves for DOG	RS-D	14.2
g)	Repair sleeves for LYND	RS-L	19.5
h)	Repair sleeves for CUCKOO	RS-C	27.7
i)	Repair sleeves for RAIL	RS-R	29.6
j)	Repair sleeves for CARDINAL	RS-CA	30.4

2. The sub para (ii) of subclause 2.1 is substituted as follows:

ii) The next letter stands for the name of conductor for which the hardware is meant for i.e. 'D' for DOG, 'L' for LYNX, 'C' for CUCKOO, 'R' for RAIL and 'CA' for CARDINAL.

3. Replace Table-II of sub clause 3.1 with the following:

TABLE - II

Rating of Hardware

Sr. No.	Description	Failing load in Kg.
1.	MS-D	3300
2.	MS-L	8000
3.	MS-C	12000
4.	MS-R	12000
5.	MS-CA	16000
6.	RS-L	-
7.	RS-L	-
8.	RS-C	-
9.	RS-R	-
10.	RS-CA	-

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4. The first sentence of sub para 1 of clause 11 is substituted as follows:

" The test current shall be that power frequency current which raises the surface temperature of the conductor 100 degC above 40°C ambient temperature and maintains the temperature at a steady value".

5. The last sentence of sub para 3 of clause 11 is substituted as follows:

" The sequence of operation shall be repeated so that 100 cycles of heating and cooling are applied".

6. The principal dimensions of Mid Span Joints and Repair Sleeves for ACSR CARDINAL Conductor are added on Dwg. No..PDW/DF-302.

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C O N E N T S

PRINTING HISTORY

First approved on 21st September, 1980.

AMENDMENT NO.1 DEC.1982

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SPECIFICATION P-144: 80

MID SPAN JOINTS AND REPAIR SLEEVES FOR TRANSMISSION LINES

0 FOREWORD

0.1 This standard has been introduced by WAPDA and has been prepared by the Transmission Line Section of the office of the Chief Engineer (Designs).

0.2 This standard is intended only for the purpose of technical specification to facilitate procurement of materials and does not include provision of contract.

0.3 This specification is subject to periodic revision as and when required.

1 SCOPE

1.1 This specification covers the mid span joints and repair sleeves for ACSR Conductor intended to be used on Transmission Lines.

2 TYPES OF MID SPAN JOINTS AND REPAIR SLEEVES

2.1 The hardware described in this Specification are of the following types:

TABLE - 1

Description	Designation	Cond.OD(mm)
a) Mid span joint for DOG	MS - D	14.2
b) Mid span joint for LYNX	MS - L	19.5
c) Mid span joint for CUCKOO	MS - C	27.7
d) Mid span joint for RAIL	MS - R	29.6
e) Repair sleeves for DOG	RS - D	14.2
f) Repair sleeves for LYNX	RS - L	19.5
g) Repair sleeves for CUCKOO	RS - C	27.7
h) Repair sleeves for RAIL	RS - R	29.6

The hardware described above in this Specification has been designated by the code numbers. These codes have been

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assigned in the following manner.

i) The first two letters stand for Mid Span joints or repair sleeves i.e. MS for mid span joint and RS for repair sleeves.

ii) The next letter stands for the name of conductor for which the hardware is meant for i.e. 'D' for DOG, 'L' for LYNX, 'C' for CUCKOO and 'R' for RAIL.

3 RATING OF HARDWARE

3.1 The hardware shall be of the rating as specified in Table-II below:

TABLE - II

Rating of Hardware

Sr. No.	Description	Failing load in Kg
1.	MS-D	3300
2.	MS-L	8000
3.	MS-C	12000
4.	MS-R	12000
5.	RS-D	-
6.	RS-L	-
7.	RS-C	-
8.	RS-R	-

4 GENERAL REQUIREMENTS

4.1 Generally each mid span joint shall consist of:

1 Steel sleeve galvanised

1 Aluminium sleeve

4.2 The repair sleeve shall be made of 2 pieces. It shall be compression type and shall made of all aluminium.

4.3 All ferrous parts shall be hot dip galvanised in accordance with WAPDA Specification P-82.(latest revision)

5 DIMENSIONS AND TOLERANCES

5.1 All hardware shall generally be in accordance with

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drawings forming a part of this specification.

5.2 The dimensions of these parts of hardware that mate with other hardware or that determine the length of insulator string are binding and are shown enclosed on the drawing.

5.3 For dimensions that are fixed and binding the tolerance will be plus or minus 2 percent with a maximum of 0.8mm. For dimensions that are shown as MAX or MIN there shall be no plus and minus tolerance respectively. The tolerance in the opposite sense may however be 4%.

6 DESIGN AND MATERIAL

6.1 Mid Span Joints

Mid span joints shall be of the compression type. They shall be such that after compression they shall assume a hexagonal cross-section. The electrical conductivity and current carrying capacity shall not be less than an equal length of conductor.

Conductor joints shall be made of aluminium with a galvanised steel inner sleeve. Mid span joints shall be made according to Dwg. No. PDW/DF-302.

6.2 Repair Sleeves

Repair sleeves shall be designed to make good a conductor of which not more than one-fifth of the strands in the outer layer have been served.

6.3 Repair sleeve shall be composed of two aluminium pieces fitted into each other and forming an integral part. They shall be compressed on the damaged part of conductor by the same dies used for aluminium component of dead-end and mid-span joint and shall have un-installed length as indicated in Dwg. No. PDW/DF-302.

7 TESTS

7.1 Type Tests

7.1.1 Type tests are intended to verify and establish design characteristics. They shall be made once only on hardware identical in all essential details with those to be supplied.

i) Mechanical Test)
ii) Heat Cycle Test) On mid span joints only
iii) Resistance Test)

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7.1.2 The bidder shall supply heat cycle test result with the bid.

7.2 Sample Tests

Sample tests shall be made to verify the quality and workmanship. The number of samples shall be nearest whole number to one half of one percent of the batch offered for inspection.

The following sample test shall be performed in accordance with the clause:

i) Visual examination
ii) Verification of dimensions
iii) Mechanical tests) On mid span joints
iv) Resistance tests)
v) Galvanising tests On ferrous parts.

8 VISUAL EXAMINATION

The test samples shall be examined visually for the following defects.

Visual Examination

Examination	Defects
Material	Not as specified in relevant clauses.
Construction	Not of the shape given in relevant Drawing. Any part missing.
Finish	Galvanising not proper. Presence of burrs, black and bare spots, dross and projections, which will interfere with proper use of the articles.

9 VERIFICATION OF DIMENSIONS

The binding dimensions of the hardware shall be measured and shall be as shown on the relevant approved drawings subject to the tolerance given in clause 5.

10 MECHANICAL TEST

10.1 Test piece shall be assembled in accordance with manufacturer's recommendations on conductor of the size and type with which it is to be used. The assembly shall be

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mounted in a tensile testing machine and anchored in a manner approximating as nearly as possible to the arrangement to be used in service, precautions being taken to avoid birdcaging of the conductor. The length of conductor between the fitting under test and any other clamp or joint in the test assembly should preferably be not less than 100 times the overall diameter of the conductor.

10.2 A tensile load of about 30 percent of the failing load specified in Table-II shall be applied and the conductor shall be marked in such a way that movement relative to the fitting can easily be detected. Without any subsequent adjustment of the fitting, the load shall be steadily increased to 95% of the failing load and then reduced to 90% of the failing load and maintained for 1-minute. There shall be no movement of the conductor relative to the fitting due to slip during this 1-minute period and no failure of the fitting.

11 HEAT CYCLE TEST

The test current shall be 40°C that power frequency current which raises the surface temperature of the conductor 40 degC above 40 degC ambient temperature and maintains the temperature at a steady value. The minimum length of conductor used for determining this current shall be 2 meters and the conductor temperature shall be measured near the centre of the test length.

The joint shall be assembled in accordance with the manufacturer's recommendations on conductor of the size and type with which it is to be used. (The assembly, to which a tensile load not exceeding 20% of the rated minimum failing load as specified in Table-II may be applied, shall be directed indoors so that the conductor is roughly horizontal). Air shall be able to circulate freely round line assembly which shall not however, be exposed to draughts. The minimum length of conductor on each side of the fitting shall be 2 meters.

The test current shall be passed continuously through the assembly for a period of 30 min. The current shall then be interrupted, and the assembly shall be allowed to cool to within 5 degC above the ambient temperature. The sequence of operation shall be repeated so that 250 cycles of heating and cooling are applied.

During the last five cycles, the maximum temperature measured when the test current is flowing at any points on the surface of the fittings, shall not exceed that of the conductor. At the end of the test the joint

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shall meet the requirements of the resistance test specified above. There shall be no sign of local heating, burning or fusing of any part of the joint or of the conductor.

12 RESISTANCE TEST

12.1 The fitting shall be assembled in accordance with the manufacturer's recommendations on conductors of the size and type with which it is to be used. The electrical resistance shall be measured between points on the conductor on either side and just clear of the fitting and shall not exceed 75% of the measured resistance of the equivalent length of conductor.

12.2 The test may be made with direct current or with alternating current at any convenient power frequency. The current connections shall be at a distance not less than 50 times the diameter of the conductor from the fitting and shall be so made that effective contact is made with all these strands of the conductor which would be taken into account in calculating its equivalent resistance.

13 GALVANISING TEST

This test shall be carried out on all ferrous parts complying with the following requirements.

i) Weight of zinc coating

ii) Uniformity of zinc coating

iii) Adherence of zinc coating

This test shall be performed in accordance with WAPDA Specification P-82.(latest revision)

14 SAMPLING PLAN - ACCEPTANCE AND REJECTION

i) Sampling sizes are designated by code letters. Table-III shall be used to find the applicable code letter for the particular lot or batch size for various tests specified in this Specification. While the number of units of product from each lot or batch which are to be inspected (sample size) and the criteria for determining the acceptability of the lot or batch (acceptance & rejection numbers) for different code letters can be obtained from the table-IV given below.

ii) The number of sample units inspected shall be equal to the first sample size given in Table-IV. If the number of defective units founding the first sample is equal

to less than the first acceptance number, the lot shall be acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot shall be rejected. If the number of defectives found in the first sample is between the first acceptance and rejection number, a second sample of the size given by the plan shall be inspected. The number of defectives found in the first and the second samples shall be a cumulated. If the cumulative number of defectives is equal to or less than the second acceptance number, the lot shall be acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, the lot shall be rejected.

TABLE - III Sample Size

Lot of Batch Size	Sample size for Test specified in Clause 10,12 & 13	Sample size for dimensional and finish defects
2 to 8	A	A
9 to 15	A	B
16 to 25	A	C
26 to 50	A	D
51 to 90	B	E
91 to 150	B	F
151 to 280	B	G
281 to 500	B	H
501 to 1200	C	J

TABLE - IV

Sample acceptance criteria

Sample size code letters	Sample	Sample size	Cumulative sample size	Acceptance number	Rejection number
A	First	1	1	0	1
	Second	-	-	-	-
B	First	2	2	0	2
	Second	2	4	1	2
C	First	3	3	0	2
	Second	3	6	1	2
D	First	5	5	0	2
	Second	5	10	1	2
E	First	8	8	0	2
	Second	8	16	1	2

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F	First	13	13	0	3
	Second	13	26	3	4
G	First	20	20	1	4
	Second	20	40	4	5
H	First	32	32	2	5
	Second	32	64	6	7
J	First	50	50	3	7
	Second	50	100	8	9

15 MARKING AND PACKING

The material shall be packed in wooden crates for export shipment to permit convenient handling and to protect against loss or damage to final destination. Containers (wooden crates) shall be designed for handling by fork-lift, truck and by slings around the container. The weight of each package should be between 100 and 150 kg.

Packages shall be designed for rough handling. All wooden crates shall be clearly marked to indicate.

1. Quantity
2. Name of hardware item
3. Manufacturer's Name

All packages shall be numbered consecutively so that total shipment can be readily determined.

16 INFORMATION TO BE SUPPLIED

The following information shall be supplied with the bid and failure to supply the same may subject the bid to disqualifications:

i) Detailed fully dimensioned drawings of midspan joints and repair sleeves

ii) Specification giving material grade & composition of all items of hardware

iii) Catalogues/literature of standardised items

iv) Test certificates

v) One complete sample of all types of midspan joints and repair sleeves

vi) Detail of manufacturing & testing facilities available with manufacturers.

17 DRAWING

The following drawing form the part of this specification:

a) Mid span joint & repair sleeve PDW/DF-302

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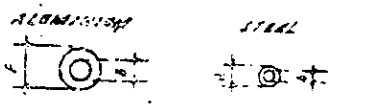
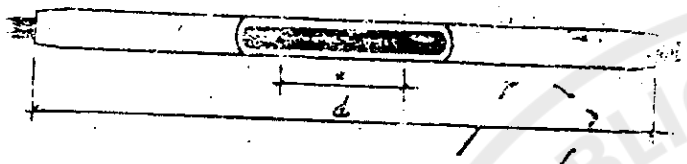
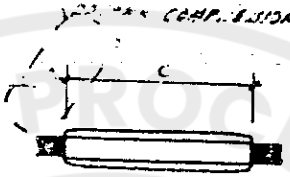


(BEFORE COMPRESSION)



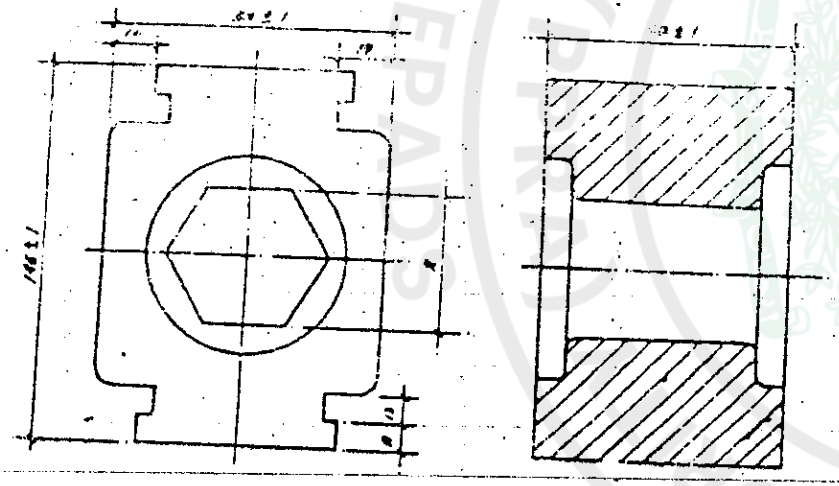
ALUMINIUM COMPRESSION MID SPAN JOINT

(AFTER COMPRESSION)



(CONDUCTOR REPAIR SLEEVE)

DESCRIPTION	DOG	LYNX	CUCKOO	RAIL
CONDUCTOR DIA				
DIA OF COMPLETE COND.	14.2	19.5	27.7	29.4
DIA OF STEEL CORE	4.7	6.5	9.2	7.4
AL. JOINT				
OUTSIDE DIA (A)	22.5	34.5	45.6	50.5
INSIDE DIA (B)	15.5	21.0	29.0	31.0
LENGTH (d)	275	660	850	850
STEEL JOINT				
OUTSIDE DIA (a)	10.5	20.6	20.5	19.0
INSIDE DIA (b)	5.5	8.75	9.75	8.0
LENGTH (c)	130	220	230	220
REPAIR SLEEVE				
OUTSIDE DIA (X)	22.6	34.5	45.5	50.5
INSIDE DIA (B)	15.5	21.0	29.0	32.0
LENGTH (C)	340	200	250	256
COMPRESSOR DIES				
FOR AL. (E)	21.5	30.0	39.5	44.0
FOR STEEL (R)	10.6	17.0	17.0	16.0



(DIES FOR COMPRESSION JOINTS)

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY

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MID SPAN JOINT AND REPAIR SLEEVE

SCALE —

DATE 8 2 1980

DWG. NO. PDW/DF-302

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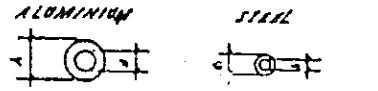
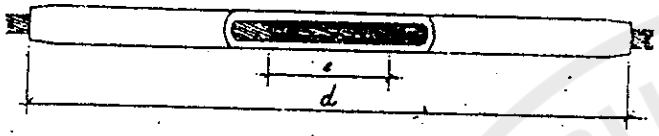


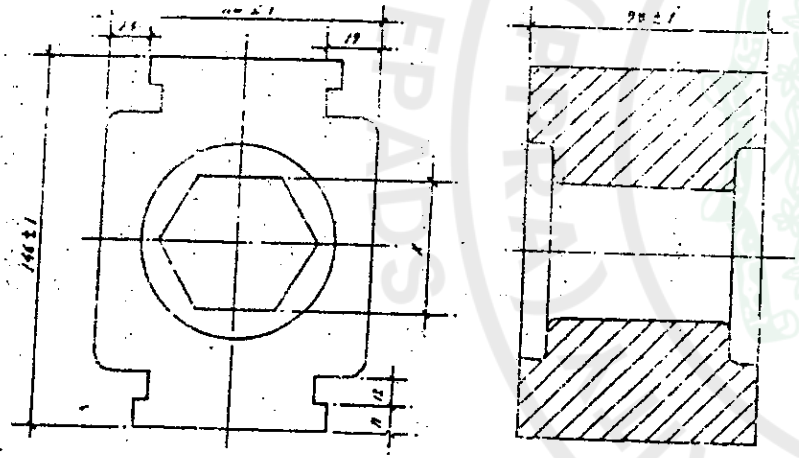
(BEFORE COMPRESSION)

(BEFORE COMPRESSION)



ALUMINIUM COMPRESSION MID SPAN JOINT.

(CONDUCTOR REPAIR SLEEVE)



(DIES FOR COMPRESSION JOINTS)

DESCRIPTION	DOG	LYNX	CUCKOO	RAIL	CARDINAL
CONDUCTOR DIA					
DIA OF COMPLETE COND:	14.2	19.5	27.7	29.5	30.4
DIA OF STEEL CORE	4.7	8.5	9.2	7.4	10.14
AL. JOINT					
OUTSIDE DIA (A)	22.5	34.5	45.5	50.5	54.0
INSIDE DIA (B)	15.5	21.0	28.0	31.0	32.5
LENGTH (d)	275.0	660.0	850.0	850.0	740.0
STEEL JOINT					
OUTSIDE DIA (a)	10.5	20.5	20.5	19.0	20.6
INSIDE DIA (b)	5.5	8.75	9.75	8.0	10.75
LENGTH (c)	130.0	220.0	230.0	200.0	250.0
REPAIR SLEEVE					
OUTSIDE DIA (A)	22.5	34.5	45.5	50.5	54.0
INSIDE DIA (B)	15.5	21.0	29.0	32.0	32.0
LENGTH (C)	360.0	200.0	350.0	350.0	275.0
COMPRESSOR DIES					
FOR AL. (K)	21.5	30.0	39.5	44.0	48.0
FOR STEEL (K)	10.0	17.0	17.0	16.0	17.0

NO	DATE	REVISIONS	BY
1	18-8-82	DIMENSIONS OF ACSR CARDINAL CONDUCTOR ADDED	

PAKISTAN
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MID SPAN JOINT AND REPAIR SLEEVE

SCALE — DATE 5.2.1980

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NATIONAL TRANSMISSION AND DESPATCH COMPANY

SPECIFICATION P-176: 2011

FOR ADB-SBDs ONLY
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA)
EPADS

CONNECTORS FOR 500/220/132 kV GRID STATIONS

DESIGN DEPARTMENT

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CONTENTS

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PRINTING HISTORY
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Third revision on April 2011

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SPECIFICATION P-176: 2011

CONNECTORS FOR GRID STATIONS

0 FOREWORD

0.1 This specification has been prepared by Design NTDC.

0.2 This specification is intended for the procurement of material and does not include all the necessary provisions of a contract.

0.3 This specification is subject to revision as and when required.

1 SCOPE

1.1 This specification describes the connectors suitable for installations on 500, 220 and 132 kV Grid Stations under climatic conditions mentioned in clause 2.0.

1.2 The connectors shall be of the type described in the following clauses:

1.2.1 Monometallic Connectors

The monometallic connectors shall be of the following types and designation as per drawings attached and as per Table-I(A), I(B), (IC) and I(D).

TABLE-I(A) TEE-CONNECTORS

Description	Designation	Drawing No.	Dia Run (mm)	Dia Tap (mm)
Tee-connector 2x600/3.0	TDMHP3.0	PDW/DF-405R	88.9	2X32
Tee-connector 484/2x600	TDMRH	PDW/DF-406R	2X29.6	2X32
Tee-connector 600/5.0	TMHP5.0	PDW/DF-395R	141.3	32
Tee-connector 2X600/2X600	TDMHH	PDW/DF-409R	2X32	2X32
Tee-connector 2X600/3.0	TDMHP3.0	PDW/DF-405R	88.9	2X32
Tee-connector 2X600/3.5	TDMHP3.5	PDW/DF-405R	101.6	2X32
Tee-connector 2X600/5.0	TDMHP5.0	PDW/DF-405R	141.3	2X32
Tee-connector 2X455/3.0	TDMAP3.0	PDW/DF-405R	88.9	2X27.72
Tee-connector 2X484/3.0	TDMRP3.0	PDW/DF-405R	88.9	2X29.6
Tee-connector 484/2X455	TDMAR	PDW/DF-406R	29.6	2X27.72
Tee-connector 2X484/2X484	TDMRR	PDW/DF-409R	2X29.6	2X29.6

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Tee-connector 600/600	TMHH	PDW/DF-388R	32	32
Tee-connector 484/600	TMRH	PDW/DF-388R	29.6	32
Tee-connector 183/600	TMLH	PDW/DF-388R	20	32

TABLE-I(B) ANGLE TEE-CONNECTORS

Description	Designation	Drawing No.	Dia Run (mm)	Dia Tap (mm)
Angle Tee-connector 3.0/2x2.5	TDMP3.0, P 2.5	PDW/DF-389R	88.9	2X73
Angle Tee-connector 3.0/2.5	TMP 3.0, P 2.5	PDW/DF-392R	88.9	73
Angle Tee-connector 3.5/2x2.5	TDMP3.5 ,P 2.5	PDW/DF-389R	101.6	2x73
Angle Tee-connector 3.5/2.5	TMP 3.5, P 2.5	PDW/DF-392R	101.6	2X32
Angle Tee-connector 5.0/2x2.5	TDMP5.0, P 2.5	PDW/DF-389R	141.3	2x73
Angle Tee-connector 5.0/2.5	TMP 5.0, P 2.5	PDW/DF-392R	141.3	73

TABLE-I(C) STRAIGHT CONNECTORS

Description	Designation	Drawing No.	Dia Run (mm)	Dia Tap (mm)
Straight connector -2x600/3.0	ODMHP3.0	PDW/DF-398R	2X32	88.9
Straight connector -2x600/3.5	ODMHP3.5	PDW/DF-398R	2X32	101.6
Straight connector -2x600/5.0	ODMHP5.0	PDW/DF-398R	2X32	141.3
Straight connector - 2x484/3.0	ODMRP3.0	PDW/DF-398R	2X29.6	88.9
Straight connector - 455/3.0	OMSP 3.0	PDW/DF-439R	28	88.9
Straight connector - 600/5.0	OMHP 5.0	PDW/DF-439R	32	141.3
Straight connector - 2x600/Flat	ODMHF	PDW/DF-438R	2x32	Flat
Straight connector - 3.0/Flat	OMP3.OF	PDW/DF-430R	Flat	88.9
Straight connector - 3.5/Flat	OMP3.5F	PDW/DF-430R	Flat	101.6

TABLE-I(D) SUPPORTING CONNECTORS

Description	Designation	Drawing No.	Dimensions
PG clamp 484 – 484	PGRR	PDW/DF-415R	29.6 each grove
PG clamp 600 – 600	PGHH	PDW/DF-415R	32 each grove
PG clamp 887 – 887	PGJJ	PDW/DF-415R	39 each grove
Slide bus support for 3” pipe size	SBSP3.0	PDW/DF-431R	88.9
Slide bus support for 3.5” pipe size	SBSP3.5	PDW/DF-431R	101.6
Slide bus support for 5” pipe size	SBSP5.0	PDW/DF-431R	141.3
Fixed bus support for 3” pipe size	BSP3.0	PDW/DF-436R	88.9
Fixed bus support for 3.5” pipe size	BSP3.5	PDW/DF-436R	101.6

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Fixed bus support for 5” pipe size	BSP5.0	PDW/DF-436R	141.3
Expansion bus support for coupling 3” pipe size	EBSP3.0	PDW/DF-434R	88.9
Expansion bus support for coupling 3.5” pipe size	EBSP3.5	PDW/DF-434R	101.6
Expansion bus support for coupling 5” pipe size	EBSP5.0	PDW/DF-434R	141.3
T-slide bus support for 3” pipe size	T-SBSP3.0	PDW/DF-432R	88.9
T-slide bus support for 3.5” pipe size	T-SBSP3.5	PDW/DF-432R	101.6
Monometallic spacer	SH100	PDW/DF-401R	32 each
Monometallic spacer	SH200	PDW/DF-401R	32 each
Monometallic spacer	SH400	PDW/DF-401R	32 each
Bus support	BSHH	PDW/DF-437R	2X32
Cap for 3” pipe size	Cap 3.0	PDW/DF-433R	88.9
Cap for 3.5” pipe size	Cap 3.5	PDW/DF-433R	101.6
Cap for 5” pipe size	Cap 5.0	PDW/DF-433R	141.3

1.2.2 Bimetallic Connectors

The bimetallic connector shall be made of separate Copper and Aluminum alloy bodies joined by a suitable bimetallic joint to prevent galvanic action. These shall be of the following types and according to the drawings attached and as per Table – II (A) and II (B)

TABLE-II(A) STRAIGHT CONNECTORS

Description	Designation	Drawing No.	Dia Conductor (mm)	Dia Terminal (mm)
Straight connector-2x600/F	ODBHF	PDW/DF-407R	2X32	88.9
Straight connector - 3.0/60	OBEP3.0,60	PDW/DF-393R	88.9	60
Straight connector - 3.0/F	OBEP3.0,F	PDW/DF-394R	88.9	Flat
Straight connector - 3.5/60	OBEP3.5,60	PDW/DF-393R	101.6	60
Straight connector - 3.5/F	OBEP3.5,F	PDW/DF-394R	101.6	Flat
Straight connector-2X600/60	ODBH60	PDW/DF-397R	2x32	60
Straight connector - 5.0/60	OBEP5.0,60	PDW/DF-393R	141.3	60
Straight connector - 5.0/F	OBEP5.0,F	PDW/DF-394R	141.3	Flat
Straight connector - 3.0/60	OBP 3.0,60	PDW/DF-428R	88.9	60
Straight connector - 3.0/F	OBP 3.0,F	PDW/DF-429R	88.9	Flat
Straight connector - 2X484/60	ODBR60	PDW/DF-397R	2x29.6	60
Straight connector - 2X455/60	ODBA60	PDW/DF-397R	2x27.72	60

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Straight connector - 3.5/60	OBP 3.5,60	PDW/DF-428R	101.6	60

TABLE-II (A) STRAIGHT CONNECTORS

Description	Designation	Drawing No.	Dia Conductor (mm)	Dia Terminal (mm)
Straight connector - 3.5/F	OBP 3.5,F	PDW/DF-429R	101.6	Flat
Straight connector - 600/40	ODBH40*	PDW/DF-397R	32	40
Straight connector - 600/F	ODBHF*	PDW/DF-407R	32	Flat
Straight connector - 5.0/40	OBP5.0,40	PDW/DF-428R	141.3	40
Straight connector - 5.0/F	OBP 5.0,F	PDW/DF-428R	141.3	40

TABLE-II (B) – 90^0 CONNECTORS

Description	Designation	Drawing No.	Dia Conductor (mm)	Dia Terminal (mm)
90^0 connector -3.0/60	90BEP3.0,60	PDW/DF-396R	88.9	60
90^0 connector -3.5/60	90BEP3.5,60	PDW/DF-396R	101.6	60
90^0 connector -5.0/60	90BEP5.0,60	PDW/DF-396R	141.3	60
90^0 connector -600/40	90BH40*	PDW/DF-435R	32	40
90^0 connector -600/60	90BH60	PDW/DF-435R	32	60
90^0 connector -3.0/40	90BEP3.0,40	PDW/DF-396R	3.0	40
90^0 connector -5.0/40	90BEP5.0,40	PDW/DF-396R	5.0	60
90/T connector -2X600/F	90/TDBHF	PDW/DF-402R	2X32	Flat
90/T connector -3.0/60	90/TBP3.0,60	PDW/DF-427R	88.9	60
90/T connector -2X600/60	90/TDBH60	PDW/DF-408R	2X32	60
90/T connector -2X600/30	90/TDBH30	PDW/DF-408R	2X32	30
90/T connector -2X455/60	90/TDBA60	PDW/DF-408R	2X27.72	60
90/T connector -2X455/30	90/TDBA30	PDW/DF-408R	2X27.27	30
90/T connector -2X484/60	90/TDBR60	PDW/DF-408R	2X29.6	60
90/T connector -2X484/30	90/TDBR30	PDW/DF-408R	2X29.6	30
90/T connector -3.0/30	90/TBP3.0,30	PDW/DF-427R	88.9	30
90/T connector -3.5/60	90/TBP3.5,60	PDW/DF-427R	101.6	60
90/T connector -3.5/30	90/TBP3.5,30	PDW/DF-427R	101.6	30
90/T connector -5.0/40	90/TBP5.0,40	PDW/DF-427R	141.3	40
90/T connector -5.0/30	90/TBP5.0,40	PDW/DF-427R	141.3	30
90/T connector -2X600/40	90/TDBH40*	PDW/DF-408R	2X32	40
90/T connector -2X600/30	90/TDBH30*	PDW/DF-408R	2X32	30

* Connectors for 132 kV Busbar

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2. CLIMATIC CONDITIONS

2.1 Connectors of all types shall be suitable for satisfactory operation under the following conditions:

2.2 Ambient Temperature

Maximum	50^0 C
Maximum mean over any 24 hours	45^0 C
Mean in any year	30^0 C
Minimum	-10^0 C

2.3 Humidity

The relative humidity may range from 0 to 100%. The maximum values of the ambient temperature and humidity however do not occur simultaneously. During the monsoon, high humidity may persist for many days at a time along with temperature ranging from 30^0 C to 40^0 C.

2.4 Altitude

Installation up to 1000 m above Sea level.

2.4 Atmospheric Conditions

It may be assumed that the air is not normally heavily polluted by dust, smoke, aggressive gases, vapors, or salt spray. At certain times of year severe dust storm may be experienced.

3 REQUIREMENTS

3.1 The connectors shall be so designed that there are no sharp corners or edges which may damage the conductor or cause radio interference, and corona. The connector shall not become loose due to vibrations, or temperature variations.

3.2 The connectors shall be of bolted type and should be able to develop adequate electrical contact between the conductors and or terminals and between all wires of the stranded conductor.

Connectors with single bolt technology may be considered for connection on tube only; if the design of the product is submitted for approval along with type test reports giving evidence of covering the following performances:

- Electrical ageing test as per ANSI 119.4 (Class C).
- Bending test (applicable loading must be obtained by calculation by implementing boundary condition on the busbar system).
- Short circuit test as per IEC 694

3.3 The temperature rise of the connector shall not exceed the temperature rise of the conductor with which it is intended to be used.

3.4 The temperature rise of the connector, which connects conductors of varying sizes shall not exceed the temperature rise of the conductor having highest temperature rise.

3.5 The resistance of a conductor including connectors shall not exceed the resistance of an equal length of the identical conductor without connectors by more than 110 percent of all sizes of conductor.

3.6 The resistance measurement shall be made by milli volt drop, accurate resistance bridge or other suitable means.

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3.7 The condition specified in clause 3.3, 3.4 and 3.5 above, shall be for the minimum rated current specified in Table-III.

TABLE – III

Conductor	Area mm^2	Rated Current A
Arvidal	455.7	925
Snap-dragon	456.26	925
Hawthorn	604	1085
Coreopsis	811	1300
Jessamine	887	1350
Aluminium pipe 2.5" nominal dia	1096.85	1550
Aluminium pipe 3.0" nominal dia	1437.70	1890
Aluminium pipe 3.5" nominal dia	1728.70	2170
Aluminium pipe 5" nominal dia	2772.60	3080
Aluminium pipe 6" nominal dia	2900	4000
Copper stud 30 mm dia	-	1250
Copper stud 40 mm dia	-	1600
Copper stud 60 mm dia	-	2000
Copper stud flat (125 x 125 x 16 mm)	-	2000

3.8 The pull out strength of the connectors shall not be less than that indicated in Table – IV

TABLE - IV

Connector	**Minimum Pullout kg. (per connector)**
All connectors for Ardival conductor	1000
All connectors for snap-Dragon conductor	1000
All connectors for Hawthorn conductor	1000
All connectors for Rail conductor	1200
All connectors for Coreopsis conductor **Connector**	1300
All connectors for Jessamine conductor	1400

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All connectors for 2½" pipe size snap-Dragon conductor	1400
All connectors for 3" pipe size snap-Dragon conductor	1800
All connectors for 3½" pipe size snap-Dragon conductor	2200
All connectors for 5" pipe size snap-Dragon conductor	3500
All connectors for 6" pipe size snap-Dragon conductor	4000

3.9 The monometallic connectors and Aluminum portion of Bimetallic connectors shall be made from corrosion proof Aluminum alloy conforming to clause 4.1. The Copper based Aluminum alloys shall not be acceptable.

3.10 The bimetallic connectors shall have separate Copper and Aluminum bodies jointed by a suitable bimetal strip joint with 2mm of thickness. The bimetallic connectors using pin type design shall not be accepted. Bimetallic connectors employing bimetallic shims shall not be accepted.

3.11 The Copper portion of the bimetallic joints shall be made of Copper alloy conforming to clause 4.3

3.12 The nuts, bolts and washers shall be conforming to clause 4.2.

3.13 The number and size for bolts nuts shall be adequate for the design of connectors to fulfill the requirements of contact pressure, temperature rise and resistance etc.

3.14 The dimensions of the connector shall be submitted for approval. The tolerance on the dimensions shall be plus or minus 3 percent from that of the approved one.

3.15 For connectors with flat terminals, the flat portion shall have holes drilled in it as per respective drawing. The numbers of bolts, nuts and washers as per clause 3.13 shall be supplied with each flat type connector.

3.16 Each connector drawing should clearly indicate the grade of material being used, the weight of Copper and Aluminum parts, separately and tightening torque of bolts.

3.17 The current carrying capacity of the connectors shall be twice the current rating of the respective conductor(s) / pipe for which it is to be used.

4 MATERIAL

4.1 The material and composition of the Aluminum alloy used on monometallic connectors and the Aluminum portion of the bimetallic connectors shall be as per details below:

S. No.	Technical characteristics	EN AC 42100 (For body)	EN AC 42200 (For keeper)	Applicable standard
1	Ultimate tensile strength , min	230 N/mm^2	320 N/mm^2	EN 1706-1998
2	Yield strength, 0.2% off set, min	190 N/mm^2	240 N/mm^2	EN 1706-1998
3	Elongation, min	2%	3%	EN 1706-1998
4	Electrical conductivity, min	38% of IACS	38% of IACS	EN 1706-1998
5	Brinell hardness, min	75 HB	100 HB	EN 1706-1998

Al alloy characteristics as per EN AC 42100 and 42200 to be submitted for approval. The alloy will be properly heat treated. Additionally, keepers, components, which are subjected to high forces during services, will be obtained by gravity die casting

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4.2 The bolts, nuts and washers shall be of stainless steel type A2-70 minimum as per ISO 3506 standard having following properties:

Breaking strength, min	=	65 kg/ mm^2
Yield strength, min	=	40 kg/mm^2
Brinell hardness, min	=	140 HB

4.3 The material and composition of the Copper alloy in the bimetallic connectors shall be submitted for approval. The Copper alloy will be from the Copper/Nickel base family CuNi2Si having minimum of 96.4% of Copper and 3.6% other alloy in order to guarantee high conductivity properties as well as high strengths characteristics. Copper alloy shall be heat-treated.

4.4 The Copper alloy must be developed and defined in accordance with mechanical and electrical properties indicated in clause 4.3 of P-176:2011. This Copper alloy must be heat treated to reach the electrical and mechanical requirement as per clause 4.3. The chemical composition should be in accordance with the following standards:

ASTM B411 – alloy reference C64700
DIN 17673 – alloy reference 17678
BSS 4577 – alloy reference A3/2

The Copper alloy shall have the following characteristics:

Ultimate tensile strength Rm (min)	=	20 kg/ mm^2, (196.2) N/mm^2, (196.2) MPa
Yield strength Re 0.2% min	=	10 kg/mm^2, (98.1) N/mm^2, (98.1) MPa
Elongation (min)	=	18% on 50 mm scale
Electrical conductivity at 20^0C (%IACS) (min)	=	32% IACS

5 TESTS

5.1 <u>Sample Tests</u>

5.1.1 The following sample tests are required to be carried out on connectors:

i) visual inspection and dimension test
ii) Temperature rise test
iii) Resistance test
iv) Strength test

5.1.2 <u>Visual Inspection and Dimensions</u>

Each batch offered for acceptance shall be divided into lots of 500 connectors. Samples shall be selected at random from each lot for test.

The number of connectors in the sample shall be 50 for visual inspection and verification of dimensions.

If the number of defective connectors in any sample is three or less, the entire lot shall be accepted. If it is more than 10, the entire lot shall be rejected.

If the number of the defective connectors is 4 to 10 inclusive, a second sample of 100 connectors shall be selected at random from the same lot (but excluding the first sample) and these shall be inspected and the number of the defective units in the second sample determined.

If the total number of defective units from the first and second sample together is 10 or less, the entire lot shall be accepted. If it is more than 10 than the entire lot shall be rejected.

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Individual items shall be visually examined for the defects given below:

Sr.No.	Examination	Defects
1.	Construction	i. Not of proper dimensions ii. Nor of correct material iii. Any crack on the material
2.	Finish	i. Not free from roughness, sharp edges and projections which will interfere with the proper use of the article ii. Corner edges not rounded

5.1.3 Temperature Rise Test

Connectors of each type being offered shall be subject to temperature rise test. For this purpose a circuit diagram/loop containing at least two connectors of each type shall be formed by using the relevant conductor/tube.
The test shall be performed according to NEMA CC1.
The temperature rise of the connectors shall not exceed the temperature rise of the conductor with which it is intended to be used.
The temperature rise of the connectors, which connects conductors of varying sizes, shall not exceed the temperature rise of the conductor having highest temperature rise.

5.1.4 Resistance Test

The resistance of each connector shall not exceed 110% of the reference conductor resistance.

5.2 Type Tests

5.2.1 The following type tests shall be carried out on connector bodies, bolts, nuts and washers.

i) Material composition test
ii) Tensile strength test
iii) Elongation test
iv) Brinell hardness test
v) Heat Cycle Test
vi) Conductivity test
vii) Radio interference voltage and corona tests

5.2.2 Subject to approval, the type test reports can be submitted in lieu of actual tests. Copies in English Language of appropriate test methods shall be submitted with the type test report.

5.2.3 Cost of type tests shall be separately indicated by the bidder.

6 PACKING

6.1 Each connector shall be packed in a polythene bag. Nuts, bolts and washers supplied as per clause 3.15 shall also be packed therein.

6.2 The connector shall be packed in wooden cases with 100 connectors in each case. The wooden cases shall be strong e4nough to withstand the rigors of transportation. Each package shall have marked on two sides the connector types designations as per clause 1.2.

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7 TENDER DATA

The manufacturer shall submit with the tender the following information:

a) The details of materials, its composition and materials, its composition and mechanical characteristics.
b) Manufacturer catalogue number along with the catalogues.
c) Copies of type test reports on the connectors along with English version of the relevant specifications, to which the connectors are manufactured and tested.
d) Fully dimensioned drawings of the connectors.

8. APPROVAL DRAWINGS.

Four sets of the drawings and one set of reproducible shall be submitted for approval. The drawings shall show all dimensions, alloy designation and catalogue number.

500 kV CONNECTOR

9 SCOPE

The aim of this specification is to provide technical recommendations for selection of clamps and connectors used in 500 kV substations for transmission systems. HV connectors need to be selected carefully as they are one of the most critical functions within the substation and by consequence for the grid.

This document covers all connection functions as well as mechanical support and spacers required for phase conductors (cables and tubes).

10 QUALITY REQUIREMENTS

Clamps and connectors when manufactured by casting process are produced with aluminum alloys first melt with new ingots. Ingots will be delivered to the casting plant with its certificate of conformity as per the relevant standard requirement. Alloys and applicable standards are listed in the hereunder paragraphs.

Traceability from the components to the poured alloy will be provided by the supplier through his quality system, which has to be ISO 9001 (Edition 2000) certified.

11 GENERAL DESIGN OF CONNECTORS

The connectors will be designed such as they comply with the performances indicated in the paragraph 5 ("performances of the connectors"). Additionally the design of the products will comply with the following requirements.

11.1 The connectors shall be so designed that there are no sharp corners or edges, which may damage the conductor or cause radio interference, and corona.

11.2 The connectors shall be of bolted type and should be able to develop adequate electrical contact.

The quantity of keepers and bolts per connector body and conductor attachment will correspond at least at the following requirements.

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Conductor type	Number of Keepers	Number of Bolts
Stranded conductor	3 minimum	6 minimum
Stud	1 minimum	4 minimum
Tube	2 minimum	4 minimum

Connectors with single bolt technology are permitted for connection on tube only; but the design of the product must be submitted to approval with type test reports evidence covering the following performances:

- Electrical ageing test: ANSI 119.4 (Class C).
- Bending test (applicable loading must be obtained by calculation by implementing boundary condition on the busbar system).
- Short circuit test: IEC 62271-1 (2007)

11.3 Bolts and washers will be made in stainless steel grade A2-70 minimum as per the ISO 3506 standard.

Item	Technical characteristics	Requirements	Applicable standard
Stainless steel bolts	Ultimate tensile strength minimum	700 N/mm²	ISO 3506
	Hardness minimum	140 HB	

The maximum torques to be applied on the bolts is defined in the following table.

	M10	M12	M14	M16	M20
Torque (Nm)	37	60	80	110	200

11.4 The connectors shall be made from corrosion proof aluminum alloy: Silicon based \aluminum alloy.

11.5 The material and composition of the Aluminum alloy used on monometallic connectors and the Aluminum portion of the bimetallic connectors shall be as per details below:

S. No.	Technical characteristics	EN AC 42100 (For body)	EN AC 42200 (For keeper)	Applicable standard
1	Ultimate tensile strength, min	230 N/mm^2	320 N/mm^2	EN 1706-1998
2	Yield strength, 0.2% off set, min	190 N/mm^2	240 N/mm^2	EN 1706-1998
3	Elongation, min	2%	3%	EN 1706-1998
4	Electrical conductivity, min	38% of IACS	38% of IACS	EN 1706-1998
5	Brinell hardness, min	75 HB	100 HB	EN 1706-1998

Al alloy characteristics as per EN AC 42100 and 42200 to be submitted for approval. The alloy will be properly heat treated. Additionally, keepers, components, which are subjected to high forces during services, will be obtained by gravity die casting

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12 TYPE TEST

The connectors shall be subjected to the type test and meet the requirements given below:

Type tests	Applicable standard	Requirement performance
Tensile Test	NEMA CC1 (edition 2005)	8896N per stranded conductor
Cantilever test	NEMA CC1 (edition 2005)	8896N orthogonally applied to supports and busbar connectors.
Electrical resistance test	NEMA CC1 (edition 1984)	R≤110% of conductor reference
Temperature rise test	NEMA CC1 (edition 2005)	T°(K) of the connector lower than the higher T°(K) of the connected conductors.
Ageing cycling test	ANSI C119.4 (edition 2004)	125 Cycles minimum
Short Circuit test	IEC 62271-1 (Edition 2007)	40kA/1Sec 63 kA/1Sec
		No cracks and no melt on the tested connectors. T° Max < 200°C after testing.
R.I.V test	IEC 62271-1 (Edition 2007)	2500µV at Un
Corona test	IEC 62271-1 (Edition 2007)	Extinction at Un
Corrosion test	EN 60068-2-11 (edition 1999)	500 Hours in Salt fog
Tightening torque test	NEMA CC1 (edition 2005)	1.5 time nominal torque
		No damage of the connector and the fasteners
Bending test (2)		Applicable loading must be obtained by calculation by implementing boundary condition on the busbar system
		No damage of the connector and the fasteners
Mechanical oscillation test (3)	NEMA CC1 1984 (for measurement method of the resistance)	Resistance deviation every 10 000 cycles. Number of cycles: 100 000
		Max deviation allowed: 10% from original resistance

(1) Not applicable for shear head bolts.

(2) Applicable on connectors use single bolt technology.

(3) Applicable on multi-angular connectors.

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SCHEDULE OF TECHNICAL DATA FOR 132 kV GRID STATION CONNECTORS

		Value Required for Body	Value offered for Body	Value Required for Keeper	Value offered for Keeper	Unit
A	**Monometallic Connectors**					
1	Applicable standard	EN 1706-1998		EN 1706-1998		
2	Type/grade of alloy	EN AC 42100		EN AC 42200		
3	Ultimate tensile strength (Rm), min	230		320		N/mm^2
4	Yield strength, 0.2% off set (Rp0.2), min	190		240		N/mm^2
5	Elongation, min	2		3		%
6	Brinell hardness, min	75		100		HB
7	Electrical conductivity (min)	38		38		% IACS
8	Pull out strength	According to Conductor		According to Conductor		N
9	No. of Keepers			2		Nos.

B	**Bimetallic Connectors**					
2	Applicable standard	ASTM B411 – alloy reference C64700, DIN 17673 - alloy reference 17678, BS 4577 - alloy reference A3/2		ASTM B411 – alloy reference C64700, DIN 17673 - alloy reference 17678, BS 4577 - alloy reference A3/2		
3	Type/grade of alloy	Copper Alloy		Copper Alloy		
4	Material Composition	CuNi2Si		CuNi2Si		
5	% age of each metal	96.4 % of Copper		96.4 % of Copper		
6		3.6% other metals		3.6% other metals		
7	Ultimate tensile strength	196.2		196.2		N/mm^2
8	Yield strength, 0.2% off set (min)	98.1		98.1		N/mm^2
9	Elongation	18		18		%
10	Brinell hardness (min.)	74		74		HB
11	Electrical conductivity (min)	32		32		% IACS
12	Pull out strength	According to Conductor		According to Conductor		N
13	No. of Keepers	2		2		Nos.

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C	**Bolts, Nuts and Washers**					
1	Applicable standard	ISO 3506	ISO 3506			
2	Type/grade of alloy	Stainless Steel A2-70 & A4-70				
3	Breaking strength (min.)	637.65				N/mm^2
4	Yield strength (min)	392.4				N/mm^2
5	Brinell hardness	140				HB
D	**P.G. Clamp**					
1	Applicable standard	EN 1706-2010				
2	Type/grade of alloy	EN AC 42100				

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SCHEDULE OF TECHNICAL DATA FOR 220 kV GRID STATION CONNECTORS

		Value Required for Body	Value offered for Body	Value Required for Keeper	Value offered for Keeper	Unit
A	**Monometallic Connectors**					
1	Applicable standard	EN 1706-1998		EN 1706-1998		
2	Type/grade of alloy	EN AC 42100		EN AC 42200		
3	Ultimate tensile strength (Rm), min	230		320		N/mm^2
4	Yield strength, 0.2% off set (Rp0.2), min	190		240		N/mm^2
5	Elongation, min	2		3		%
6	Brinell hardness, min	75		100		HB
7	Electrical conductivity (min)	38		38		% IACS
8	Pull out strength	According to Conductor		According to Conductor		N
9	No. of Keepers			2		Nos.
B	**Bimetallic Connectors**					
1	Applicable standard	ASTM B411 – alloy reference C64700, DIN 17673 - alloy reference 17678, BS 4577 - alloy reference A3/2		ASTM B411 – alloy reference C64700, DIN 17673 - alloy reference 17678, BS 4577 - alloy reference A3/2		
2	Type/grade of alloy	Copper Alloy		Copper Alloy		
3	Material Composition % age of each metal	CuNi2Si 96.4 % of Copper		CuNi2Si 96.4 % of Copper		
4	Ultimate tensile strength	196.2		196.2		N/mm^2
5	Yield strength, 0.2% off set (min)	98.1		98.1		N/mm^2
6	Elongation	18		18		%
7	Brinell hardness (min.)	74		74		HB
8	Electrical conductivity (min)	32		32		% IACS
9	Pull out strength	According to Conductor		According to Conductor		N
10	No. of Keepers	2		2		Nos.

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C	**Bolts, Nuts and Washers**			
1	Applicable standard	ISO 3506		
2	Type/grade of alloy	Stainless Steel A2-70 & A4-70		
3	Breaking strength (min.)	637.65		N/mm^2
4	Yield strength (min)	392.4		N/mm^2
5	Brinell hardness	140		HB

D	**P.G. Clamp**		Offered
2	Applicable standard	EN 1706-1998	
3	Type/grade of alloy	EN AC 42100	

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SCHEDULE OF TECHNICAL DATA FOR 500 kV GRID STATION CONNECTORS

		Value Required for Body	Value offered for Body	Value Required for Keeper	Value offered for Keeper	Unit
A	**Monometallic Connectors**					
2	Applicable standard	EN 1706-2010		EN 1706-2010		
3	Type/grade of alloy	EN AC 42100		EN AC 42200		
4	Ultimate tensile strength (Rm), min	230		320		N/mm^2
5	Yield strength, 0.2% off set (Rp0.2), min	190		240		N/mm^2
6	Elongation, min	2		3		%
7	Brinell hardness, min	75		100		HB
8	Electrical conductivity (min)	38		38		% IACS
10	Pull out strength	According to Conductor		According to Conductor		N
11	No. of Keepers			3		Nos.
B	**Bolts, Nuts and Washers**					
1	Applicable standard	ISO 3506		ISO 3506		
2	Type/grade of alloy	Stainless Steel A2-70 & A4-70				
3	Breaking strength (min.)	637.65				N/mm^2
4	Yield strength (min)	392.4				N/mm^2
5	Brinell hardness	140				HB
C	**P.G. Clamp**					
1	Manufacturer's Name and Address					
2	Applicable standard	EN 1706-2010				
3	Type/grade of alloy	EN AC 42100				

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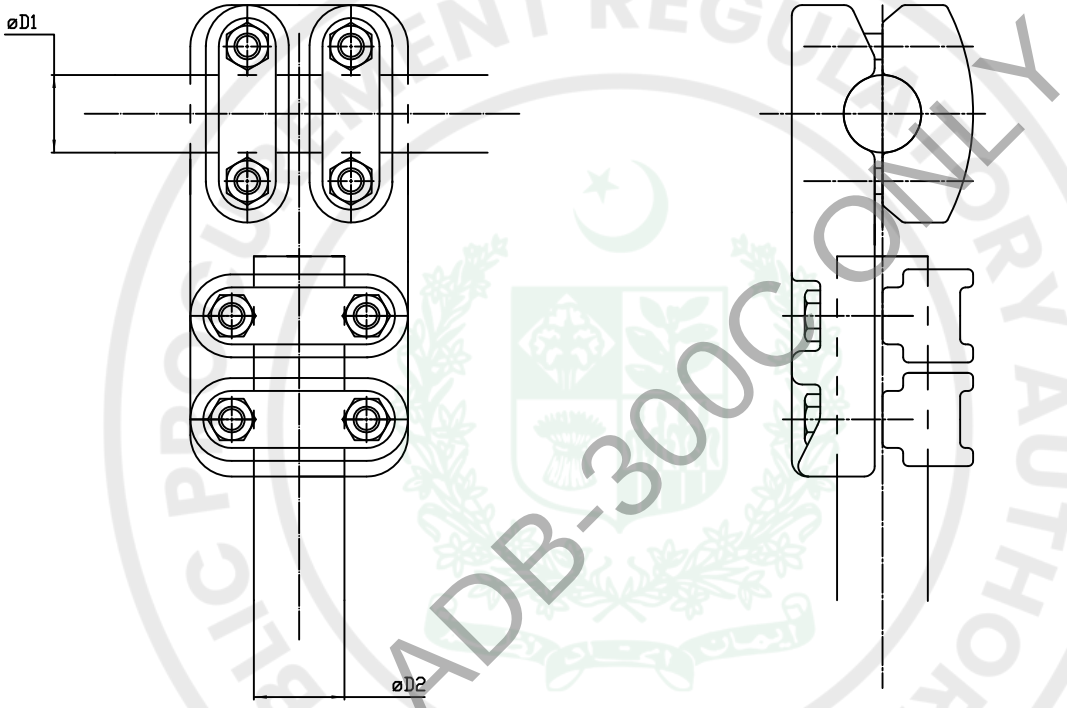

TMRR	29.6	29.6
TMHH	32	32
TMRH	29.6	32
TMLH	20	32
TYPE & DESIGNATION	øD1	øD2

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company	Design NTDC
Drawn	-
Checked	-
Approved	-
Chief Engineer Design NTDC	

TEE - MONOMETALLIC CONNECTOR
AL.CONDUCTOR TO
ALUMINIUM CONDUCTOR

Scale: -
Date: -

DWG No: PDW/DF 388R

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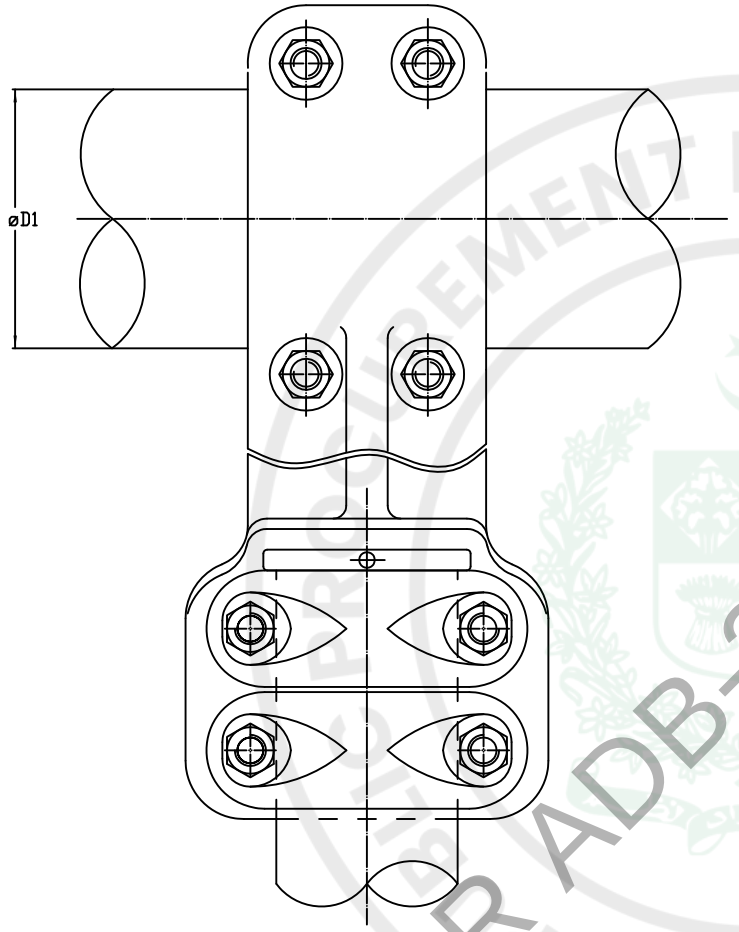

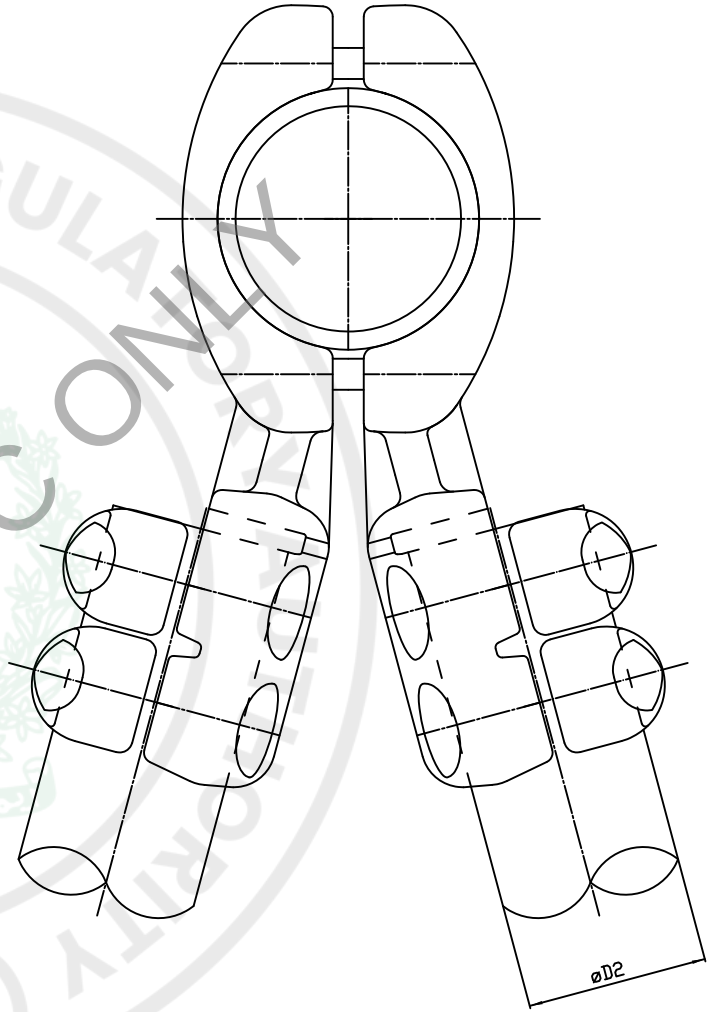

TDMP3.0,P2.5	88.9	73
TDMP3.5,P2.5	101.6	73
TDMP5.0,P2.5	141.3	73
TDMP5.0,P3.5	141.3	101.6
TYPE & DESIGNATION	øD1	øD2

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	THREE WAY ANGLE CONNECTOR 3", 3 1/2 " & 5 AL PIPE TO 2 1/2", 3 1/2" AL PIPE TAP
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 389R

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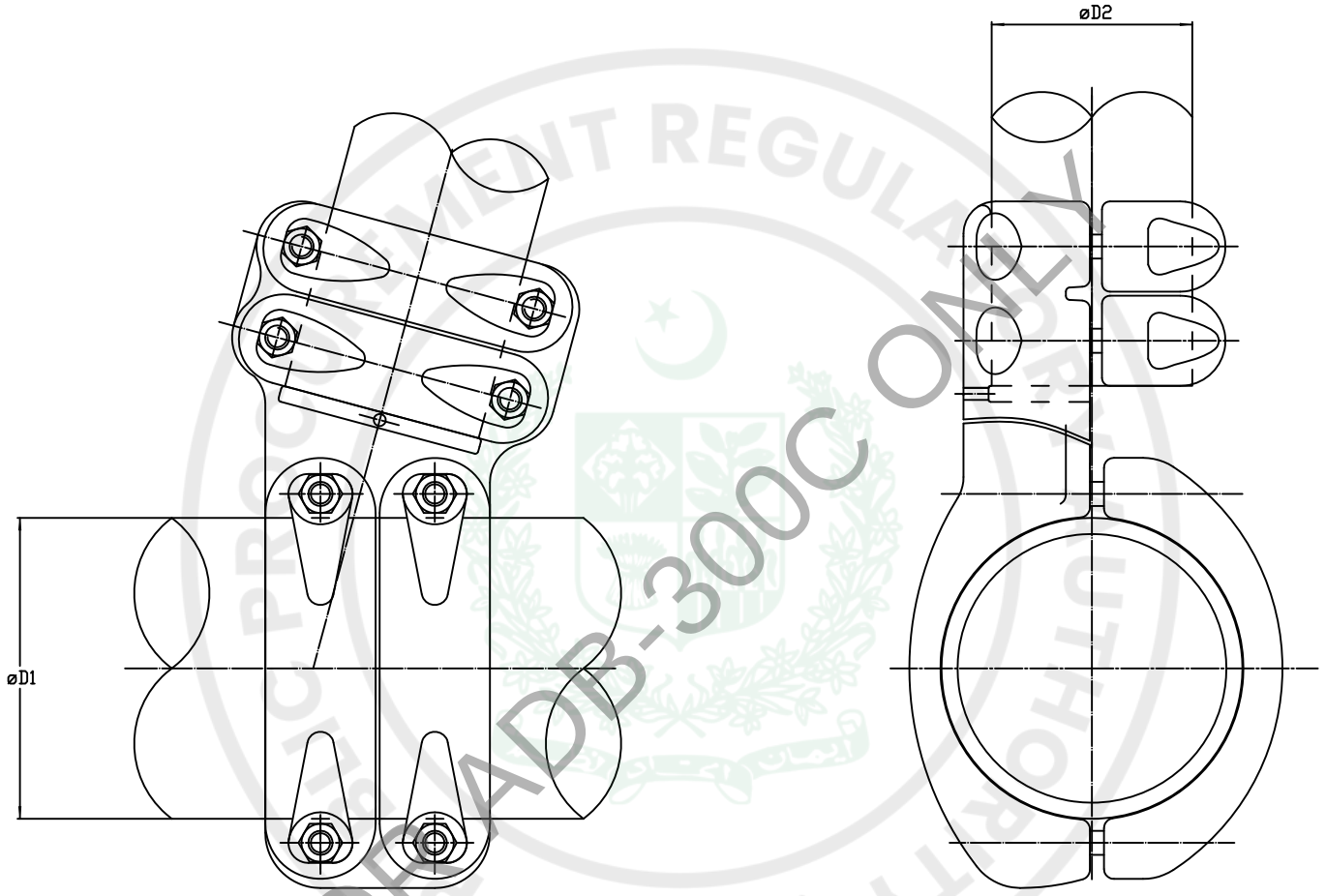

TYPE & DESIGNATION	øD1	øD2
TMP3.0P2.5	88.9	73
TMP3.5P2.5	101.6	73
TMP5.0P2.5	141.3	73
TMP5.0P3.5	141.3	101.6

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	ANGLE TEE CONNECTORS AL 3", 3 1/2" & 5" PIPE TO 2 1/2", 3 1/2" AL PIPE TAP
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 392R

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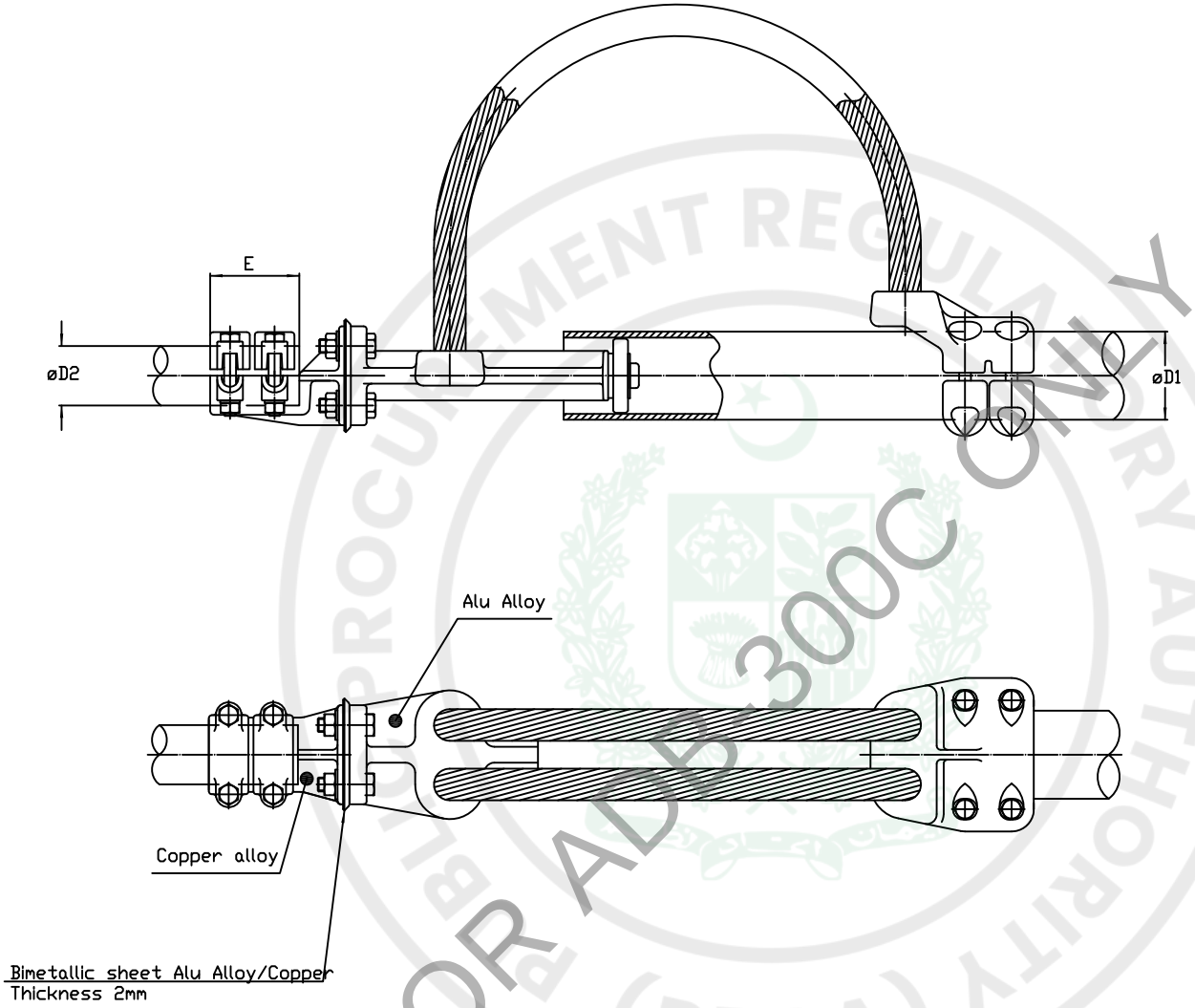

□BEP3.0,60	88.9	60	90
□BEP3.5,60	101.6	60	90
□BEP5.0,60	141.3	60	90
TYPE & DESIGNATION	øD1	øD2	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy.
   Keeper for Cu alloy portion of connector in Cu alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper alloy-Copper / Nikel base family CuNi2Si, 96.4% copper+3.6% other alloy (Heat Treated)
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT BIMETALLIC EXPANSION CONNECTOR AL.PIPE TO COPPER TERMINAL
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 393R

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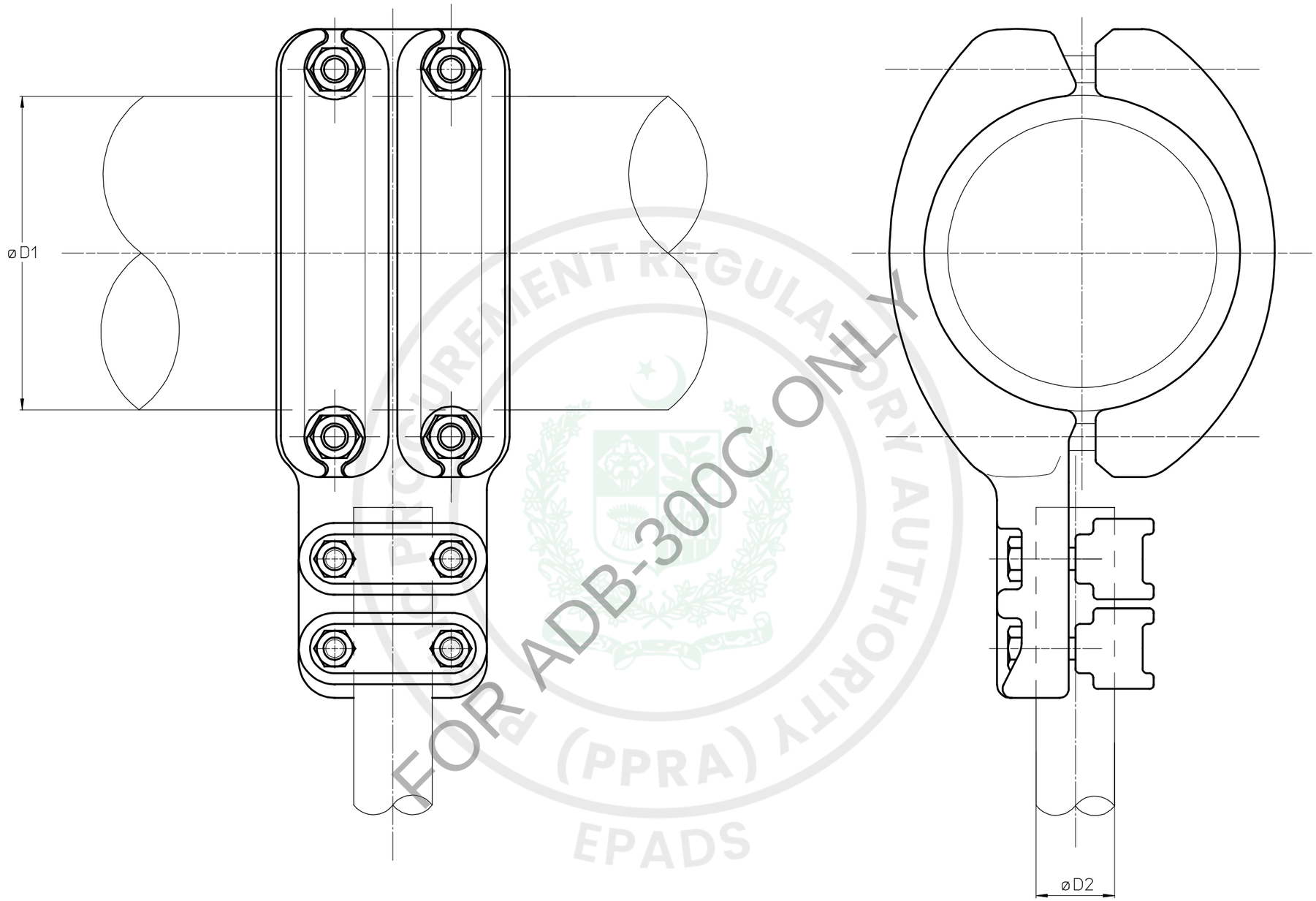

TMHP5.0	141.3	32
TYPE & DESIGNATION	øD1	øD2

NOTES:

1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:

(i) Al Alloy - EN AC-serial 42000

(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70

4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	TEE MONOMETALLIC CONNECTOR AL.PIPE TO ALUMINIUM HAWTHORN CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 395R

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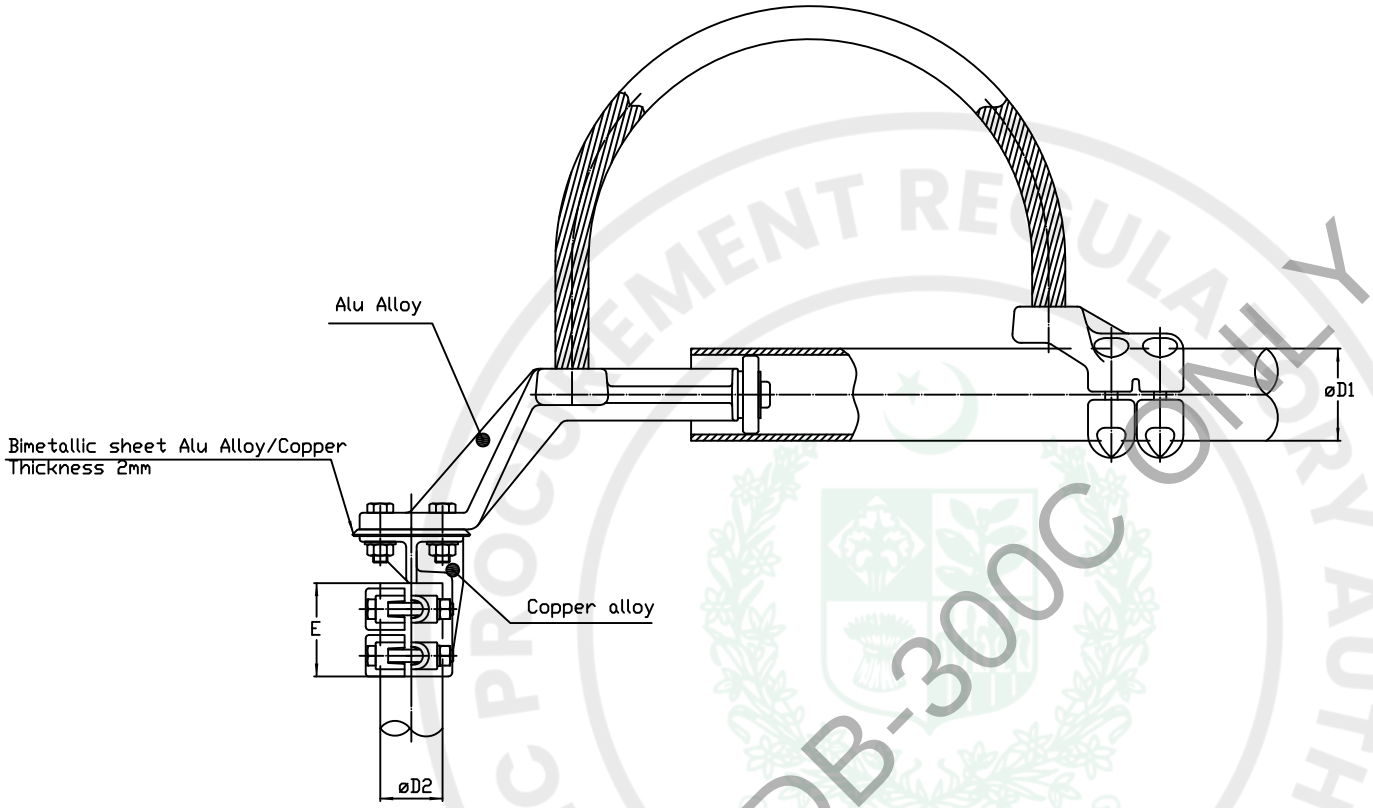

TYPE & DESIGNATION	øD1	øD2	E
90°BEP3.0,60	88.9	60	90
90°BEP3.5,60	101.6	60	90
90°BEP5.0,60	141.3	60	90
90°BEP3.0,40	88.9	40	72
90°BEP5.0,40	141.3	40	72

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy
   Keeper for Cu alloy portion of connector in Cu alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper alloy-Copper / Nikel base family CuNi2Si,96.4% copper+3.6% other alloy (Heat Treated)
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company	Design NTDC
Drawn -	90° BIMETALLIC EXPANSION CONNECTOR FOR AL.PIPE TO COPPER TERMINAL
Checked -	
Approved -	
Chief Engineer Design NTDC	Scale: - Date: -
	DWG No: PDW/DF 396R

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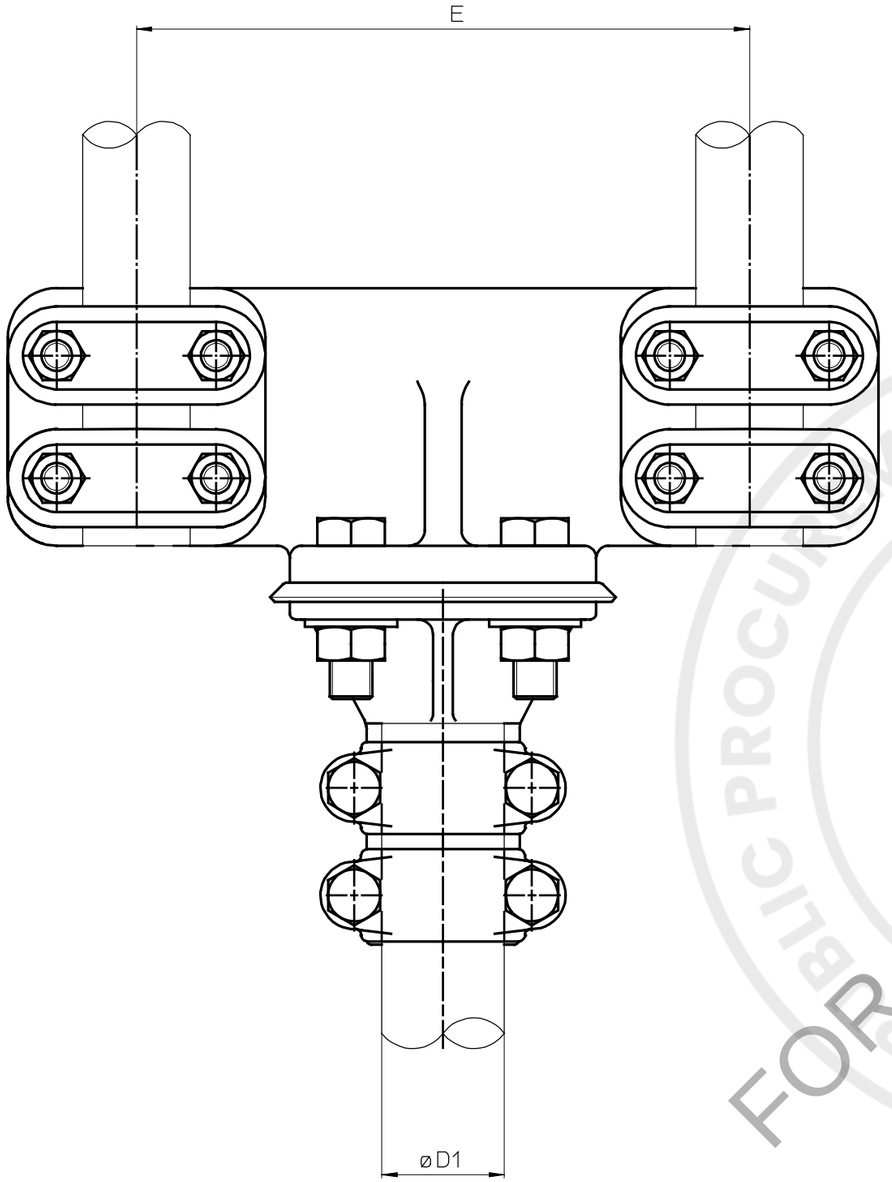

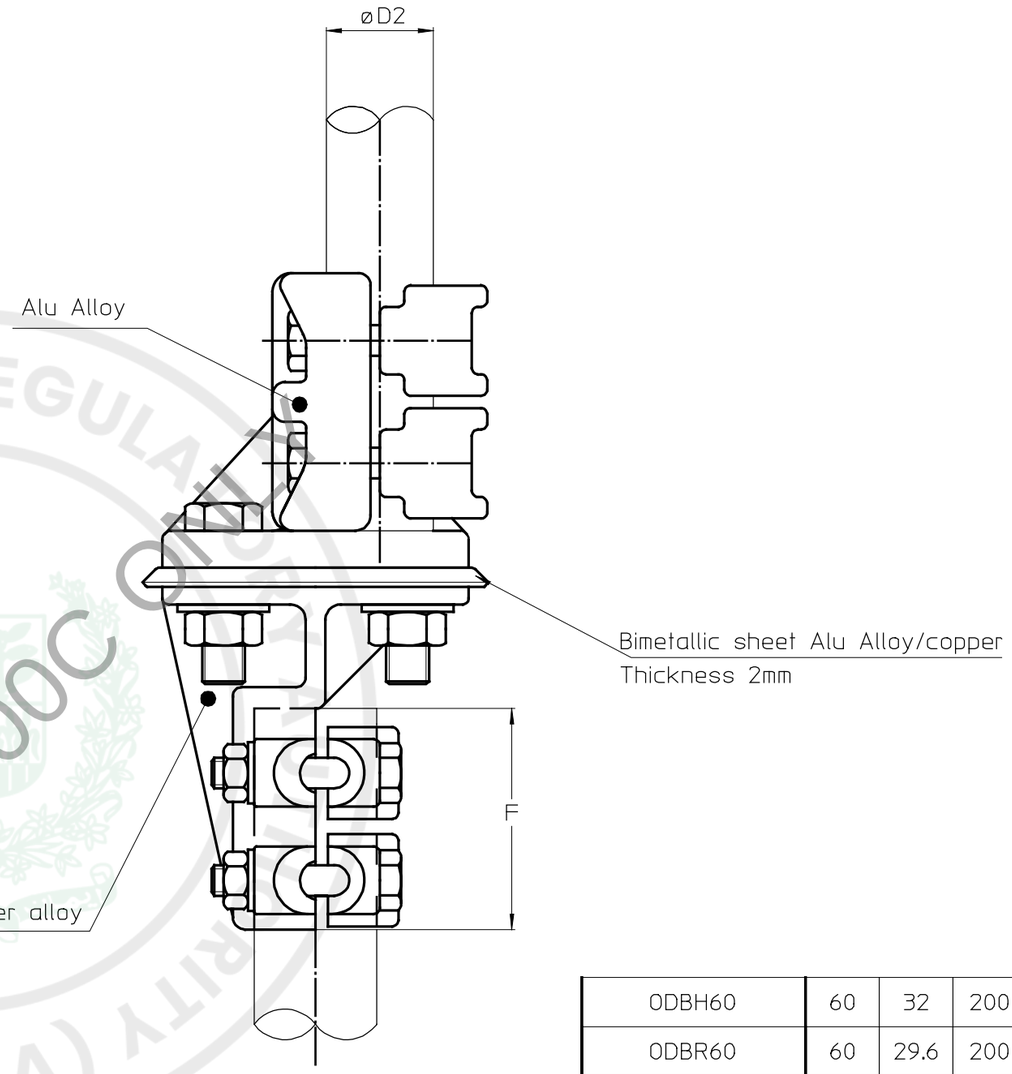

TYPE & DESIGNATION	øD1	øD2	E	F
ODBH60	60	32	200	90
ODBR60	60	29.6	200	90
ODBA60	60	27.72	200	90
ODBH40	40	32	200	72

NOTES:

1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy
3. Type of material:

(i) Al Alloy - EN AC-serial 42000
(ii) Copper alloy-Copper / Nikel base family CuNi2Si,96.4% copper +3.6% other alloy (Heat Treated)
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70

4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT BIMETALLIC CONNECTOR COPPER TERMINAL TO TWIN AL.CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 397R

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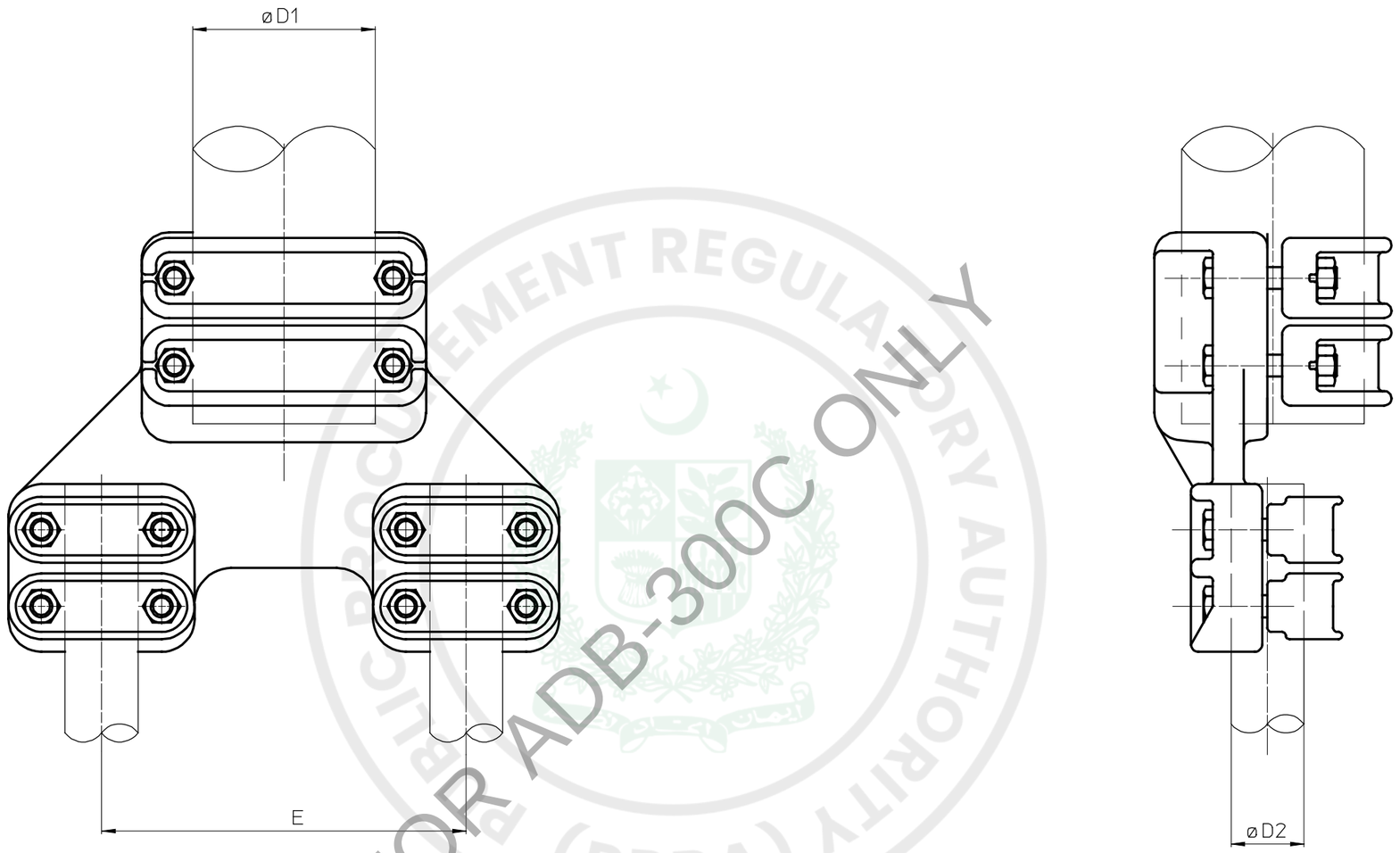

TYPE & DESIGNATION	øD1	øD2	E
ODMHP3.0	88.9	32	200
ODMHP3.5	101.6	32	200
ODMHP5.0	141.3	32	200
ODMRP3.0	88.9	29.6	200

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy - EN AC-serial 42000
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT MONOMETALLIC CONNECTOR FOR TWIN AL.CONDUCTOR TO AL.PIPE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 398R

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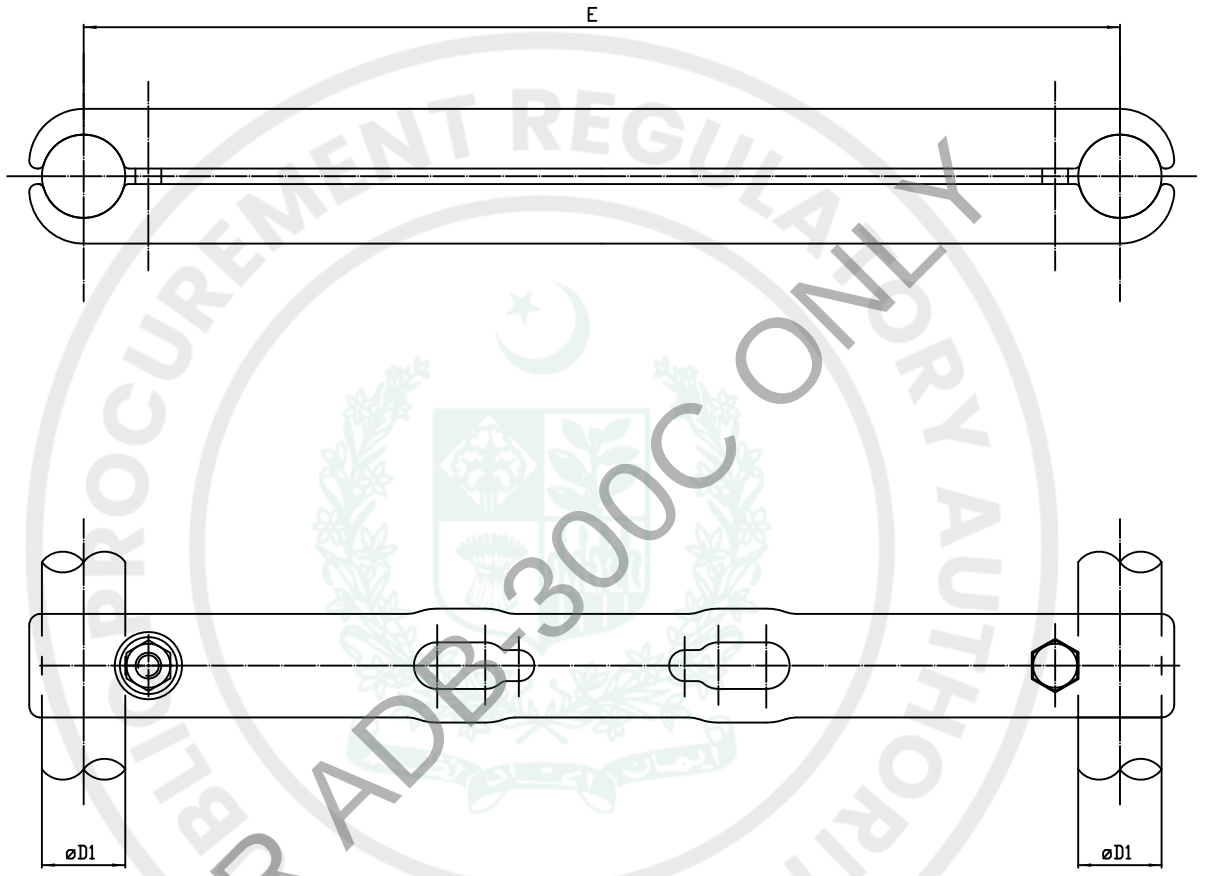

SH400	32	400
SH200	32	200
SH100	32	100
SR400	29.6	400
SR200	29.6	200
TYPE & DESIGNATION	øD1	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	MONOMETALLIC SPACER FOR TWIN CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 401R

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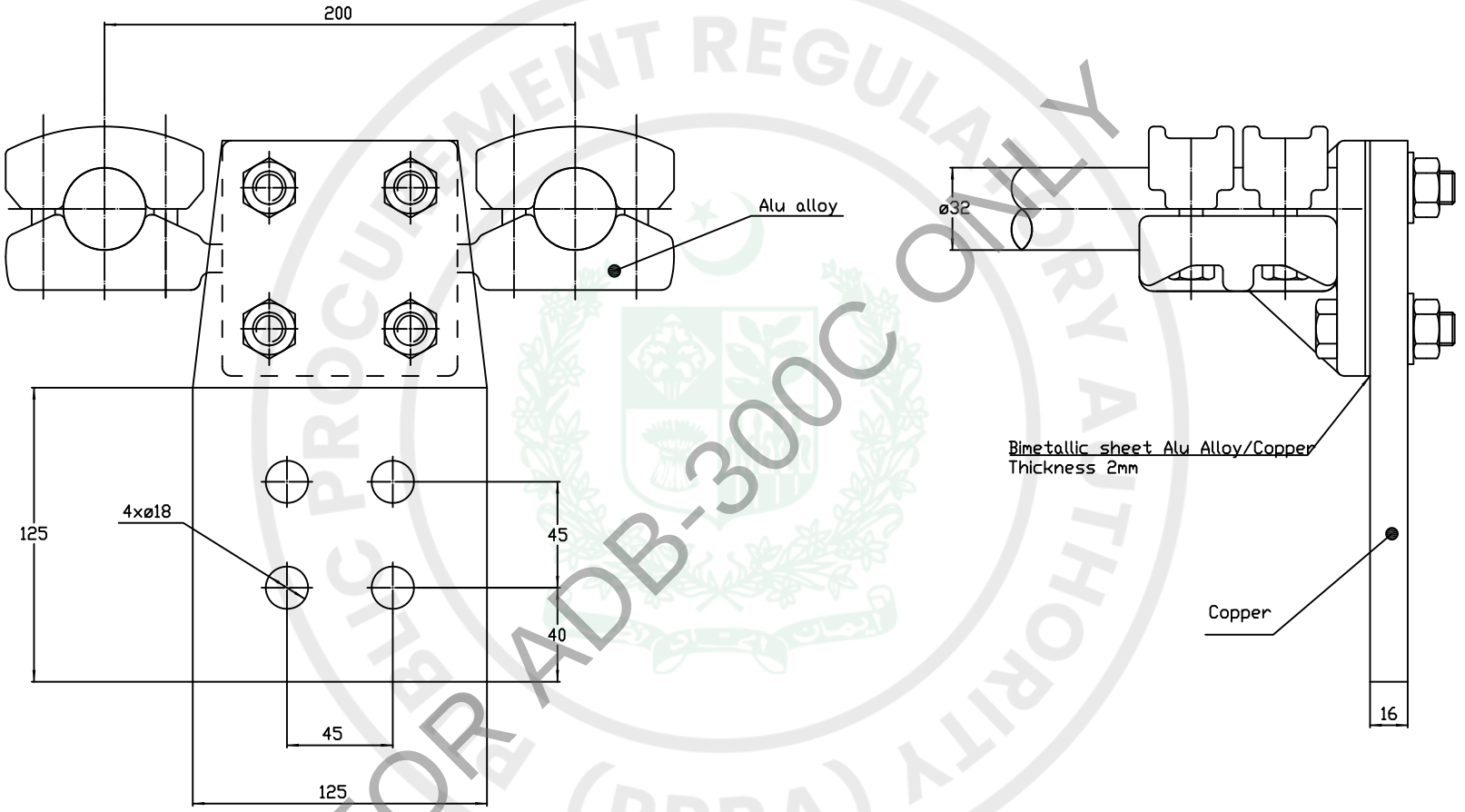

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper Cu-ETP
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

90DBHF
TYPE & DESIGNATION

National Transmission & Despatch Company		Design NTDC
Drawn	-	90° BIMETALLIC CONNECTOR COPPER FLAT TO TWIN ALUMINIUM CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 402R

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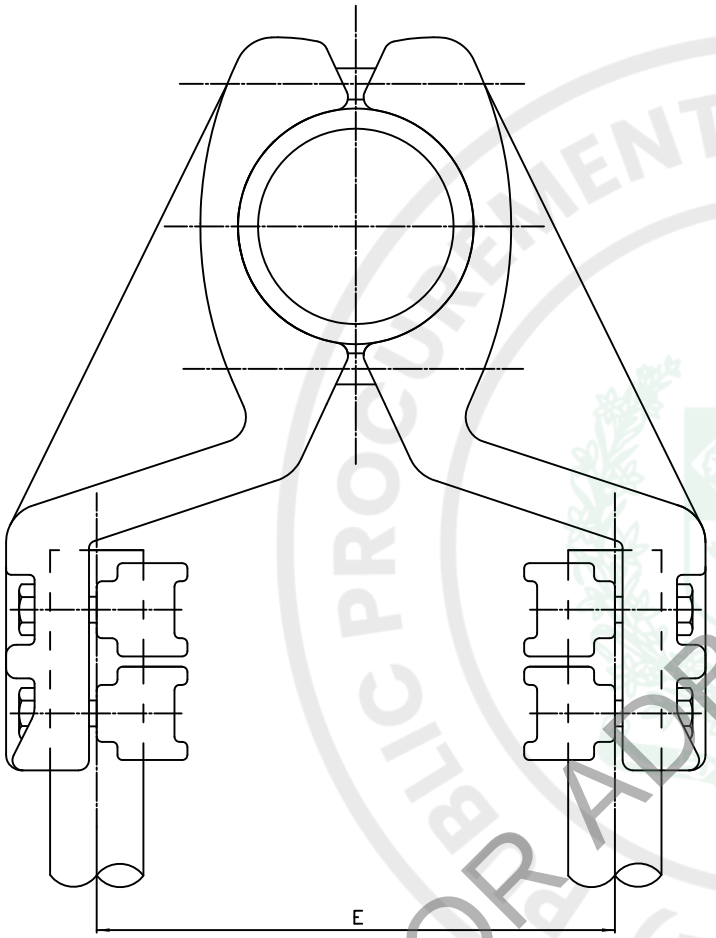

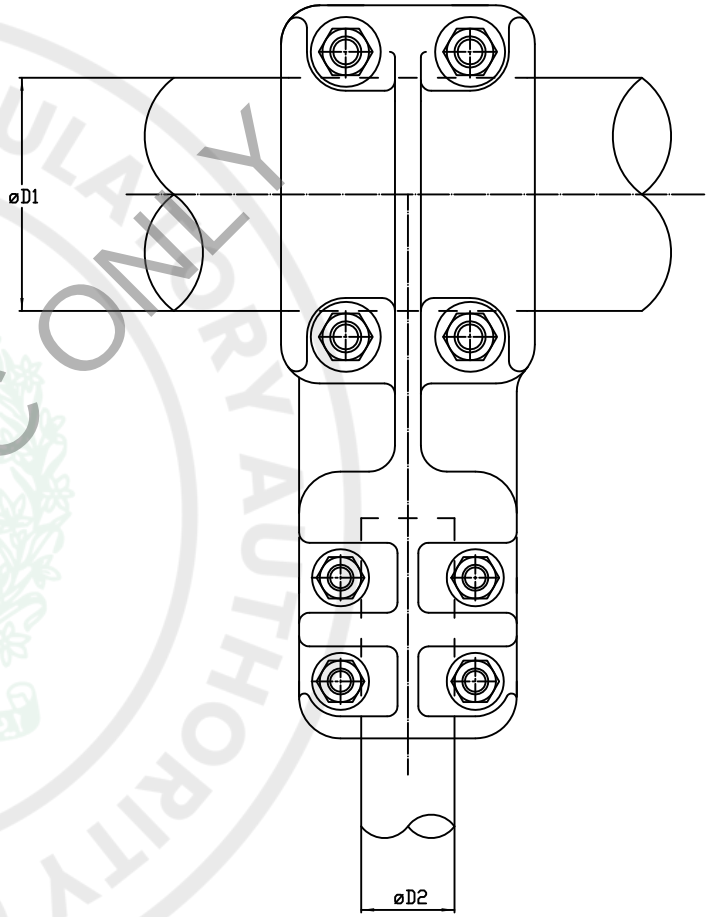

TDMHP5.0	141.3	32	100
TDMHP3.5	101.6	32	200
TDMAP3.0	88.9	27.72	200
TDMRP3.0	88.9	29.6	200
TYPE & DESIGNATION	øD1	øD2	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	TEE MONOMETALLIC CONNECTOR TWIN AL. CONDUCTOR TO AL.PIPE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 405R

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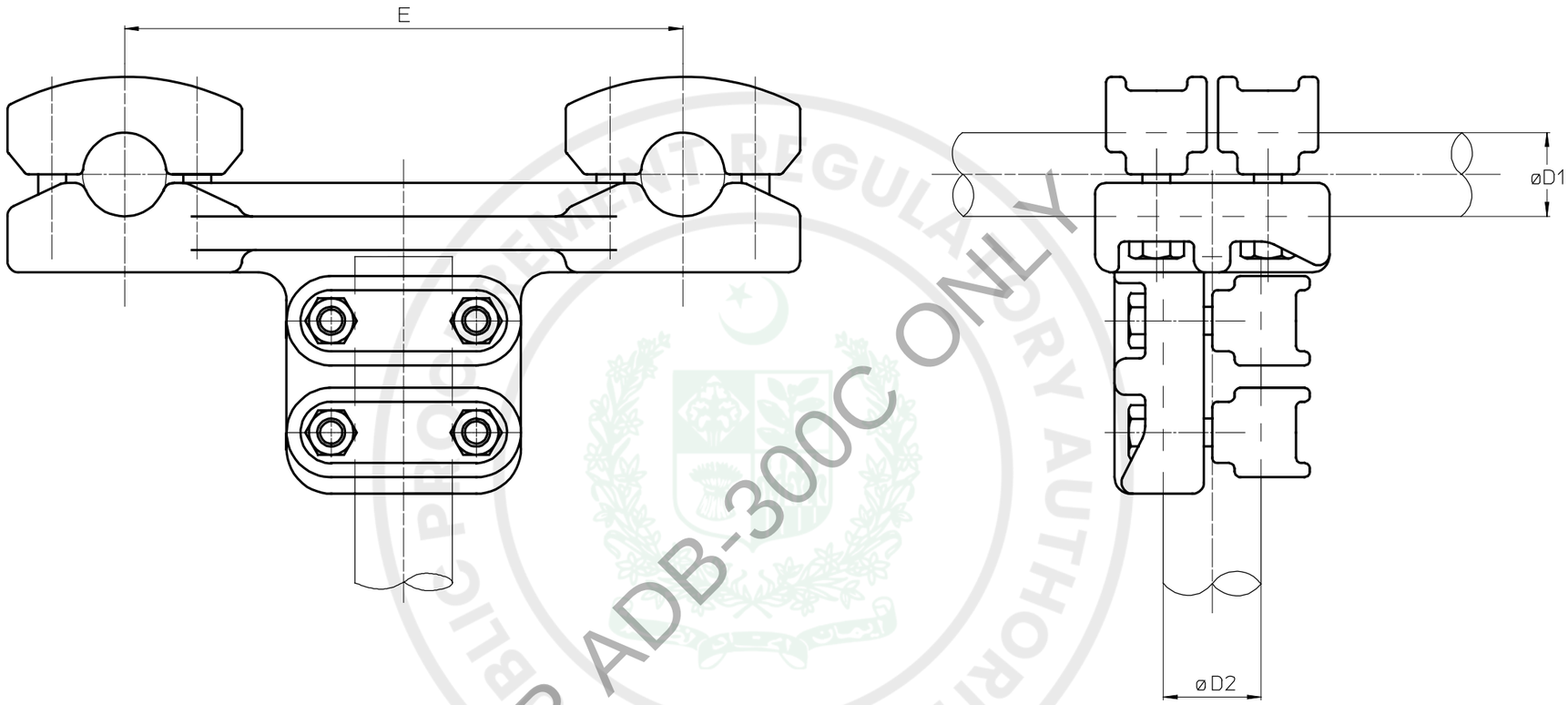

TDMHH	32	32	200
TDMRH	29.6	32	200
TDMRA	29.6	27.72	200
TYPE & DESIGNATION	øD1	øD2	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy - EN AC-serial 42000
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	TEE MONOMETALLIC CONNECTOR TWIN ALUMINIUM CONDUCTOR TO ALUMINIUM CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 406R

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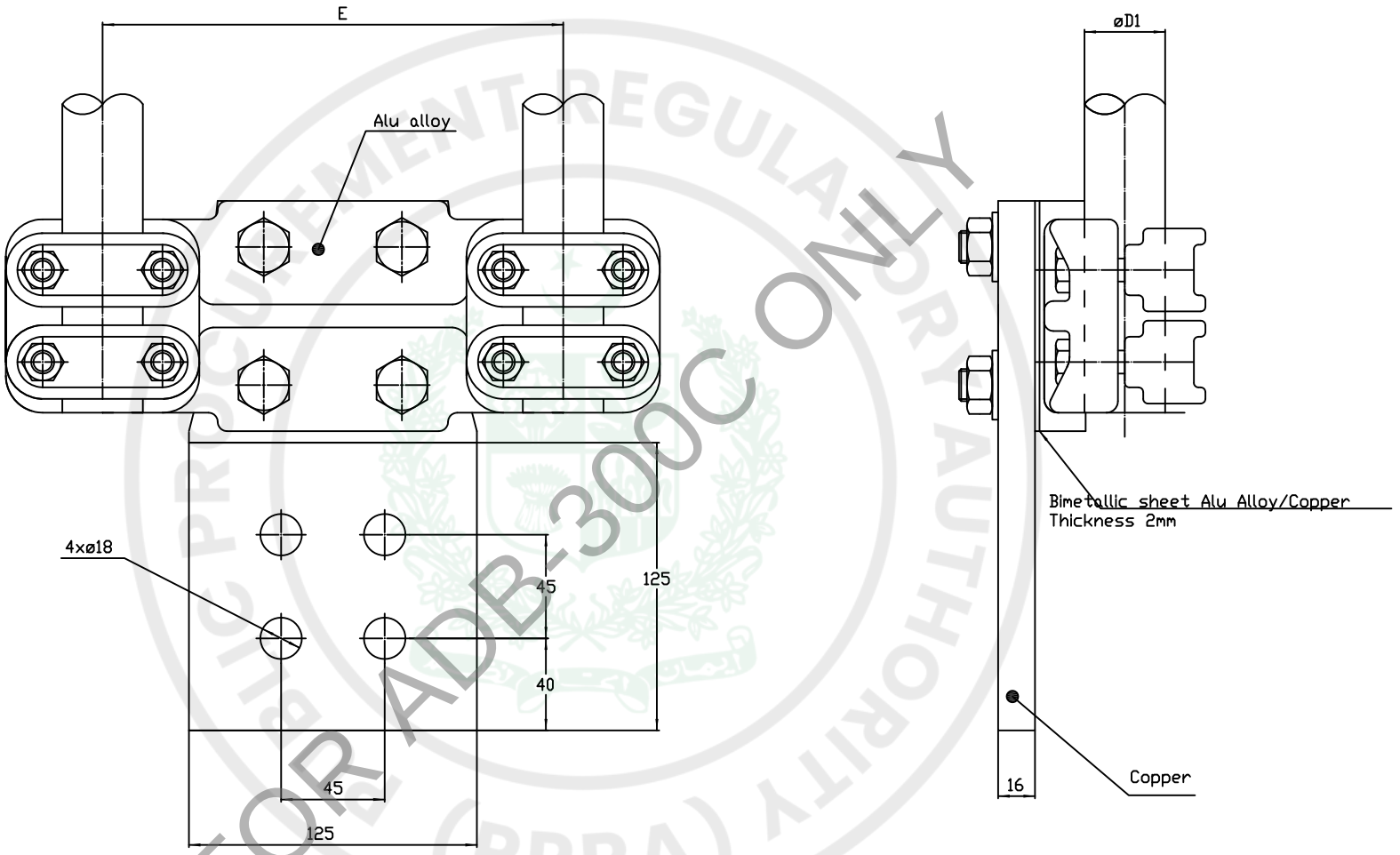

ODBHF	32	200
ODBHF	32	100
TYPE & DESIGNATION	øD1	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper Cu-ETP
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT BIMETALLIC CONNECTOR COPPER FLAT TO AL.CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 407R

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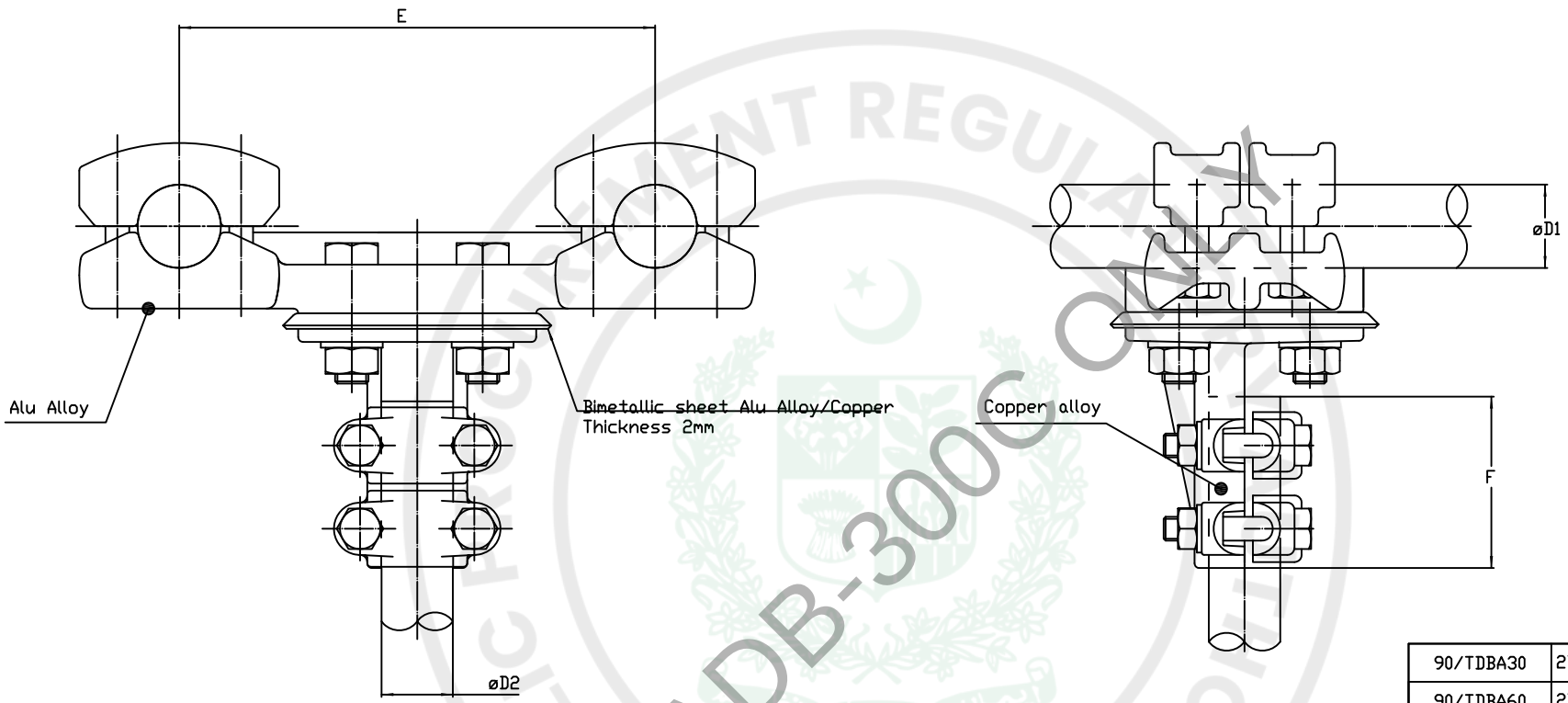

TYPE & DESIGNATION	øD1	øD2	E	F
90/TDBA30	27,72	30	200	72
90/TDBA60	27,72	60	200	90
90/TDBR30	29.6	30	200	72
90/TDBR60	29.6	60	200	90
90/TDBH30	32	30	200	72
90/TDBH60	32	60	200	90

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy
   Keeper for Cu alloy portion of connector in Cu alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper alloy-Copper / Nikel base family CuNi2Si, 96.4% copper+3.6% other alloy (Heat Treated)
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	90/T BIMETALLIC CONNECTOR COPPER TERMINAL TO ALUMINIUM TWIN CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 408R

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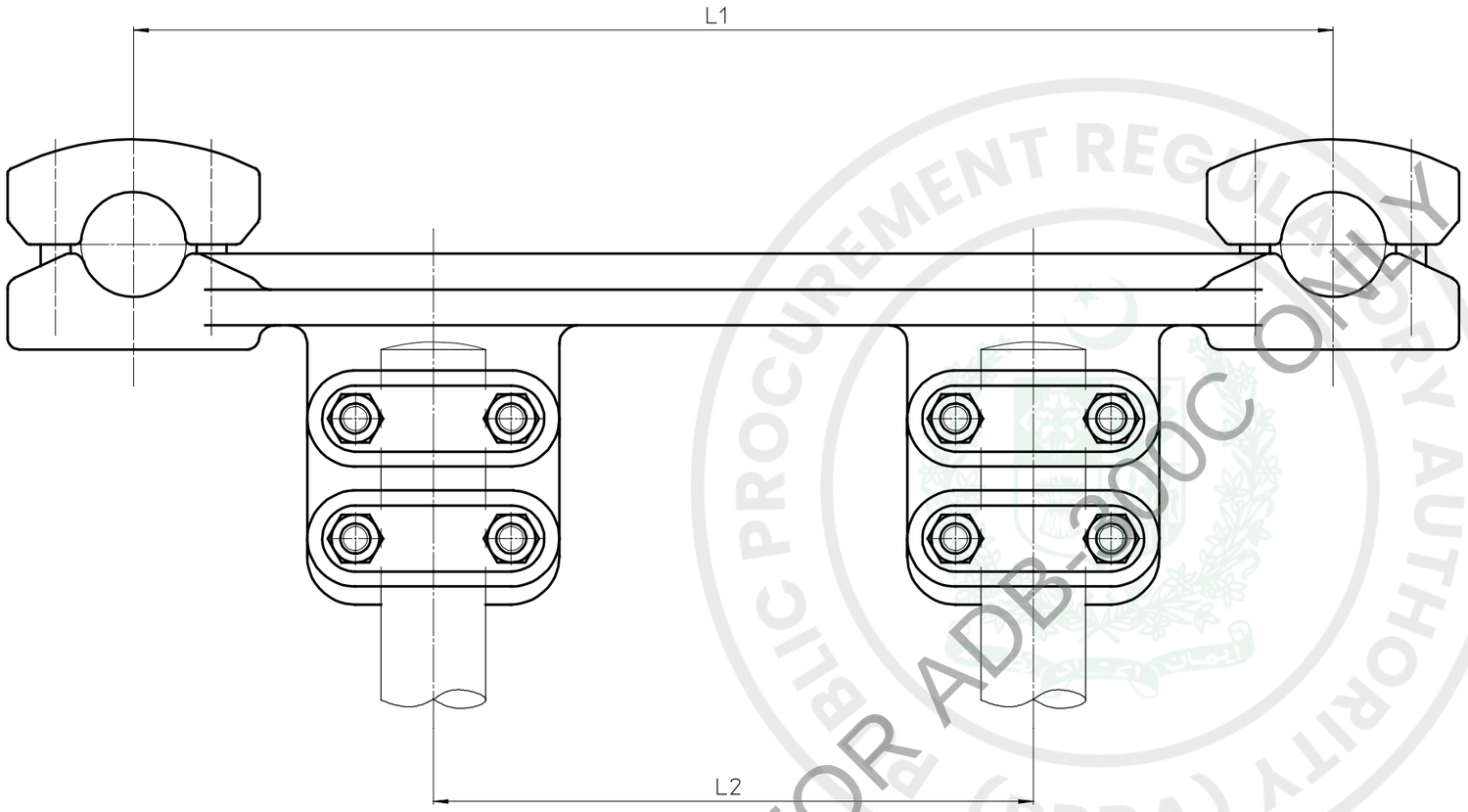

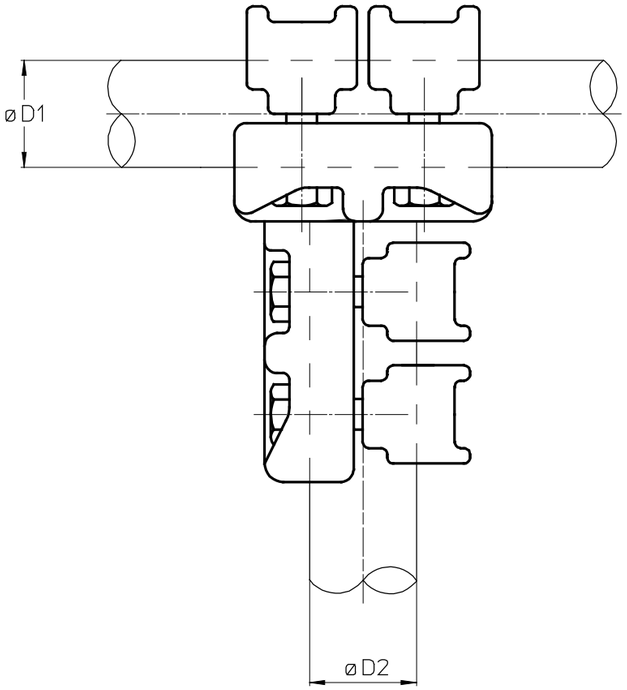

TYPE & DESIGNATION	øD1	øD2	L1	L2
TDMHH	32	32	400	200
TDMRH	29.6	32	400	200

NOTES:

1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy - EN AC-serial 42000
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company	Design NTDC
Drawn -	TEE DOUBLE MONOMETALLIC CONNECTOR TWIN AL.CONDUCTOR TO TWIN AL.CONDUCTOR
Checked -	
Approved -	
Chief Engineer Design NTDC	Scale: - / Date: -
	DWG No: PDW/DF 409R

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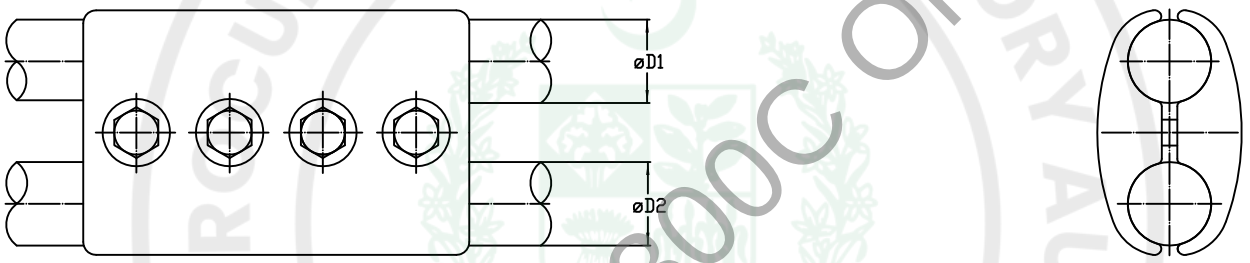

PGHH	32	32
PGJJ	39	39
PGRR	29.6	29.6
TYPE & DESIGNATION	øD1	øD2

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	PG CLAMP FOR AL CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 415R

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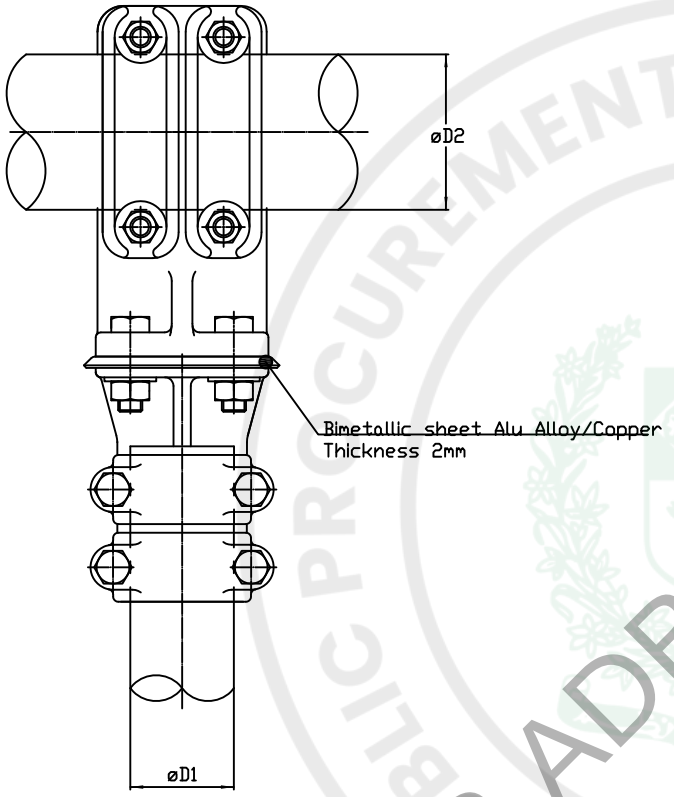

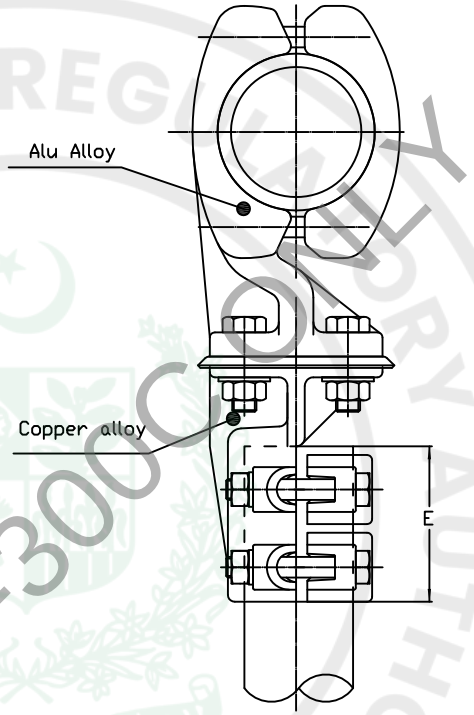

90/TBP3.0,60	60	88.9	90
90/TBP3.0,30	30	88.9	72
90/TBP3.5,60	60	101.6	90
90/TBP3.5,30	30	101.6	72
90/TBP5,40	40	141.3	72
90/TBP5,30	30	141.3	72
TYPE & DESIGNATION	øD1	øD2	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy
   Keeper for Cu alloy portion of connector in Cu alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper alloy-Copper / Nikel base family CuNi2Si, 96.4% copper+3.6% other alloy (Heat Treated)
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company			Design NTDC
Drawn	-	90°T BIMETALLIC CONNECTOR ALUMINIUM PIPE TO COPPER TERMINAL	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		DWG No: PDW/DF 427R	

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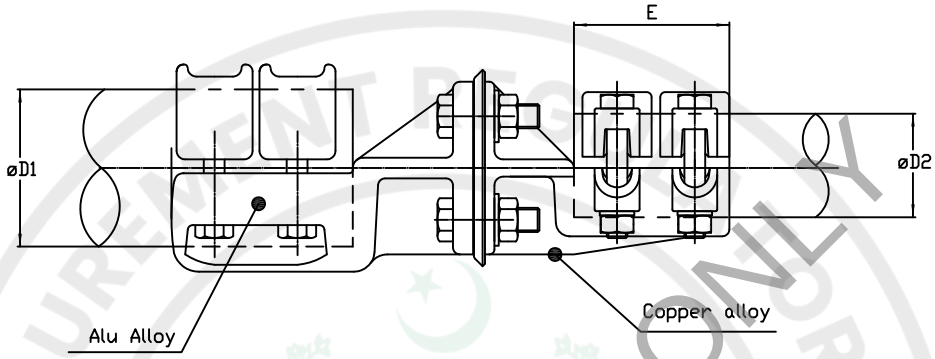

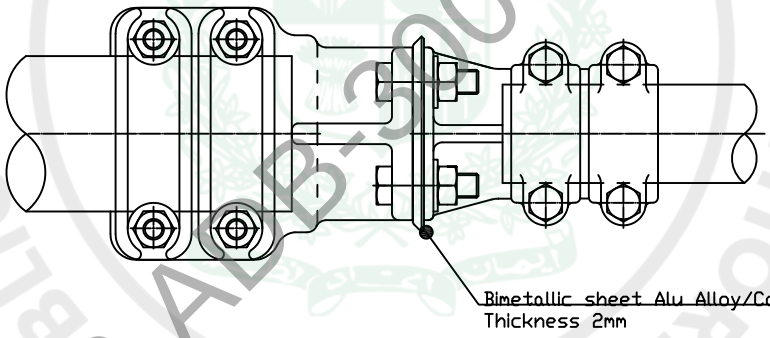

□BP3.0,60	88.9	60	90
□BP3.5,60	101.6	60	90
□BP5.0,40	141.3	40	72
TYPE & DESIGNATION	øD1	øD2	E

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy
   Keeper for Cu alloy portion of connector in Cu alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper alloy-Copper / Nikel base family CuNi2Si, 96.4% copper+3.6% other alloy (Heat Treated)
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT BIMETALLIC CONNECTOR ALUMINIUM PIPE TO COPPER TERMINAL
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 428R

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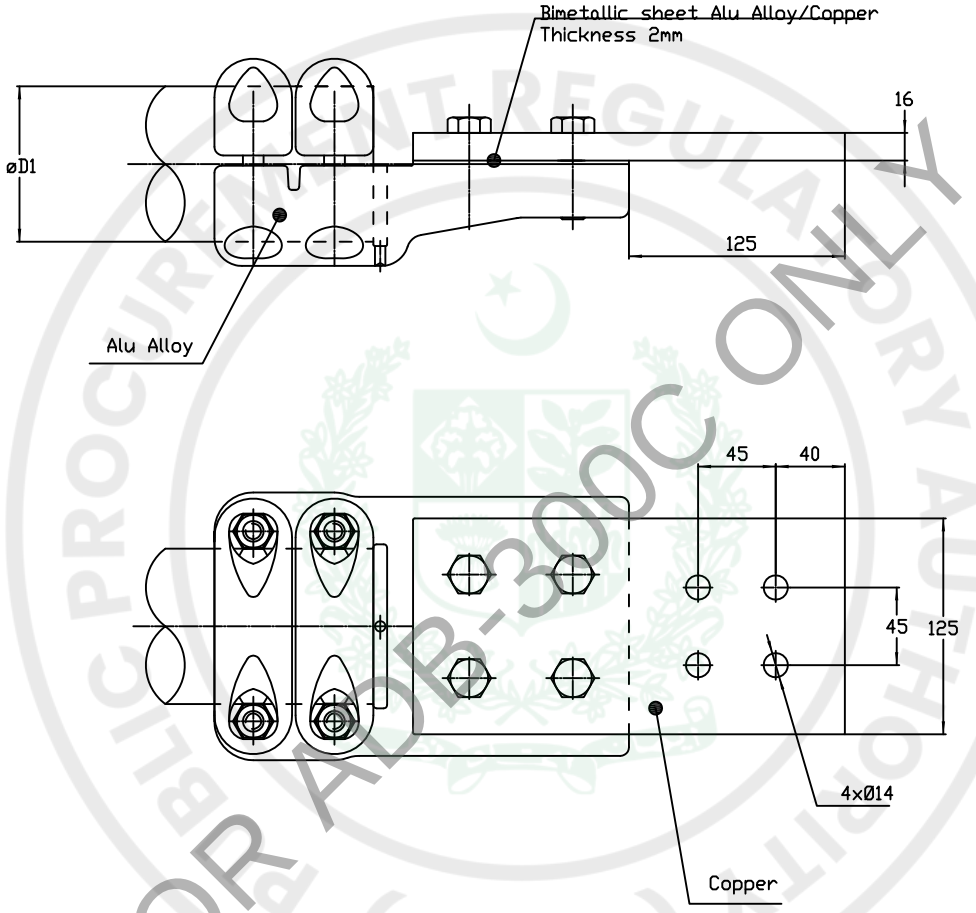

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ØBP3.0F	88.9
ØBP5.0F	141.3
TYPE & DESIGNATION	øD1

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Copper Cu-ETP
(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT BIMETALLIC CONNECTOR ALUMINIUM PIPE TO FLAT COPPER TERMINAL
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 429R

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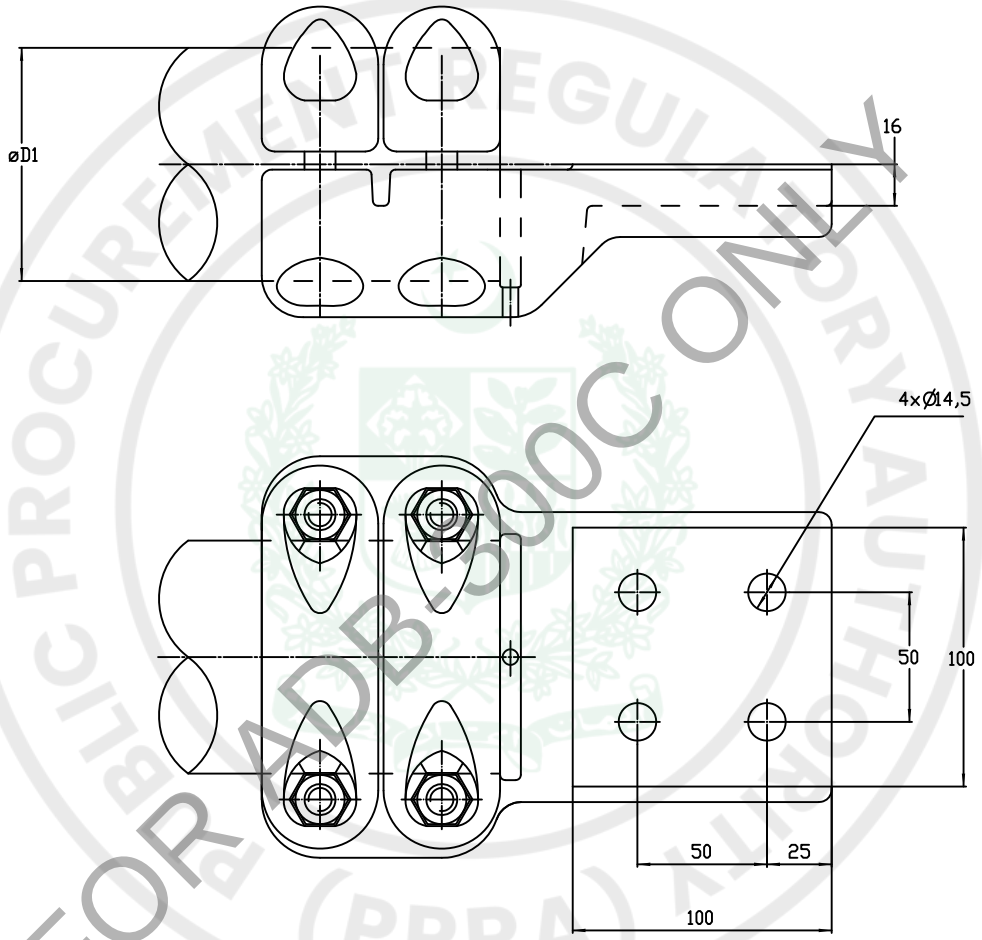

▯MP3.0F	88.9
▯MP3.5F	101.6
TYPE & DESIGNATION	øD1

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body
& EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC	
Drawn	-	STRAIGHT MONOMETALLIC CONNECTOR FOR ALUMINIUM PIPE TO FLAT ALUMINIUM TERMINAL	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		DWG No: PDW/DF 430R	

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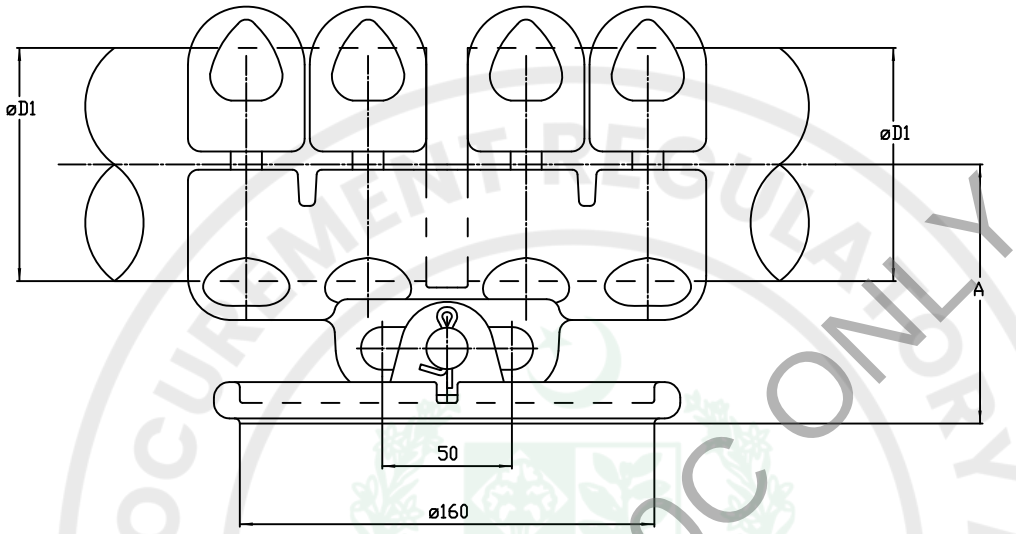

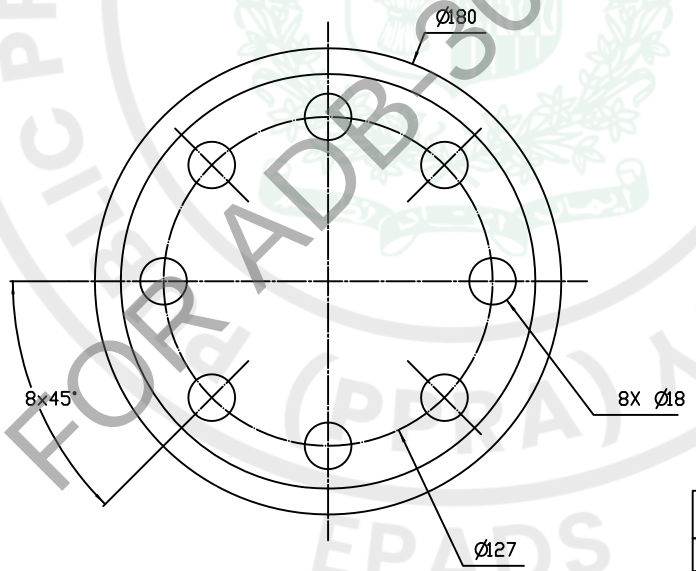

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 body
& EN AC 42200 keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

SBSP3.0	88.9	100
SBSP3.5	101.6	105
SBSP5.0	141.3	125
TYPE & DESIGNATION	øD1	A

National Transmission & Despatch Company		Design NTDC
Drawn	-	MONOMETALLIC SLIDE SUPPORT FOR ALUMINIUM PIPE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 431R

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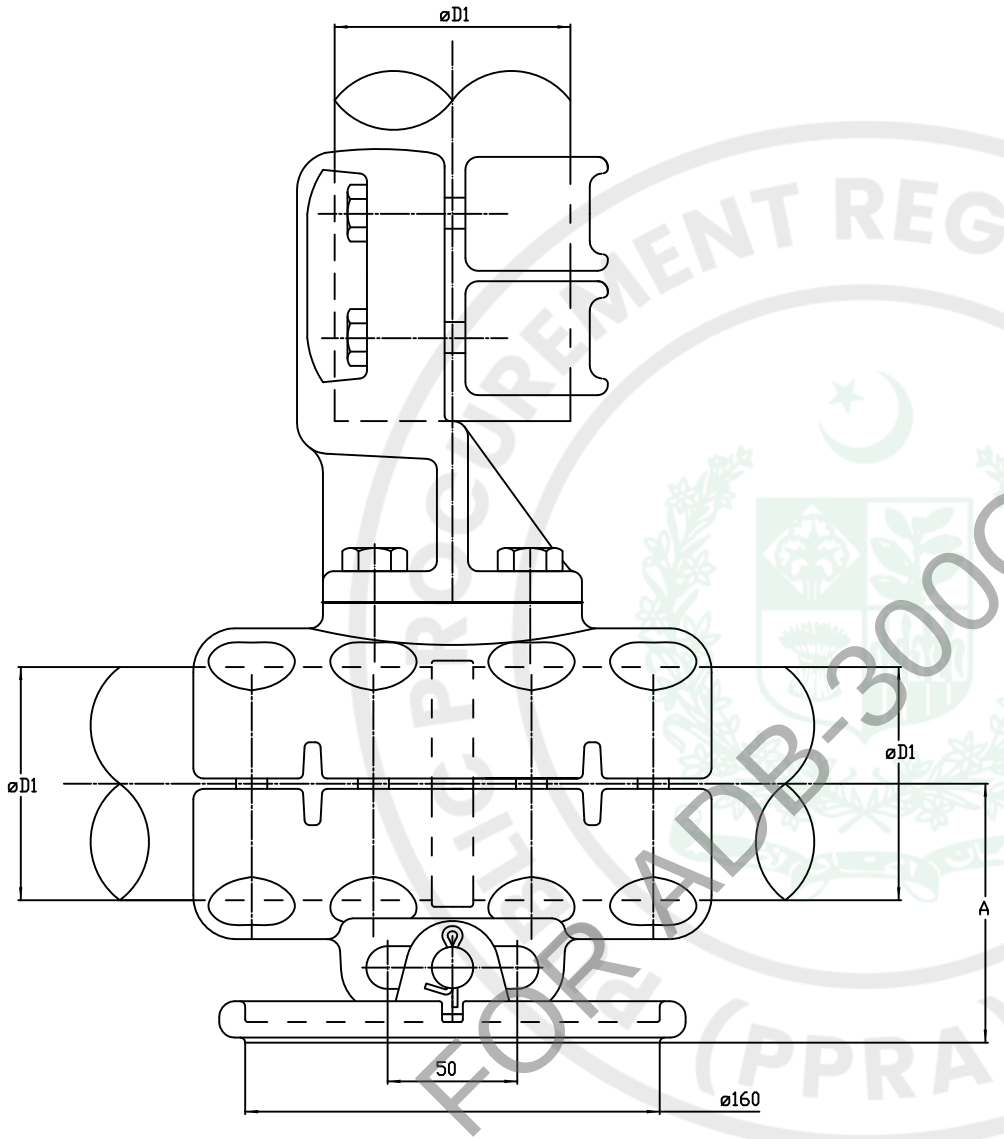

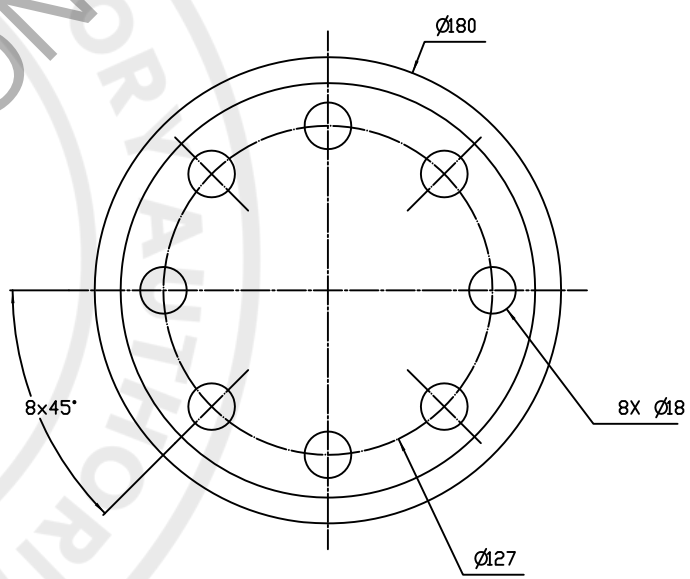

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 body & EN AC 42200 keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

T-SBSP3.0	88.9	100
T-SBSP3.5	101.6	105
TYPE & DESIGNATION	øD1	A

National Transmission & Despatch Company		Design NTDC
Drawn	-	MONOMETALLIC T-SLIDE BUS SUPPORT FOR ALUMINIUM PIPE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 432R

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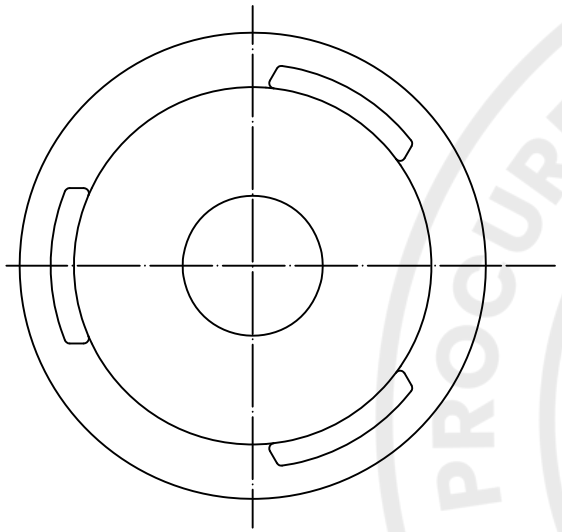

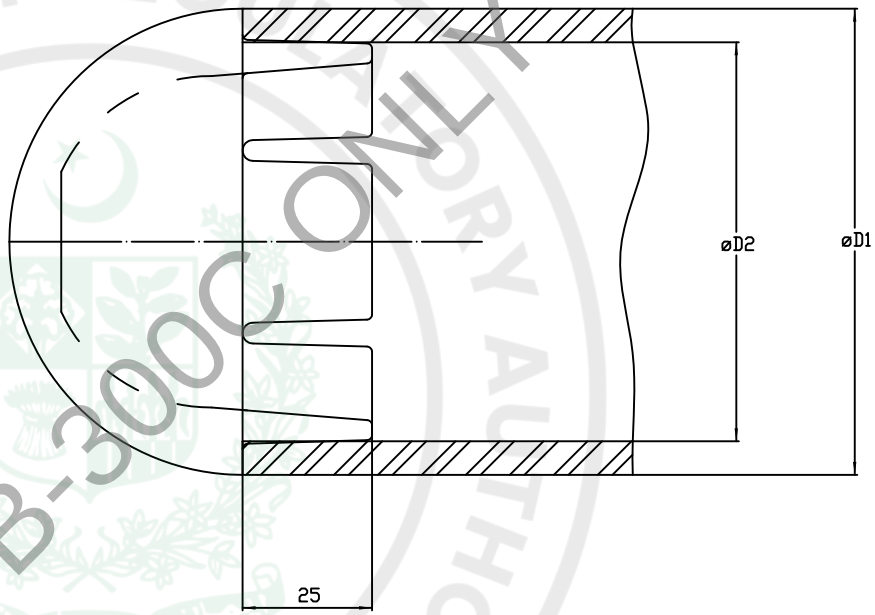

CAPP3.0	88.9	77.92
CAPP3.5	101.6	90.12
CAPP5.0	141.3	128.3
TYPE & DESIGNATION	øD1	øD2

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	
Checked	-	
Approved	-	
Chief Engineer Design NTDC		

CAP FOR ALUMINIUM PIPE

Scale: -

Date: -

DWG No: PDW/DF 433R

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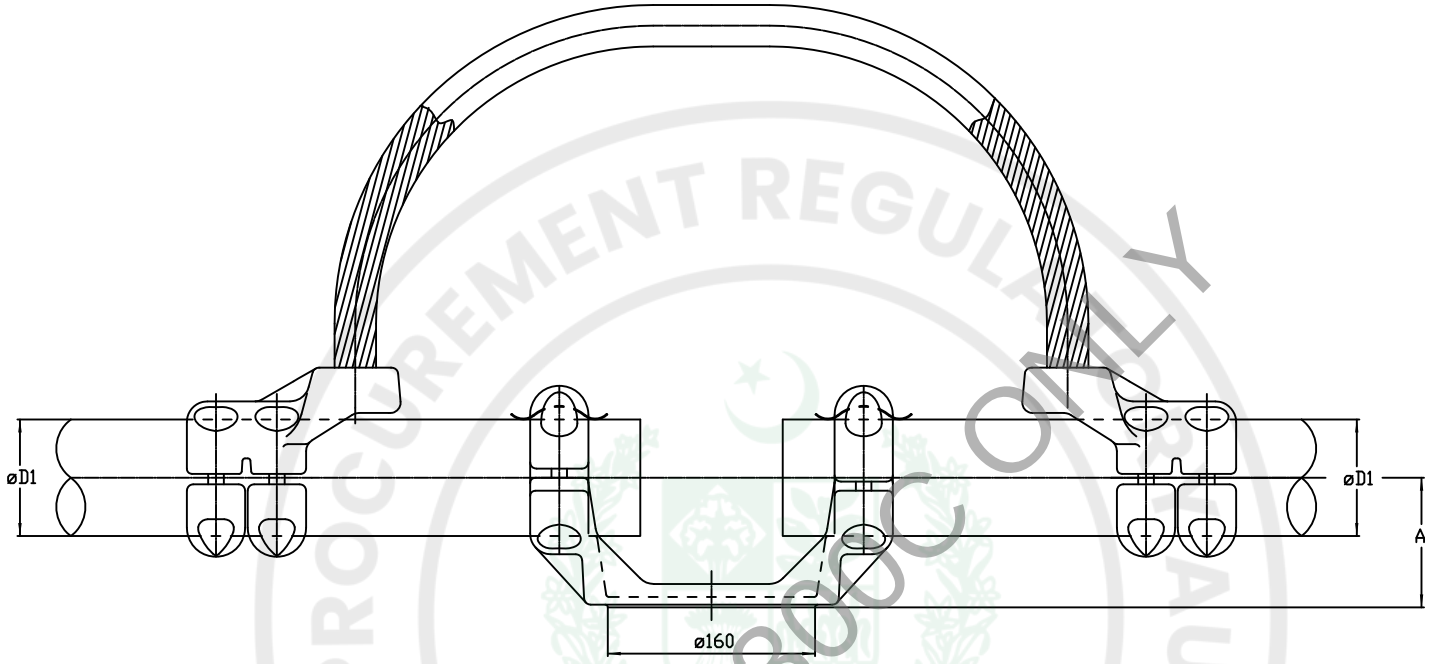

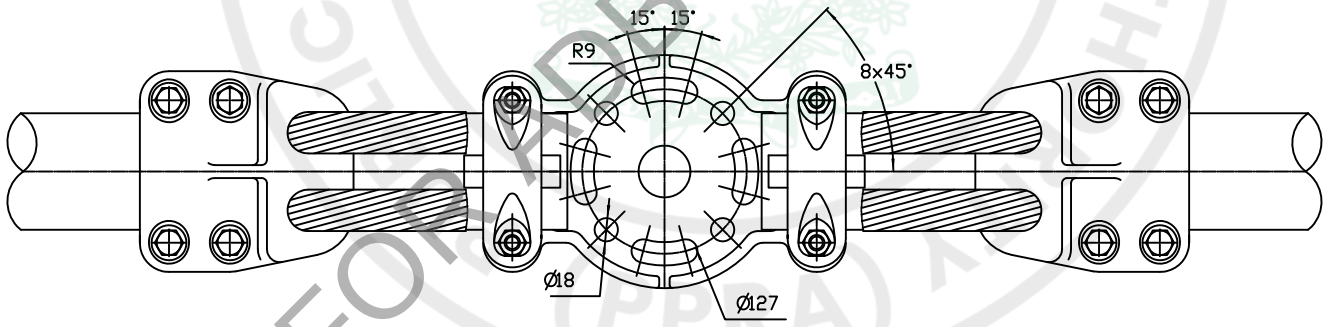

EBSP3.0	88.9	100
EBSP3.5	101.6	105
EBSP5.0	141.3	125
TYPE & DESIGNATION	øD1	A

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	MONOMETALLIC EXPANSION BUS SUPPORT FOR ALUMINIUM PIPE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 434R

FOR APP-300C ONLY
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EPADS
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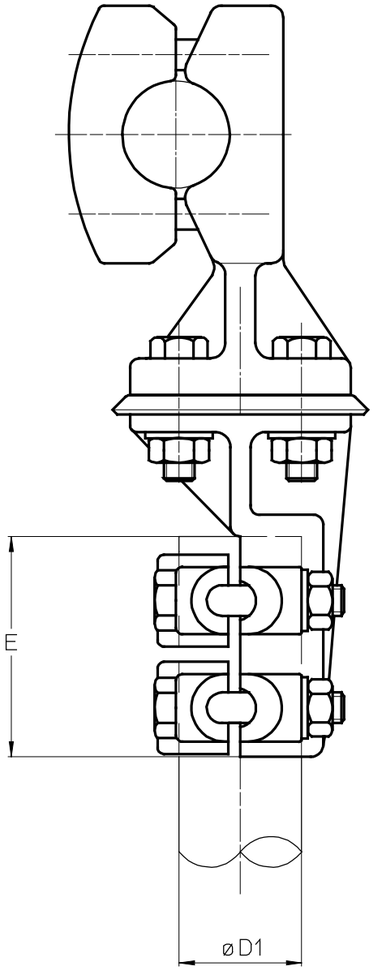

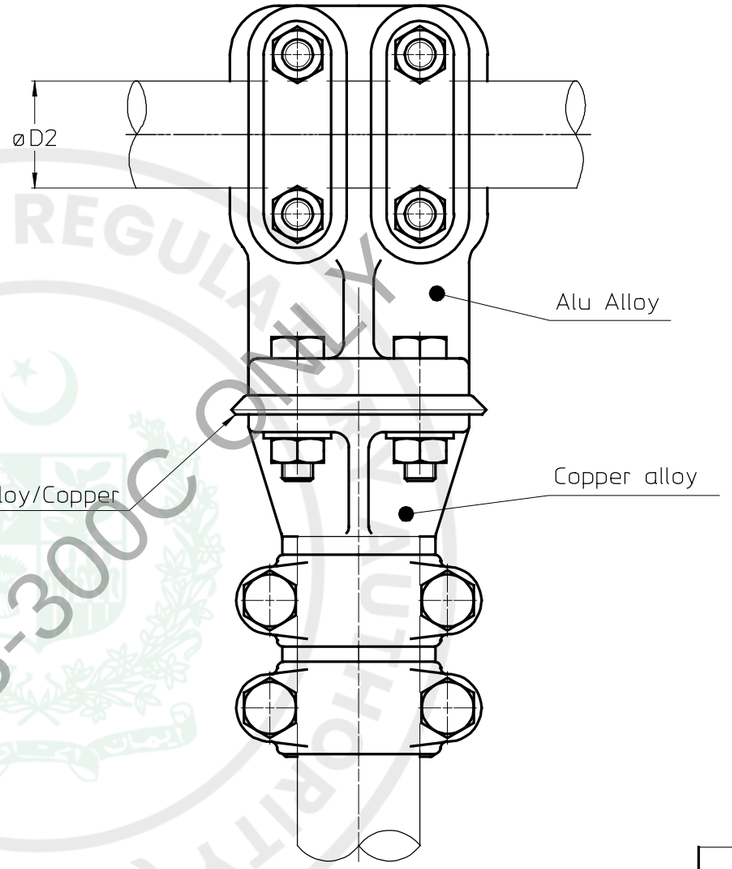

TYPE & DESIGNATION	øD1	øD2	E
90BH60	60	32	90
90BH40	40	32	72
90BH30	30	32	72

NOTES:

1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy and Copper Alloy
3. Type of material:

(i) Al Alloy - EN AC-serial 42000

(ii) Copper alloy-Copper / Nikel base family CuNi2Si,96.4% copper +3.6% other alloy (Heat Treated)

(iii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70

4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	BIMETALLIC CONNECTOR FOR SINGLE AL.CONDUCTOR TO COPPER TERMINAL
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		DWG No: PDW/DF 435R

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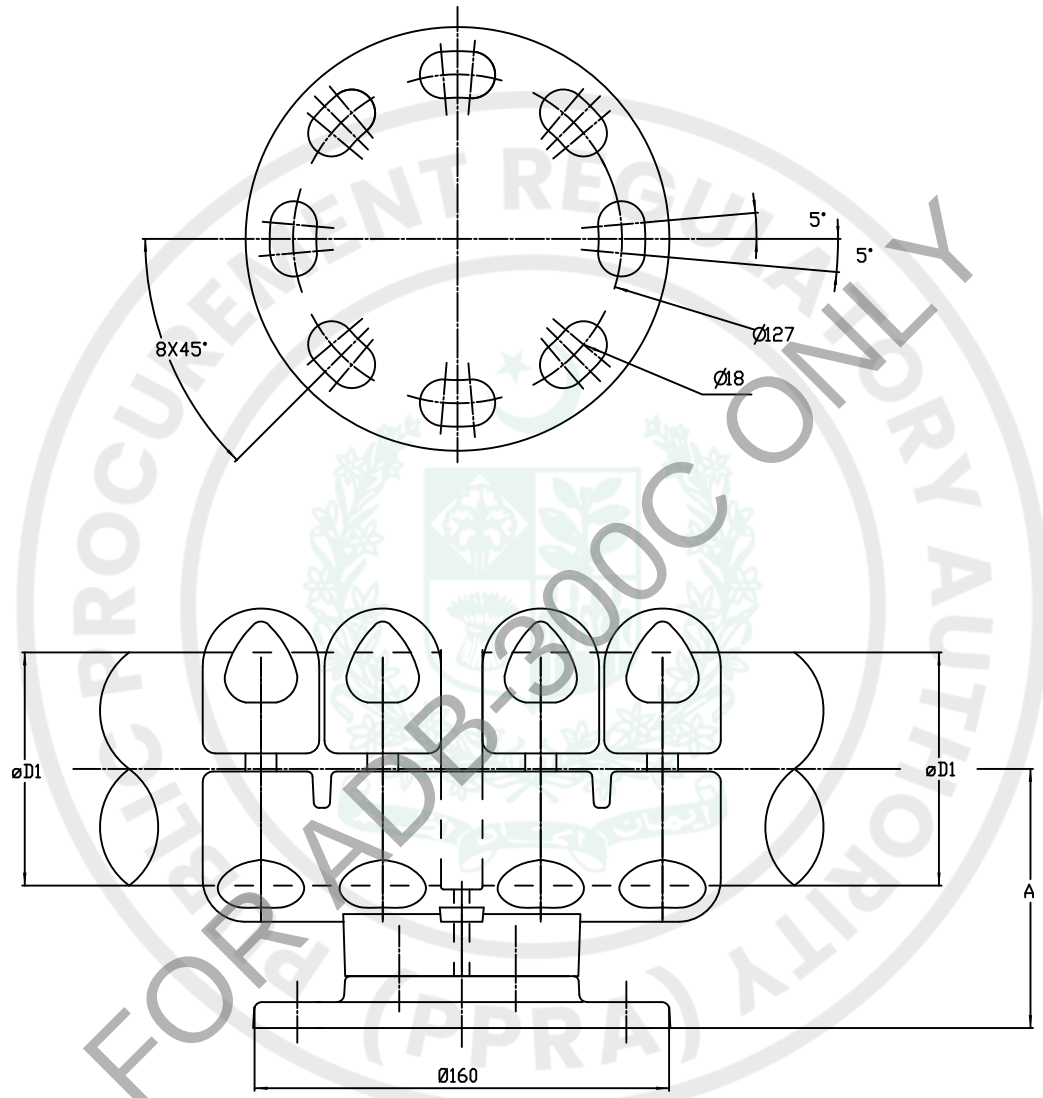

BSP3.0	88.9	100
BSP3.5	101.6	105
BSP5.0	141.3	125
TYPE & DESIGNATION	øD1	A

NOTES:
1. All dimensions are in millimeters
2. Body & keeper manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body & EN AC 42200 for keeper
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	MONOMETALLIC FIXED BUS SUPPORT FOR ALUMINIUM PIPE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 436R

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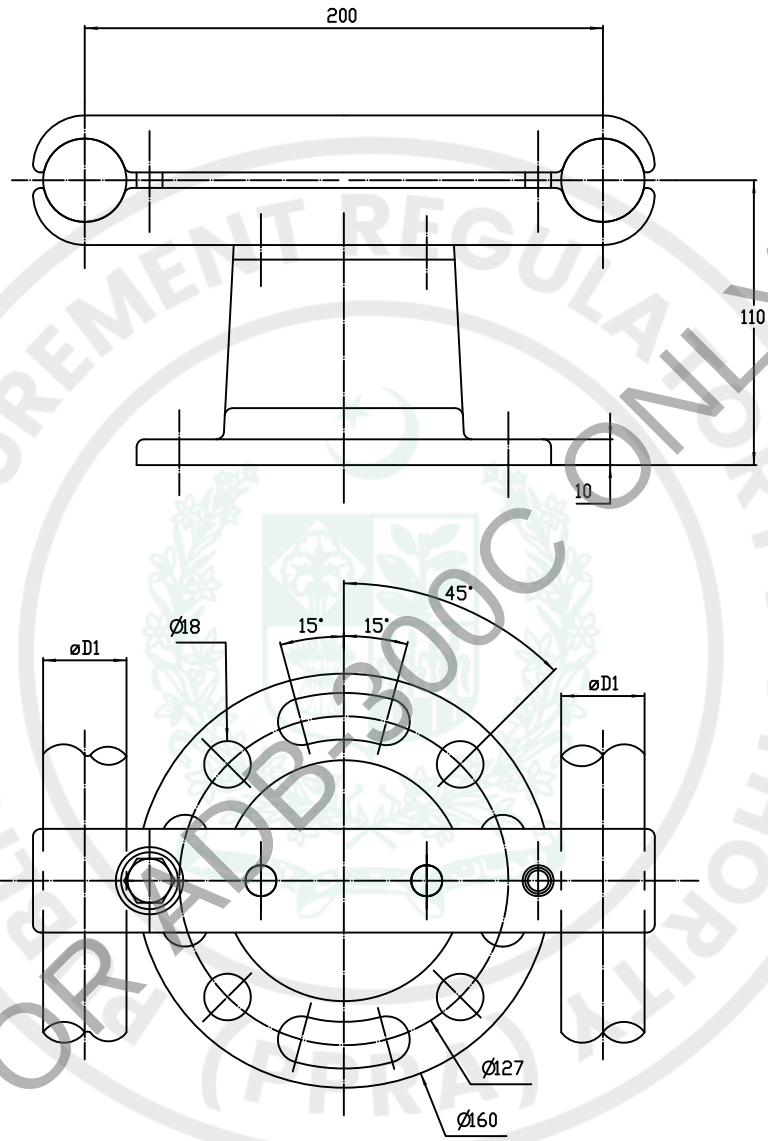

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EPADS

BSHH	32
TYPE & DESIGNATION	øD1

NOTES:
1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy heat treated - EN AC 42100 for body
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	MONOMETALLIC BUS SUPPORT FOR DOUBLE AL. HAWTHORN CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 437R

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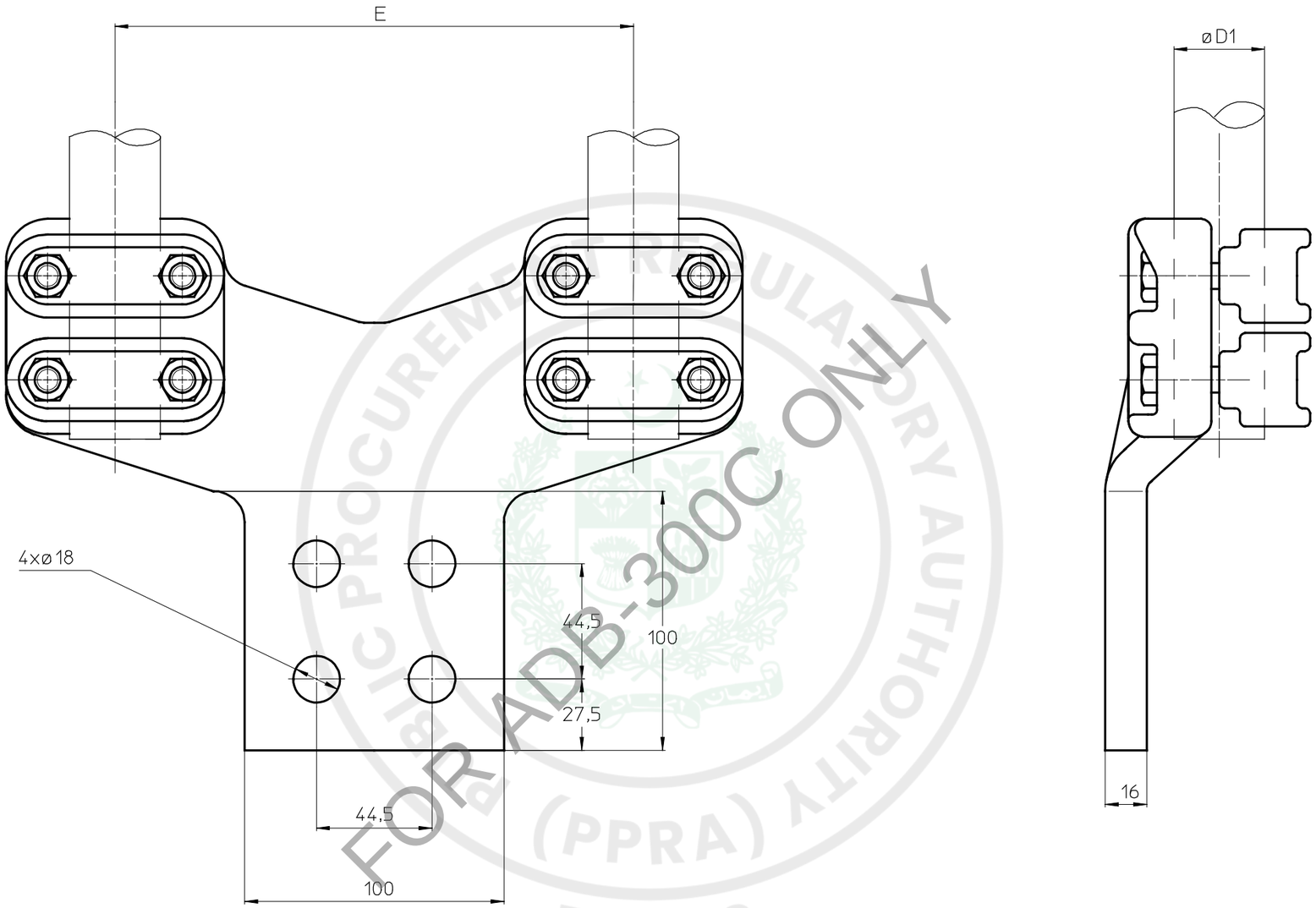

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EPADS

ODMHF	32	200
TYPE & DESIGNATION	øD1	E

NOTES:

1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:
(i) Al Alloy - EN AC-serial 42000
(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70
4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT MONOMETALLIC CONNECTOR FOR DOUBLE ALUMINIUM CONDUCTOR TO FLAT ALUMINIUM TERMINAL
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 438R

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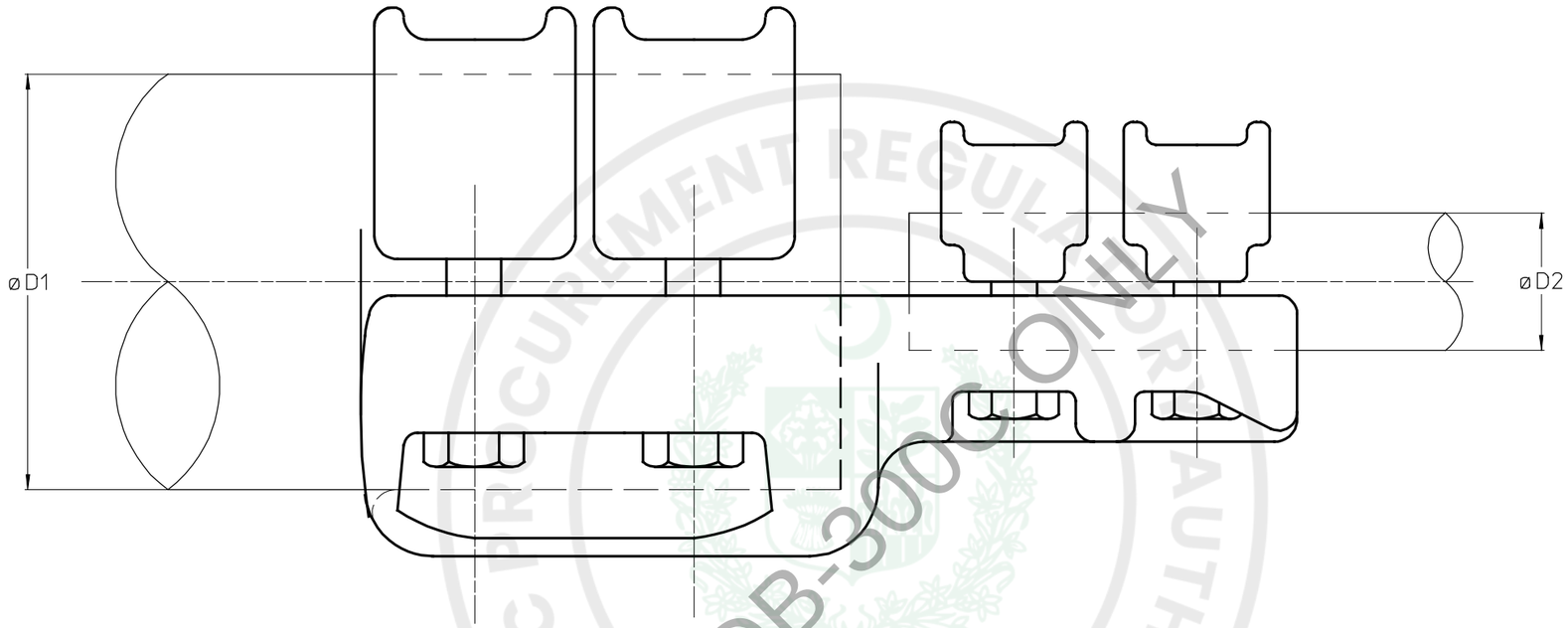

TYPE & DESIGNATION	øD1	øD2
OMHP5.0	141.3	32
OMHP3.0	88.9	32

NOTES:

1. All dimensions are in millimeters
2. Body manufactured in Al-Alloy
3. Type of material:

(i) Al Alloy - EN AC-serial 42000

(ii) Bolts, Nuts and washers - Stainless steel A2-70 & A4-70

4. This drawing is for guidance only

National Transmission & Despatch Company		Design NTDC
Drawn	-	STRAIGHT MONOMETALLIC CONNECTOR FOR ALUMINIUM PIPE TO ALUMINIUM CONDUCTOR
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		DWG No: PDW/DF 439R

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SPECIFICATION P-142: 83

STOCK BRIDGE VIBRATION DAMPERS

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY
DESIGN DEPARTMENT (POWER)

CONTENTS

PRINTING HISTORY

First approved on 21st September, 1980,
2nd edition in June 1983.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SPECIFICATION P-142: 83

STOCK BRIDGE VIBRATION DAMPERS

0 FOREWORD

0.1 This standard has been introduced by WAPDA and has been prepared by the Transmission Line Section of the Office of the Chief Engineer (Designs).

0.2 This standard is intended only for the purpose of technical specification to facilitate procurement of materials and does not include provision of contract.

0.3 This Specification is subject to periodic revi. as and when required.

1 SCOPE

This Specification covers the Stock Bridge Vibration Dampers intended for installation on the 220 kV, 132 kV and 66 kV Lines.

2 TYPE OF STOCK BRIDGE DAMPERS

The stock bridge dampers described in this Specification are of the following types:

TABLE - I

Description	Designation	Conductor or E/W O-D(mm)
a) Stock Bridge Dampers for DOG	SB-D	14.2
b) Stock Bridge Dampers for LYNX	SB-L	19.5
c) Stock Bridge Dampers for CUCKOO	SB-C	27.7
d) Stock Bridge Dampers for RAIL	SB-R	29.6
e) Stock Bridge Dampers for CARDINAL	SB-CA	30.4
f) Stock Bridge Dampers for 9mm E/W Strand	SB-9	9.0
g) Stock Bridge Dampers for 12mm E/W Strand	SB-12	12.0

The hardware described above has been designated by the code Nos. These codes have been assigned in the following manners.

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1. The first 2 letters stand for the type of fitting i.e. 'SB' for Stock Bridge Dampers.

2. The succeeding letters indicate the name of conductor whereas numbers indicate the size of E/W i.e. 'D' for DOG conductor and 9 for Earthwire strand of 9mm dia.

3 GENERAL REQUIREMENTS

3.1 Vibration dampers shall be of the Stock Bridge Design and shall effectively suppress aeolian vibration to within 200/400 micro inches per inch peak to peak strain measured for ACSR conductor and earthwire.

3.2 The damper shall be suitable to work in following conditions. No armour rod will be used.

TABLE II

Name of Wire	O.D dia in mm	Unit wt. kg/m	Rated U.T.S Kg.	E. D Stress (at 23°C)	Average Span length m	Vibration Frequency range, Hz	No. of Damper per S
ACSR DOG	14.2	0.394	3225	22%	320	12-90	1
" LYNX	19.5	0.842	8192	22%	320	8.5-65	1
" CUCKOO	27.7	1.52	12385	22%	400	6-45	1
" RAIL	29.6	1.60	11874	17%	400	6-45	1
" CARDINAL	30.4	1.83	15262	17%	700	6-45	2
E/W 9mm	9.0	0.39	5050	17%	320	15-140	1
" 12mm	12.0	0.69	10300	17%	400	12-90	

Note: The contractor can propose two dampers per span also, in which case the quantities of dampers to be procured will be double.

4 CONSTRUCTION AND DESIGN

4.1 The dampers shall generally comply with the weight and dimensional requirements of the approved drawing. Each damper shall consist of two weights resiliently suspended from the conductor through a suitable clamp conforming to conductor size. The clamp shall be made of high strength anti corrosion aluminium alloy and shall be suitable for hot line maintenance operations. The end of the clamp face shall be smoothly blended to avoid damage to or chafing of conductor when the clamp is

applied. The areas of the clamps and weights exposed to high electric stress shall be rounded and smoothly finished to minimise corona emission and radio interefe-rence.

4.2 The damper weights shall be made of cast iron and permanently attached to the messanger wire at its two ends in a manner that mounting remains equidistant from the clamp. The weights, clamp bolts and lock washers shall be galvanised by hot dip process. The messanger wire shall consist of seven strands of high tensile steel wire similar to that used for the steel reinforcement of ACSR Conductors. This wire shall hold the weight firmly and be galvanised, by hot dip process. A drain hole shall be provided in the damper weights to keep the assembly free from any water.

5 TEST

5.1 Type Test

5.1.1 The Contractor shall perform the bending amplitude test for each conductor and Earthwire for the frequency range, span, length and every day stress as given in Table-II both for with and without damper/dampers. A curve shall be plotted to establish the relationship between frequency of vibration versus bending amplitude in mils.

5.1.2 A curve shall be furnished for each type of damper proposed showing the power dissipated by damper versus vibration frequency range for the conditions as indicated in Table-II.

5.1.3 5 certified copies of each curve shall be supplied with the bid.

5.2 Sample Test

i) Visual Examination
ii) Verification of Dimensions
iii) Galvanising Test on ferrous parts

6 TEST METHODS

6.1 Visual Examination

The test samples shall be examined visually for the following defects:

Examination	Defects
Material	Not as specified in relevant clauses.

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Examination	Defects
Construction	Not of the shape given in relevant Dwg. Any part missed.
Finish	Galvanising not proper. Presence of burrs, black and bare spots, dross and projections, which will interfere with proper use of the articles.

6.2 Verification of Dimensions

The binding dimensions of the hardware shall be measured and shall be as shown on the relevant approved drawing.

6.3 Galvanising Tests

This test shall be carried out on all ferrous parts complying with the following requirements.

i) Weight of zinc coating
ii) Uniformity of zinc coating
iii) Adherence of zinc coating

This test shall be performed in accordance with WAPDA Specification P-82.(latest revision)

7 SAMPLING PLAN - ACCEPTANCE AND REJECTION

I. Sampling sizes are designated by code letters. Table III shall be used to find the applicable code letter for the particulars lot or batch size for various tests specified in this Specification. While the number of units of product from each lot or batch which are to be inspected (sample size) and the criteria for determining the acceptability of the lot or batch (acceptance & rejection numbers) for different code letters can be obtained from the table-IV given below.

II. The number of sample units inspected shall be equal to the first sample size given in Table-IV. If the number of defective units in the first sample is equal to or less than the first acceptance number, the lot shall be acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot shall be rejected. If the number of defectives found in the first sample is between

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the first acceptance and rejection number, a second sample of the size given by the plan shall be inspected. The no. of defectives found in the first and the second samples shall be accumulated. If the cumulative no. of defectives is equal to or less than the second acceptance number, the lot shall be acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, the lot shall be rejected.

TABLE - III

Lot of Batch Size	Sample size for Test specified in Clause 6.3.	Sample size for dimensional and finish defects
2 to 8	A	A
9 to 15	A	B
16 to 25	A	C
26 to 50	A	D
51 to 90	B	E
91 to 150	B	F
151 to 280	B	G
281 to 500	B	H
501 to 1200	C	J

TABLE - IV

Sample size code letters	Sample	Sample size	Cumulative sample size	Acceptance Number	Rejection Number
A	First	1	1	0	1
	Second	-	-	-	-
B	First	2	2	0	2
	Second	2	4	1	2
C	First	3	3	0	2
	Second	3	6	1	2
D	First	5	5	0	2
	Second	5	10	1	2
E	First	8	8	0	2
	Second	8	16	1	2
F	First	13	13	0	3
	Second	13	26	3	4
G	First	20	20	1	4
	Second	20	40	4	5

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H	First	32	32	2	5
	Second	32	64	6	7
J	First	50	50	3	7
	Second	50	100	8	9

8 MARKING AND PACKING

The material shall be packed in wooden crates for export shipment to permit convenient handling and to protect against loss or damage to final destination. Containers (wooden crates) shall be designed for handling by fork-lift, truck and by slings around the container. The weight of each package should be between 100 and 150 K.

Packages shall be designed for rough handling. All wooden crates shall be clearly marked to indicate.

1. Quantity
2. Name of hardware item
3. Manufacturer's Name

All packages shall be numbered consecutively so that total shipment can be readily determined.

9 INFORMATION TO BE SUPPLIED

The following information shall be supplied with the bid and failure to supply the same may subject the bid to disqualifications:

i) Detailed fully dimensioned drawings of Stock Bridge Dampers.

ii) Specification giving material grade & composition of all parts of Stock Bridge Dampers.

iii) Catalogues/literature of standardised items.

iv) Test Certificates.

v) One complete sample of for all types Stock Bridge Dampers

vi) Detail of manufacturing & testing facilities available with manufacturers.

10 DRAWING

The following drawings form the part of this specification.

a) Stock Bridge Vibration Dampers DW/DF-322

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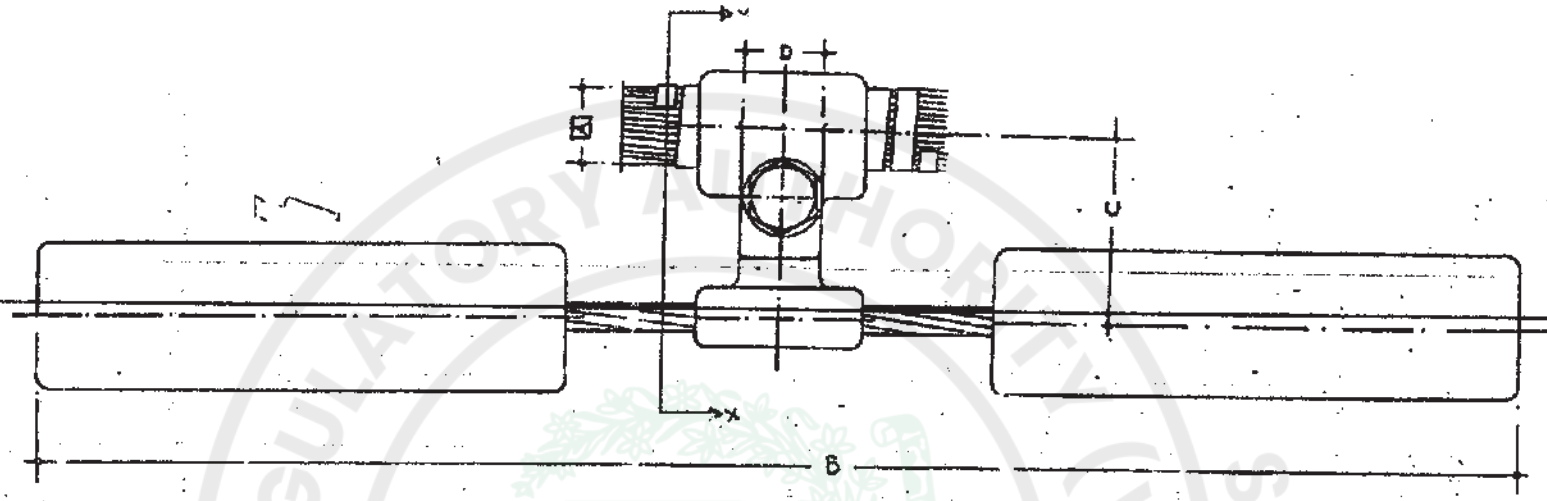
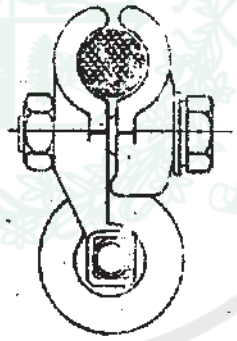


DESCRIPTION	A mm
CARDINAL	30.4
RAIL	25.5
CUCKOO	27.7
LYNX	19.5
DOG	14.2
[illegible]	9
[illegible]	12



SECTION X X

DIMENSION MARKED AS B, C & D SHALL BE SUPPLIED ALONG WITH THE WEIGHT OF DAMPER BY THE BIDDER WITH THE OFFER.

▭ INDICATES BINDING DIMENSION.

DIMENSION SHOWN BY MILLIMETRES

2	17-8-66	DIMENSION 'A' OF ACSR CARDINAL CONDUCTOR ADDED.	B
1	DATE	REVISIONS	

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY — DESIGN DEPARTMEN

DRAWN	AZMAT KHAN	
TRACED	GHULAM RASUL	
JUNIOR ENGINEER	NAZAR ABBAS	
SENIOR ENGINEER	MUHAMMAD-A-MALIK	
DIRECTOR	A. ISHTIAQ HUSSAIN	
CHIEF ENGINEER	JAVID AKHTER	

STOCK BRIDGE VIBRATION DAMPER (GENERAL ARRANGEMENT)

SCALE — DATE 27-7-66

DWG. NO. PDW/DF-322

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

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PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SPECIFICATION P-140:82

SUSPENSION STRINGS

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WATER AND POWER DEVELOPMENT AUTHORITY
(DESIGN DEPARTMENT POWER)

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(PPRA)
EPADS

C O N T E N T S

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PRINTING HISTORY

First approved on. 21.7.80

First revision on December, 1982.

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

SPECIFICATION P-140: 82

SUSPENSICN STRINGS

0 FOREWORD

0.1 This standard has been introduced by WAPDA and has been prepared by the Transmission Line Section of the office of the Chief Engineer (Design).

0.2 This standard is intended only for the purpose of technical specification to facilitate procurement of materials and does not include provision of contract.

0.3 This specification is subject to periodic revision as and when required.

1 SCOPE

1.1 This specification covers the hardware of suspension strings for transmission lines.

2 TYPES OF SUSPENSION STRINGS

2.1 Suspension string described in this specification are of the following types:

Description	String Designation	Cond:O.D. (mm)
a) Single Suspension string for "DOG"	SS-D	14.2
b) Single Suspension string for "LYNX"	SS-L	19.5
c) Single Suspension string for "CUCKOO"	SS-C	27.7
d) Single Suspension string for "RAIL"	SS-R	29.6
e) Single Suspension string for "CARDINAL"	SS-CA	30.4
f) Double Suspension string for "DOG"	DS-D	14.2
g) Double Suspension string for "LYNX"	DS-L	19.5
h) Double Suspension string for "CUCKOO"	DS-C	27.7
i) Double Suspension string for "RAIL"	DS-R	29.6
j) Double Suspension string for "CARDINAL"	DS-CA	30.4

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The hardware used in the suspension string described above in this specification has been designated by the code numbers. These codes have been assigned in the following manner:

i) The first letter 'S' stands for single and 'D' for Double.

ii) The next letter 'S' stands for Suspension.

iii) The succeeding letters stand for the name of conductor for which the hardware is meant for i.e. 'D' for Dog 'L' for Lynx, 'C' for Cuckoo, 'R' for Rail and 'CA' for Cardinal.

3 RATINGS OF HARDWARE

3.1 The hardware shall be of the ratings as specified in Table-I and Table-II below:

TABLE - I

RATINGS OF HARDWARE FOR SINGLE SUSPENSION STRING

Sr. No.	Description	Failing Load Kg.				
		SS-D	SS-L	SS-C	SS-R	SS-CA
1.	Ball hook	8000	8000	12000	12000	16000
2.	Socket eye	8000	8000	12000	12000	16000
3.	Arcing Horn	150	150	150	150	150
4.	Suspension Clamp:					
	i) Resistance to Conductor slippage	600	1500	2500	2500	3350
	ii) Vertically applied load	8000	8000	12000	12000	16000

TABLE - II

RATINGS OF HARDWARE FOR DOUBLE SUSPENSION STRING

Sr. No.	Description	Failing Load Kg.				
		DS-D	DS-L	DS-C	DS-R	DS-CA
1.	Ball Hook	12000	12000	20,000	20,000	25,000
2.	Socket Clevis Type A	12000	12000	20,000	20,000	25,000
3.	Yoke Plates	12000	12000	20,000	20,000	25,000
4.	Ball Clevis	8000	8000	12,000	12,000	16,000
5.	Socket Clevis Type B	8000	8000	12,000	12,000	16,000

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Sr. No.	Description	Failing Load Kg.				
		DS-D	DS-L	DS-C	DS-R	DS-CA
6.	Arcing Horn Bottom	150	150	150	150	150
7.	Eye Clevis	12000	12000	20,000	20,000	25,000
8.	Suspension Clamp:					
	i) Resistance to Conductor slippage	600	1500	2,500	2,500	3,350
	ii) Vertically applied load	8000	8000	12,000	12,000	16,000

4 GENERAL REQUIREMENTS

4.1 Each single suspension string hardware shall consist of:

1 Self locking ball hook
1 Socket eye
1 Arcing horn bottom
1 Non magnetic suspension clamp

4.2 Each double suspension string hardware shall consist of:

1 Self locking ball hook
1 Socket clevis type 'A'
2 Yoke plates
2 Ball clevis
2 Socket clevis type 'B'
1 Arcing horn
1 Eye clevis
1 Suspension clamp

4.3 The ball and socket shall be of size IEC, 16mmA, and shall conform to WAPDA Specification P-8:82 (latest revision).

4.4 All ferrous parts shall be hot dip galvanized in accordance with WAPDA Specification P-82:81 (latest revision).

4.5 The parts of hardware that mate with each other shall not have a play clearance of more than 2mm.

5 DIMENSIONS AND TOLERANCES

All hardware shall generally be in accordance with drawings forming a part of this Specification.

The dimensions of these parts of hardware that mate with other hardware or that determine the length of insulator string are binding and are shown enclosed on the drawing.

For dimensions that are fixed and binding the tolerance

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will be plus or minus 2 percent with a maximum of 0.8mm. For dimensions that are shown as Max. or Min. there shall be no plus and minus tolerance respectively. The tolerance in the opposite sense may however be 4%.

6 DESIGN AND MATERIAL

6.1 Self Locking Ball Hook

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. The detail dimensions shall be according to Drawing No. PDW/DF-315.

6.2 Socket Eye

It shall be made from drop forged steel or malleable iron of suitable grade. It shall be hot dip galvanised. The detail dimension shall be according to Dwg. No. PDW/DF-316. It shall be supplied with a split pin made from half round brass wire protected against corrosion by appropriate coating and shall be able to work under hot line conditions.

6.3 Socket Clevis

These shall be made from drop forged steel or malleable iron of suitable grade. These shall be hot dip galvanized and shall be made according to Dwg. No. PDW/DF-376 and PDW/DF-378. The socket shall be supplied with a split pin made from half round brass wire protected against corrosion by an appropriate coating and shall be able to work under hot line conditions. The clevis shall be supplied with rivet round headed with aluminium alloy round washer and straight split pin. The split pin shall be made from cadmium plated brass or copper.

6.4 Yoke Plates

Yoke plates shall be of mono block or flat type and shall be made from high grade steel, hot dip galvanized and subject to normalizing process and shall be made according to Drawing No. PDW/DF-377.

6.5 Ball Clevis

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. It shall be made according to Dwg. No. PDW/DF-382.

6.6 Arcing Horn

It shall be made from drop forged mild steel and shall be hot dip galvanized. The dimensions shall be according to

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Drawing No. PDW.DF-317. The tolerance on the length shall be 5% with a maximum of 15mm.

6.7 Eye Clevis

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. The detail dimensions shall be according to Dwg. No. PDW/DF-379. The clevis shall be supplied with rivet round headed with aluminium alloy round washer and straight split pin. The split pin shall be made from cadmium plated brass or copper.

The eye shall be supplied with a split pin made from half round brass wire protected against corrosion by an appropriate coating and shall be able to work under hot line conditions.

6.8 Conductor Suspension Clamps

Suspensions clamps shall be so designed that the effect of vibration, both on the conductor and on the fitting itself, are minimised. They shall be designed, manufactured and finished so as to avoid sharp radius of curvature, ridges and out growths which might lead to localized pressure or damage to the conductor in service. The clamp shall permit the conductor to slip before failure of the conductor occurs. The clamps shall have sufficient contact surface to minimize damage due to fault current.

The wire groove diameter shall be within the limits of 1.0 and 1.15 times the diameter of the conductor. Suspension clamp shall be made according to Dwg. No. PDW/DF-318. The bodies and keepers shall be of cast or forged high strength corrosion resistant aluminium alloy. Connecting pieces, bolts, nuts and locks washers shall be made of hot dip galvanized steel. Cotter pins shall be made of stainless steel. Edges and corners shall be rounded to minimise field contractions and radio interference.

7 TESTS

7.1 Type Tests

Type tests are intended to verify and established design characteristics. They shall be made once only on hardware identical in all essential details with those to be supplied.

The following type tests shall be carried out in according with clause 8,9 and 10.

i) Mechanical Test	) On each individual item or hardware
ii) Resistance to conductor slippage test	) On suspension clamp only

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iii) Corona Test) For complete insulator String.

7.2 Sample Tests

Sample tests shall be made to verify the quality and workmanship. The following sample test shall be performed in accordance with clause 8, 9, 11, 12, & 13.

i)	Visual examination	On each item of hardware
ii)	Verification of dimensions	
iii)	Mechanical test	
iv)	Resistance to conductor slippage test	On suspension clamp only
v)	Galvanising test	On all ferrous parts

8 MECHANICAL TEST

8.1 For Hardware Except Arcing Horn

Th e fitting shall be held in tensile testing machine in a manner approximating as nearly as possible to the arrangement to be used in service. A tensile load equal to one-half of the specified minimum failing load shall be applied and increased at a steady rate. Failure of the fitting shall not occur at a load less than the specified minimum failing load as per Table-I & Table-II.

8.2 For Arcing Horn

Arcing horn shall be rigidly supported in a manner approximating as nearly as possible to the arrangement in service and a load of 150 Kg shall be applied parallel to the insulator string axis at each outer extremity of the fitting. The fitting shall not fail or show any signs of distortion or over-stressing of the material.

9 RESISTANCE TO CONDUCTOR SLIPPAGE TEST

Test piece shall be assembled in accordance with manufacturer's recommendations on conductors of the size and type with which it is to be used. The assembly shall be mounted in a tensile testing machine and anchored in a manner approximating as nearly as possible to the arrangement to be used in service, precautions being taken to avoid birdcaging of the conductor. The length of conductor joint in the test assembly should preferably be not less than 100 times the overall diameter of the conductor.

A tensile load of about 50% of the minimum failing load as specified in table-I and table-II shall be applied and

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the conductor shall be marked in such a way that movement relative to the fitting can easily be detected, without any subsequent adjustment of the fitting, the load shall be steadily increased tc 95% of the minimum failing load and then reduced to 90% of the minimum failing load and maintained for 1 minute. There shall be no movement of the conductor relative to the fitting due to slip during this 1 minute period and no failure of the fitting.

10 CORONA TEST

Typical insulator sets completely assembled with all fittings shall be set up in a manner as nearly as possible to the arrangement to be used. A test voltage of 160kV, 100kV and 50kV shall be applied for the nominal voltage of 220kV, 132kV and 66kV respectively between the conductor and earth for five minutes during which time no corona formation shall be visible or audible with the room in complete darkness.

11 VISUAL EXAMINATION

The test samples shall be examined visually for the following defects:

Visual Examination

Examination	Defects
Material	Not as specified in relevant clauses.
Construction	Not of the shape given in relevant Dwg. Any part missing.
Finish	Galvanising not proper. Presence of burrs, black and bare spots, dross and projections, which will interfere with proper use of the articles.

12 VERIFICATION OF DIMENSIONS

The binding dimensions of the hardware shall be measured and shall be as shown on the relevant approved drawings subject to the tolerance given in clause 5.

13 GALVANISING TEST

This test shall be carried out on all ferrous parts complying with the following requirements:

i. Weight of zinc coating
ii. Uniformity of zinc coating
iii. Adherence of zinc coating

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This test shall be performed in accordance with WAPDA Specification P-82:81 (latest revision)

14 SAMPLING PLAN --ACCEPTANCE AND REJECTION

I. Sampling sizes are designated by code letters.. Table-III shall be used to find the applicable code letter for the particular lot or batch size for various tests specified in this specification. While the number of units of product from each lot or batch which are to be inspected (sample size) & the criteria for determining the acceptability of the lot or batch (acceptance & rejection numbers) for different code letters can be obtained from the table-IV given below.

II. The number of sample units inspected shall be equal to the first sample size given in Table-IV. If the number of defective units found in the first sample is equal to or less than the first acceptance number, the lot shall be acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot shall be rejected. If the number of defectives found in the first sample is between the first acceptance and rejection number, a second sample of the size given by the plan shall be inspected. The number of defectives found in the first & the second samples shall be accumulated. If the cumulative number of defectives is equal to or less than the second acceptance number, the lot shall be acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, the lot shall be rejected.

Table-III Sample Size

Lot or Batch Size	Sample size for Test Specified in Clause 8,9, & 13.	Sample size for dimensional and finish defects
2 to 8	A	A
9 to 15	A	B
16 to 25	A	C
26 to 50	A	D
51 to 90	B	E
91 to 150	B	F
151 to 280	B	G
281 to 500	B	H
501 to 1200	C	J

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Table-IV Sample Acceptance Criteria

Sample size code letters	Sample	Sample size	Cumulative sample size	Acceptance Number	Rejection Number
1	2	3	4	5	6
A	First	1	1	0	1
	Second	-	-	-	-
B	First	2	2	0	2
	Second	2	4	1	2
C	First	3	3	0	2
	Second	3	6	1	2
D	First	5	5	0	2
	Second	5	10	1	2
E	First	8	8	0	2
	Second	8	16	1	2
F	First	13	13	0	3
	Second	13	26	3	4
G	First	20	20	1	4
	Second	20	40	4	5
H	First	32	32	2	5
	Second	32	64	6	7
J	First	50	50	3	7
	Second	50	100	8	9

15 MARKING AND PACKING

The material shall be packed in wooden crates for export shipment to permit convenient handling and to protect against loss or damage to final destination. Containers (wooden crates) shall be designed for handling by forklifts, trucks and by slings around the containers. The weight of each package should be between 100 and 150 Kg.

Packages shall be designed for rough handling. All wooden crates shall be clearly marked to indicate.

1. Quantity
2. Name of hardware item
3. Manufacturer's name

All packages shall be numbered consecutively so that total shipment can be readily determined.

16 INFORMATION TO BE SUPPLIED

The following information shall be supplied with the bid and failure to supply the same may subject the bid to disqualifications:

i. Detailed fully dimensioned drawings of hardware for suspension strings.

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ii) Specification giving material grade & composition of all items of hardware.

iii) Catalogues/literature of standardised items.

iv) Test certificates.

v) One complete sample of hardware for all types of suspension strings.

vi) Detail of manufacturing & testing facilities available with manufacturers.

17 DRAWINGS

The following drawings form the part of this specification:

a)	Single Suspension String	PDW/DF-314
b)	Self Locking Ball Hook	PDW/DF-315
c)	Socket Eye	PDW/DF-316
d)	Arcing Horns	PDW/DF-317
e)	Suspension Clamp for ACSR Conductors	PDW/DF-318
f)	Socket Clevis Type A	PDW/DF-376
g)	Yoke Plate	PDW/DF-377
h)	Ball Clevis	PDW/DF-382
i)	Socket Clevis Type B	PDW/DF-378
j)	Eye Clevis	PDW/DF-379
k)	Double Suspension String	PDW/DF-381

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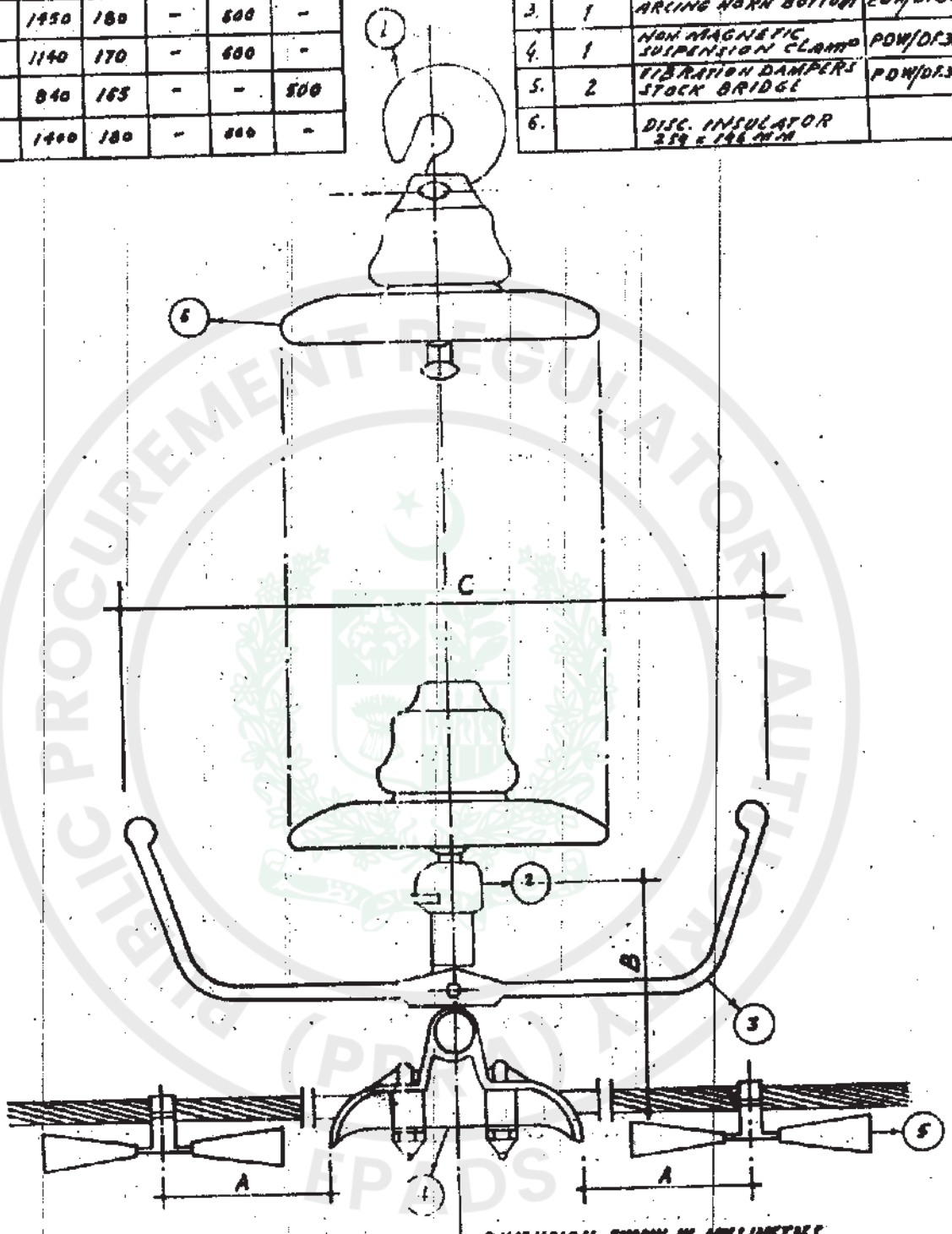
yk

PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

CONDUCTOR DESIGNATION	DIMENSIONS A	B	C 220 KV	C 132 KV	C 66 KV
RAIL	1525	188	750	600	-
CUCKOO	1450	180	-	600	-
LYNX	1140	170	-	600	-
DOG	840	165	-	-	500
CARDINAL	1400	180	-	660	-

ITEM	QTY.	DESCRIPTION	DRG. NO.
1.	1	SELF LOCKING BALL HOOK	PDW/DF-315
2.	1	SOCKET EYE	PDW/DF-316
3.	1	ARCING HORN BOTTOM	PDW/DF-317
4.	1	NON MAGNETIC SUSPENSION CLAMP	PDW/DF-318
5.	2	VIBRATION DAMPERS STOCK BRIDGE	PDW/DF-322
6.		DISC. INSULATOR 254 x 146 mm	



DIMENSION SHOWN IN MILLIMETRES

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY

DESIGN DEPARTMENT

DRAWN	AZHAR SHAH	
CHECKED	GHULAM RASUL	
JUNIOR ENGINEER	NAZAR ABBAS	
SENIOR ENGINEER	A'UNAWAR-A-MALIK	
DIRECTOR	S. ISHTIAQ HUSSAIN	
CHIEF	JAVID AKHTER	

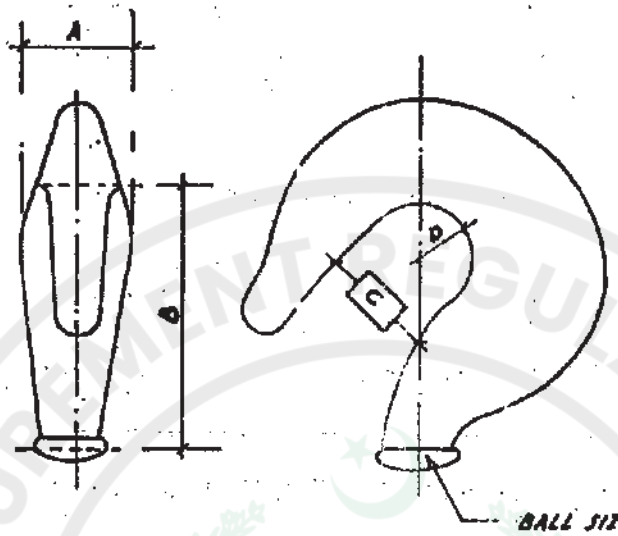
SINGLE SUSPENSION STRING

SCALE ✓ DATE 27.9.80

DWG. NO. PDW/DF-314

1 28.9.85 DIMENSION FOR ACSR CARDINAL CONDUCTOR ADDED

e-Pak Acquisition and Disposal System (EPADS) generated document 42826 Page 344 of 382



BALL SIZE IEC [16] mm A FOR DOG, LYNX
CUCKOO, RAIL

BALL SIZE IEC [20] mm A FOR CARDINAL

DESCRIPTION	A	B	C	D
SELF LOCKING BALL HOOK	30	60	22	14

[ ] INDICATES BINDING DIMENSION.

DIMENSION SHOWN IN MILLIMETRES

1	2-3-82	BALL SIZE FOR ACSR CARDINAL CONDUCTOR ADDED	

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY — DESIGN DEPARTMENT

DRAWN	ILHAR SHAH	
CHECKED	GHULAM RASUL	
JUNIOR ENGINEER	NIZAR ABBAS	
SENIOR ENGINEER	MUNAWAR-A-MALIK	
DIRECTOR	S ISHTIAQ HUSSAIN	
CHIEF	DAVID AKHTER	

SELF LOCKING BALL HOOK

SCALE — DATE 27.9.80

DWG. NO. PDW/DE315

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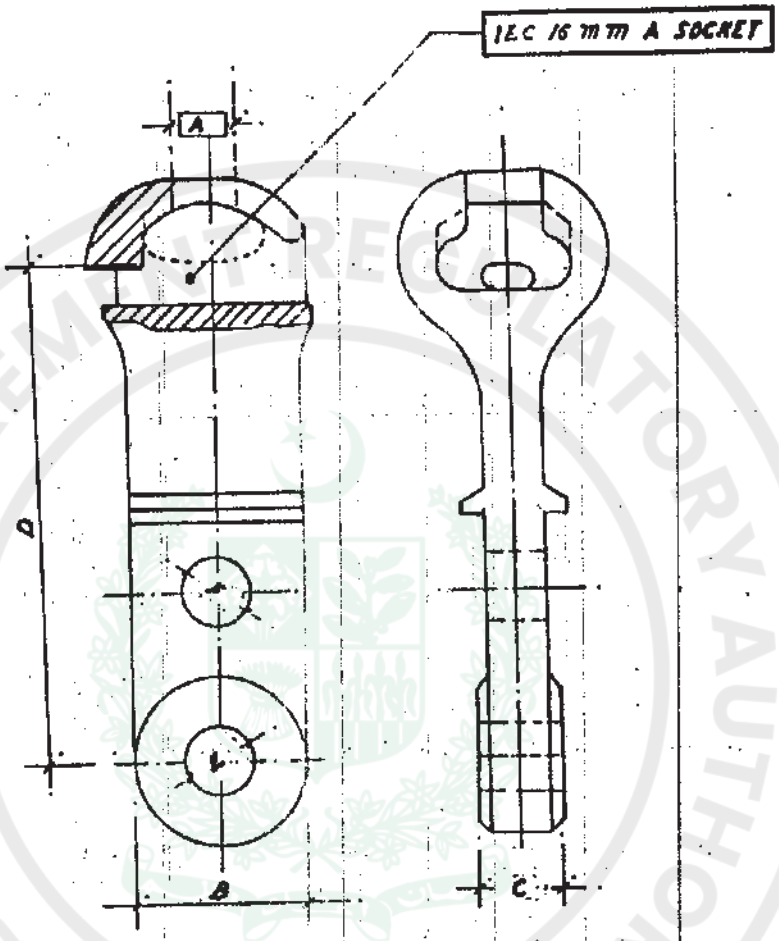

SOCKET EYE

DESCRIPTION	A	B	C	D	E	F
DOG & LYNX	16	44.5	22	110	17.5	14
CUCKOO & RAIL	16	44.5	35	110	17.5	14
CARDINAL	20	445	35	110	17.5	14

▭ INDICATES BINDING DIMENSION

DIMENSION SHOWN IN MILLIMETRES

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT
DRAWN	AZHAR SHAH		SOCKET EYE (FOR SUSPENSION STRING)
CHECKED	GHULAM RASUL		
JUNIOR ENGINEER	NAZIR ABBAS		
SENIOR ENGINEER	MUNAWAR-A-MALIK		
DIRECTOR	[illegible]		SCALE — DATE 27.9.80
CHIEF	JAVED AKHTER		DWG. NO PPW/no.316

NO	DATE	REVISIONS	BY
1	2.9.82	DIMENSIONS FOR ACSR CARDINAL ADDED.	

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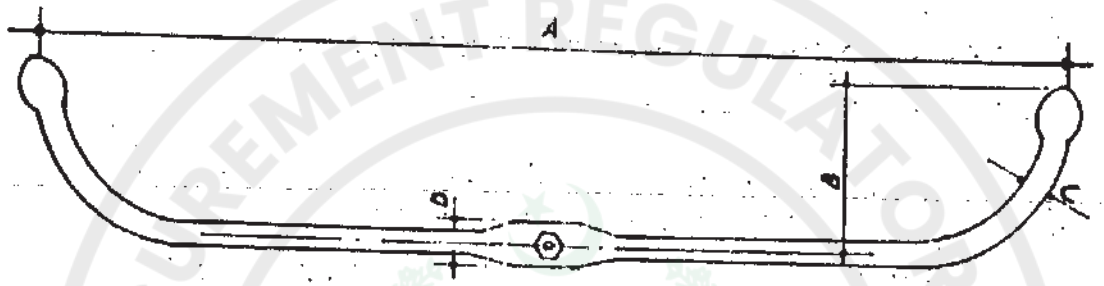
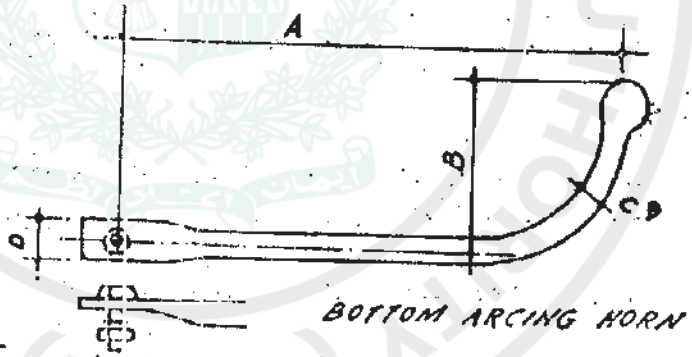
FOR SINGLE SUSPENSION ASSEMBLY

VOLTAGE KV	SINGLE SUSPENSION ASSEMBLY					SINGLE TENSION / DOUBLE SUSPENSION ASSEMBLY				
	A	B	C	D	E	A	B	C	D	E
66	500	110	14	30	12	250	110	14	30	12
132	600	120	14	30	12	300	120	14	30	12
220	750	125	18	30	12	375	125	18	30	12



BOTTOM ARCING HORN

VOLTAGE	DOUBLE TENSION ASSEMBLY			
	A	B	C	D
66 KV	245	115	14	12
132 KV	295	125	16	12
220 KV	370	140	18	12



BOTTOM ARCING HORN

FOR SINGLE TENSION ASSEMBLY

ALL DIMENSION IN MILLIMETRES

FOR DOUBLE TENSION ASSEMBLY
BOTTON ARCING HORN

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY

DESIGN DEPARTMENT

DRAWN	AZHAR SHAH	
CHECKED	GHULAM RASUL	Ghasul
JUNIOR ENGINEER	NAZAR ABBAS	
SENIOR ENGINEER	MUNAWAR-A-MALIK	
DIRECTOR	S. ISHTIAQ HUSSAIN	

ARCING HORNS

SCALE

DATE 27-9-80

2	9-3-82	BOTTOM ARCING HORN
1		DOUBLE TENSION ASSEMBLY ADDED

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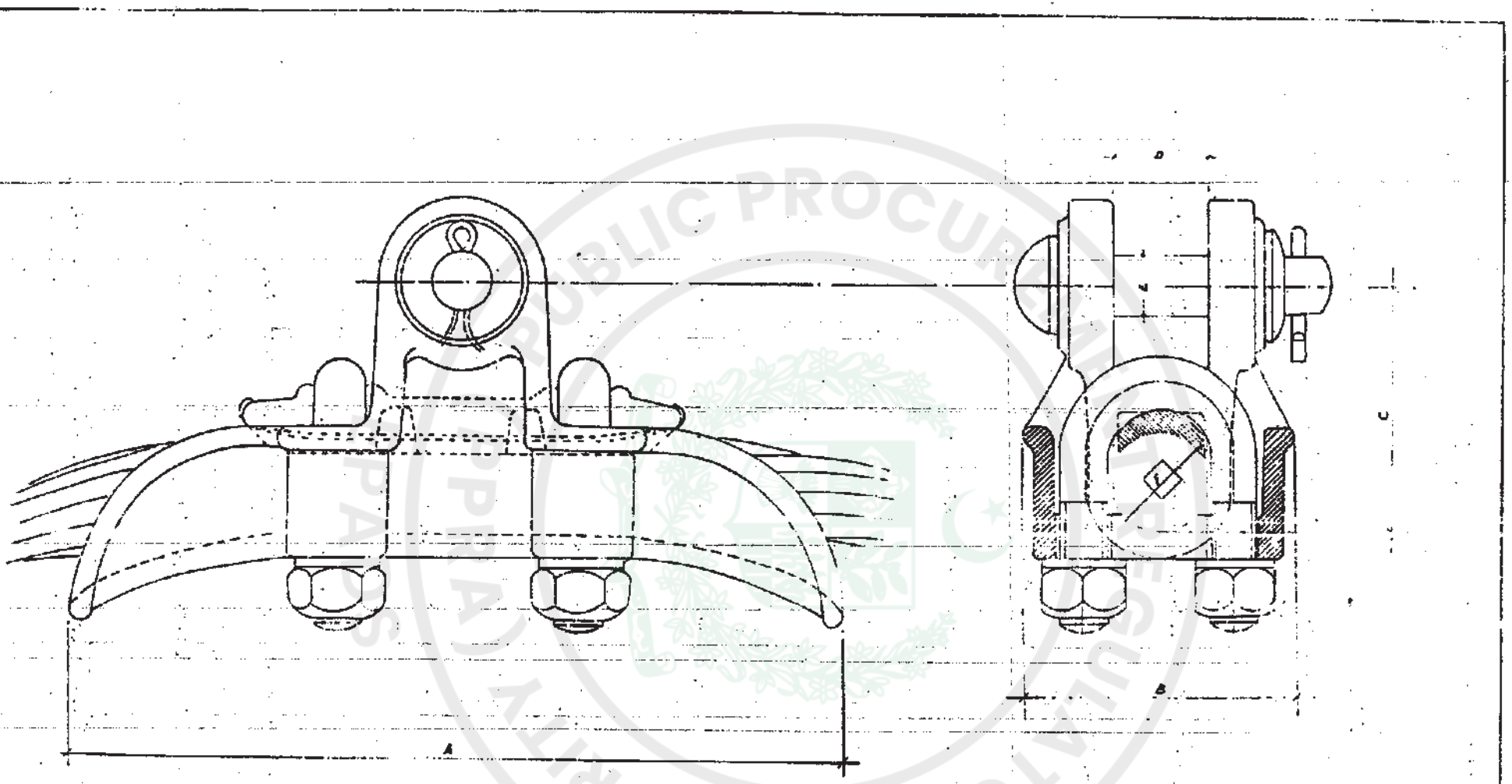


DIMENSION SHOWN IN MILLIMETRES

☐ INDICATES BINDING DIMENSION

DESCRIPTION	A	B	C	D	E	F
DOG	180	62	55	24	16	14.2
LYNX	190	65	60	24	16	19.5
CHUKOO	220	87	70	37	16	27.7
RAIL	226	87	70	37	16	29.6
CARDINAL	230	87	70	37	16	30.4

NO	DATE	REVISION	BY
1	7-9-82	DIMENSIONS FOR ACSR CARDINAL ADDED.	

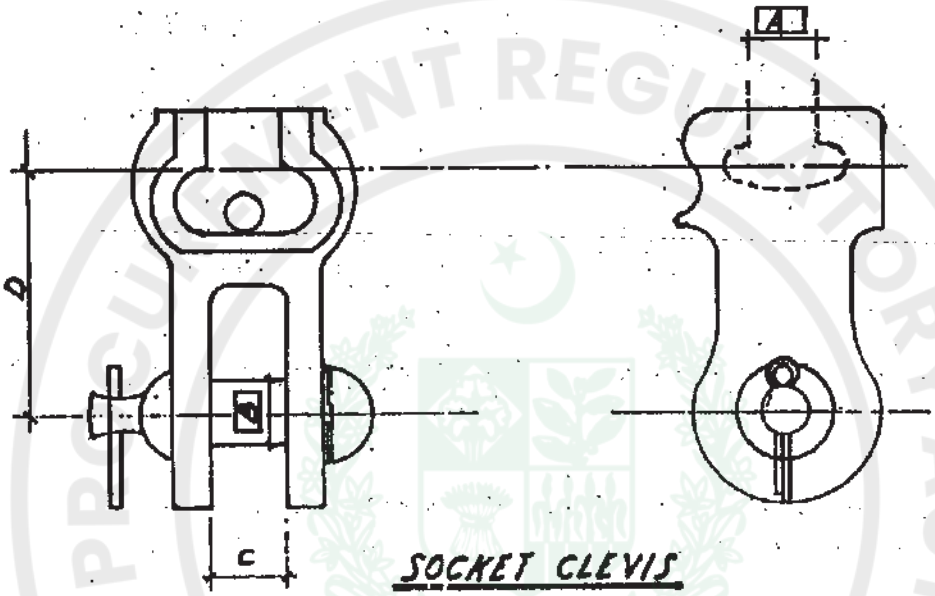
PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY — DESIGN DEPARTMENT

DRAWN	AZHAR SHAH	
CHECKED	SARWAR NAZEL	
JUNIOR ENGINEER	NAZIR ABBAS	
SENIOR ENGINEER	MUHAMMAD A. MALIK	
DIRECTOR	S. ISHTIAQ HUSSAIN	
CHIEF ENGINEER	JAVID AKHTAR	

SUSPENSION CLAMP FOR ACSR CONDUCTORS

SCALE - DATE 27-9-82

DWG. NO. PDW/DF-318



SOCKET CLEVIS
TYPE - A

DESCRIPTION	DIMENSIONS			
	A	B	C	D
DOG, LYNX	16	16	18	70
CUCADO, RAIL	16	16	20	70
CARDINAL	20	16	20	70

DIMENSIONS SHOWN IN MILLIMETRES

☐ INDICATES BINDING DIMENSIONS

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT
DRAWN	AZHAR SHAH		SOCKET CLEVIS TYPE - A
CHECKED	GHULAM RASUL		
ASSTT. DIRECTOR	NAZAR ABBAS		
DEPUTY DIRECTOR	MUHAMMAD A. MALIK		
DIRECTOR	S. ISHTIAQ HUSSAIN		SCALE ✓ DATE 13-9-82
CHIEF ENGINEER			DWG. NO. PDW/DF-376

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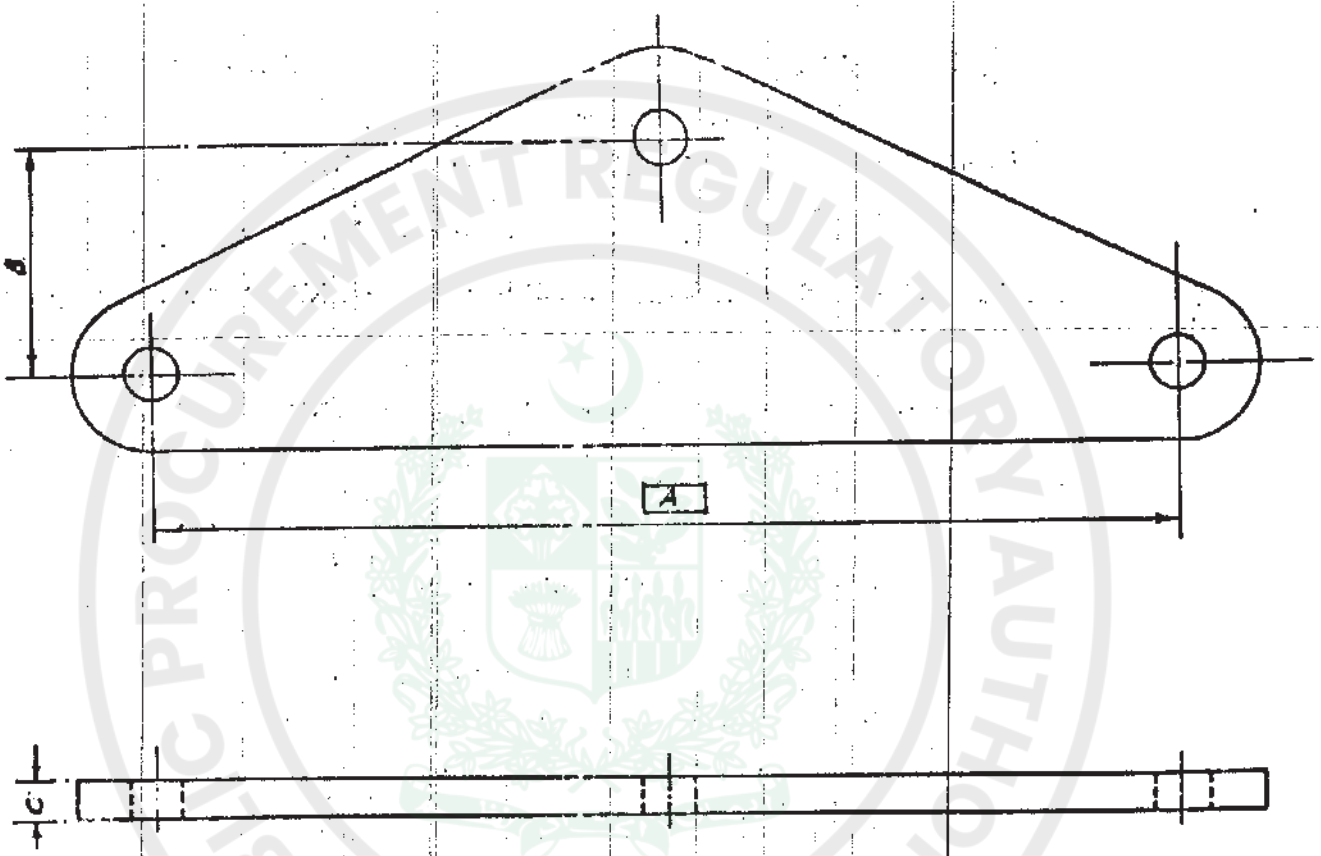

DESCRIPTION	A	B	C
DOG, LYNX	400	90	16
CUCKOO, RAIL CARDINAL	400	90	18

ALL DIMENSIONS IN MILLIMETRES

▭ INDICATES BINDING DIMENSIONS

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY

DESIGN
DEPARTMENT
POWER

DRAN	IZHAR SHAH	
CHECKED	GHULAM RASOL	
ASSTT DIRECTOR	NAZAR ABBAS	
DEPUTY DIRECTOR	MUHAMMAD-A-MALIK	
DIRECTOR	S. ISHTIAQ HUSSAIN	
CHIEF ENGINEER		

YOKE PLATE

SCALE ✓ DATE. 13-9-82

DWG. NO. PDW/DE-377

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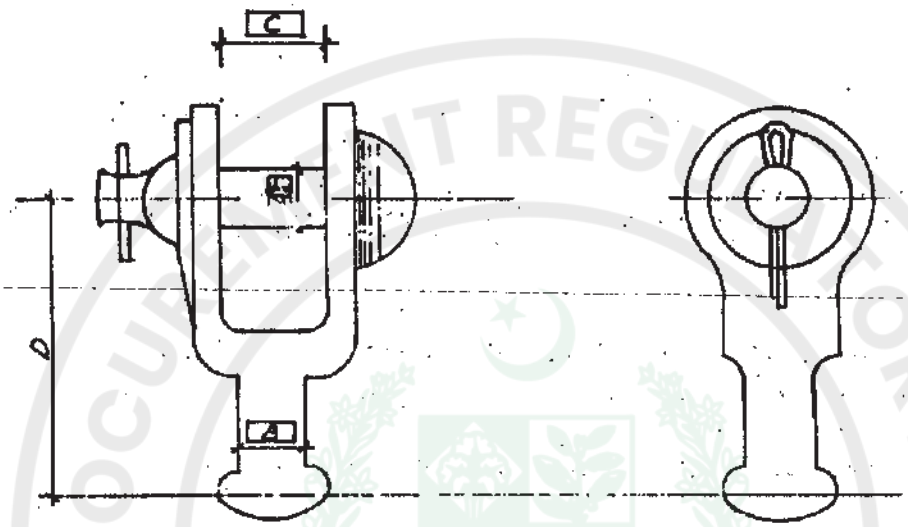


BALL CLEVIS

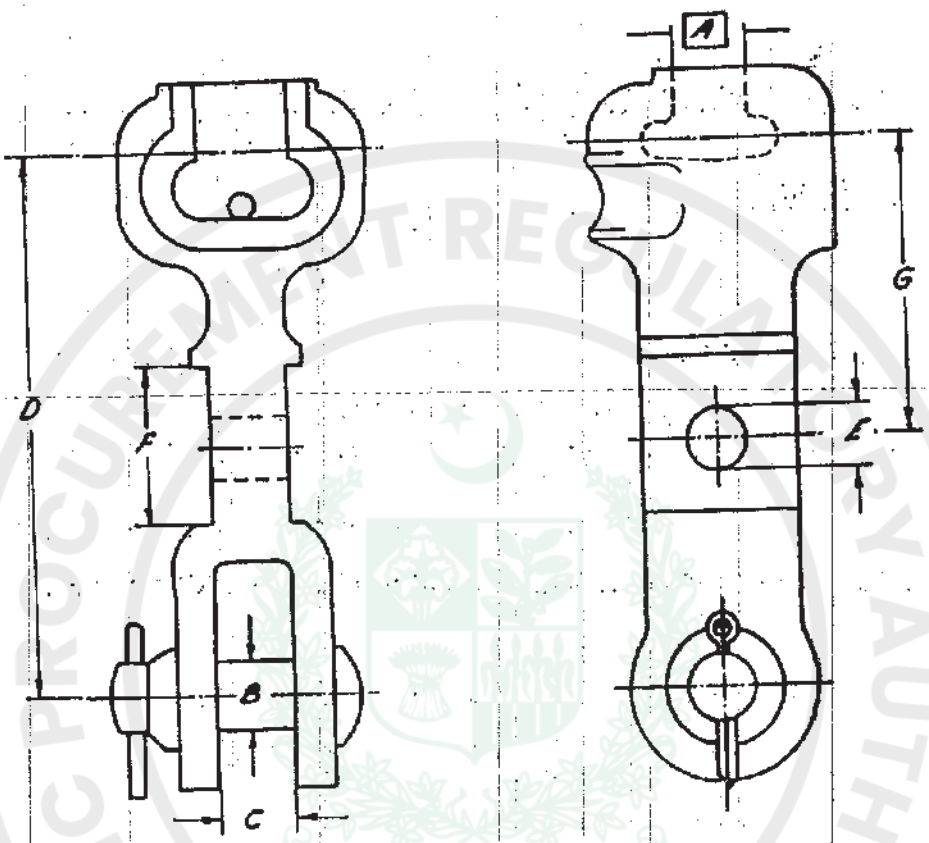
DESCRIPTION	DIMENSIONS			
	A	B	C	D
DOG, LYNX	16	16	18	75
CUCKOO, RAIL	16	16	20	75
CARDINAL	16	20	20	75

DIMENSION SHOWN IN MILLIMETRES

☐ INDICATES BINDING DIMENSIONS

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT
DRAWN	AZHAR KHAN		BALL CLEVIS
CHECKED	GHULAM RASUL		
ASSTT DIRECTOR	NAZAR ABBAS		
DEPUTY DIRECTOR	MUNAWAR-A-MALIK		
DIRECTOR	S. ISHTIAQ HUSSAIN		SCALE ✓ DATE 13-9-82
CHIEF ENGINEER			DWG. NO. PDW/DF-382

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS



SOCKET CLEVIS
TYPE - B

DESCRIPTION	A	B	C	D	E	F	G
DOG, LYNX	16	16	18	110	14	30	60
CUCKOO, RAIL	16	16	20	110	14	30	60
CARDINAL	20	16	20	110	14	30	60

DIMENSION SHOWN IN MILLIMETERS.

☐ INDICATES BINDING DIMENSIONS

PAKISTAN
WATER AND POWER DEVELOPMENT AUTHORITY

DESIGN DEPARTMENT (POWER)

DRAWN	LIAZ ALI RAHMOOD	11-8-82
CHECKED	A. LATIF	
JUNIOR ENGINEER	NAZAR ABBAS	
SENIOR ENGINEER	MUNAWWAR A. MALIK	
DIRECTOR	S. ISHTIAQ HUSSAIN	
CHIEF		

SOCKET CLEVIS
TYPE - B

SCALE:- ✓ DATE:- 13-9-82

DWG. NO. POWDE- 370

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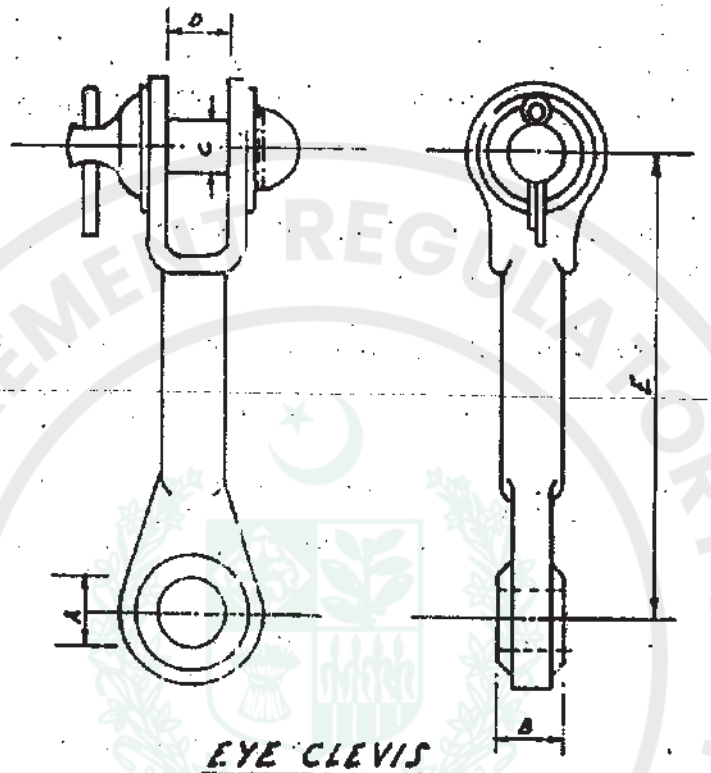

EYE CLEVIS

DESCRIPTION	A	B	C	D	E
DOG, LYNX	18	22	16	18	80
CUCKOO, RAIL CARDINAL	18	35	15	20	80

ALL DIMENSION IN MILLIMETRES

PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT POWER
DRAWN	AZHAR ALI SHAH		EYE CLEVIS WITH 90° EYE
CHECKED	GHULAM RASUL		
JUNIO DIRECTOR	NAZAR ABBAS		
DEPUTY DIRECTOR	MUNAWAR-A-MALIK		
DIRECTOR	S. ISHTIAQ HUSSAIN		SCALE ~ / DATE 13-9-82
CHIEF ENGINEER			DWG. NO. PDN/DF-379

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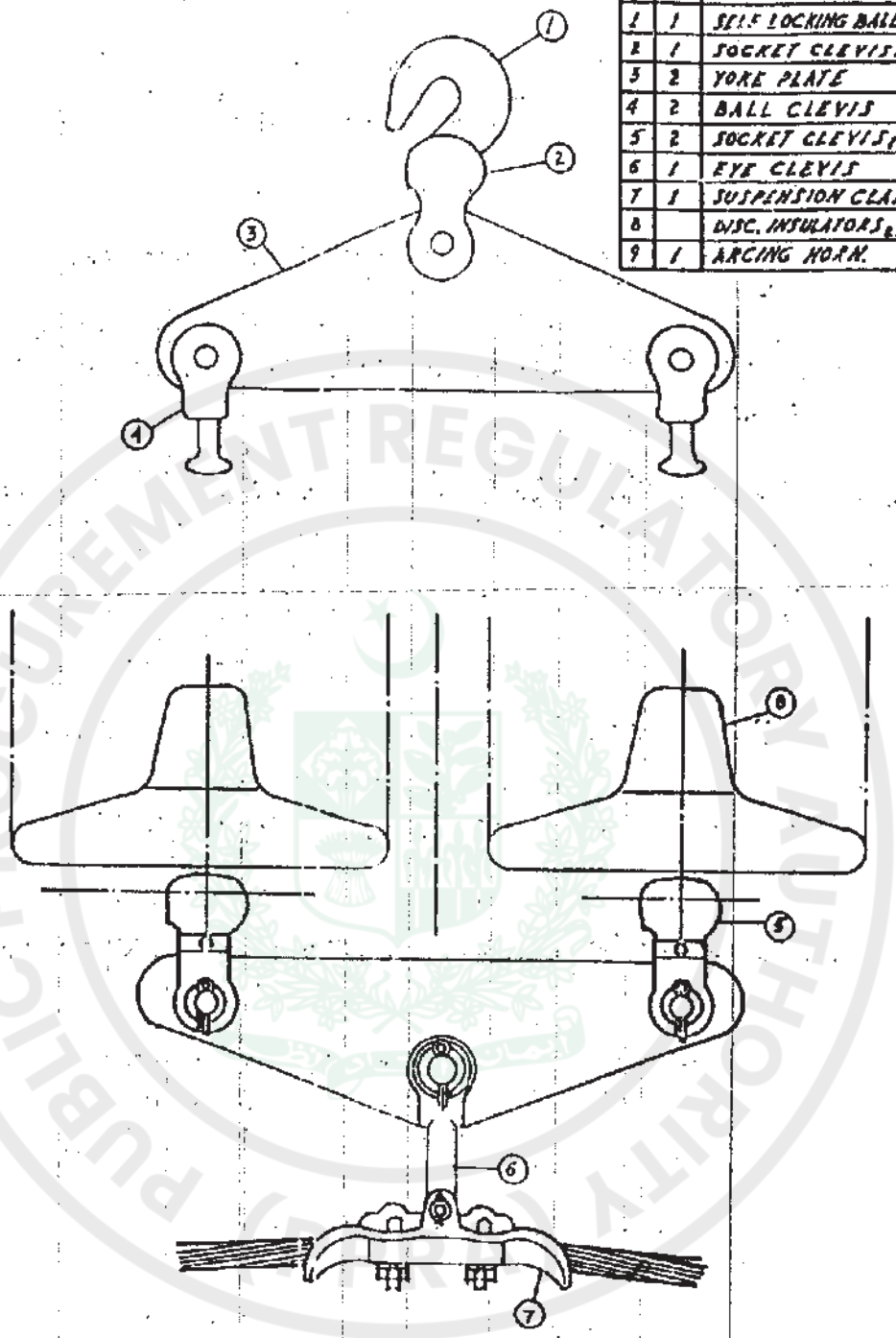
ITEM	QTY	DESCRIPTION	DWG. NO.
1	1	SELF LOCKING BALL HOOK	PDN/DF-315
2	1	SOCKET CLEVIS TYPE-A	PDN/DF-376
3	2	YOKE PLATE	PDN/DF-377
4	2	BALL CLEVIS	PDN/DF-382
5	2	SOCKET CLEVIS TYPE-B	PDN/DF-378
6	1	EYE CLEVIS	PDN/DF-379
7	1	SUSPENSION CLAMP	PDN/DF-318
8		DISC. INSULATORS 254 mm	—
9	1	ARCING HORN.	PDN/DF-317



PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY			DESIGN DEPARTMENT
DRAWN	AZHAR SHAH		DOUBLE SUSPENSION STRING
CHECKED	GHULAM RASUL		
ASSTT. DIRECTOR	NAZAR ABBAS		
DEPUTY DIRECTOR	MUNAWAR-A-MALIK		
DIRECTOR	S. ISHTIAQ HUSSAIN		SCALE — DATE 13-9-82
CHIEF ENGINEER			DWG. NO. PDN/DF-381

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PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

NATIONAL TRANSMISSION AND DESPATCH COMPANY

SPECIFICATION P- :2011

For WB-05A-1 Only

TENSION STRINGS FOR BUNDLE CONDUCTORS

DESIGN DEPARTMENT

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C O N T E N T S

For WB-05A-2019 Only

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SPECIFICATION P- :2011

TENSION STRINGS FOR BUNDLE CONDUCTORS BUS FOR GRID STATIONS

0 FOREWORD

0.1 This standard has been introduced by NTDC and has been prepared by the office of the Chief Engineer (Design).

0.2 This standard is intended only for the purpose of technical specification to facilitate procurement of materials and does not include provision of contract.

0.3 This specification is subjection to periodic revision and when required.

1 SCOPE

1.1 This specification covers the hardware of tension strings for two conductors bundle bus at Substations.

2 TYPE OF TENSION STRINGS

2.1 Tension strings described in this specification are of the following types.

Table-I

Sr. #	Description	String Designation	Conductor OD (mm)
a)	Single Tension String 'HAWTHORN'	ST – H	31.95
b)	Double Tension String for twin bundle 'HAWTHORN'	DTB – H	31.95
c)	Double Tension String for triple bundle 'COREOPSIS'	DTB – C	36.99

For WB-05A-2019 Only

2.2 The hardware used in the suspension string described above in this specification has been designated by the code numbers. These codes have been assigned in the following manner:

i. The first letter 'S' stands for single and 'D' for Double.
ii. The second letter 'S' stands for suspension.
iii. The next letter 'B' stands for conductor Bundle.
iv. The succeeding letters stand for the name of conductor for which the hardware is meant for i.e. 'H' for Hawthorn 'C' Coreopsis.

3 RATINGS OF HARDWARE

3.1 The hardware shall be of the ratings as specified in Tables-II, III and IV below:

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Table-II

RATINGS OF HARDWRAE FOR SINGLE TENSION SINGLE CONDUCTOR STRING

Sr. #	Description	Failing Load (kN) ST – H
1.	Self Locking Ball Hook	120
2.	Socket Eye for Arcing Horn	120
3.	Bow Shackle	120
4.	Arcing Horn (L/E)	15
5.	Tension Clamp (Compression type)	95% of conductor UTS
6	Turnbuckle	120

Table-III

RATINGS OF HARDWRAE FOR DOUBLE TENSION TWIN CONDUCTOR STRING

Sr. #	Description	Failing Load (kN) DTB – H
1.	V Shackle	210
2.	Bow Shackle (upper)	210
3.	Yoke Plate (upper)	210
4.	Ball Clevis	120 (per ball clevis)
5.	Socket Clevis for Arcing Horn	120 (per socket clevis)
6.	Bow Shackle (lower)	120 (per bow shackle)
7.	Tension Clamp (Compression type)	95% of conductors UTS
8.	Yoke Plate (bottom)	200
9.	Turnbuckle	120 (per turn buckle)
10	Arcing Horn (L/E)	15

TABLE – IV

RATINGS OF HARDWRAE FOR DOBLE TENSION TRIPLE CONDUCTOR STRING

Sr. #	Description	Failing Load (kN) DTB - C
1.	Hinge	160 (per hinge)
2.	Bow Shackle	160 (per bow shackle)
3.	Twisted Ball Eye Link For Arcing Horn	160 (per twisted eye link)
4.	Socket Clevis	160 (per socket clevis)
5.	Yoke Plate For Arcing Horn	320
6.	Twisted Clevis Clevis (upper)	320
7.	Yoke Plate (upper)	320
8.	Twisted Clevis Clevis (lower)	320
9.	Yoke Plate (bottom)	320
10.	Twisted Clevis Clevis (lower)	160 (per twisted clevis)
11.	Clevis Clevis (Double Plate Link)	160
12.	Turnbuckle	160 (per turn buckle)
13.	Single Point Arcing Horn (E/E)	15
14.	Arcing Ring	0.44
15	Tension Clamp (Compression type)	95% of conductors UTS

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4 GENERAL REQUIREMENT

4.1 Each single tension string hardware shall consist of the following items:

1. Self-Locking Ball Hook
2. Socket Eye For Arcing Horn
3. Bow Shackle
4. Arcing Horn
5. Tension Clamp (Compression type)
6. Turnbuckle (where required)

4.2 Each double tension twin conductor string hardware shall consist of the following items:

1. Ball Hook/V Shackle
2. Bow Shackle (upper)
3. Yoke Plate (upper)
4. Ball Clevis
5. Socket Clevis for Arcing Horn
6. Bow Shackle Lower
7. Tension Clamp (compression type)
8. Yoke Plate (bottom)
9. Turnbuckle (where required)
10. Arcing Horn

4.3 Each double tension triple conductor string hardware shall consist of the following items:

1. Hinge
2. Bow Shackle
3. Twisted Ball Eye Link For Arcing Horn
4. Socket Clevis
5. Yoke Plate For Arcing Horn
6. Twisted Clevis Clevis (upper)
7. Yoke Plate (upper)
8. Twisted Clevis Clevis (lower)
9. Yoke Plate (bottom)
10. Twisted Clevis Clevis (lower)
11. Clevis Clevis (Double Plate Link)
12. Turnbuckle (where required)
13. Single Point Arcing Horn (Earth End)
14. Arcing Ring
15. Tension Clamp (Compression type)

4.4 The ball and socket shall be of size as per following table and IEC 120. The disc insulators

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to be used for these strings shall conform to NTDC Specifications P-8 (latest)

Sr. No.	Conductor	Disc Strength	Coupling Dia
1.	Hawthorn	100 KN	16 mm
2.	Coreopsis	160 KN	20 mm

4.5 All ferrous parts shall be hot dip galvanized in accordance with NTDC Specification P-82 (latest revisions)

4.6 The coupling parts of hardware that mate with each other, shall not have a play of more than 2 mm

5 DIMENSIONS AND TOLERANCES

All hardware shall generally be in accordance with drawings forming a part of this Specification.

The dimensions of these parts of hardware that mate with other hardware or that determine the length of insulator string are binding and are shown enclosed on the drawing.

For dimensions that are fixed and binding the tolerance will be plus or minus 2 percent with a maximum of 0.8 mm. For dimensions that are shown as MAX or MIN there shall be no plus and minus tolerance respectively. The tolerance in the opposite sense may however be 4%.

6 DESIGN AND MATERIAL

6.1 Self-Locking Ball Hook/ V shackle

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized. The detail dimensions shall be according to Drawing No. 1 and 1 a. The ball when inserted in the Socket should not rotate and in the insulator cap closes a major position on the opening and prevents disconnection from the power as long as the hook is assembled with the insulator.

6.2 Socket Clevis

It shall be made from drop forged steel or malleable iron of suitable grade. It shall be hot dip galvanized and shall be made according to Drawing Nos. 2 and 3.

The socket shall be supplied with a round head rivet and plain washer made from galvanized steel and a split pin with retention clip made from stainless steel.

The clevis shall be supplied with rivet round handled with flat washer and straight split pin. The split pin shall be made from stainless steel.

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6.3 **Shackles**

Shackles shall be of two different types i.e. H.S. (High Strength) and L.S. (Low Strength). The strengths of these shackles shall be as indicated in Table-II above. H.S. type shackle shall be given red coating so as to differentiate form type L.S. and shall be made according to Drawing Nos. 4, 5 and 6.

6.4 **Arcing Horns**

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized in accordance with ASTM 153. The dimensions shall preferably in accordance with Nos. 7, 8 and 9.

6.5 **Arcing Rings**

It shall be made from drop forged steel of suitable grade and shall be hot dip galvanized in accordance with ASTM 153. The dimensions shall preferably in accordance with Drawing No. 10.

6.6 **Tension Clamps (compression type)**

The tension clamp for aluminum conductors namely, Coreopsis and Hawthorn shall be of compression dead end type. It shall be composed of aluminum body and one galvanized steel terminal without tubular termination. The clamp when assembled shall be capable of developing not less than 95% of the rated minimum failing load as specified in Table-II, and has conductivity not less than that of conductor. The clamp shall be according to Drawing. Nos. 11 and 12.

6.7 **Turn Buckle**

The turnbuckle for aluminum conductors namely, Coreopsis and Hawthorn shall be made of drop forged steel preferably in accordance with the dimensions in drawing No. of compression dead end type. It shall be composed of aluminum body and one galvanized steel terminal without tubular termination. The clamp when assembled shall be capable of developing not less than 95% of the rated minimum failing load as specified in Table-II, and has conductivity not less than that of conductor. The clamp shall be according to Drawing. Nos. 13 and 14.

6.8 **Yoke Plates**

Yoke plates shall be of mono block type and shall be made from high grade steel, hot dip galvanized and subject to normalizing process. It shall be made according to Drawing. Nos. 15, 16, 17, 18 and 19.

6.9 **Ball Clevis**

It shall be made from droop forged steel of suitable grade and shall be hot dip galvanized. It shall be made according to Drawing. No. 20. The clevis shall be supplied with rivet round headed with washer made of galvanized steel. The split pin should be made from stainless steel.

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6.10 **Hinge**

It shall be made from high grade steel of suitable grade and shall be hot dip galvanized. It shall be made according to Drawing. No. 21. The hinge shall be supplied with split pin should be made from stainless steel.

6.11 **Twisted Clevis**

It shall be made from high grade steel of suitable grade and shall be hot dip galvanized. It shall be made according to Drawing. Nos. 22, 23 and 24. The twisted clevis clevis shall be supplied with split pin should be made from tin plated copper.

6.12 **Clevis (Double Plate Link)**

It shall be made from high grade steel of suitable grade and shall be hot dip galvanized. It shall be made according to Drawing. No. 25. The Clevis Clevis (Double Plate link) shall be supplied with split pin should be made from tin plated copper.

6.13 **Twisted Ball Eye Link For Arcing Horn**

It shall be made from high grade steel of suitable grade and shall be hot dip galvanized. It shall be made according to Drawing. No. 26.

7 TESTS

7.1 **Type Tests**

7.1.1 Type tests are intended to verify and establish design characteristics. They shall be made once only on hardware identical in all essential details with those to be supplied.

The following type tests shall be carried out in accordance with clause 10, 11, 12, 13 and 14 in an independent testing laboratory.

i)	Mechanical Test	One each individual item of hardware
ii)	Resistance to Conductor Slippage Test	On Tension Clamp only
iii)	Heat Cycle Test	On Tension Clamp only (if it's current carrying device)
iv)	Resistance Test	On Tension Clamp only
v).	Corona Test	For complete insulator string.

7.1.2 The Contractor shall supply heat cycle test result with the bid (applicable for tension clamp if it's a current carrying device.

7.2 **Sample Tests**

Sample tests shall be made to verify the quality and workmanship.

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The following sample test shall be performed in accordance with clause 8, 9, 10, 11, 13 and 15.

i).	Visual Examination	On each item of hardware
ii).	Verification of Dimensions	
iii).	Mechanical test	On Tension Clamp only
iv).	Resistance to Conductor Slippage Test	
v).	Resistance Test	
vi).	Galvanizing Test	On all ferrous parts.

8 VISUAL EXAMINATION

The test samples shall be examined visually for the following defects.

Table-V

Visual Examination

Examination	Defects
Material	Not as specified in relevant Clauses
Construction	Not of the shape given in relevant Drawing. Any part missed.
Finish	Galvanizing not proper, presence of burrs, black and bare spots, dross and projections, which will interfere with proper use of the articles.

9 VERIFICATION OF DIMENSIONS

The binding dimensions of the hardware shall be measured and shall be as shown on the relevant approved drawings subject to the tolerance given in clause 5.

10 MECHANICAL TEST

10.1 For Hardware except arcing horn

The fitting shall be held in tensile testing machine in a manner approximating as nearly as possible to the arrangement to be used in service. A tensile load equal to one-half of the specified minimum failing load equal to one-half of the specified minimum failing load shall be applied and increased at a steady rate. Failure of the fitting shall not occur at a load less than the specified minimum failing load as per Table-II.

11 RESISTANCE TO CONDUCTOR SLIPPAGE TEST

Test piece shall be assembled in accordance with manufacturer's recommendations on conductors of the size and type with which it is to be used. The assembly shall be mounted in a tensile testing machine and anchored in a manner approximating as nearly as possible to the arrangement to be used in service, precautions being taken to avoid bird caging of the conductor.

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The length of conductor joint in the test assembly should preferably be not less than 100 times the overall diameter of the conductor.

A tensile load of about 50% of the minimum failing load as specified in table-II shall be applied and the conductor shall be marked in such a way that movement relative to the fitting can easily be detected, without any subsequent adjustment of the fitting, the load shall be steadily increased to 95% of the minimum failing load and then reduced to 90% of the minimum failing load and maintained for 1 minute. There shall be no movement of the conductor relative to the fitting due to slip during this 1 minute period and no failure of the fitting.

12 HEAT CYCLES TEST

The test current shall be that power frequency current which raises the surface temperature of the conductor 40 deg C above 40° C ambient temperature and maintains the temperature at a steady value. The minimum length of conductor used for determining this current shall be 2 meters and the conductor temperature shall be measured near the center of the test length. Only applicable if tension clamp is a current carrying device.

The joint shall be assembled in accordance with the manufacturer's recommendations on conductor of the size and type with which it is to be used. The assembly, to which a tensile load not exceeding 20% of the rated minimum failing load as specified in Table-II may be applied, shall be directed indoors so that the conductor is roughly horizontal. Air shall be able to circulate freely round the assembly which shall not however be exposed to draughts. The minimum length of conductor on each side of the fitting shall be 2 meters.

The test current shall be passed continuously through the assembly for a period of 30 min. The current shall then be interrupted, and the assembly shall be allowed to cool to within 5 deg C. above the ambient temperature. The sequence of operation shall be repeated so that 250 cycles of heating and cooling are applied.

During the last five cycles, the maximum temperature, measured when the test current is flowing, at any points on the surface of the fittings, shall not exceed that of the conductor. At the end of the test the joint shall meet, the requirements of the resistance test specified above. There shall be no sign of local heating, burning or fusing of any part of the joint or of the conductor.

13 RESISTANCE TEST

Test piece shall be assembled in accordance with the manufacturer's recommendations on the conductors of the size and type with which it is to be used. The electrical resistance shall be measured between points on the conductor on either side and just

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clear of the fitting and shall not exceed 75% of the measured resistance of the equivalent length of conductor.

The test may be made with direct current or with alternating current at any convenient power frequency. The current connections shall be at a distance not less than50 times the diameter of the conductor from the fitting and shall be so made that effective contact is made with all these strands of the conductor which would be taken into account in calculating its equivalent resistance.

14 CORONA TEST

Typical insulator sets completely assembled with all fittings shall be set up in a manner as nearly as possible to the arrangement to be used in service with not less than 3 meters of conductor. A voltage of 160 KV shall be applied between the conductor and earth for five minutes during which time no corona formation shall be visible or audible with the room in complete darkness.

15 GALVANIZING TEST

This test shall be carried out on all ferrous parts complying with the following with the following requirements.

i) Weight of zinc coating
ii) Uniformity of zinc coating
iii) Adherence of zinc coating

This test shall be performed in accordance with NTDC Specification P- 82(latest revision).

16 SAMPLING PLAN - ACCEPTANCE AND REJECTION

i) Sampling sizes are designated by code letters. Table-III shall be used to find the applicable code letter for the particular lot or batch size for various tests specified in this specification. While the number of units of product from each lot or batch which are to be inspected (sample size) and the criteria for determining the acceptability of the lot or batch (acceptance and rejection numbers) for different code letters can be obtained from the table-IV given below.

ii) The number of sample units inspected shall be equal to the first sample size given in Table-IV. If the number of defective units found in the first sample is equal to or less than the first acceptance number, the let shall be acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot shall be rejected. If the number of defectives found in the first sample is between the first acceptance and rejection number, second sample of the size given by the plan shall be inspected. The No. of defectives found in the first and

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the second samples shall be accumulated. If the cumulative ---- of defectives is equal to or less than the second acceptance number the lot shall be acceptable. If the cumulative No. of defectives is equal to or greater than the second rejection number, the lot shall be rejected.

TABLE – VI
Sample Size

Lot or Batch Size	Sample size for test specified in clause 10,11,13 & 15	Sample size for dimensional and finish defects
2 to 8	A	A
9 to 15	A	B
16 to 25	A	C
26 to 50	A	D
51 to 90	B	E
91 to 150	B	F
151 to 280	B	G
281 to 500	B	H
501 to 1200	C	J

TABLE –IV
Sample Acceptance Criteria

Sample Size code letters	Sample	Sample Size	Cumulative sample size	Acceptance Number	Rejection Numbers
A	First	1	1	0	1
	Second	-	-	-	0
B	First	2	2	0	2
	Second	2	4	1	2
C	First	3	3	0	2
	Second	3	6	1	2
D	First	5	5	0	2
	Second	5	10	1	2
E	First	8	8	0	2
	Second	8	16	1	2
F	First	13	13	0	3
	Second	13	26	3	4
G	First	20	20	1	4
	Second	20	40	4	5
H	First	32	32	2	5
	Second	32	64	6	7
J	First	50	50	3	7
	Second	50	100	8	9

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17 MARKING AND PACKING

The material shall be packed in wooden crates for export shipment to permit convenient

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handling and to protect against loss permit damage to final destination. Containers (Wooden Crates) shall be designed for handling by fork lift, truck and by slings around the container. The weight of each package should be between 100 and 150 kg.

Packages shall be designed for rough handling. All wooden crates shall be clearly marked to indicate

1. Quantity
2. Name of hardware item
3. Manufacturer's Name

All packages shall be numbered consecutively so that total shipment can be readily determined.

18 INFORMATION TO BE SUPPLIED

The following information shall be supplied with the bid and failure to supply the same may subject the bid to disqualification.

i) Detailed fully dimensioned drawings of hardware for Tension Strings
ii) Specification giving material grade and composition of all items of hardware.
iii) Catalogues/literature of standardized items
iv) Test certificates
v) One complete sample of hardware for all types of Tension Strings.
vi) Detail of manufacturing & testing facilities available with manufacturers.

19 DRAWINGS

The following drawings form the part of this Specification.

S. No.	Description	Drawing No.
1	Self-locking Ball Hook	1
2	V Shackle	1a
3	Socket Eye/Clevis For Arcing Horn	2 & 3
4	Bow Shackle	4, 5, 6
5	Arcing Horn (L/E)	7 & 8,
6	Arcing Horn (E/E)	9
7	Arcing Ring	10
8	Tension Clamp (Compression Type)	11 & 12
9	Turnbuckle	13 & 14
10	Yoke Plate	15, 16, 17, 18 & 19
11	Ball Clevis	20
12	Hinge	21
13	Twisted Clevis	22, 23, & 24
14	Clevis (Double Plate Link)	25
15	Twisted Ball Eye Link For Arcing Horn (E/E)	26

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Draft Reference Drawings for 132 kV, 220 kV and 500 KV Tension Strings
(For Tendering Purpose only)

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SCHEDULE OF TECHNICAL DATA FOR SINGLE TENSION SINGLE CONDUCTOR STRING ASSEMBLY								
			132kV SINGLE TENSION SINGLE COND WITH TUTNBUCKLE			132kV SINGLE TENSION SINGLE COND WITHOUT TUTNBUCKLE		
Sr. No.		Description	Value Required	Value Offered	Unit	Value Required	Value Offered	Unit
1	i)	Manufacturer's Name and Address						
	ii)	Standard followed	Wapda Specification / IEC			Wapda Specification / IEC		
2		**Self Locking Ball Hook**	Drwg No.			Drwg No.		
	i)	Ball size (Type-A)	16		mm	16		mm
	ii)	Hook opening	22		mm	22		mm
	iii)	Failing Load	120		kN	120		kN
3		**Socket Eye for A/H**	Drwg No.			Drwg No.		
	i)	Socket size	16		mm	16		mm
	ii)	Eye Size	17.5		mm	17.5		mm
	iii)	Eye Thickness	22		mm	22		mm
	iv)	Failing Load	120		kN	120		kN
4		**Arcing Horn**	Drwg No.			Drwg No.		
	i)	Length (A)	300		mm	300		mm
	ii)	Length (B)	120		mm	120		mm
	iii)	Dia	19		mm	19		mm
	iv)	Failing Load	15		kN	15		kN
5		**Bow Shackle**	Drwg No.			Drwg No.		
	i)	Shackle Opening 'A'	25		mm	25		mm
	ii)	Pin Dia 'B'	16		mm	16		mm
	iii)	Height 'C'	73		mm	73		mm
	iv)	Radius 'D'	20		mm	20		mm
	v)	Shackle Thickness 'E'	16		mm	16		mm
	vi)	Failing Load	120		kN	120		kN
6		**Tension Clamp (Compression Type)**	Drwg No.			Drwg No.		
6.1			HAWTHORN			HAWTHORN		
	a)	**Eye**						
	i)	Eye Opening	25-70		mm	25-70		mm
	ii)	Thickness of Eye	21		mm	21		mm
	iii)	Failing load	95% of Conductor		%	95% of Conductor		%
	b)	**Aluminium Body**						
	i)	Inner dia	34		mm	34		mm
	ii)	Outer dia	54		mm	54		mm
	iii)	Length	515mm (before comp.)		mm	515mm (before comp.)		mm
	iv)	Dia size	46mm. A/F		mm	46mm. A/F		mm
	v)	Failing load	95% of conductor		%	95% of conductor		%
	vi)	Heat cycle test	Applicable only for Current carrying part			Applicable only for Current carrying part		
6.2		**Turnbuckle**	Drwg No.			N/A		
	i)	Eye Opening	25		mm			
	ii)	Clevis Opening	25		mm			
	iii)	Rivet Pin Dia	16 -Rivet Type		mm			
	iv)	Adjusted Length	500-740		mm			
	v)	Failing load	120		kN			
7		Drawing No. (attach with bid)						
8		Disc insulator (balll, socket type)	IEC 120/16			IEC 120/16		

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SCHEDULE OF TECHNICAL DATA FOR DOUBLE TENSION TWIN CONDUCTOR STRING ASSEMBLY									
			132kV DOUBLE TENSION TWIN COND WITHOUT TURNBUCKLE			132kV DOUBLE TENSION TWIN COND WITH TURNBUCKLE			
Sr.No.		Description	Value Required	Value Offered	Unit	Value Required	Value Offered	Unit	
1	i)	Manufacturer's Name and Address							
	ii)	Standard followed	Wapda Specification / IEC			Wapda Specification / IEC			
2		**Socket Clevis for A/H**	Drwg No.			Drwg No.			
	i)	Socket size	16		mm	16		mm	
	ii)	Rivet Pin Dia	16		mm	16		mm	
	iii)	Clevis Opening	20		mm	20		mm	
	iv)	Failing Load	120		kN	120		kN	
3		**Ball Clevis**	Drwg No.			Drwg No.			
	i)	Ball size	16		mm	16		mm	
	ii)	Rivet Pin Dia	16		mm	16		mm	
	iii)	Clevis Opening	22		mm	22		mm	
	iv)	Failing Load	120		kN	120		kN	
4		**Arcing Horn**	Drwg No.			Drwg No.			
	i)	Length (A)	286		mm	286		mm	
	ii)	Length (B)	120		mm	120		mm	
	iii)	Dia	19		mm	19		mm	
	v)	Failing Load	15		kN	15		kN	
5		**Bow Shcakle (Lower)**	Drwg No.			Drwg No.			
	i)	Shackle Opening 'A'	25		mm	25		mm	
	ii)	Pin Dia 'B'	16		mm	16		mm	
	iii)	Height 'C'	73		mm	73		mm	
	iv)	Radius 'D'	20		mm	20		mm	
	v)	Shackle Thickness 'E'	16		mm	16		mm	
	vi)	Failing Load	120		kN	120		kN	
6		**Bow Shackle (upper)**	Drwg No.			Drwg No.			
	i)	Shackle Opening 'A'	27		mm	27		mm	
	ii)	Pin Dia 'B'	22		mm	22		mm	
	iii)	Height 'C'	92		mm	92		mm	
	iv)	Radius 'D'	22		mm	22		mm	
	v)	Shackle Thickness 'E'	22		mm	22		mm	
	vi)	Failing Load	210		kN	210		kN	
7		**Ball Hook/V-Shackle**	Drwg No.			Drwg No.			
	i)	Shackle Opening 'A'	66		mm	66		mm	
	ii)	Pin Dia 'B'	20		mm	20		mm	
	iii)	Height 'C'	195		mm	195		mm	
	iv)	Radius 'D'	16		mm	16		mm	
	v)	Shackle Thickness 'E'	20		mm	20		mm	
	vi)	Failing Load	210		kN	210		kN	
8		**Yoke Plate (Upper)**	Drwg No.			Drwg No.			
	i)	Dimensions (A to C)	(400,76,19)		mm	(400,76,19)		mm	
	ii)	Failing Load min.	210		kN	210		kN	
9		**Yoke Plate (bottom)**	Drwg No.			Drwg No.			
	i)	Hole Spacing	400 -76		mm	400 -76		mm	
	ii)	Thickness	16		mm	16		mm	
	iii)	Failing Load	210		kN	210		kN	
10		**Tension Clamp (Compression Type)**	Drwg No.			Drwg No.			
10.1			**HAWTHORN**			**HAWTHORN**			
	a)	**Eye**							
	i)	Eye Opening	25-70		mm	25-70mm.		mm	
	ii)	Thickness of Eye	21		mm	21mm.		mm	
	iii)	Failing load	95% of conductor		%	95% of conductor		%	
	b)	**Aluminium Body**							
	i)	Inner dia	34		mm	34mm.		mm	
	ii)	Outer dia	54		mm	54mm.		mm	
	iii)	Length	515mm (before comp.)		mm	515mm (before comp.)		mm	
	iv)	Dia size	46mm. A/F		mm	46mm. A/F		mm	
	v)	Failing load	95% of conductor		%	95% of conductor		%	
	vii)	Heat cycle test	Applicable only for Current carrying part			Applicable only for Current carrying part			
10.2		**Turnbuckle**	N/A			Drwg No.			
	i)	Eye Opening				25		mm	
	ii)	Clevis Opening				25		mm	
	iii)	Rivet Pin Dia				16-Rivet Type		mm	
	iv)	Adjusted Length				500-740		mm	
	v)	Failing load				120		kN	
11		Drawing No. (attach with bid)							
12		Disc insulator (balll, socket type)	IEC 120/16			IEC 120/16			
13		No. of packages to be shipped							
14		Weight of each package							

For WB-05A-2019 Only

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SCHEDULE OF TECHNICAL DATA FOR

DOUBLE TENSION TWIN CONDUCTOR STRING ASSEMBLY

Sr.No.		Description	220 kV DOUBLE TENSION TWIN COND WITHOUT TURNBUCKLE			220 kV DOUBLE TENSION TWIN COND WITH TURNBUCKLE		
			Value Required	Value Offered	Unit	Value Required	Value Offered	Unit
1	i)	Manufacturer's Name and Address						
	ii)	Standard followed	Wapda Specification / IEC			Wapda Specification / IEC		
4		**Socket Clevis for A/H**	Drwg No.			Drwg No.		
	i)	Socket size	16		mm	16		mm
	ii)	Rivet Pin Dia	16		mm	16		mm
	iii)	Clevis Opening	20		mm	20		mm
	iv)	Failing Load	120		kN	120		kN
5		**Ball Clevis**	Drwg No.			Drwg No.		
	i)	Ball size	16		mm	16		mm
	ii)	Rivet Pin Dia	16		mm	16		mm
	iii)	Clevis Opening	22		mm	22		mm
	iv)	Failing Load	120		kN	120		kN
6		**Arcing Horn**	Drwg No.			Drwg No.		
	i)	Length (A)	350		mm	350		mm
	ii)	Length (B)	123		mm	123		mm
	iii)	Dia	27 (Pipe)		mm	27 (Pipe)		mm
	iv)	Failing Load	15		kN	15		kN
7		**Bow Shackle (lower)**	Drwg No.			Drwg No.		
	i)	Shackle Opening 'A'	25		mm	25		mm
	ii)	Pin Dia 'B'	16		mm	16		mm
	iii)	Height 'C'	73		mm	73		mm
	iv)	Radius 'D'	20		mm	20		mm
	v)	Shackle Thickness 'E'	16		mm	16		mm
	vi)	Failing Load	120		kN	120		kN
8		**Bow Shackle (upper)**	Drwg No.			Drwg No.		
	i)	Shackle Opening 'A'	27		mm	27		mm
	ii)	Pin Dia 'B'	22		mm	22		mm
	iii)	Height 'C'	92		mm	92		mm
	iv)	Radius 'D'	22		mm	22		mm
	v)	Shackle Thickness 'E'	22		mm	22		mm
	vi)	Failing Load	210		kN	210		kN
9		**Ball Hook/V-Shackle**	Drwg No.			Drwg No.		
	i)	Shackle Opening 'A'	66		mm	66		mm
	ii)	Pin Dia 'B'	20		mm	20		mm
	iii)	Height 'C'	195		mm	195		mm
	iv)	Radius 'D'	16		mm	16		mm
	v)	Shackle Thickness 'E'	20		mm	20		mm
	vi)	Failing Load	210		kN	210		kN
10		**Yoke Plate (Upper)**	Drwg No.			Drwg No.		
	i)	Dimensions (A to C)	(400,76,19)		mm	(400,76,19)		mm
	ii)	Failing Load min.	210		kN	210		kN
11		**Yoke Plate (Bottom)**	Drwg No.					
	i)	Hole Spacing	400 -76		mm	400-76		mm
	ii)	Thickness	16		mm	16		mm
	iii)	Failing Load	200		kN	200		kN
12		**Tension Clamp (Compression Type)**	Drwg No.			Drwg No.		
12.1			**HAWTHORN**			**HAWTHORN**		
	a)	**Eye**						
	i)	Eye Opening	25-70		mm	25-70		mm
	ii)	Thickness of Eye	21		mm	21		mm
	iii)	Failing load	95% of conductor		%	95% of conductor		%
	b)	**Aluminium Body**						
	i)	Inner dia	34		mm	34		mm
	ii)	Outer dia	54		mm	54		mm
	iii)	Length	515mm (before comp.)		mm	515mm (before comp.)		mm
	iv)	Dia size	46mm. A/F		mm	46mm. A/F		mm
	v)	Failing load	95% of conductor		%	95% of conductor		%
	vii)	Heat cycle test	Applicable only for Current carrying part			Applicable only for Current carrying part		
12.2		**Turnbuckle**	N/A			Drwg No.		
	i)	Eye Opening				25		mm
	ii)	Clevis Opening				25		mm
	iii)	Rivet Pin Dia				16 Dome Nut Type		mm
	iv)	Adjusted Length				500-740		mm
	v)	Failing load				120		kN
13		Drawing No. (atach with bid)						
14		Disc insulator (balll, socket type)	IEC 120/16			IEC 120/16		

For WEB 05A-2019 Only

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SCHEDULE OF TECHNICAL DATA FOR DOUBLE TENSION TRIPLE CONDUCTOR STRING ASSEMBLY									
			500 kV DOUBLE TENSION TRIPLE COND WITHOUT TURNBUCKLE			500 kV DOUBLE TENSION TRIPLE COND WITH TURNBUCKLE			
Sr. No.		Information Required	Value Required	Value Offered	Unit	Value Required	Value Offered	Unit	
1	i)	Manufacturer's Name and Address							
2	ii)	Standard followed	Wapda Specification / IEC			Wapda Specification / IEC			
3		**Dimension of tension string:**	Drwg No.			Drwg No.			
	i)	Dimensions (please see attach drawing)			mm			mm	
	ii)	Failing Load min. UTS	320		KN	320		KN	
4		**Hinge**	Drwg No.			Drwg No.			
	i)	Clevis opening	25		mm	25		mm	
	ii)	Failing Load min.	160		KN	160		KN	
5		**Bow Shackle**	Drwg No.			Drwg No.			
	i)	Shackle Opening 'A'	27		mm	27		mm	
	ii)	Pin Dia 'B'	20		mm	20		mm	
	iii)	Height 'C'	84		mm	84		mm	
	iv)	Radius 'D'	23		mm	23		mm	
	v)	Shackle Thickness 'E'	20		mm	20		mm	
	vi)	Failing Load	160		KN	160		KN	
6		**Twisted Ball Eye Link for Arcing Horn**	Drwg No.			Drwg No.			
	i)	Eye opening	30		mm	30		mm	
	ii)	Thickness of eye	20		mm	20		mm	
	iii)	Ball size	20		mm	20		mm	
	iv)	Failing Load	210		KN	210		KN	
7		**Socket Clevis**	Drwg No.			Drwg No.			
	i)	Socket size	20		mm	20		mm	
	ii)	Rivet Pin Dia	20		mm	20		mm	
	iii)	Clevis Opening	24		mm	24		mm	
	iv)	Failing Load	210		KN	210		KN	
8		**Yoke Plate for Arcing Horn**	Drwg No.			Drwg No.			
	i)	Dimensions (A to C)	(400,110,22)		mm	(400,110,22)		mm	
	ii)	Failing Load min.	320		KN	320		KN	
9		**Twisted Clevis Clevis (upper)**	Drwg No.			Drwg No.			
	i)	Rivet Pin Dia	24		mm	24		mm	
	ii)	Clevis Opening	26		mm	26		mm	
	iii)	Failing Load	320		KN	320		KN	
10		**Yoke Plate (Upper)**	Drwg No.			Drwg No.			
	i)	Dimensions (A to C)	(285,70,22)		mm	(285,70,22)		mm	
	ii)	Failing Load min.	320		KN	320		KN	
11		**Twisted Clevis Clevis (lower)**	Drwg No.			Drwg No.			
	i)	Rivet Pin Dia	19		mm	19		mm	
	ii)	Clevis Opening	24		mm	24		mm	
	iii)	Failing Load	160		KN	160		KN	
12		**Yoke Plate (bottom)**	Drwg No.			Drwg No.			
	i)	Dimensions (A to C)	(330,100,20)		mm	(330,100,20)		mm	
	ii)	Failing Load min.	320		KN	160		KN	
13		**Clevis Clevis (Double plate link)**	Drwg No.			Drwg No.			
	i)	Rivet Pin Dia	19		mm	19		mm	
	ii)	Clevis Opening	25		mm	25		mm	
	iii)	Failing Load	320		KN	320		KN	
14		**Twisted Clevis Clevis (lower)**	Drwg No.			Drwg No.			
	i)	Rivet Pin Dia	16		mm	16		mm	
	ii)	Clevis Opening	22		mm	22		mm	
	iii)	Failing Load	160		KN	160		KN	
15		**Turnbuckle**	N/A			Drwg No.			
	i)	Eye Opening				25		mm	
	ii)	Clevis Opening				25		mm	
	iii)	Rivet Pin Dia				16		mm	
	iv)	Adjusted Length				500-740		mm	
	v)	Failing load				160		kN	
16		**Tension Clamp (Compression Type)**	Drwg No.			Drwg No.			
			COREOPSIS			COREOPSIS			
	a)	**Eye**							
	i)	Eye Opening	25		mm	25		mm	
	ii)	Thickness of Eye	21		mm	21		mm	
	iii)	Failing load	95% of conductor		%	95% of conductor		%	
	b)	**Aluminium Body**							
	i)	Inner dia	38		mm	38		mm	
	ii)	Outer dia	60		mm	60		mm	
	iii)	Length	595		mm	595		mm	
	iv)	Dia size	53.2		mm	53.2		mm	
	v)	Failing load	95% of conductor		%	95% of conductor		%	
	vii)	Heat cycle test	Applicable only for Current carrying part			Applicable only for Current carrying part			
17		**Line end Arcing Ring**	Drwg No.			Drwg No.			
	i)	Length (A,B)	(969.5 , 144)		mm	(969.5 , 144)		mm	
	ii)	Dia	28.5		mm	28.5		mm	
18		**Earth end Arcing Horn**	Drwg No.			Drwg No.			
	i)	Length (A,B)	(650 , 350)		mm	(650 , 350)		mm	
	ii)	Dia	27		mm	27		mm	

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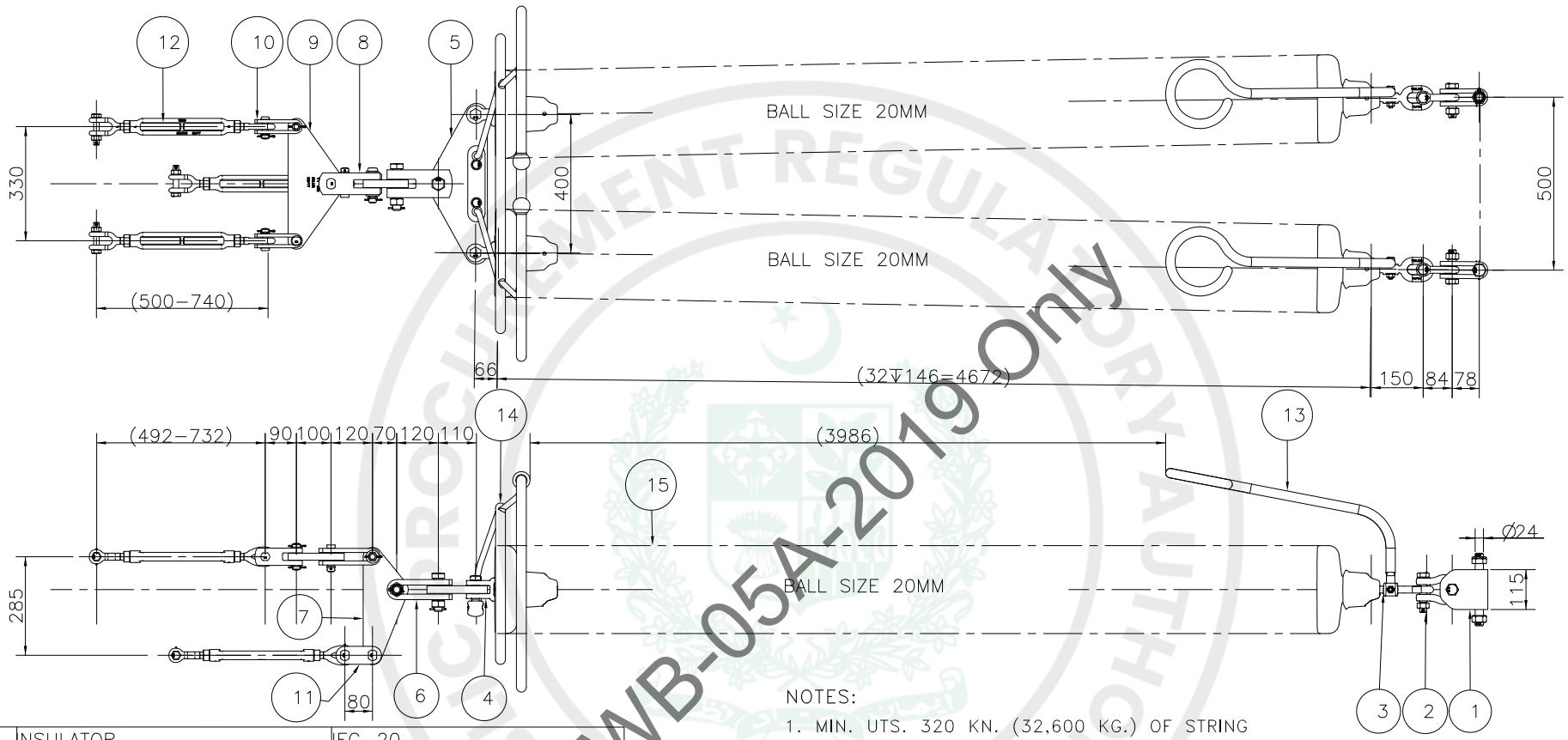

ITEM	QTY	DESIGNATION	MATERIAL
15	64	INSULATOR	IEC–20
14	1	ARCING RING	GALV. STEEL
13	2	SINGLE PT ARCING HORN	GALV. STEEL
12	3	CLEVIS–EYE TURNBUCKLE	GALV. FORGED STEEL
11	1	DOUBLE PLATE LINK	GALV. STEEL
10	2	TWISTED CLEVIS CLEVIS	GALV. STEEL
9	1	TRIA YOKE PLATE	GALV. STEEL
8	1	TWISTED CLEVIS CLEVIS	GALV. STEEL
7	1	TRIA YOKE PLATE	GALV. STEEL
6	1	TWISTED CLEVIS CLEVIS	GALV. STEEL
5	1	TRIA YOKE PLATE A/H	GALV. STEEL
4	2	SOCKET CLEVIS	GALV. FORGED STEEL
3	2	TWISTED BALL EYE LINK FOR A/H	GALV. FORGED STEEL
2	2	BOW SHACKLE	GALV. FORGED STEEL
1	2	HINGE	GALV. STEEL

NOTES:

1. MIN. UTS. 320 KN. (32,600 KG.) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/20 mm.
3. DEAD END SHALL BE SUPPLIED SEPARATELY
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P–8–96
5. ALL DIMENSIONS ARE IN MM.

For WB-05A-2019 Only

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: 500KV DOUBLE TENSION STRING TRIPLE CONDUCTOR WITH TURNBUCKLE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - (1) - BT - C (500 kV)

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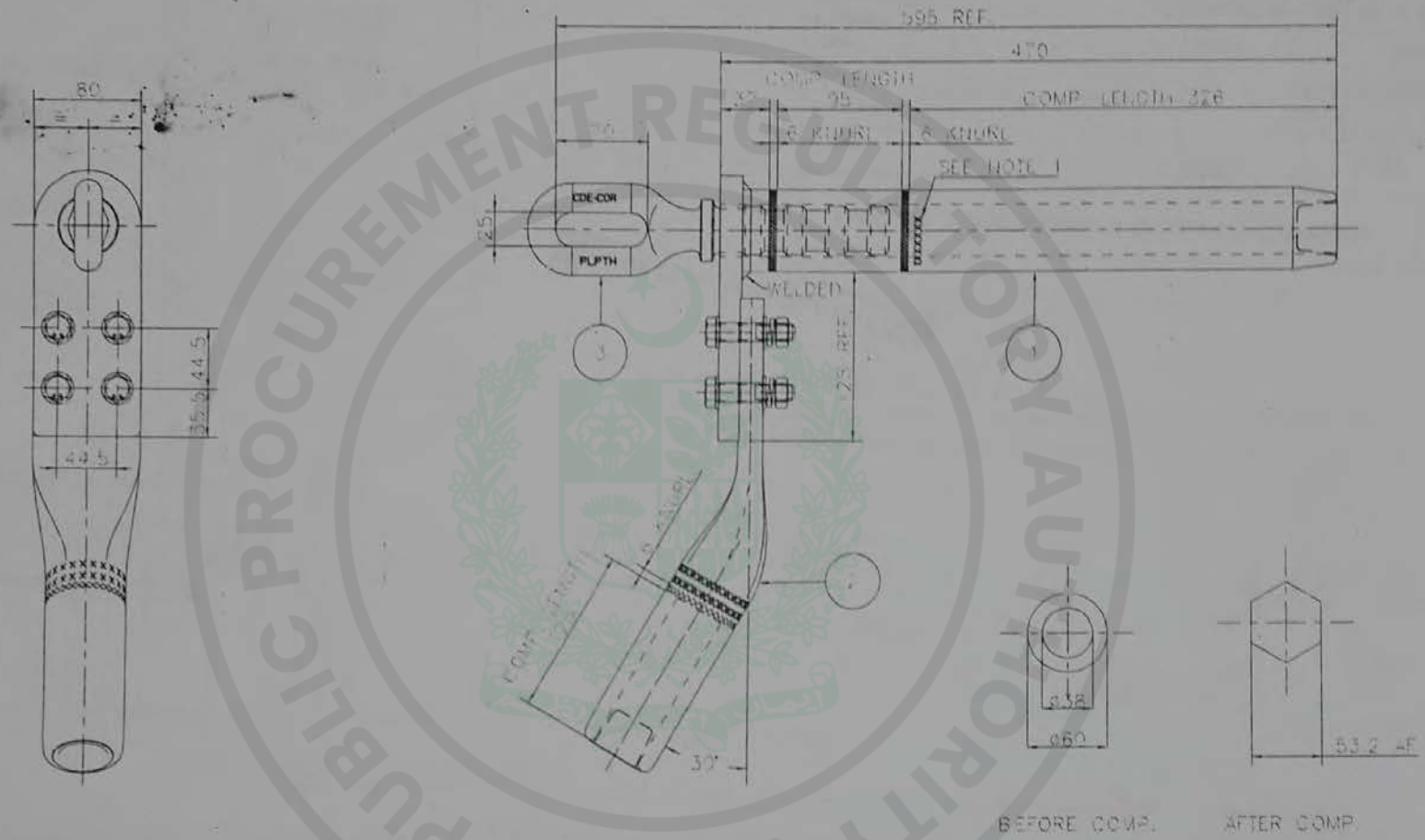

NOTES

1. BOLT & NUT TIGHTENING TORQUE 45 Nm.
2. SLEEVE SHALL BE FACTORY PREFILLED WITH OXIDE INHIBITING COMPOUND AND SEALED.
3. MIN. UTS. OF DEAD END = 95% OF UTS OF CONDUCTOR
4. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153.

Reference Drawing for Tendering Only

ITEM	QTY	DESIGNATION	MATERIAL
3	1	EYE TAIL	GALV. FORGED STEEL
2	1	JUMPER TERMINAL	ALUMINIUM + GALV. STEEL
1	1	BODY	AL. ALLOY GRADE 1050 H

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: EYE COMP. DEAD END ASSY 810SQMM COREOPSIS AAC COND. STRANDING 61/4.11
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - Date: -
		Drawing No: -

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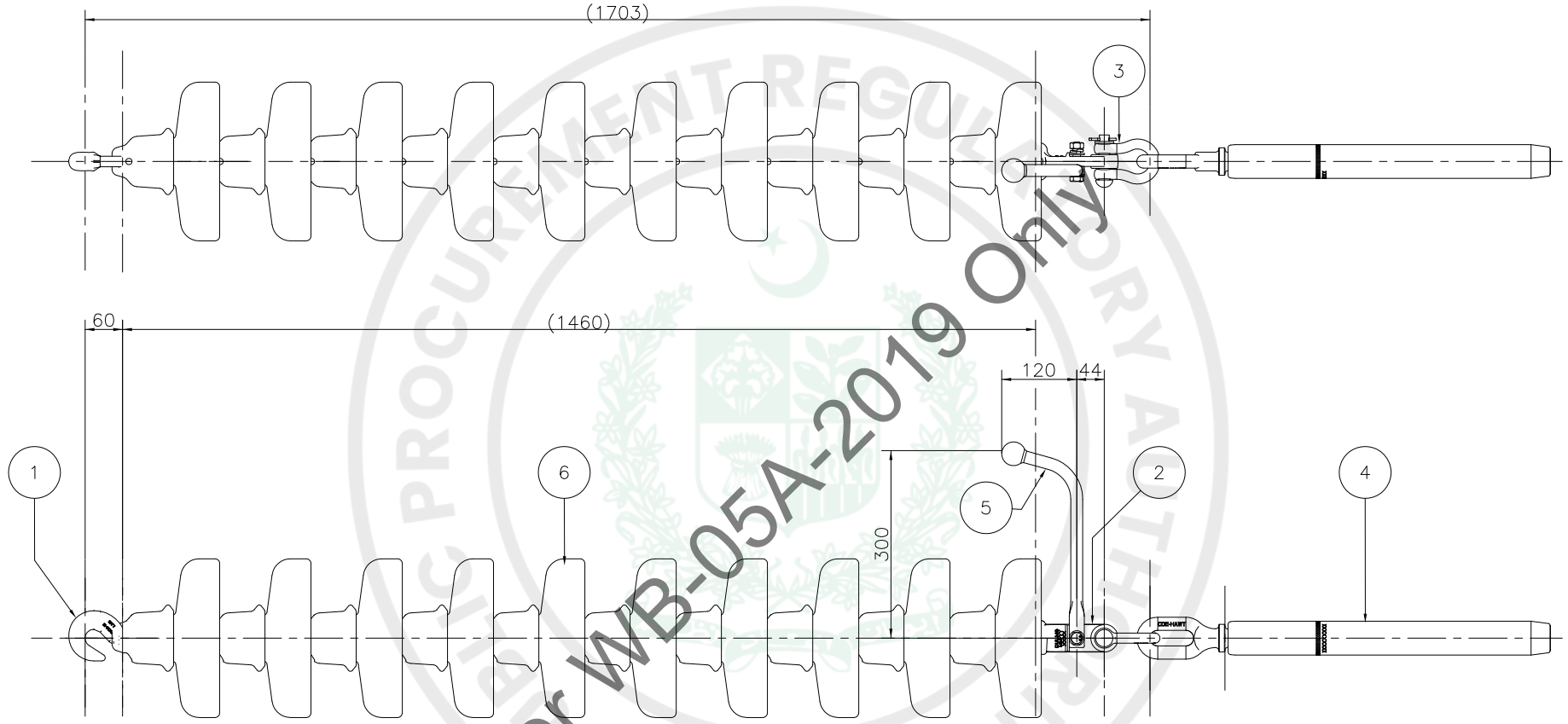

NOTES:

1. MIN UTS. = 120 KN (12,300 KG) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/16A
3. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P-8-96
5. ALL DIMENSIONS ARE IN MM.

ITEM	QTY	DESIGNATION	MATERIAL
6	10	INSULATOR	IEC16
5	1	SINGLE PT L/E A/H	GALV. STEEL
4	1	EYE COMP DEAD END	AL. ALLOY+GALV. FORGED STEEL
3	1	BOW SHACKLE	GALV. FORGED STEEL
2	1	SOCKET EYE FOR A/H	GALV. DUCTILE IRON
1	1	BALL HOOK	GALV. FORGED STEEL

National Transmission & Despatch Company

Design: NTDC

Drawn	-	NAME: 132KV SINGLE TENS STRING AAC HAWTHORN COND
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - (1) ST -H (132 kV)

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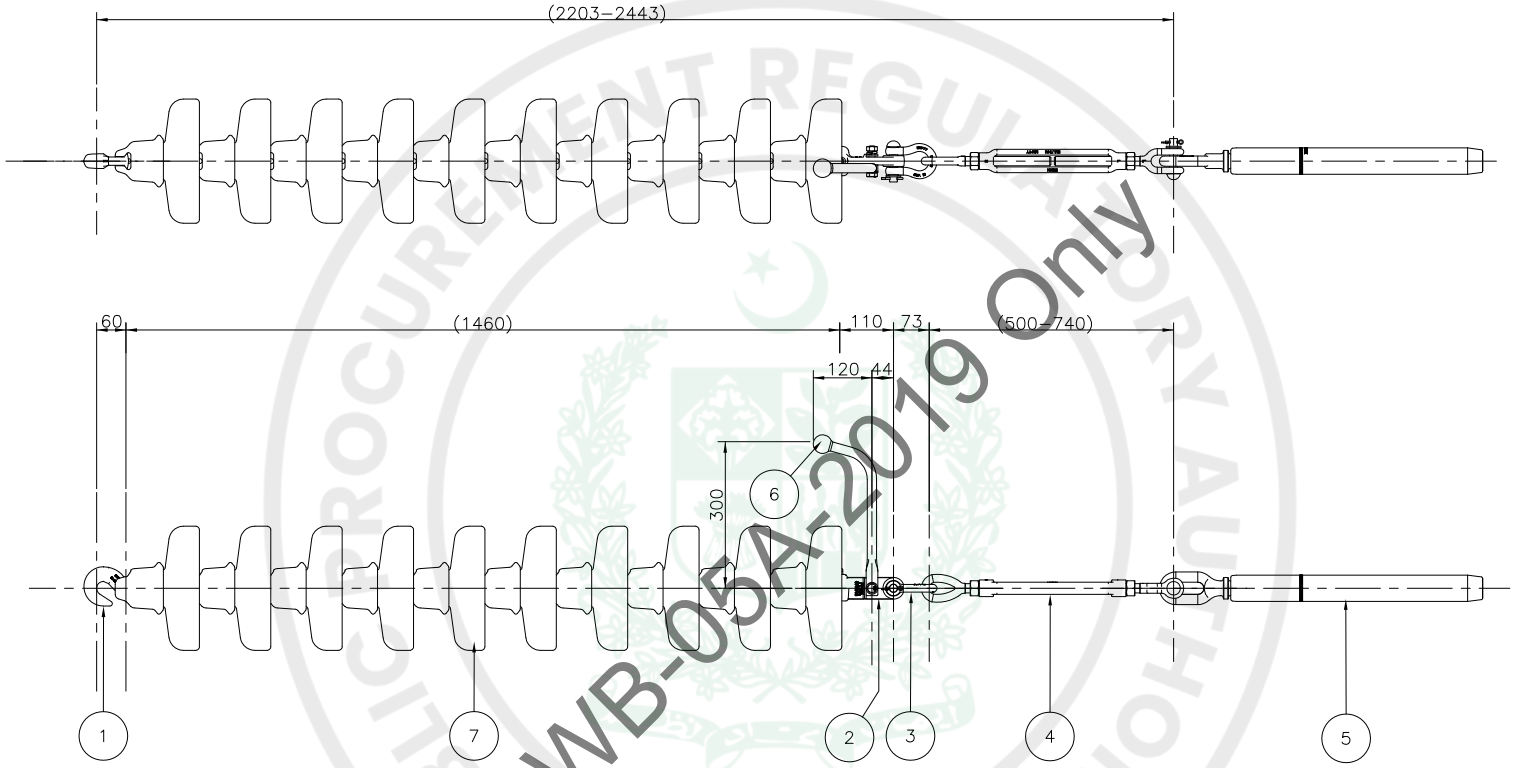

For WB-05A-2019 Only

NOTES:

1. MIN UTS. = 120 KN (12,300 KG) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/16A
3. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P–8–96
5. ALL DIMENSIONS ARE IN MM.

ITEM	QTY	DESIGNATION	MATERIAL
7	10	INSULATOR	IEC16
6	1	SINGLE PT L/E A/H	GALV. STEEL
5	1	EYE COMP DEAD END	AL. ALLOY+GALV. FORGED STEEL
4	1	CLEVIS–EYE TURNBUCKLE	GALV. FORGED STEEL
3	1	BOW SHACKLE	GALV. FORGED STEEL
2	1	SOCKET EYE FOR A/H	GALV. DUCTILE IRON
1	1	BALL HOOK	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: 132KV SINGLE TENS STRING (ADJ) AAC HAWTHORN COND
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - (2) - ST - H (132 kV)

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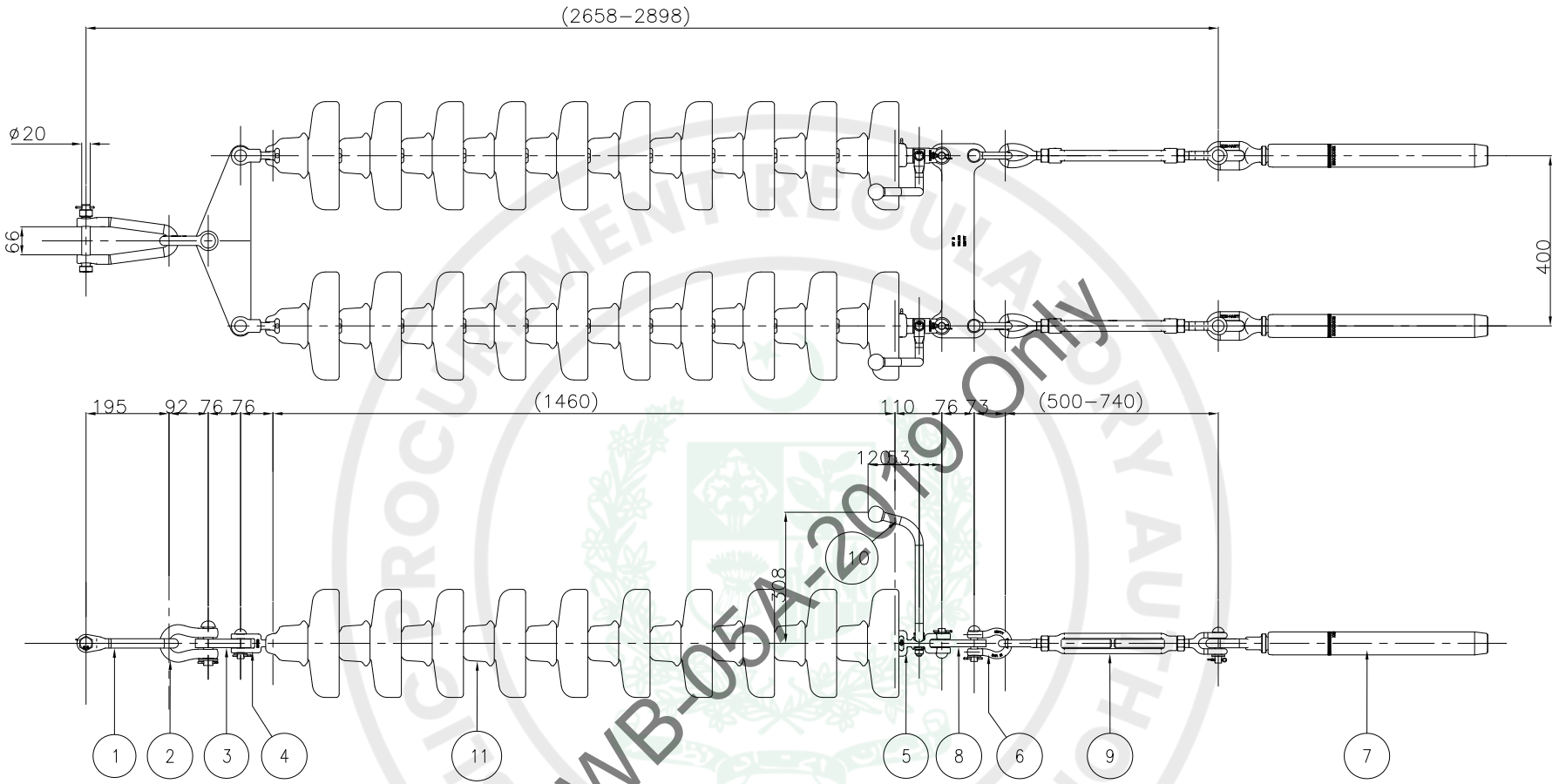

For WB-05A-2019 Only

NOTES:

1. MIN UTS. = 200 KN (20,400 KG) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/16A
3. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P–8–96
5. ALL DIMENSIONS ARE IN MM.

ITEM	QTY	DESIGNATION	MATERIAL
11	20	INSULATOR	IEC16
10	2	SINGLE PT L/E A/H	GALV. STEEL
9	2	CLEVIS–EYE TURNBUCKLE	GALV. FORGED STEEL
8	1	YOKE PLATE	GALV. STEEL
7	2	EYE COMP DEAD END	AL. ALLOY+GALV. FORGED STEEL
6	2	BOW SHACKLE	GALV. FORGED STEEL
5	2	SOCKET CLEVIS FOR A/H	GALV. DUCTILE IRON
4	2	BALL CLEVIS	GALV. FORGED STEEL
3	1	TRIA YOKE PLATE	GALV. STEEL
2	1	BOW SHACKLE	GALV. FORGED STEEL
1	1	V–SHACKLE	GALV. FORGED STEEL

National Transmission & Despatch Company

Design: NTDC

Drawn	-	NAME: 132KV DOUBLE TENS STRING (ADJ) 2xAAC HAWTHORN COND
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - (4) BT - H (220 kV)

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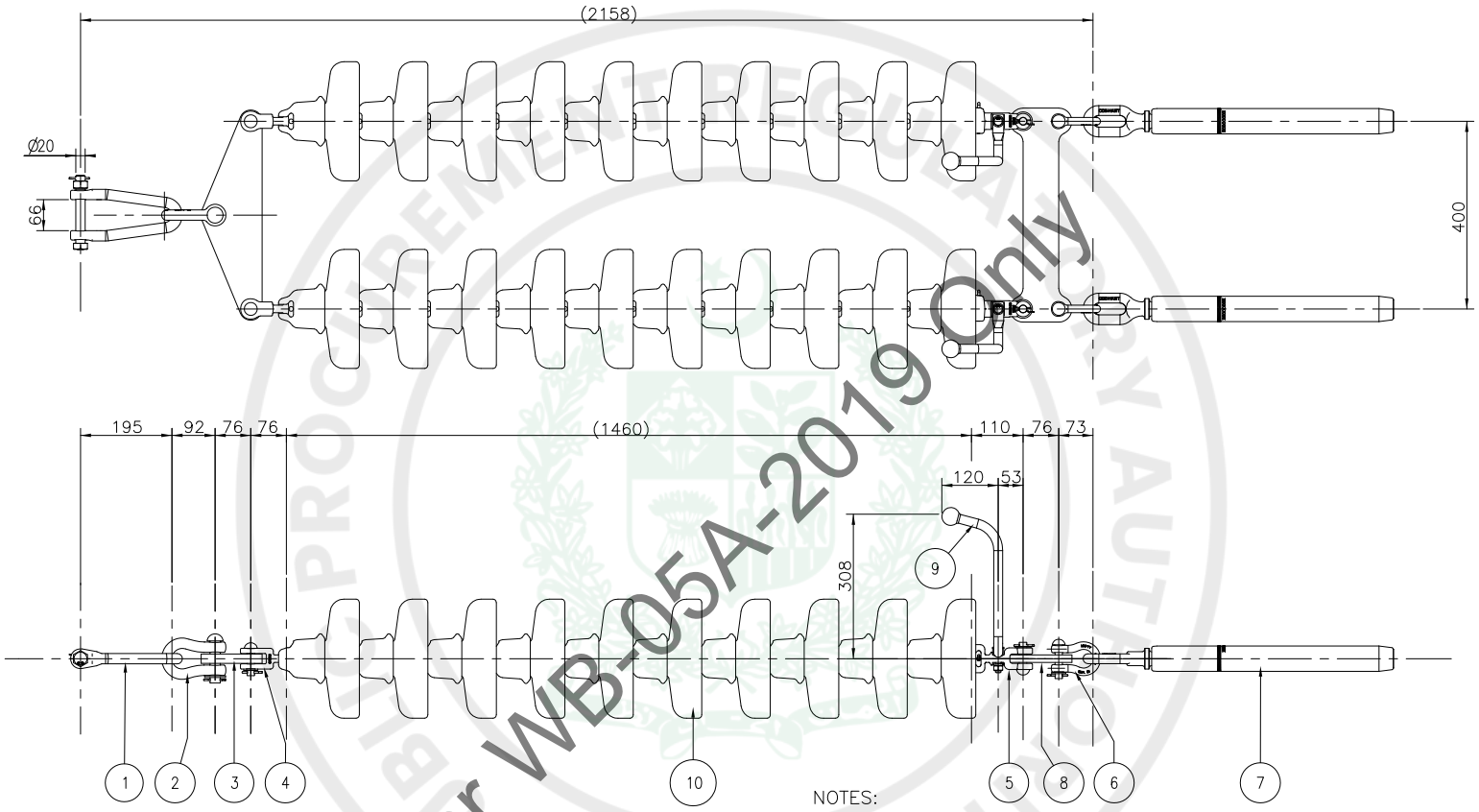

For WB-05A-2019 Only

NOTES:

1. MIN UTS. = 200 KN (20,400 KG) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/16A
3. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P-8-96
5. ALL DIMENSIONS ARE IN MM.

ITEM	QTY	DESIGNATION	MATERIAL
10	20	INSULATOR	IEC16
9	2	SINGLE PT L/E A/H	GALV. STEEL
8	1	YOKE PLATE	GALV. STEEL
7	2	EYE COMP DEAD END	AL. ALLOY+GALV. FORGED STEEL
6	2	BOW SHACKLE	GALV. FORGED STEEL
5	2	SOCKET CLEVIS FOR A/H	GALV. DUCTILE IRON
4	2	BALL CLEVIS	GALV. FORGED STEEL
3	1	TRIA YOKE PLATE	GALV. STEEL
2	1	BOW SHACKLE	GALV. FORGED STEEL
1	1	V-SHCAKLE	GALV. FORGED STEEL

National Transmission & Despatch Company

Design: NTDC

Drawn	-	NAME: 132KV DOUBLE TENS STRING 2xAAC HAWTHORN COND
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - (1) BT- H (132 kV)

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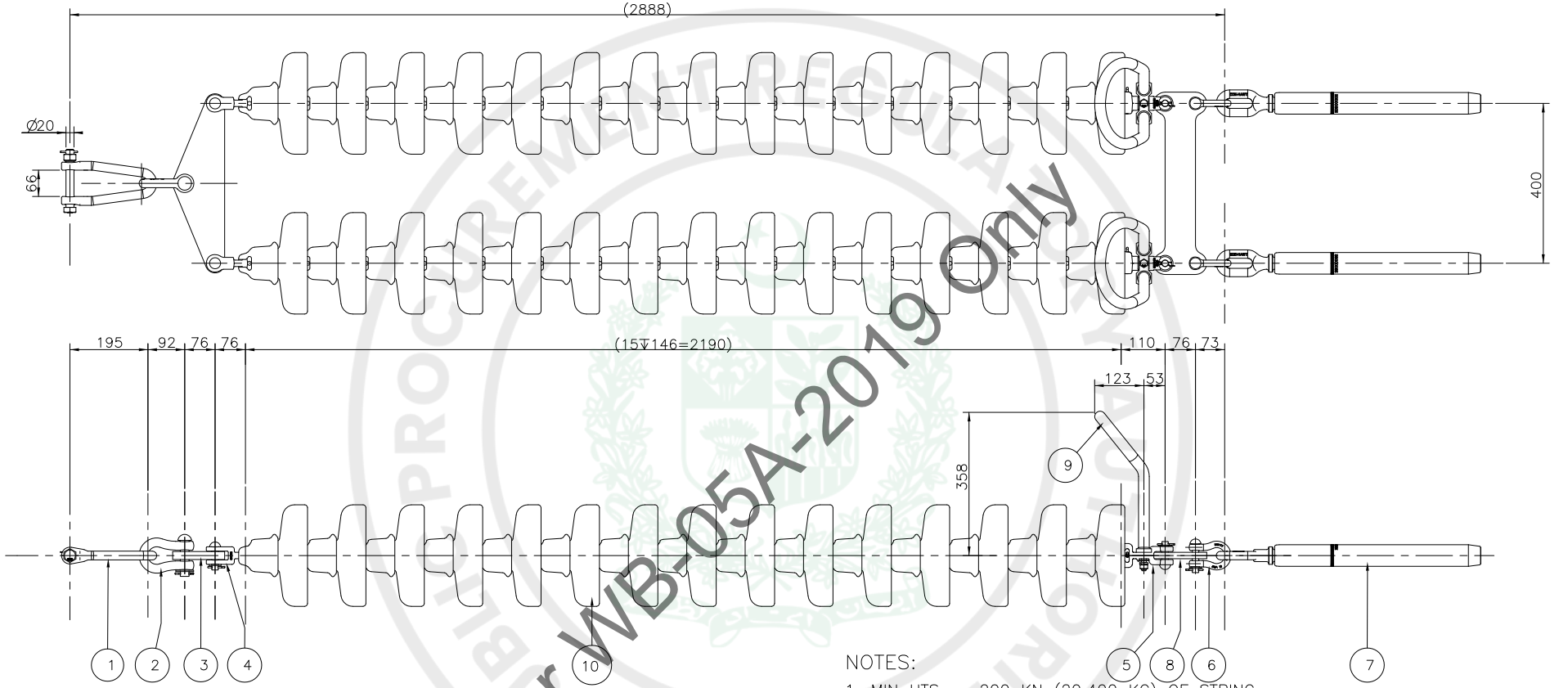

For WB-05A-2019 Only

NOTES:

1. MIN UTS. = 200 KN (20,400 KG) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/16A
3. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P-8-96
5. ALL DIMENSIONS ARE IN MM.

ITEM	QTY	DESIGNATION	MATERIAL
10	30	INSULATOR	IEC16
9	2	SINGLE PT ARCING HORN	GALV. STEEL
8	1	YOKE PLATE	GALV. STEEL
7	2	EYE COMP DEAD END	AL. ALLOY+GALV. FORGED STEEL
6	2	BOW SHACKLE	GALV. FORGED STEEL
5	2	SOCKET CLEVIS FOR A/H	GALV. DUCTILE IRON
4	2	BALL CLEVIS	GALV. FORGED STEEL
3	1	TRIA YOKE PLATE	GALV. STEEL
2	1	BOW SHACKLE	GALV. FORGED STEEL
1	1	V-SHCAKLE	GALV. FORGED STEEL

National Transmission & Despatch Company

Design: NTDC

Drawn	-	NAME: 220KV DOUBLE TENS STRING 2 x HAWTHORN AAC COND
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - (1) - BT - H (220 kV)

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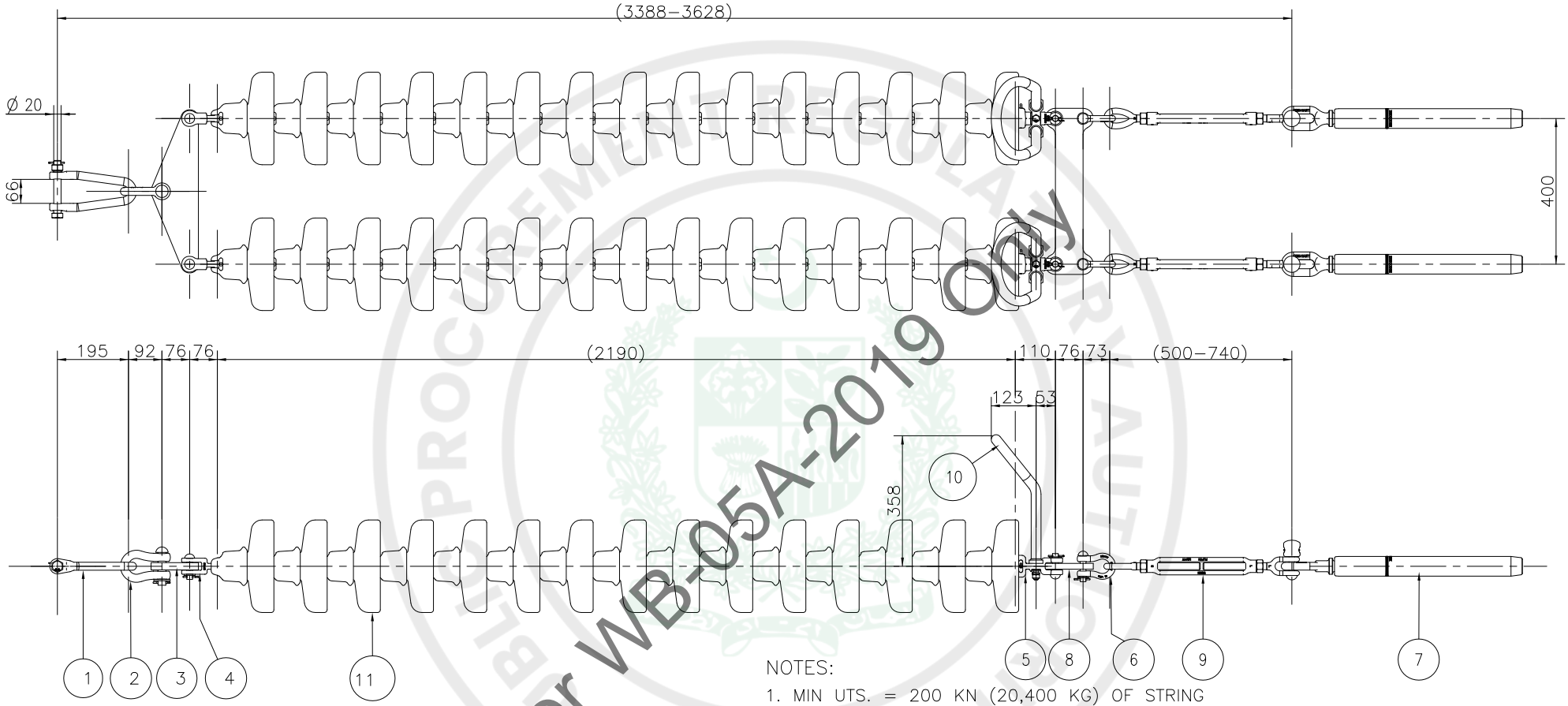

NOTES:

1. MIN UTS. = 200 KN (20,400 KG) OF STRING
2. INSULATOR BALL & SOCKET COUPLING SIZE ACC. TO IEC 120/16A
3. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
4. FOR INSULATOR DETAILS REFER TO INSULATOR SPEC P–8–96
5. ALL DIMENSIONS ARE IN MM.

ITEM	QTY	DESIGNATION	MATERIAL
11	30	INSULATOR	IEC16
10	2	SINGLE PT L/E A/H	GALV. STEEL
9	2	CLEVIS–EYE TURNBUCKLE	GALV. FORGED STEEL
8	1	YOKE PLATE	GALV. STEEL
7	2	EYE COMP DEAD END	AL. ALLOY+GALV. FORGED STEEL
6	2	BOW SHACKLE	GALV. FORGED STEEL
5	2	SOCKET CLEVIS FOR A/H	GALV. DUCTILE IRON
4	2	BALL CLEVIS	GALV. FORGED STEEL
3	1	TRIA YOKE PLATE	GALV. STEEL
2	1	BOW SHACKLE	GALV. FORGED STEEL
1	1	V–SHACKLE	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC	
Drawn	-	NAME: 220KV DOUBLE TENS STRING (ADJ) 2xAAC HAWTHORN COND	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - (3) - BT - H (220 kV)	

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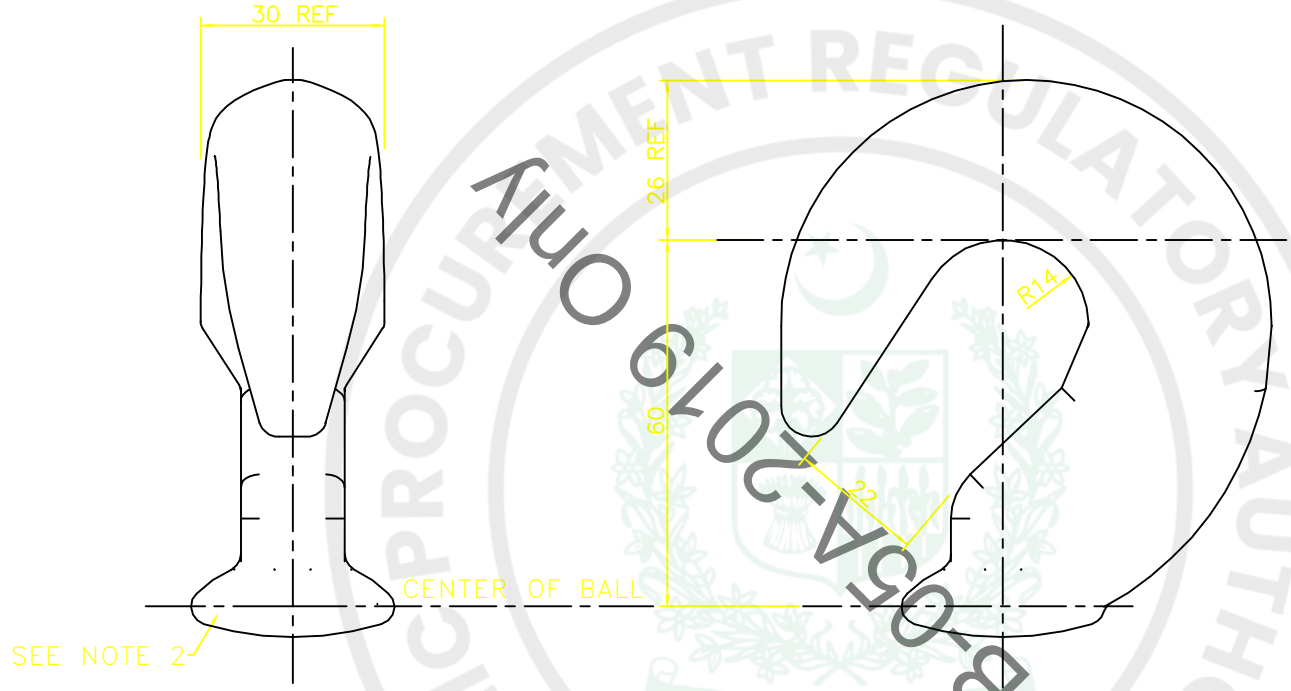

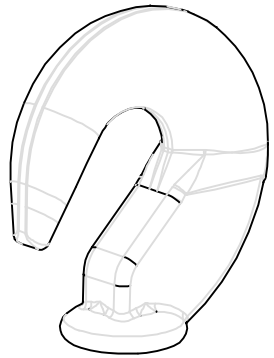

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. BALL DIMENSIONS SHALL GENERALLY BE AS PER IEC PUB120–16A TO EXTENT POSSIBLE TO COMPLY WITH SELF LOCKING FEATURE
3. MIN. UTS. 120 kN. (12,300 KG.)
4. ALL FERROUS METAL SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
1	1	BALL HOOK	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC	
Drawn	-	NAME: 16MM SELF LOCK BALL HOOK	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 1	

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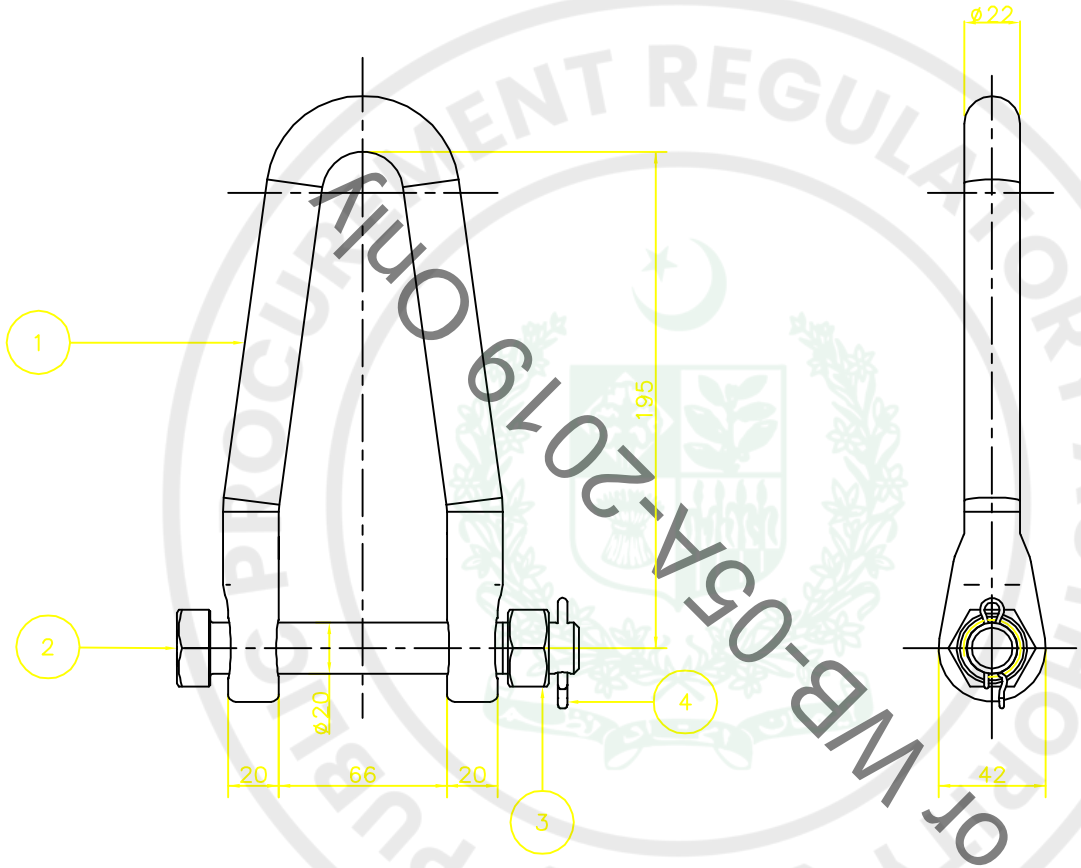
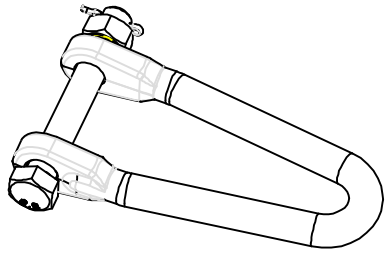
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS



For VB-05A-2019 Only



3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 210 KN. (21,400 KG.)
3. ALL FERROUS METAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
4	1	SPLIT PIN	STAINLESS STEEL
3	1	HEX. NUT M20	GALV. STEEL GRADE 8
2	1	HEX. BOLT M20-145-30 DRILL ø5.5	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: 22MM V-SHACKLE SPACING 195
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 1a

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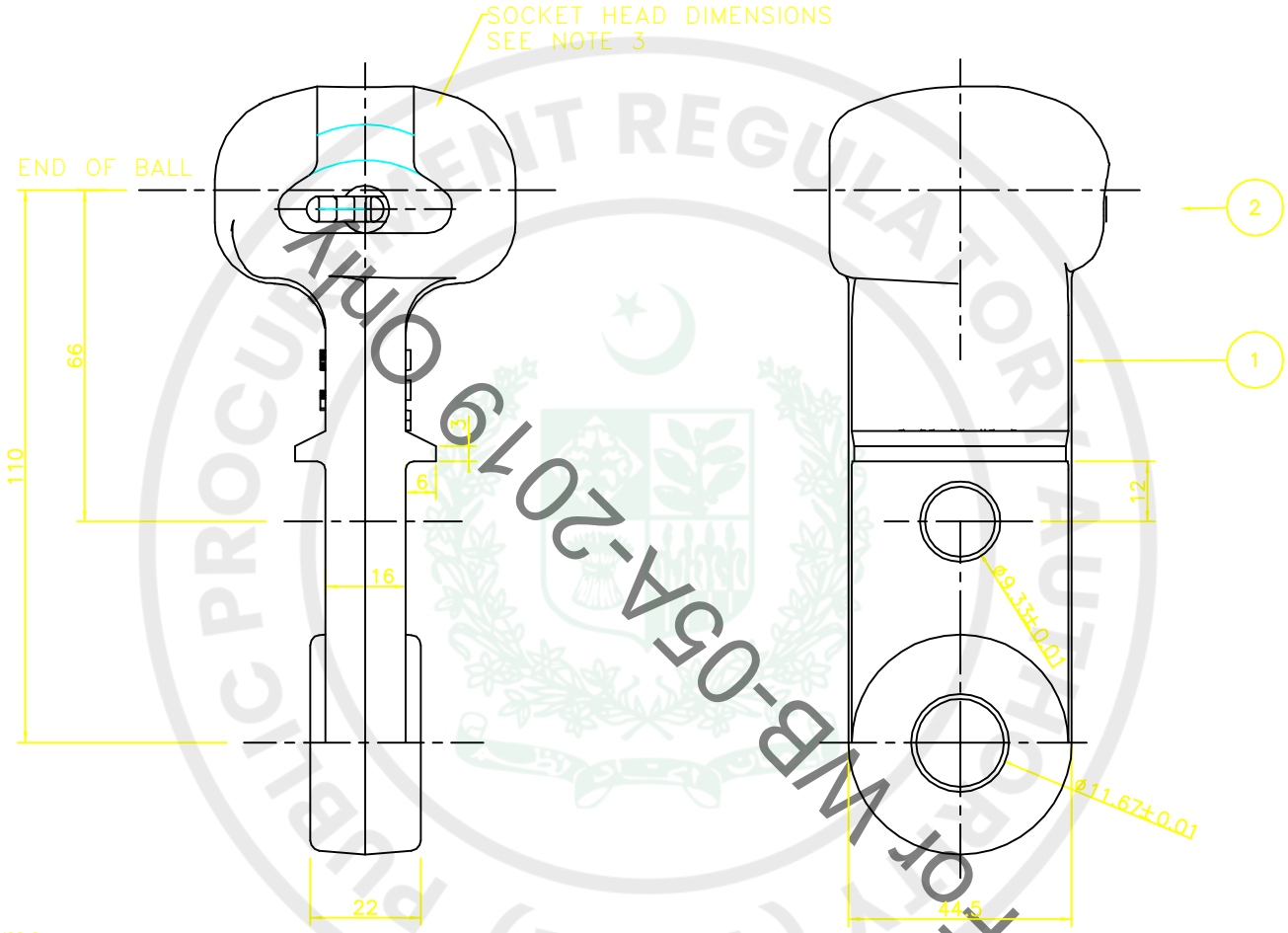
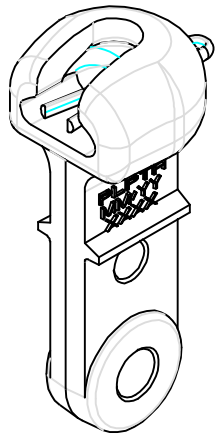
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS





3D VIEW

For WB-05A-2019 Only

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN .UTS. 120 KN. (12,300 KG.)
3. SOCKET DIMENTIONS ARE AS PER IEC PUB 120–16MM TYPE A
4. ALL FERROUS METAL SHALL BE HOT DIP GALVANIZED IN ACC. WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
2	1	R CLIP	STAINLESS STEEL
1	1	BODY	GALV. DUCTILE IRON

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 16MM SOCKET EYE FOR A/H 22MM BOSS	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 2	

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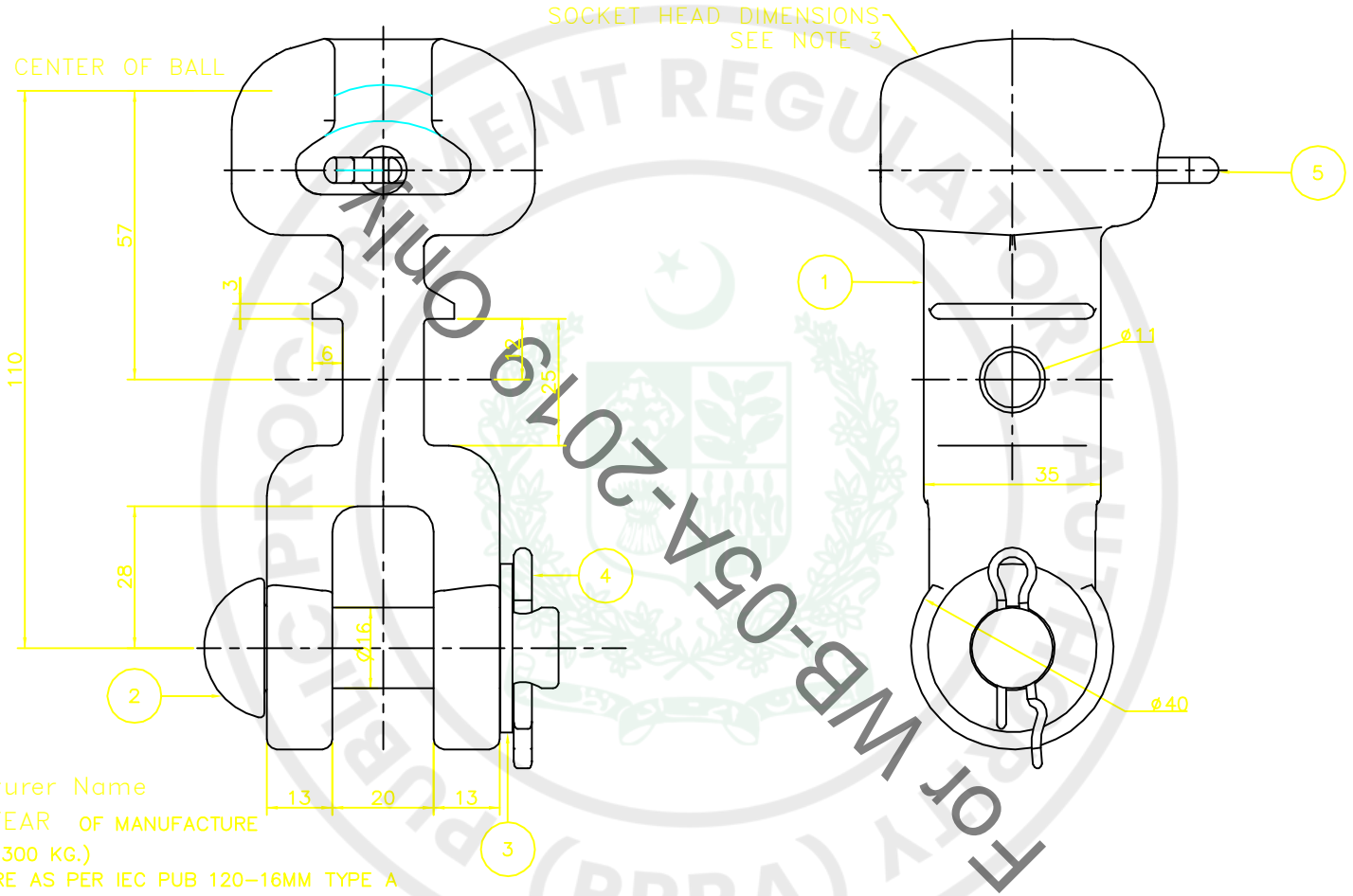
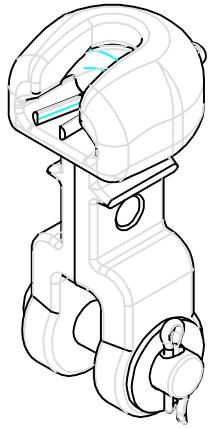


For VB-05A-2019 Only



3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN .UTS. 120 KN. (12,300 KG.)
3. SOCKET DIMENTIONS ARE AS PER IEC PUB 120-16MM TYPE A
4. ALL FERROUS METAL SHALL BE HOT DIP GALVANIZED IN ACC. WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
5	1	R CLIP	STAINLESS STEEL
4	1	SPLIT PIN	STAINLESS STEEL
3	1	FLAT WASHER Ø16	GALV. STEEL
2	1	RIVET Ø16mm, LENGTH 58mm	GALV. STEEL
1	1	BODY	GALV. DUCTILE IRON

National Transmission & Despatch Company		Design NTDC
Drawn	-	NAME 16MM SOCKET CLEVIS FOR A/H
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 3

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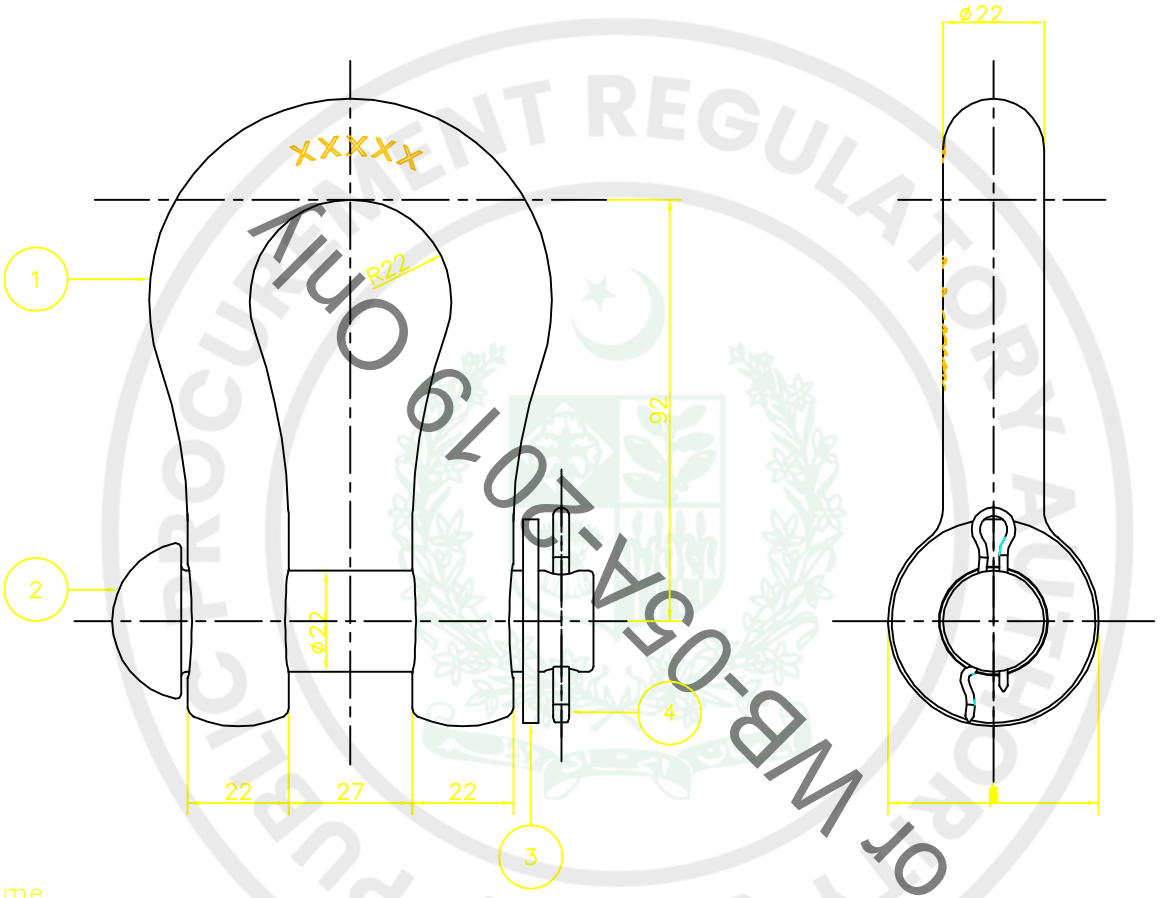

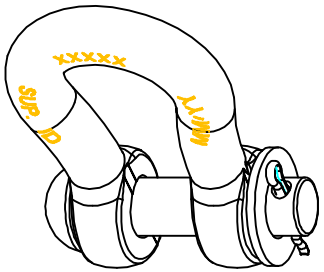

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 210KN. (21,410KG.)
3. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
4	1	SPLIT PIN ø22mm	STAINLESS STEEL
3	1	PLAIN WASHER ø22mm	GALV. STEEL
2	1	RIVET ø22mm, LENGTH 90 mm.	GALV. STEEL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: 22MM BOW SHACKLE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 4

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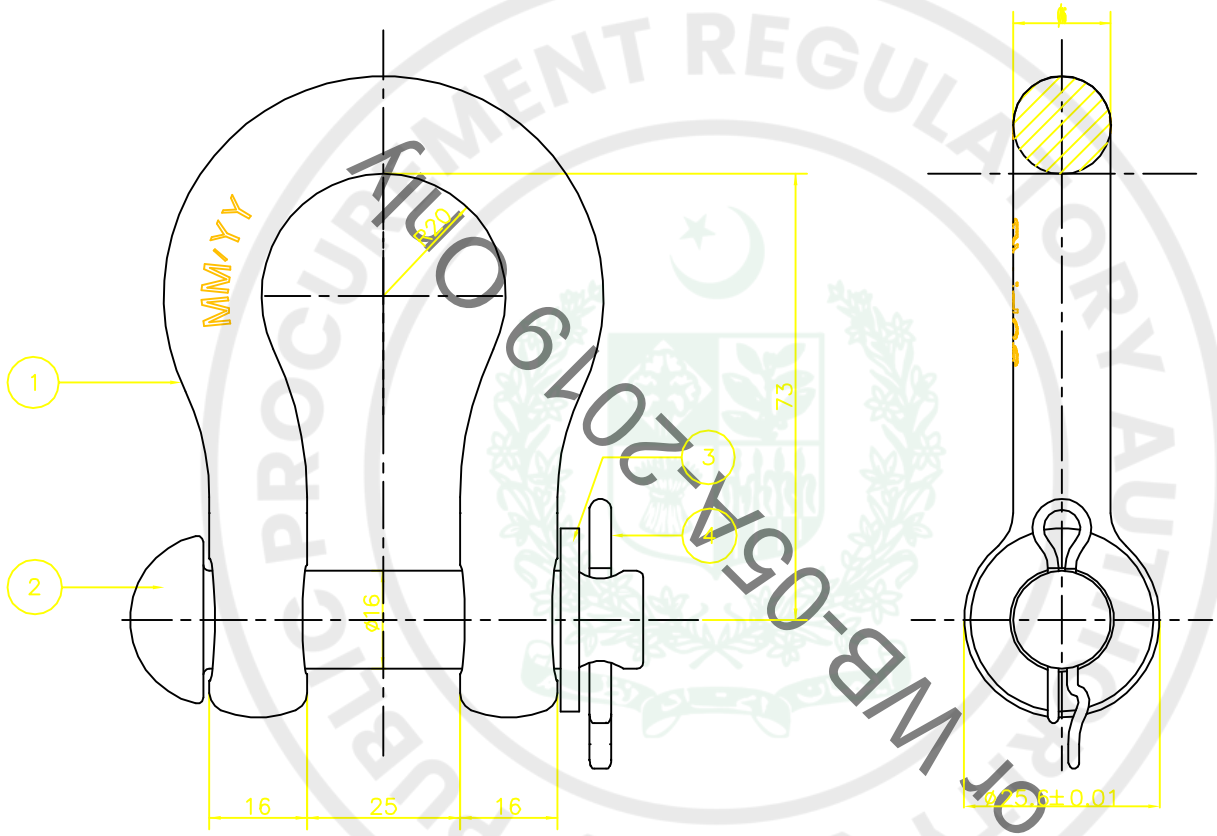
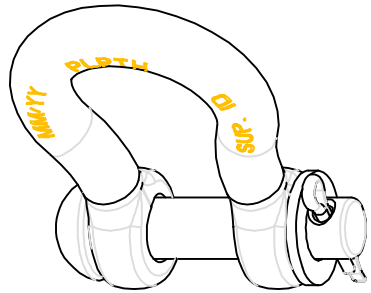
For WB-05A-2019 Only

Public Procurement Regulatory Authority (PPRA) EPADS





3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 120 KN. (12,300 KG.)
3. ALL FERROUS METAL SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
4	1	SPLIT PIN	STAINLESS STEEL
3	1	PLAIN WASHER M16	GALV. STEEL
2	1	RIVET Ø16mm, LENGTH 72mm	GALV. STEEL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: 16MM BOW SHACKLE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 5

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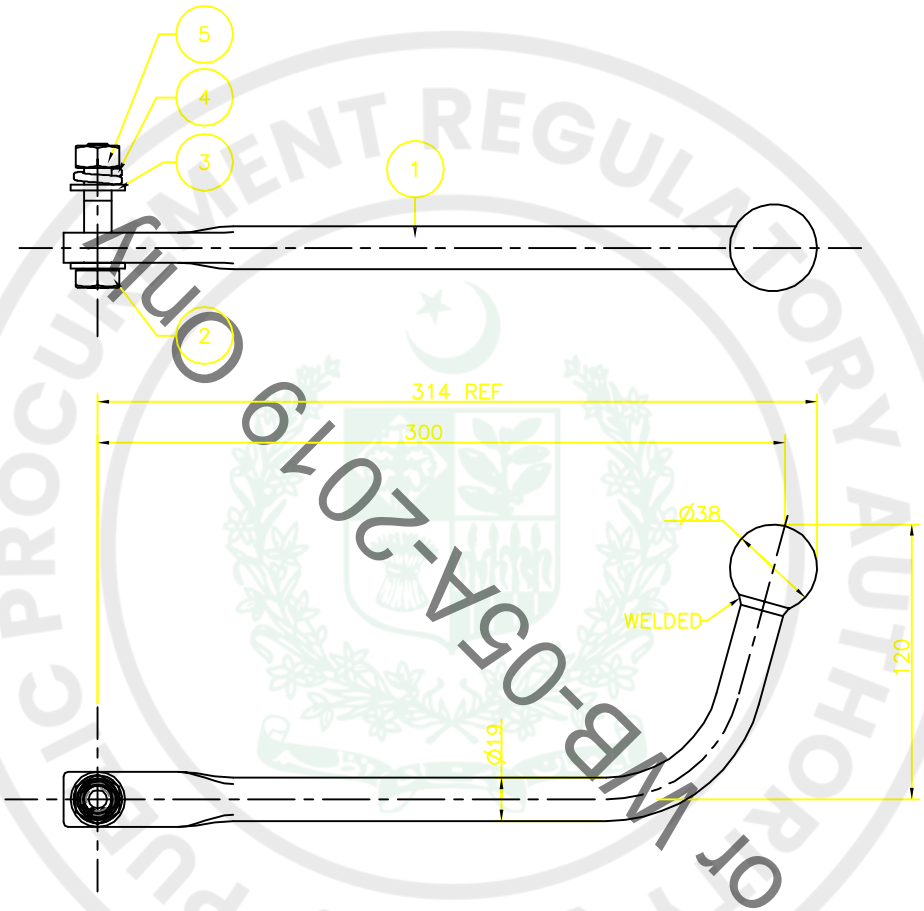
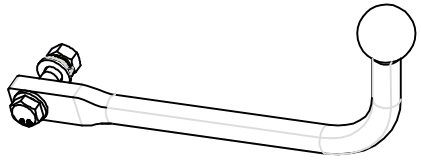
For WB-05A-2019 Only

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS





3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. BOLT & NUT TIGHTENING TORQUE = 45 Nm.
3. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153

ITEM	QTY	DESIGNATION	MATERIAL
5	1	HEX. NUT M12	GALV. STEEL GRADE 8
4	1	SPRING WASHER M12	GALV. STEEL SPRING
3	2	PLAIN WASHER M12	GALV. STEEL
2	1	HEX. BOLT M12-55-25	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME SINGLE POINT LINE END ARCING HORN	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 7	

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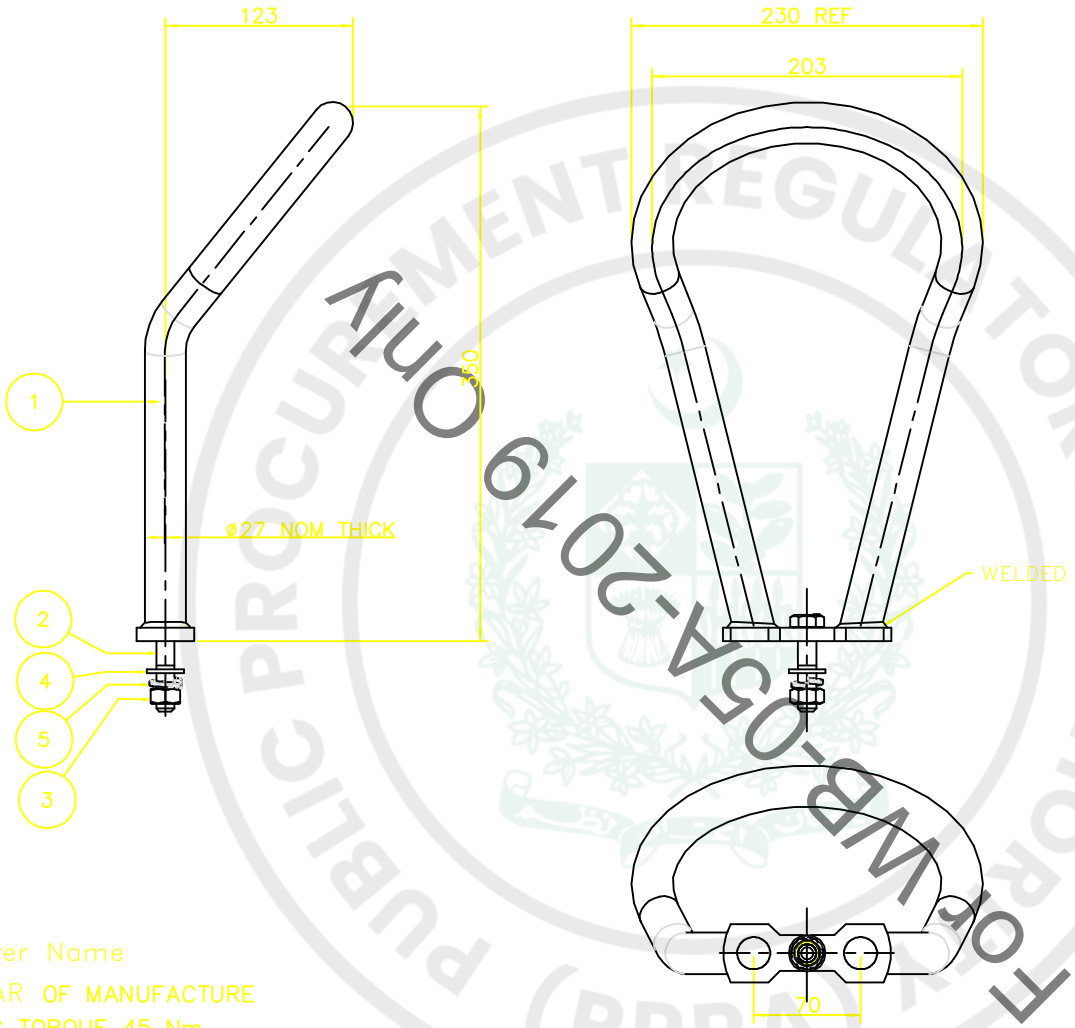
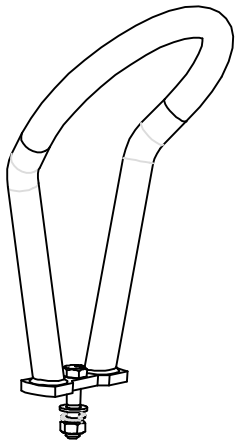
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS





3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. BOLT & NUT TIGHTENING TORQUE 45 Nm.
3. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
5	1	SPRING WASHER M12	GALV. STEEL SPRING
4	1	PLAIN WASHER M12	GALV. STEEL
3	1	HEX. NUT M12	GALV. STEEL GRADE 8
2	1	HEX. BOLT M12-55-30	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. STEEL

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS
For WB-05A-2019 Only

National Transmission & Despatch Company

Design: NTDC

Drawn	-
Checked	-
Approved	-
Chief Engineer Design NTDC	

NAME: SINGLE POINT LINE END ARCING HORN

Scale: -

Date: -

Drawing No: - 8

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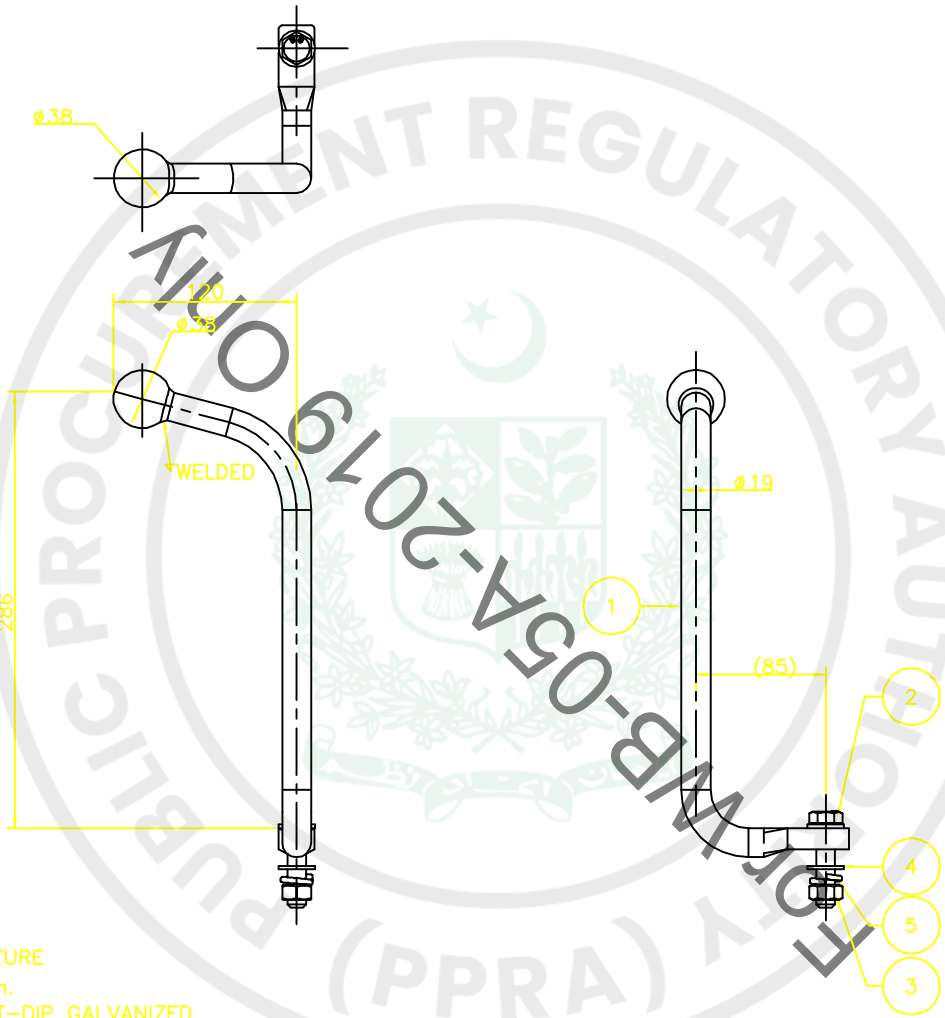

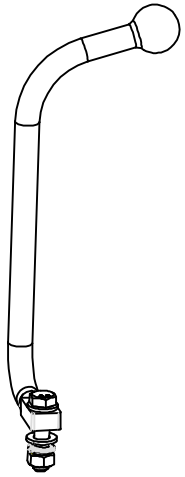

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. BOLT & NUT TIGHTENING TORQUE = 45 Nm.
3. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153.

ITEM	QTY	DESIGNATION	MATERIAL
5	1	SPRING WASHER M12	GALV. STEEL SPRING
4	2	PLAIN WASHER M12	GALV. STEEL
3	1	HEX. NUT M12	GALV. STEEL GRADE 8
2	1	HEX. BOLT M12-55-25	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. STEEL GRADE S45C

National Transmission & Despatch Company		Design: NTDC
Drawn	-	NAME: SINGLE POINT LINE END ARCING HORN
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 8a (132 kV BT-H)

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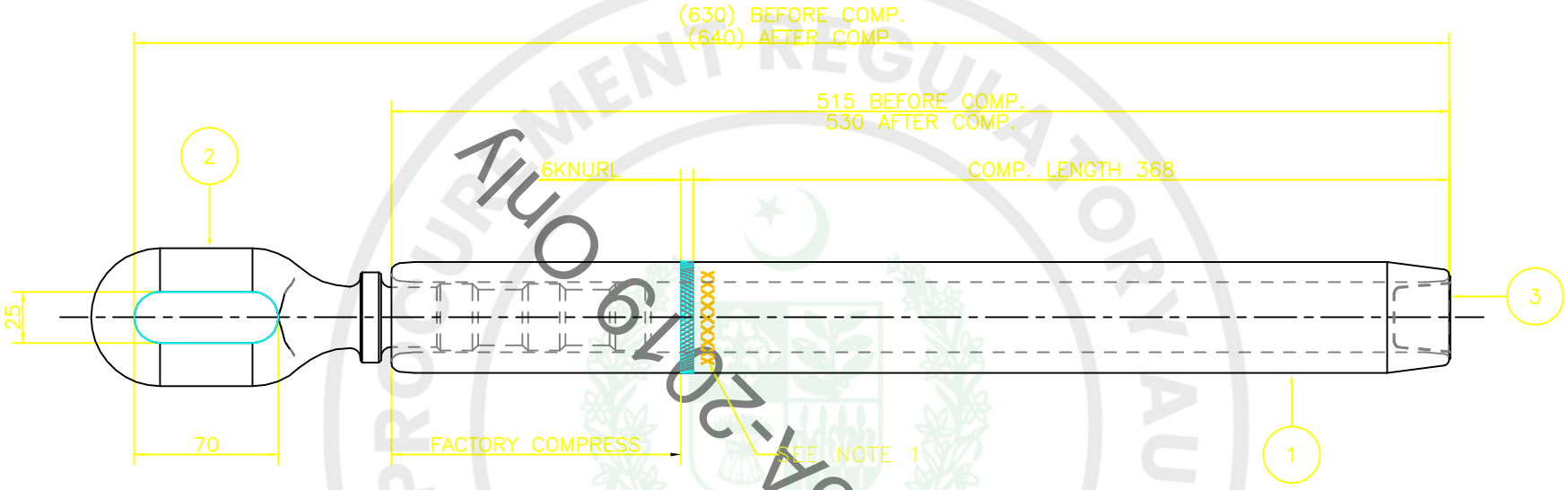

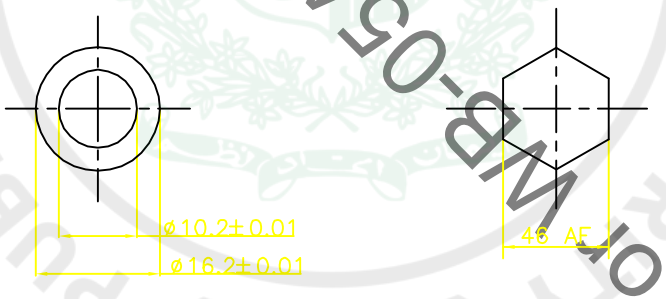

ITEM 1

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. OF DEAD END SHALL BE NOT LESS THAN 95% OF UTS. OF CONDUCTOR
3. SLEEVE SHALL BE FACTORY PRE FILLED WITH OXIDE INHIBITING COMPOUND AND SEALED
4. ALL FERROUS METAL PARTS SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153.

ITEM	QTY	DESIGNATION	MATERIAL
3	1	PLASTIC CAP	PLASTIC
2	1	EYE TAIL	GALV. FORGED STEEL
1	1	BODY	ALUMINIUM ALLOY

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME EYE COMP DEAD END HAWTHORN AAC STRANDING 61/3.551	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 11	

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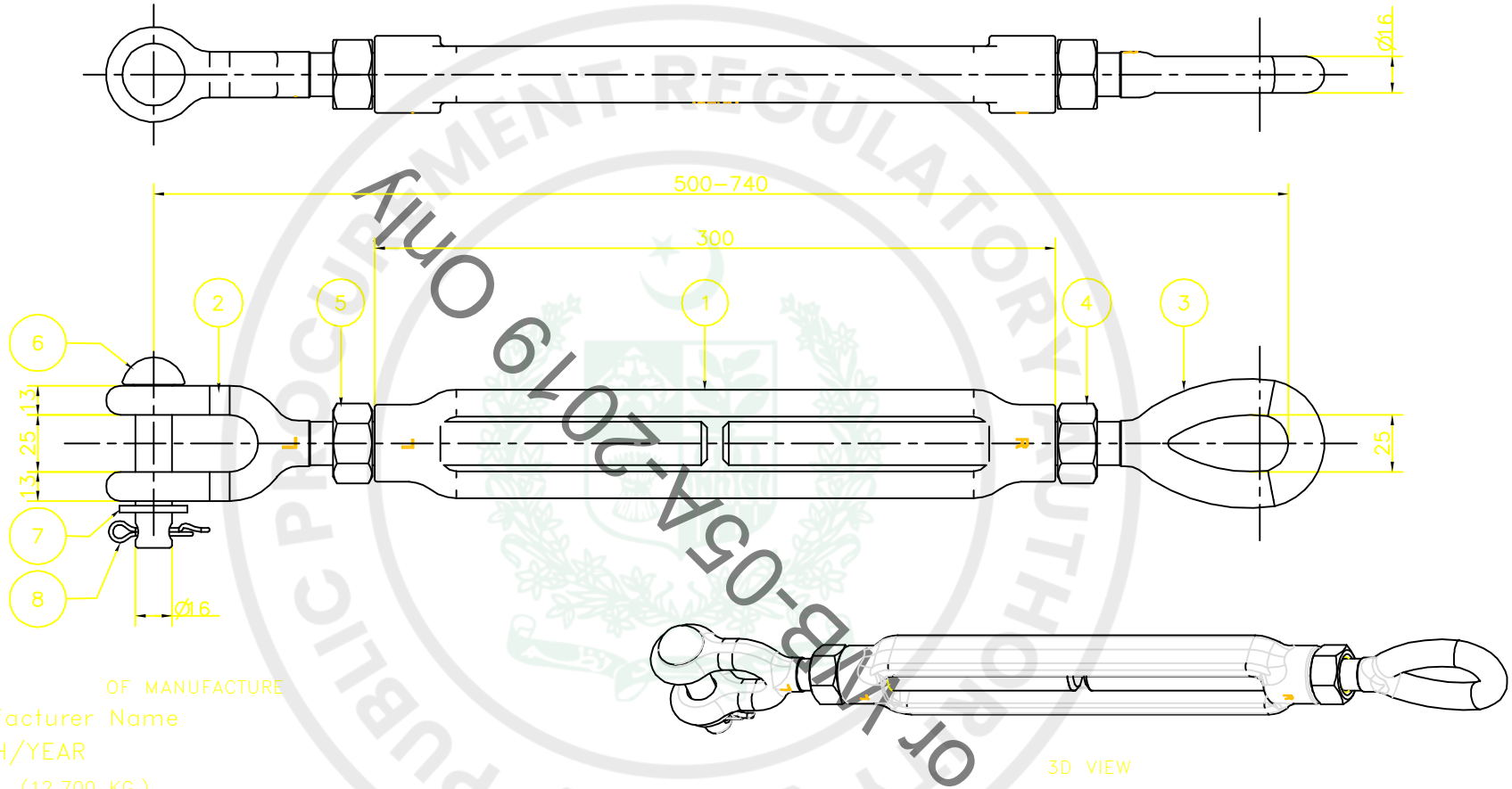

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR
2. MIN. UTS. 125 KN. (12,700 KG.)
3. CLEVIS & EYE THREADS TO EXTEND APPROX 10 mm OUTSIDE AFTER INSTALLATION.
4. ALL FERROUS METAL PARTS SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153
5. SAME AS DRAWING NO

ITEM	QTY	DESIGNATION	MATERIAL
8	1	SPLIT PIN	STAINLESS STEEL
7	1	PLAIN WASHER M16	GALV. STEEL
6	1	RIVET Ø16mm. LENGTH 72mm	GALV. STEEL
5	1	HEX NUT 3/4" LEFT HAND THREAD	GALV. STEEL GRADE 8
4	1	HEX. NUT 3/4"	GALV. STEEL GRADE 8
3	1	EYE TAIL Ø19 RIGHT HAND THREAD	GALV. FORGED STEEL
2	1	CLEVIS TAIL Ø19 LEFT HAND THREAD	GALV. FORGED STEEL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design: NTDC	
Drawn	-	NAME: 16MM (RIVET TYPE) EYE–CLEVIS TURNBUCKLE	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 13	

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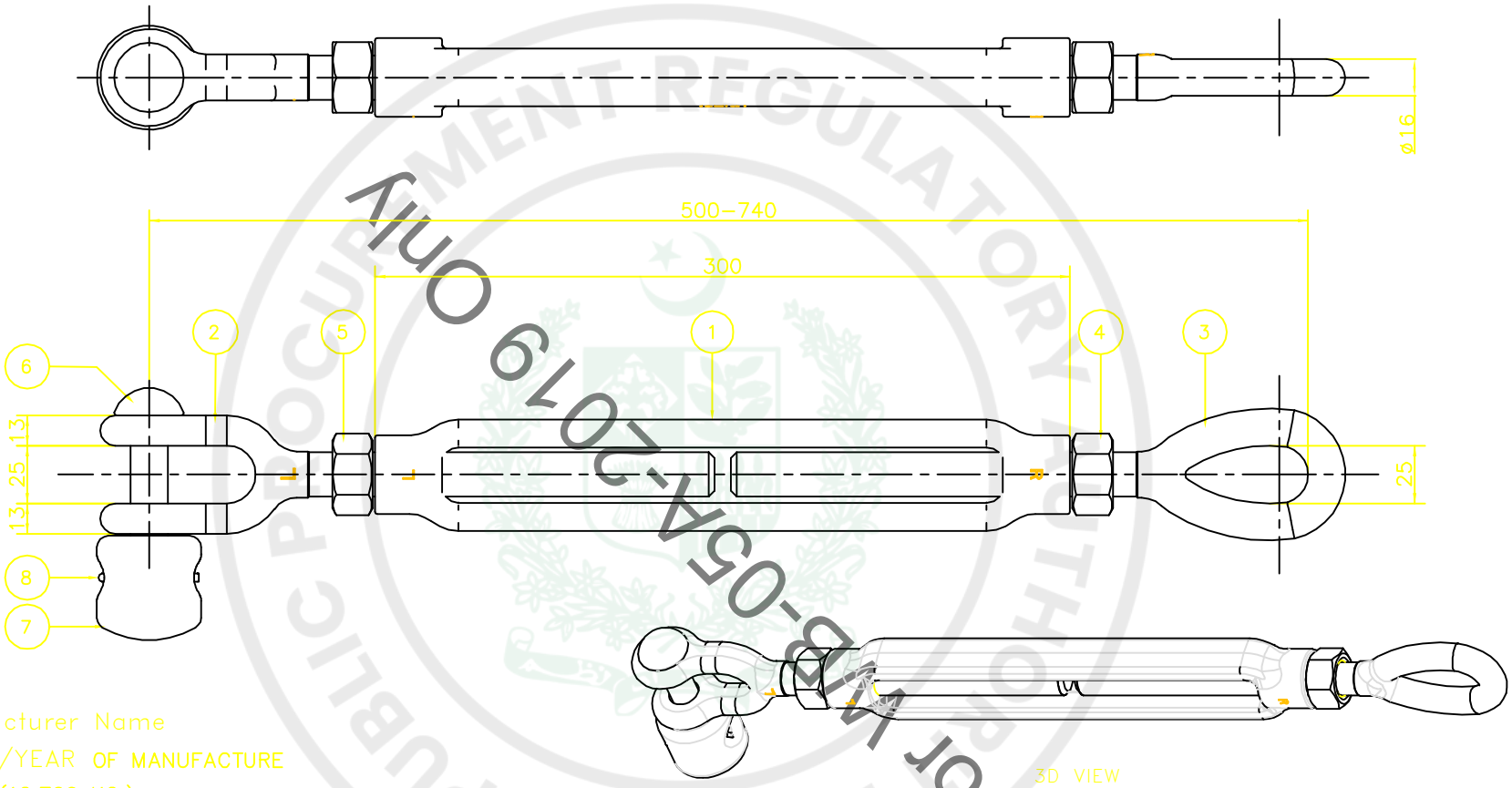
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS



FOR WB-05A-2019 ONLY

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 125 KN. (12,700 KG.)
3. CLEVIS & EYE THREADS TO EXTEND APPROX 10 mm OUTSIDE AFTER INSTALLATION.
4. ALL FERROUS METAL PARTS SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153
5. SAME AS DRAWING NO A3DD06412T EXCEPT WITH DOME NUT IN CLEVIS

ITEM	QTY	DESIGNATION	MATERIAL
8	1	SPLIT PIN (CORONA FREE)	STAINLESS STEEL
7	1	CORONA FREE NUT M16	GALV. CAST IRON
6	1	CORONA FREE BOLT M16-80-30	GALV. STEEL GRADE 8.8
5	1	HEX NUT 3/4" LEFT HAND THREAD	GALV. STEEL GRADE 8
4	1	HEX. NUT 3/4"	GALV. STEEL GRADE 8
3	1	EYE TAIL Ø19 RIGHT HAND THREAD	GALV. FORGED STEEL
2	1	CLEVIS TAIL Ø19 LEFT HAND THREAD	GALV. FORGED STEEL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design NTDC
Drawn	-	NAME: 16MM (DOME NUT TYPE) EYE–CLEVIS TURNBUCKLE
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 13 a (220 kV - BTH) - Drg No. 13

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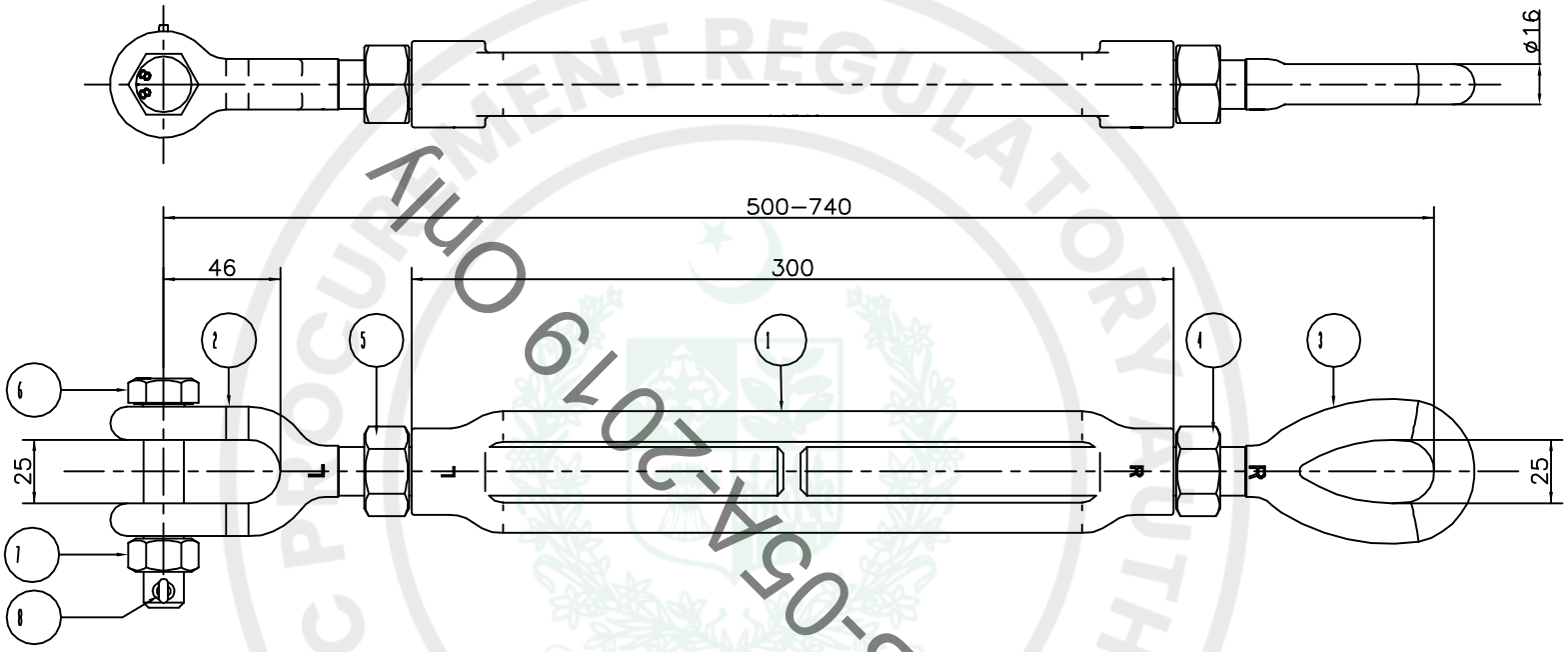

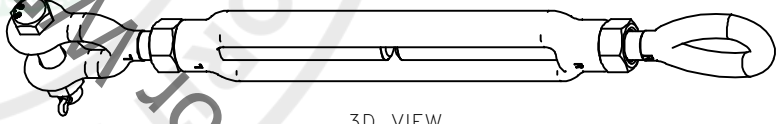

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 120 KN (12,230 KG).
3. BOLTS THREADS TO EXTEND APPROX 10 mm OUTSIDE AFTER INSTALLATION.
4. ALL FERROUS METAL PARTS SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A153

ITEM	QTY	DESIGNATION	MATERIAL
8	1	SPLIT PIN	STAINLESS STEEL
7	1	HEX. NUT M16	GALV. STEEL GRADE 8
6	1	HEX. BOLT M16-8G-27 DRILL Ø5.5	GALV. STEEL GRADE 8.8
5	1	HEX NUT 3/4" LEFT HAND THREAD	GALV. STEEL GRADE 8
4	1	HEX. NUT 3/4"	GALV. STEEL GRADE 8
3	1	EYE TAIL Ø19 RIGHT HAND THREAD	GALV. FORGED STEEL
2	1	CLEVIS TAIL Ø19 LEFT HAND THREAD	GALV. FORGED STEEL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME EYE–CLEVIS TURNBUCKLE	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 14	

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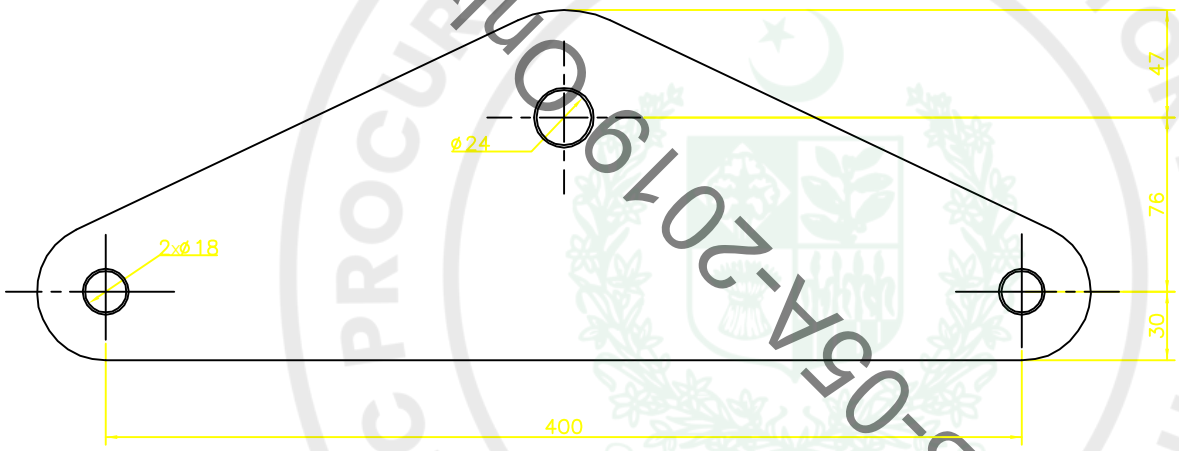

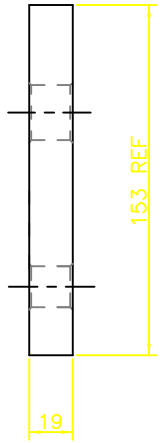

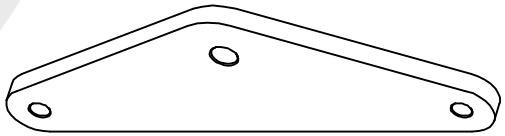

3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 210 KN. (21,400 KG)
3. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153.

ITEM	QTY	DESIGNATION	MATERIAL
1	1	TRIA. YOKE PLATE	GALV. STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 19MM TRIA YOKE PLATE	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 15	

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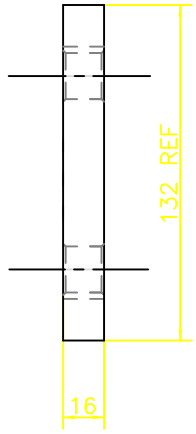
For WB-05A-2019 Only

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS



3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 200 KN.
3. ALL FERROUS METAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
1	1	BODY	GALV. STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 16MM 'H' TYPE YOKE PLATE	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - Drg No. 16	

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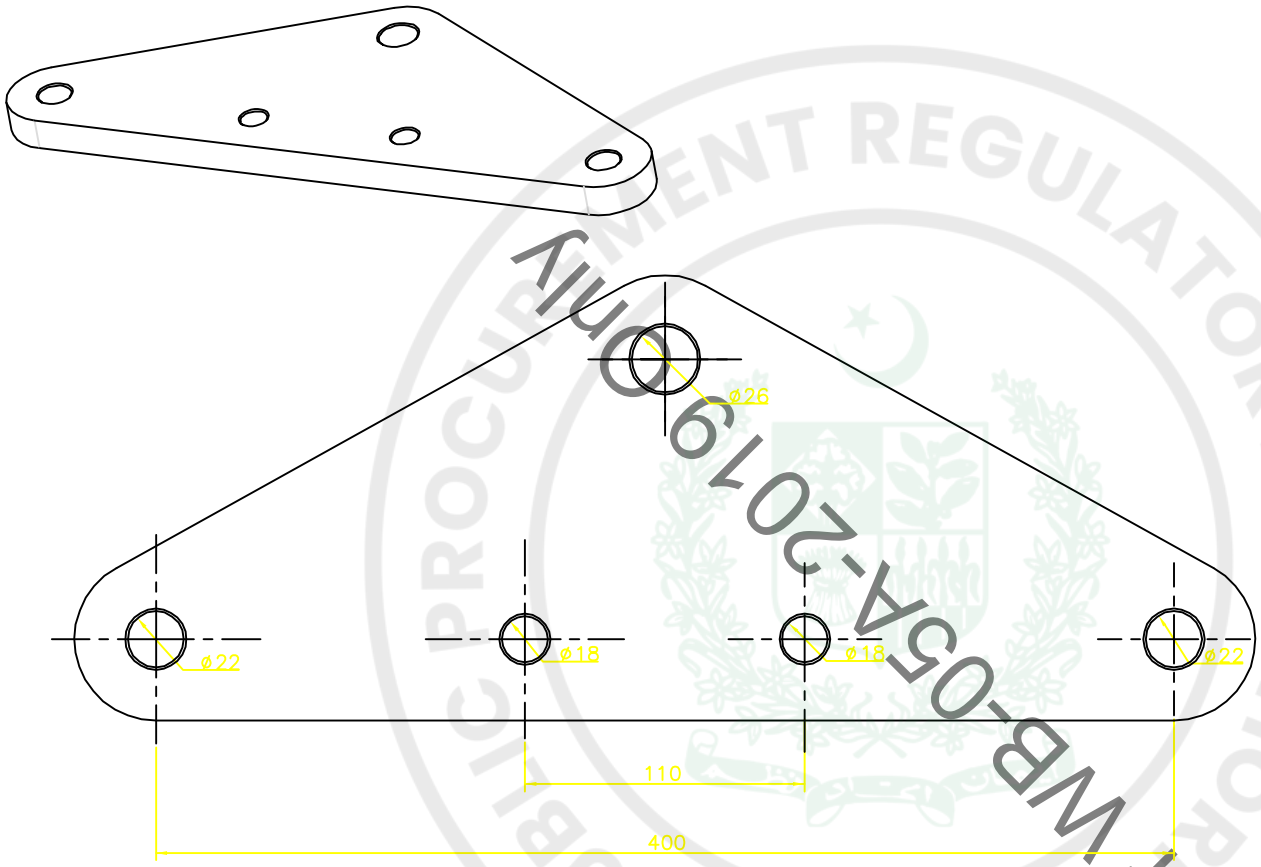
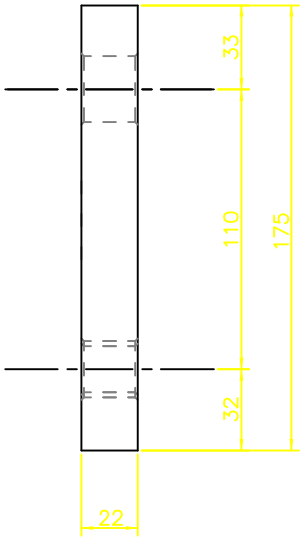
For VB-05A-2019 Only

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS





For WB-05A-2019 Only

NOTES

1. MARKING NO. Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 320 kN. (32,600 kG.)
3. ALL FERROUS METAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153.

ITEM	QTY	DESIGNATION	MATERIAL
1	1	YOKE PLATE	GALV. STEEL

National Transmission & Despatch Company	Design: NTDC
Drawn: -	NAME: 22MM. TRIA. YOKE PLATE FOR ARCING HORN
Checked: -	
Approved: -	
Chief Engineer Design NTDC	Scale: - / Date: -
	Drawing No: - 17

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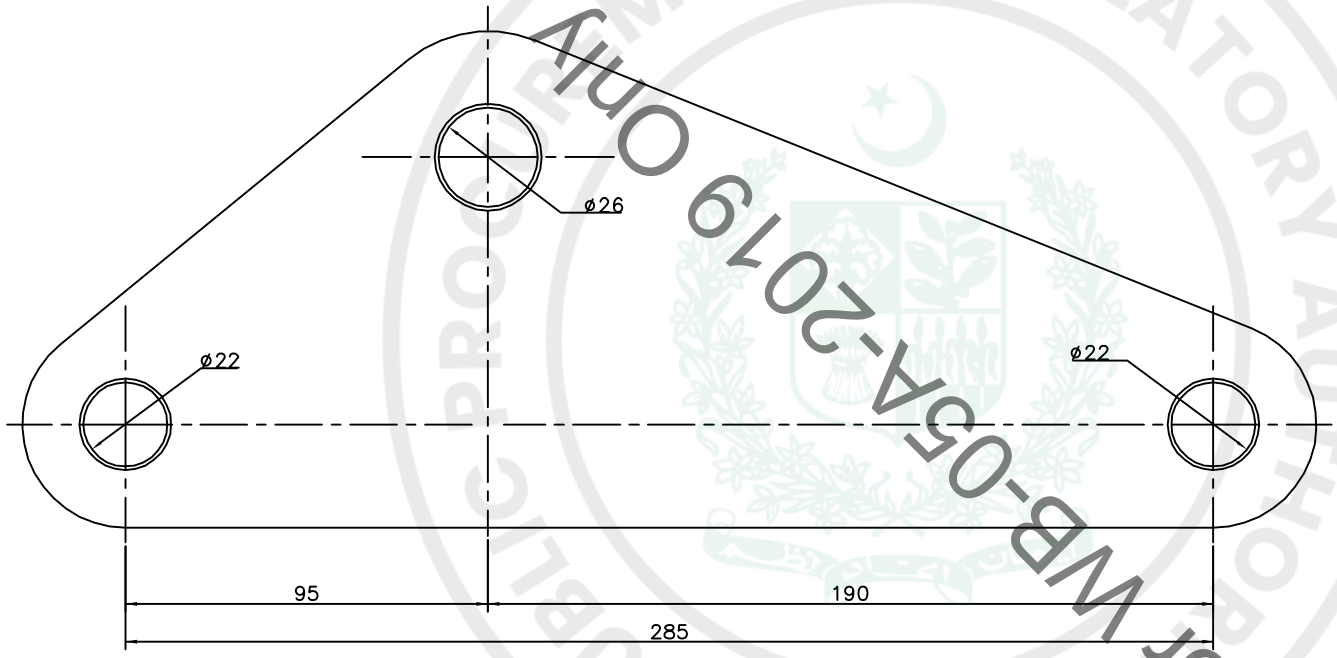

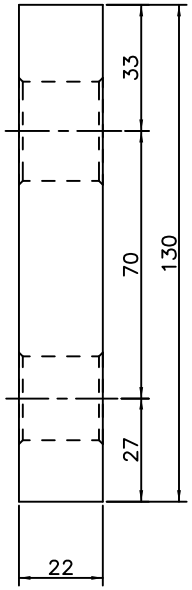

For WB-05A-2019 Only

NOTES:

1. MIN UTS. 320 KN (32,600 KG)
2. REMOVE ALL SHARP EDGES AND CORNERS BEFORE GALVANIZING
3. CHAMFER 1 ± 0.5x45° ALL THE HOLES
4. MARKING NO. : Manufacturer Name
   MONTH / YEAR OF MANUFACTURE

ITEM	QTY	DESIGNATION	MATERIAL
1	1	22MM. TRIA. YOKE PLATE	GALV. STEEL GRADE SS400

National Transmission & Despatch Company		Design	NTDC
Drawn	-	NAME	22 MM. TRIA YOKE PLATE TY 130
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 18	

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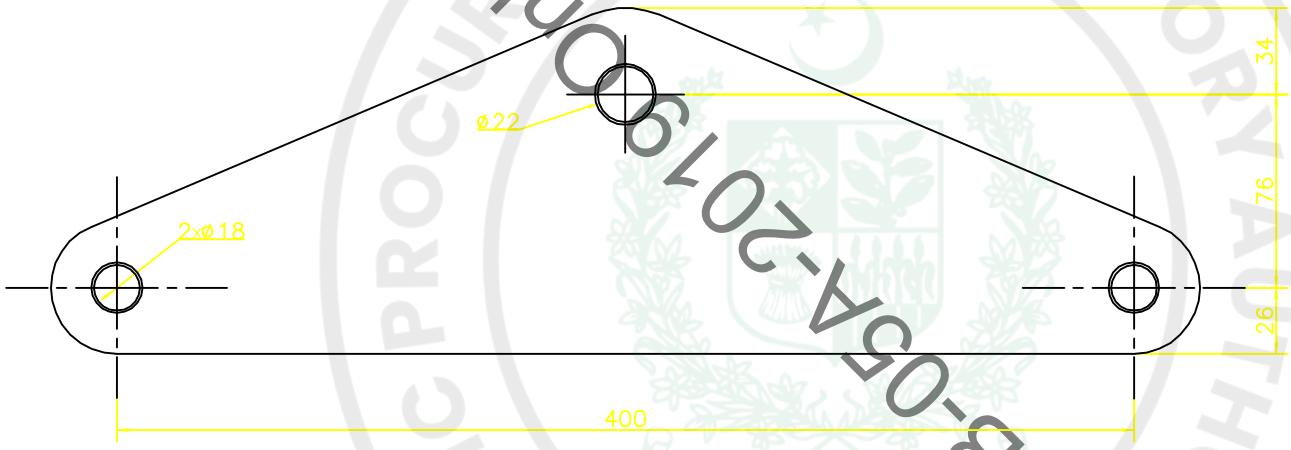
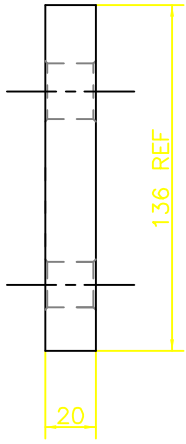
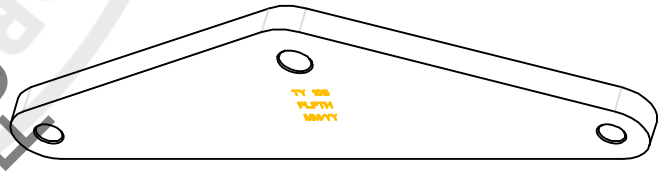
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS







3D VIEW

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 200 KN.
3. ALL FERROUS METAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
1	1	TRIA. YOKE PLATE	GALV. STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 20MM TRIA YOKE PLATE	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 19	

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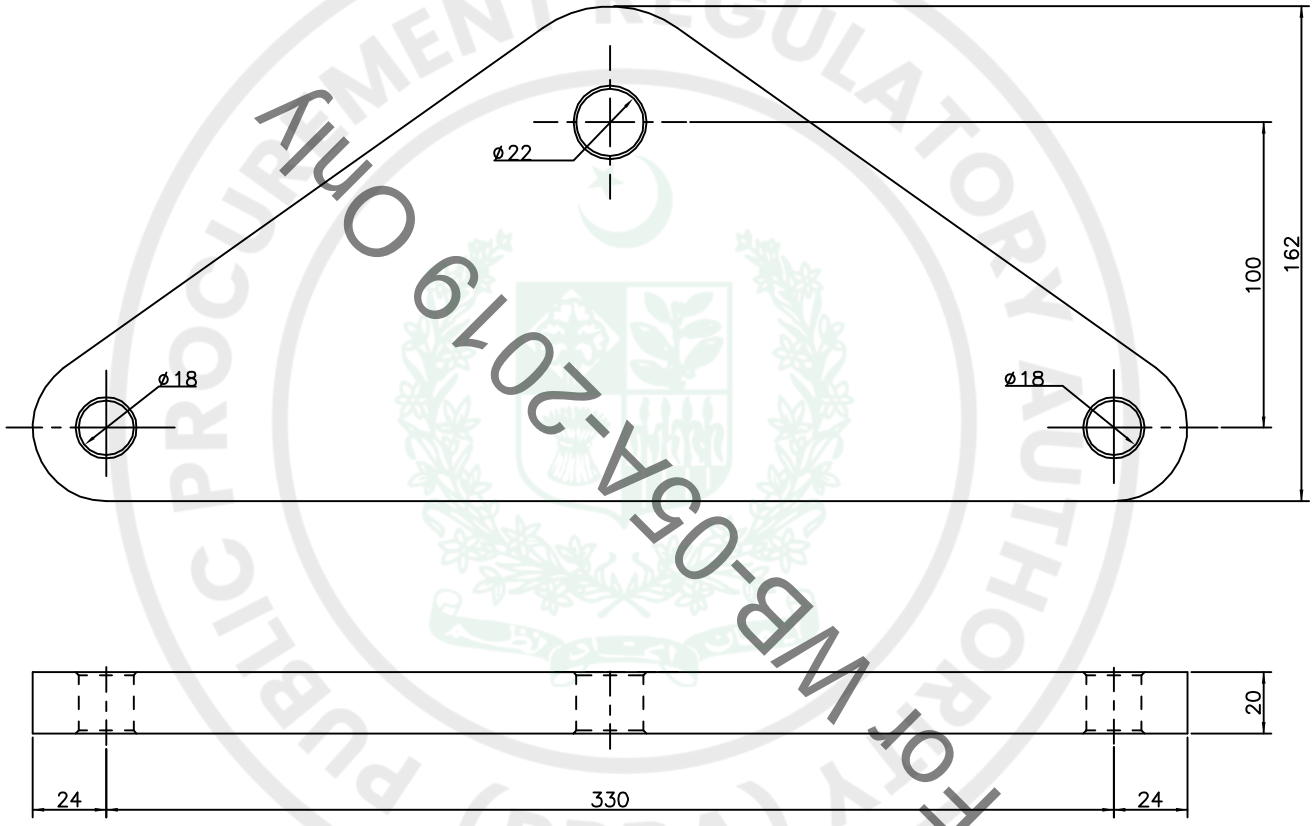
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS
For WB-05A-2019 Only



For WB-05A-2019 Only

NOTES:

1. MIN UTS. 160 KN (16,300 KG)
2. REMOVE ALL SHARP EDGES AND CORNERS BEFORE GALVANIZING
3. CHAMFER 1 ± 0.5x45° ALL THE HOLES
4. MARKING NO. : Manufacturer Name
   MONTH / YEAR OF MANUFACTURE

ITEM	QTY	DESIGNATION	MATERIAL
1	1	20MM. TRIA. YOKE PLATE	GALV. STEEL GRADE SS400

National Transmission & Despatch Company		Design	NTDC
Drawn	-	NAME	20 MM. TRIA YOKE PLATE TY 129
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 19	

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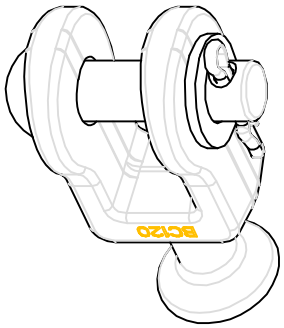

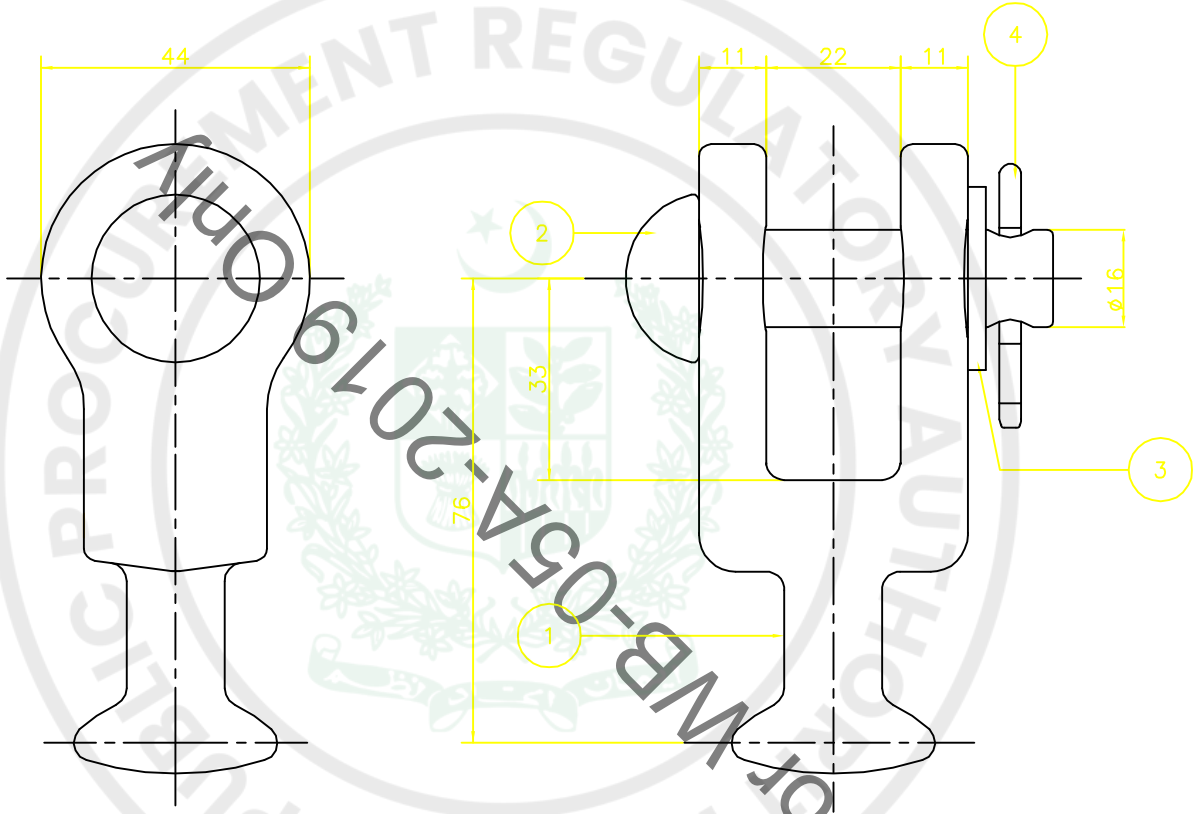

For WB-05A-2019 Only

NOTES

1. MARKED : Manufacturer Name
   SUPPLIER IDENTIFICATION
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 120 KN. (12,300 KG.)
3. BALL & SHANK DIMENSIONS ARE AS PER BS 3288 PART 3:1989 OR IEC PUB 120 – 16
4. ALL FERROUS METAL PARTS SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
4	1	SPLIT PIN	STAINLESS STEEL
3	1	PLAIN WASHER M16	GALV. STEEL
2	1	RIVET Ø16mm, LENGTH 58mm	GALV. STEEL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 16MM BALL CLEVIS	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 20	

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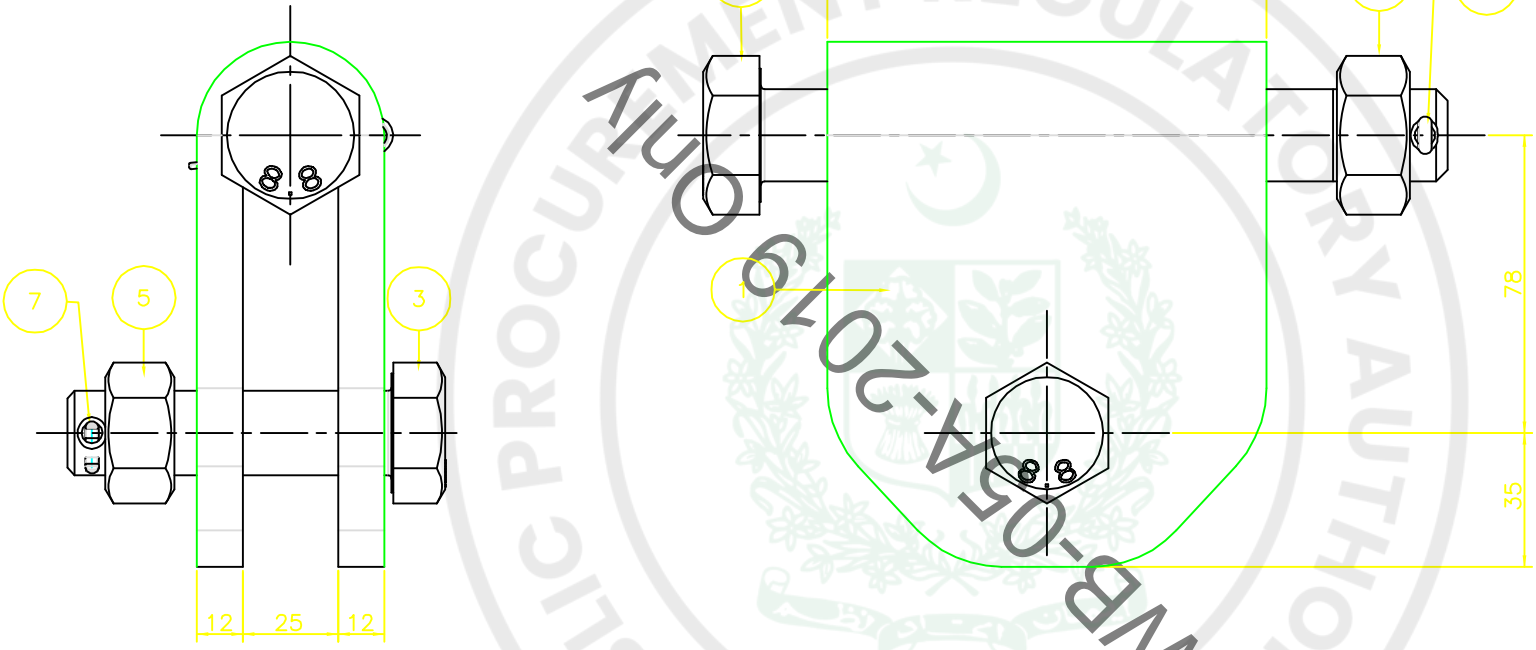

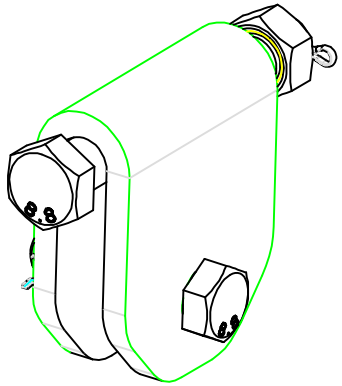

3D VIEW

NOTES

1. MARKING NO. Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 160 kN. (16,300kG)
3. ALL FERROUS METAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
7	1	SPLIT PIN Ø22mm	STAINLESS STEEL
6	1	SPLIT PIN	STAINLESS STEEL
5	1	HEX. NUT M22	GALV. STEEL GRADE 8
4	1	HEX. NUT M24	GALV. STEEL GRADE 8
3	1	HEX. BOLT M22 -85-35 DRILL Ø5.5	GALV. STEEL GRADE 8.8
2	1	HEX BOLT M24-180-30 DRILL Ø5.5	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. STEEL

National Transmission & Despatch Company

Design: NTDC

Drawn	-
Checked	-
Approved	-
Chief Engineer Design NTDC	

NAME: 12 MM. HINGE

Scale: -

Date: -

Drawing No: - 21

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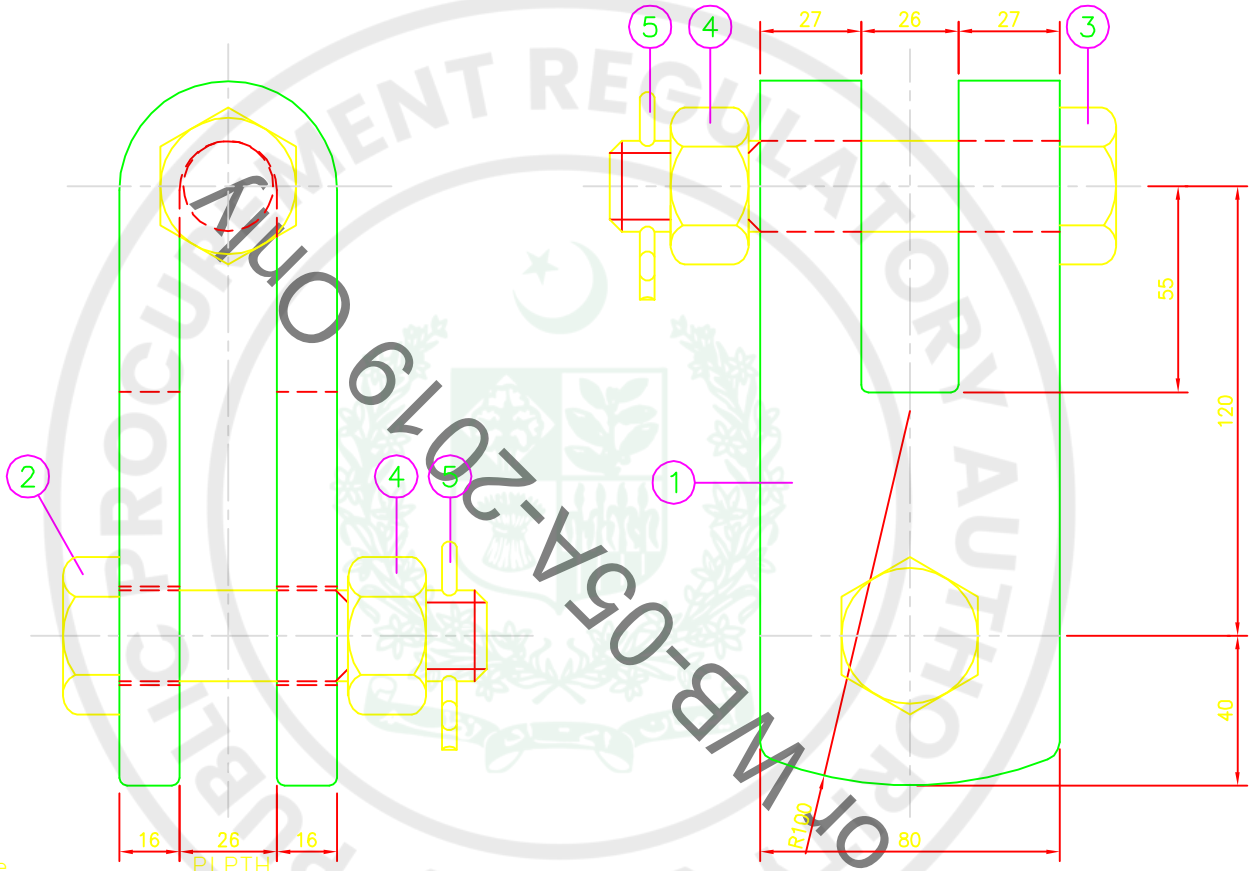

For WB-05A-2019 Only

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 320 KN.
3. ALL FERROUS METAL PARTS SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	Q'TY	DESCRIPTION	MATERIAL	PIP CODE
5	2	SPLIT PIN	STAINLESS STEEL	
4	2	NUT M24	GALV. STEEL GRADE 8	
3	1	BOLT M24x120x35	GALV. STEEL GRADE 8.8	
2	1	BOLT M24x95x35	GALV. STEEL GRADE 8.8	
1	1	BODY	GALV. STEEL	

National Transmission & Despatch Company

Design: NTDC

Drawn	-
Checked	-
Approved	-
Chief Engineer Design NTDC	

NAME: 24MM TWISTED CLEVIS CLEVIS MIN UTS 320 KN

Scale: - | Date: -

Drawing No: - 22

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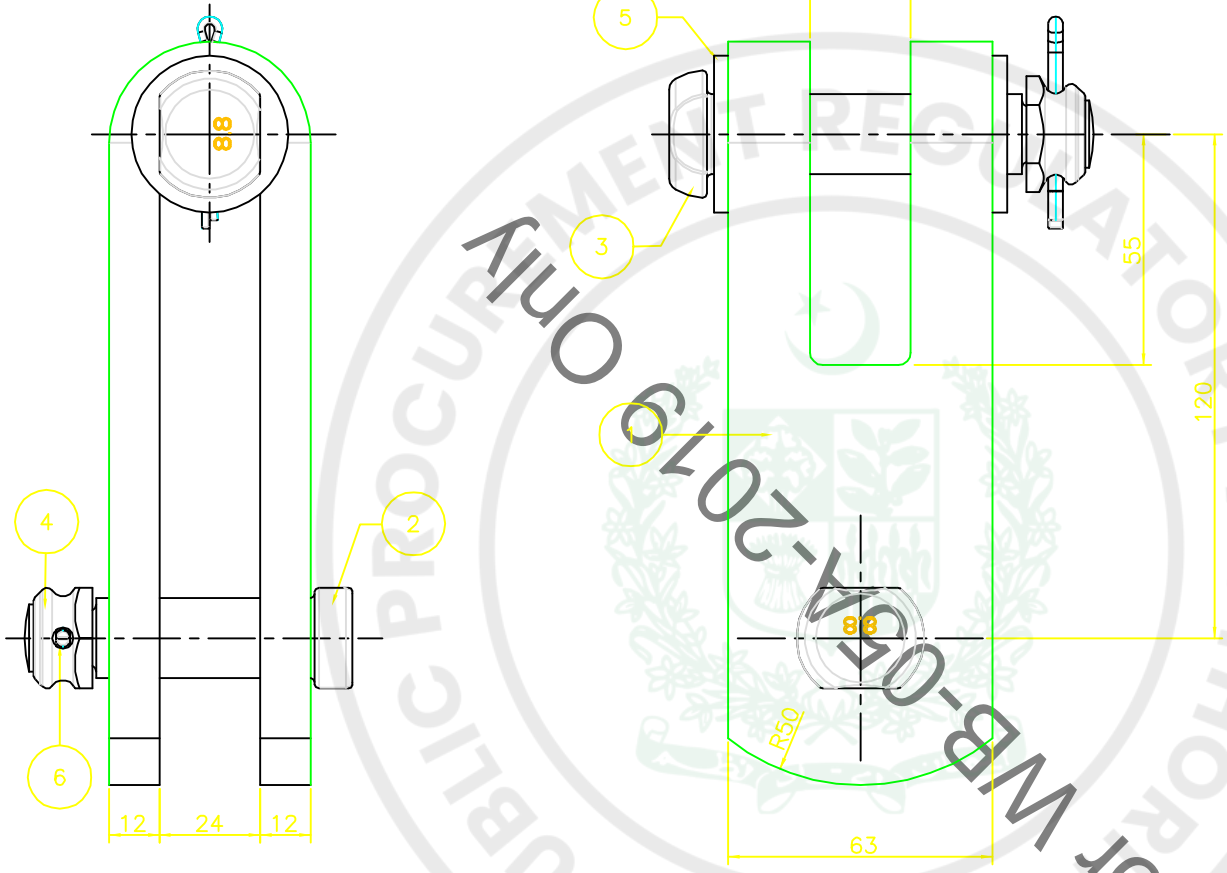

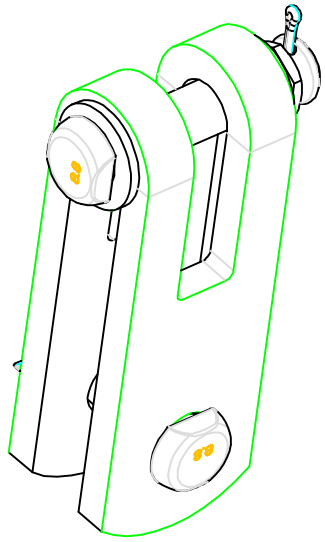

3D VIEW

NOTES

1. MARKING NO. Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 160 kN. (16,300kG)
3. ALL FERROUS METAL SHALL BE HOT-DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
6	2	SPLIT PIN	TIN PLATE COPPER
5	2	FLAT WASHER Ø19mm	GALV. STEEL
4	2	DIN NUT S19 : DIN 1441	GALV. STEEL GRADE 8
3	1	DIN BOLT S19-75 : DIN 48 073	GALV. STEEL GRADE 8.8
2	1	DIN BOLT S19-52 : DIN 48 073	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME TWISTED CLEVIS CLEVIS	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 23	

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PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

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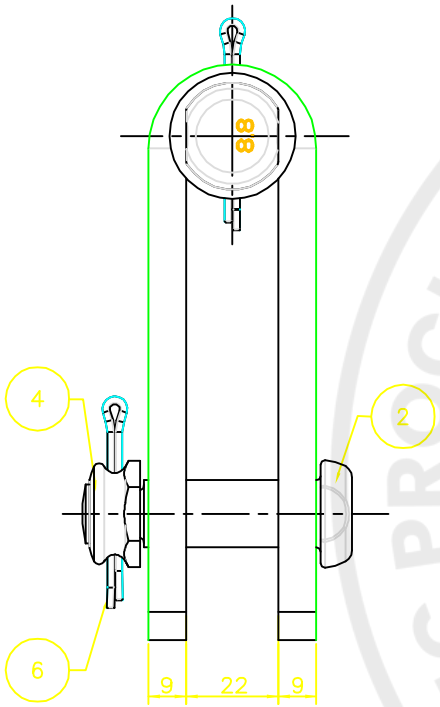

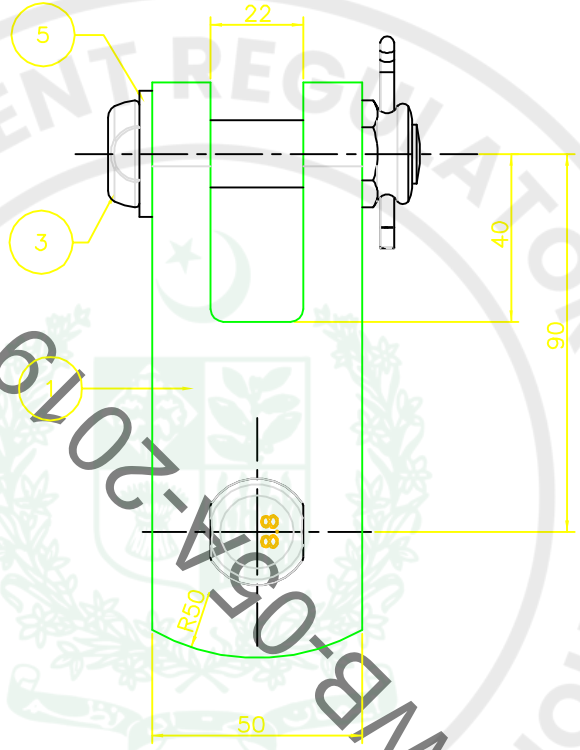

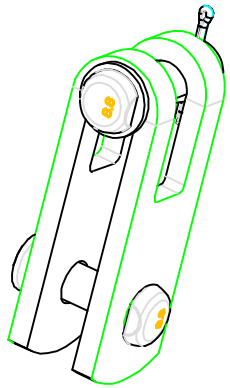

3D VIEW

NOTES

1. MARKING NO. Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 120 kN. (12,300kG)
3. ALL FERROUS METAL SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A153.

ITEM	QTY	DESIGNATION	MATERIAL
6	2	SPLIT PIN	TIN PLATE COPPER
5	1	PLAIN WASHER M16	GALV. STEEL
4	2	DIN NUT S16 : DIN 1441	GALV STEEL GRADE 8
3	1	DIN BOLT S16-52 : DIN 48 073	GALV. STEEL GRADE 8.8
2	1	DIN BOLT S16-42 : DIN 48 073	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME TWISTED CLEVIS CLEVIS	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 24	

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PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS
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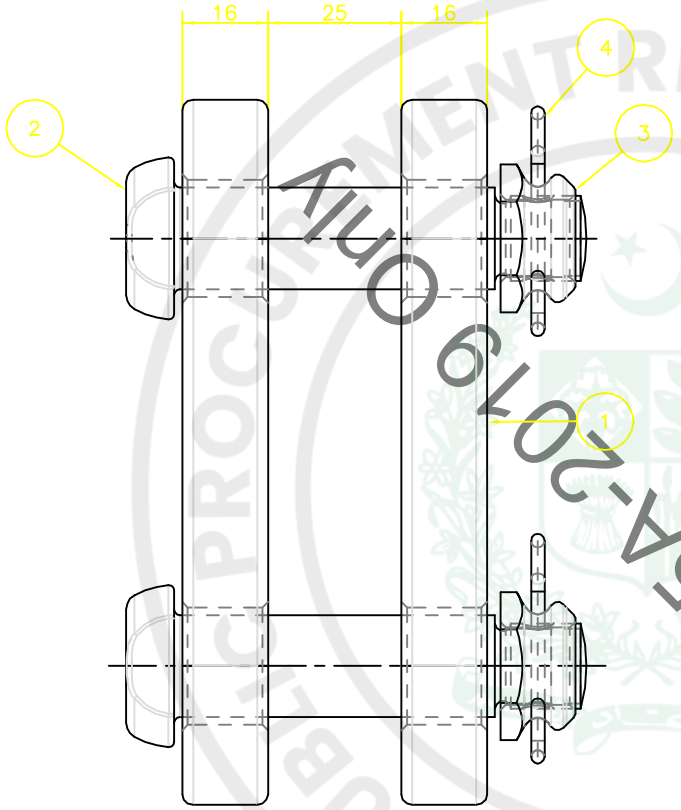

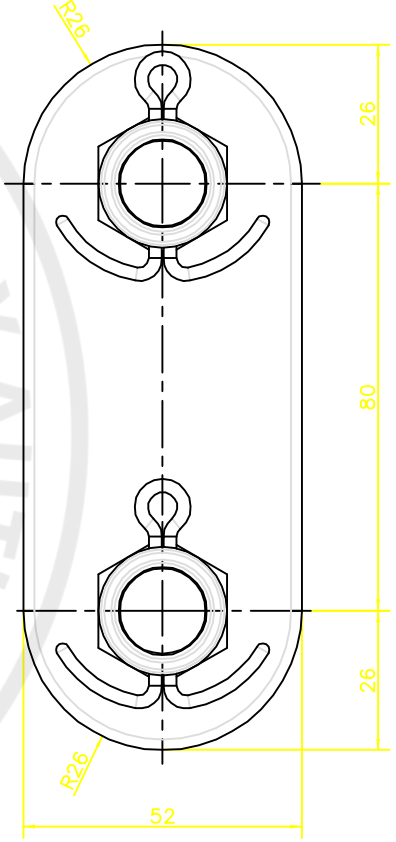

For VB-05A-2019 Only

NOTES:

1. MIN. UTS. 160 KN (16,300 KG)
2. ALL FERROUS PARTS HOT DIP GALVANIZED
3. MARKING NO. : Manufacturer Name
   MONTH / YEAR OF MANUFACTURE

ITEM	QTY	DESIGNATION	MATERIAL
4	2	SPLIT PIN 4x40 : DIN 94	TIN PLATE COPPER
3	2	DIN NUT S19 : DIN 1441	GALV. STEEL GRADE 8
2	2	DIN BOLT S19-60 : DIN 48 073	GALV. STEEL GRADE 8.8
1	2	BODY	GALV. STEEL

National Transmission & Despatch Company		Design NTDC
Drawn	-	NAME CLEVIS CLEVIS
Checked	-	
Approved	-	
Chief Engineer Design NTDC		Scale: - / Date: -
		Drawing No: - 25

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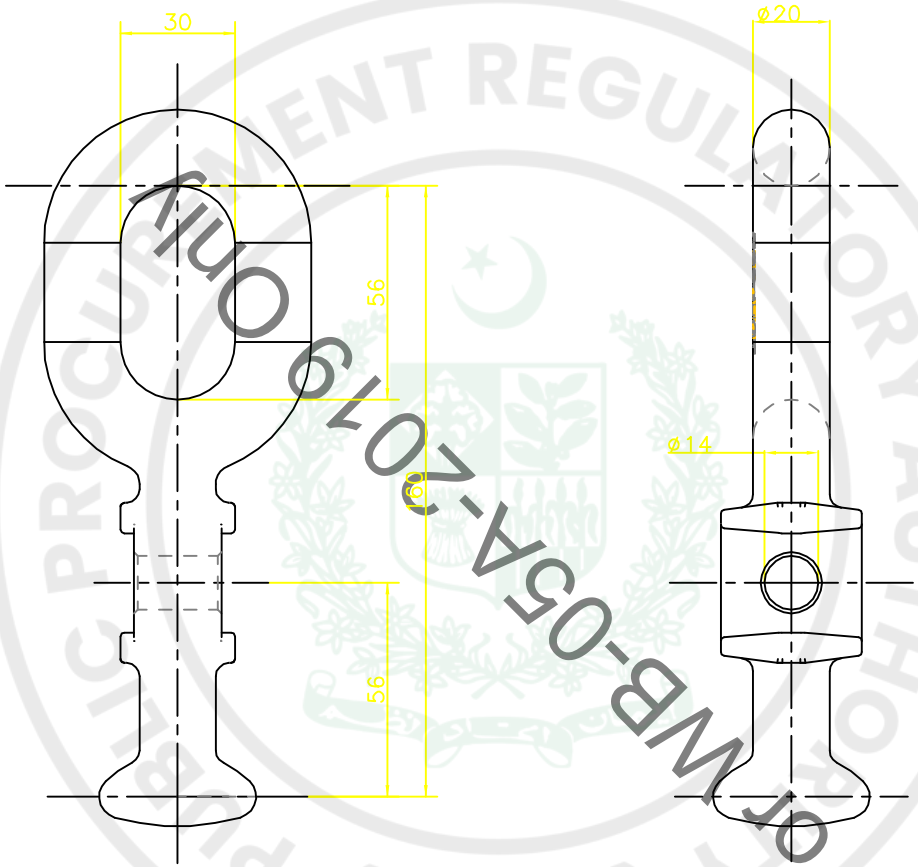
PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS



For WB-05A-2019 Only

SCALE 0.400

NOTES

1. MARKING NO. Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. MIN. UTS. 210 KN. (21,410 KG.)
3. BALL & SHANK DIMENSIONS ARE AS PER BS 3288 PART 3:1989 OR IEC PUB 120–20mm.
4. ALL FERROUS METAL SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153.

ITEM	QTY	DESIGNATION	MATERIAL
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 20MM TWISTED BALL EYE LINK FOR ARCING HORN	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 26	

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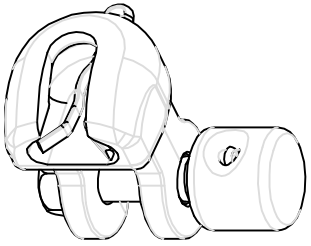
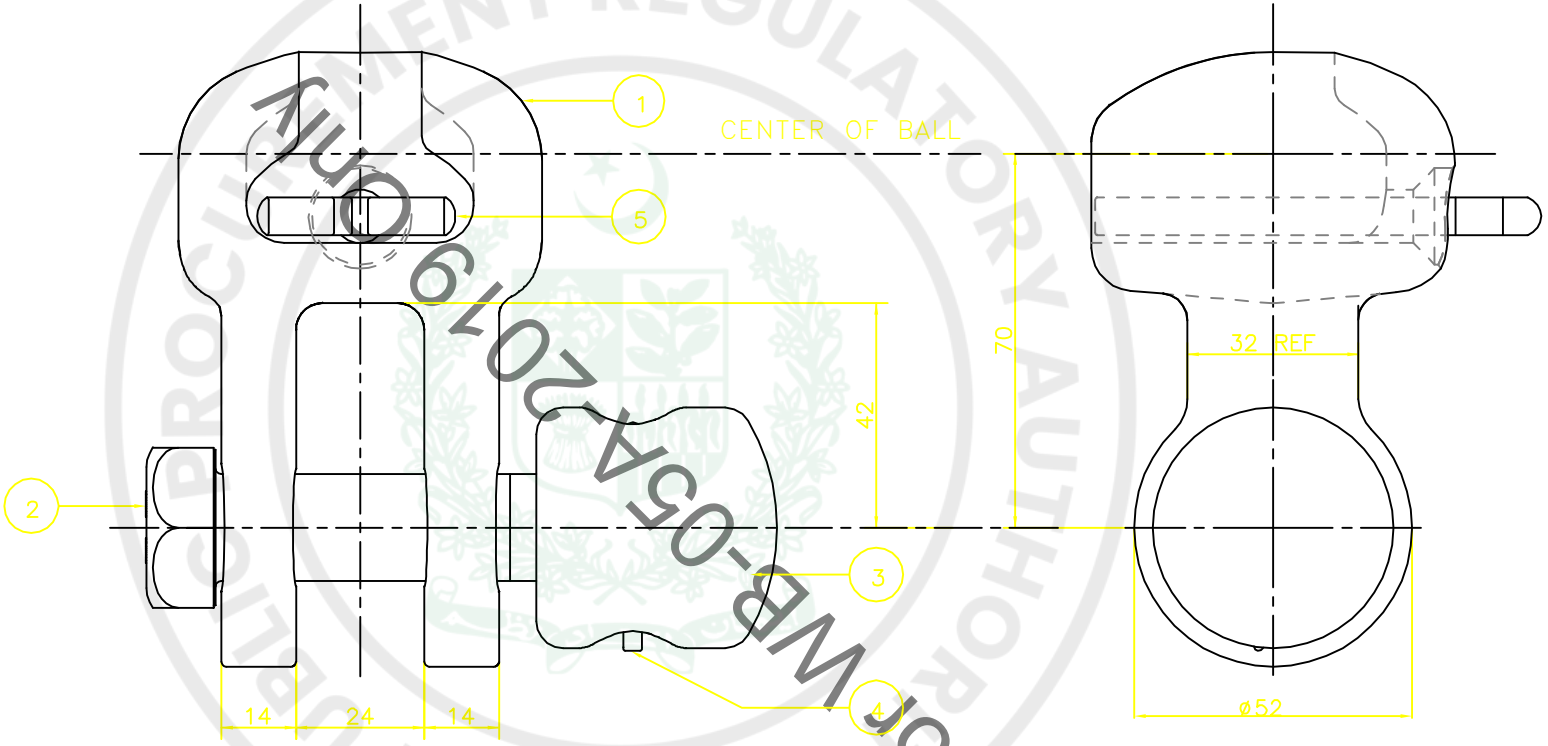


3D VIEW



FOR VB-05A-2019 ONLY

NOTES

1. MARKED : Manufacturer Name
   MONTH/YEAR OF MANUFACTURE
2. SOCKET DIMENSIONS ARE AS PER BS 3288 PART 3 : 1989 OR IEC PUB 120–20mm.
3. MIN. UTS. 210 KN. (21,400 KG.)
4. ALL FERROUS METAL SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH ASTM A 153

ITEM	QTY	DESIGNATION	MATERIAL
5	1	SECURITY CLIP	STAINLESS STEEL
4	1	SPLIT PIN (CORONA FREE)	STAINLESS STEEL
3	1	CORONA FREE NUT M20	GALV. CAST IRON
2	1	CORONA FREE HEX. BOLT M20x90x35	GALV. STEEL GRADE 8.8
1	1	BODY	GALV. FORGED STEEL

National Transmission & Despatch Company		Design NTDC	
Drawn	-	NAME 20MM SOCKET CLEVIS	
Checked	-		
Approved	-		
Chief Engineer Design NTDC		Scale: -	Date: -
		Drawing No: - 27	

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PRICE SCHEDULE TENDER NO. PMU-212/26-27

Tender No.	Item No.	Description of Stores	Unit	Qty Req:	FCS/DDP unit rate in PKR without GST	Applicable GST	FCS/DDP unit rate in PKR with GST	Total Amount in PKR
		1	2	3	4	5	6	7=3*6
PMU-212/26-27	1	Connector TMLH	No.	60				
	2	Connector TM63A	No.	27				
	3	Connector 90B40F	No.	21				
	4	Connector TMHH	No.	90				
	5	Connector TM40A	No.	18				
	6	Connector TM75A	No.	30				
	7	Connector 90BH30	No.	60				
	8	Connector 90BH40	No.	60				
	9	Connector 90B75F	No.	6				
	10	Connector 90B63F	No.	6				
	11	Connector TM63F	No.	3				
	12	Connector TMLL	No.	150				
	13	Single Tension Fitting for Lynx Conductor	Set.	99				

PUBLIC PROCUREMENT REGULATORY AUTHORITY (PPRA) EPADS

14	Single Tension Assembly for Hawthorn Conductor	No.	33				
15	Single Suspension Clamp for Greely Conductor	No.	45				
16	Single Suspension Clamp for LYNX Conductor	No.	1500				
17	Single Suspension Clamp for DOG Conductor	No.	60				
18	Single Suspension fitting for Lynx Conductor	Set.	391				
19	Single Suspension Fitting for Greely Conductor	Set.	817				
20	Stock Bridge Damper for Lynx Conductor	No.	2060				
21	Stock Bridge Damper for Greely Condutor	No.	1094				
22	Dead end Clamp for Greely Conductor	No.	30				
23	Dead end Clamp for LYNX Conductor	No.	60				
24	Dead end Clamp for DOG Conductor	No.	30				
25	Double Suspension fiiting for Rail Conductor	Set.	6				
26	Double Tension Fitting for Rail Conductor	Set.	18				
27	Mid Span Joint For Lynx Conductor	No.	60				
28	Mid Span Joint For Greely Conductor	No.	367				
29	Mid Span Joint For Rail Conductor	No.	10				
30	Repair Sleeves for Greely Condutor	No.	165				
31	Repair Sleeves for LYNX Conductor	No.	200				
32	PG Clamp for LYNX (3-bolted)	No.	6000				

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	33	P.G Clamps for Dog Conductor (2-bolted)	No.	300				
	34	P.G Clamp for Rail Conductor	No.	183				
	35	P.G Clamp for Greely Conductor	No.	1454				
	36	P.G Clamps for Cairo Condutor	No.	236				
	37	U Bolt Zm type Tower	No.	120				
	38	Earth Wire Tension Assembly With G Clamp	No.	10				
							***Grand Total**	

(IN WORDS: _____

_____

Note: The ***Grand Total Price** must be same as the Bid Quoted Price

Stamp & Sign: _____ Date: _____

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Past Experience and Completed Contracts

Contractual Experience

Bidder/Manufacturer shall have successfully completed at least two (02) number of contracts of same nature/type. “Same nature/type” means material/equipment having comparable characteristics/ features same rating or higher rating not lower rating within last 07 years. In this context, complete set of copies of the contract agreements/Purchase Orders along-with copy of GRN/ completion certificate (must be issued by the end user client) for the equipment indicated in the supply record pertaining to the specified and comparable equipment during the bid evaluation.

The bidders/JV, who are not manufacturers themselves, shall furnish a valid and fresh authorization from the concerned manufacturer to submit a bid from supply of their goods to Pakistan against the tender.

Manufacturing Experience

The manufacturer shall demonstrate designing and manufacturing experience of similar or higher rated equipment /material for at least five year and Two-year satisfactory operation performance of offered equipment.

Performance Criteria

The material manufactured/supplied by the manufacturer/ bidder must have satisfactory operational experience. The bidder / manufacturer shall submit at least two (2) operational certificate with the bid from the end user from Pakistan or from outside the country of offered equipment /goods to establish satisfactory operation for a continuous period of at least two years prior to deadline for submission of bids within the period of last 10 years.

Supply Capacity

The manufacturer shall provide the following information with the Bid to establish its capacity/capability to execute the order.

-Manufacturing Capacity

-Orders in hand

Past Experience / Contracts

Contracts over *[insert amount]* during the last three years:				
Procuring Agency	Value	Year	Goods/Services Supplied	Country of Destination

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Historical Contract Non-Performance, and Pending Litigation and Litigation History

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
IFP No. and title: *[insert IFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

☐ Not debarred due to deviation from commitment of Bid Securing Declaration-☐ Not debarred due to non-performance			
Year	**Non-performed portion of contract**	**Contract Identification**	**Total Contract Amount (current value, currency, exchange rate and PKR equivalent)**
[insert year]	*[insert amount and percentage]*	Contract Identification: *[indicate complete contract name/ number, and any other identification]* Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Reason(s) for nonperformance: *[indicate main reason(s)]*	*[insert amount]*
Pending Litigation, in accordance with Section III, Qualification Criteria and Requirements			
☐ Pending litigation in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.3 as indicated below.			

Year of dispute	**Amount in dispute (currency)**	**Contract Identification**	**Total Contract Amount (currency), ~~US$~~ PKR Equivalent (exchange rate)**

[insert year]	*[insert amount]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Agency" or "Supplier"]* Status of dispute: *[Indicate if it is being treated by the Adjudicator, under Arbitration or being dealt with by the Judiciary]*	*[insert amount]*

☐ No consistent history of court/arbitral award decisions in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4.

☐ Consistent history of court/arbitral award decisions in accordance with Section III, Qualification Criteria and Requirements, Sub-Factor 2.4 as indicated below.

Year of award	**Outcome as percentage of Net Worth**	**Contract Identification**	**Total Contract Amount (currency), PKR Equivalent (exchange rate)**
[insert year]	*[insert percentage]*	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Procuring Agency: *[insert full name]* Address of Procuring Agency: *[insert street/city/country]* Matter in dispute: *[indicate main issues in dispute]* Party who initiated the dispute: *[indicate "Procuring Agency" or "Supplier"]* Court/ arbitral award decision: *[Indicate if the award decision was against the Applicant or any member of a joint venture.]y]*	*[insert amount]*

Financial Situation and Performance

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
IFP No. and title: *[insert IFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

1. Financial data

Type of Financial information in (currency)	**Historic information for previous _[insert number] years, [insert in words] (amount in currency, currency, exchange rate*, PKR equivalent)**				
	Year 1	Year 2	Year 3		
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

* Refer ITA 14 for the exchange rate

3. Financial documents

The Applicant and in case of JV, members of JV shall provide copies of financial statements for *[number]* years pursuant Section III, Qualifications Criteria and Requirements. The financial statements shall:

(a) reflect the financial situation of the Applicant or in case of JV member, and not an affiliated entity (such as parent company or group member).

(b) be independently audited or certified in accordance with local legislation.

(c) be complete, including all notes to the financial statements.

(d) correspond to accounting periods already completed and audited.

☐ Attached are copies of financial statements[1] for the *[number]* years required above; and complying with the requirements.

[1] If the most recent set of financial statements is for a period earlier than 12 months from the date of Application, the reason for this should be justified.

Average Annual Turnover (Annual Sales Value)

[The following table shall be filled in for the Applicant and for each member of a Joint Venture]

Applicant's Name: *[insert full name]*
Date: *[insert day, month, year]*
Joint Venture Member Name: *[insert full name]*
IFP No. and title: *[insert IFP number and title]*
Page *[insert page number]* of *[insert total number]* pages

Annual Turnover Data			
Year	**Amount** **Currency**	**Exchange rate*** **(If applicable)**	**PKR equivalent**
[indicate calendar year]	*[insert amount and indicate currency]*		
		Average Annual Turnover **	

* Refer ITA for date and source of exchange rate.

** Total PKR equivalent for all years divided by the total number of years. See Section III, Qualification Criteria and Requirements, ITA.