

**UBE CHEMICALS (ASIA) PUBLIC COMPANY LIMITED**

**TENDER DOCUMENTS**

**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY  
CONSTRUCTION AND MODIFICATION PACKAGE**

**THIS PACKAGE IS A PART OF  
SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**

**PROJECT NO. [CC-24002-2]**

**REVISION NO. 0 – May 14, 2024**

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**SECTION 1  
INVITATION TO TENDER**

**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY  
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## 1 INTRODUCTION

- 1.1 Nitrous oxide (N<sub>2</sub>O) is a greenhouse gas (GHG) with a global warming potential 273 times higher than that of carbon dioxide (CO<sub>2</sub>). One of the sources of N<sub>2</sub>O emissions is the manufacture of nitric acid and caprolactam, which is mainly used to produce nitrogen fertilizers and used in manufacture of fiber synthesis respectively. Despite the availability of effective abatement technologies at comparatively low cost, N<sub>2</sub>O from nitric acid and caprolactam production continues to be released into the atmosphere in most countries of the world, as there are usually no economic or corporate incentives for plant operators to reduce emissions.

To tap the global mitigation potential of this sector, the German Federal Ministry for Economic Affairs and Climate Action (BMWK) has launched the Nitric Acid Climate Action Group (NACAG) initiative. This initiative promotes the phasing out of global N<sub>2</sub>O emissions in the production process of nitric acid and caprolactam. The program provides:

- i) technical advisory and financial support for the installation of abatement technologies and nitrous oxide emissions monitoring equipment,
- ii) as well as assistance to governments for the development of public policies addressing the regulation of such N<sub>2</sub>O emissions.

In 2023, Thailand signed the commitment to minimize N<sub>2</sub>O emissions from caprolactam production within 3 years, which opens the possibility for caprolactam plants to apply for the funds for the installation and operation of N<sub>2</sub>O abatement technologies, and N<sub>2</sub>O monitoring systems.

Under the NACAG initiative framework, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is working with a caprolactam producing company, which has a well-advanced process to sign a grant contract. The grant covers the cost of purchasing and installing nitrous oxide reduction equipment as well as emissions monitoring technology. Under the NACAG initiative regulation, the tendering of the equipment acquired through the grant must be purchased by the company via an international bidding process under national public procurement procedures.

UBE Chemicals (Asia) Public Company Limited, hereinafter called UCHA, hereby invites qualified Tenderers to participate in the bidding of **N<sub>2</sub>O Abatement Technology Construction and Modification Package** which is a part of Secondary Catalytic N<sub>2</sub>O Abatement Process Project at Caprolactam Plant of UCHA in Rayong, hereinafter called the "Activities", in accordance with the terms, conditions, and specifications contained in the Tender Documents.

- 1.2 UCHA needs to reduce N<sub>2</sub>O emission from existing process equipment 1210-R1-3 Ammonia Oxidizer by replacing existing ceramic packing with N<sub>2</sub>O abatement technology catalyst. By replacing with N<sub>2</sub>O abatement technology catalyst, there will be changes in operating condition and UCHA shall replace the existing Basket Bottom and its support (SA240 TP310S) inside the Ammonia Oxidizer with new material (SA240 TP321H) to resist additional temperature and stress.

UCHA needs to complete one (1) Basket Bottom replacement for 1210-R1-3 during turnaround period in coming November-December 2024.

UCHA plans to continue Basket Bottom replacement for other two (2) Ammonia Oxidizers (1210-R1-1 and 1210-R1-2) in 2027 after proofing of successfulness in N<sub>2</sub>O emission reduction after utilizing of new N<sub>2</sub>O abatement technology catalyst in 2026.

- 1.3 This Tender is part of the overall procurement process for the provision of the Activities.
- 1.4 This Invitation to Tender together with the other Tender Documents specifies the requirements, terms and conditions of the Tender to be complied with by Tenderers in preparing and submitting Tenders.
- 1.5 The requirements of the Tender Documents shall be strictly complied with and shall not be modified by Tenderers.

## **2. INFORMATION OF N<sub>2</sub>O ABATEMENT TECHNOLOGY CONSTRUCTION AND MODIFICATION PACKAGE**

### 2.1 Schedule

- |                             |  |
|-----------------------------|--|
| a) Expected project period  | July 16, 2024 – December 31, 2024                        |
| b) Expected completion date | Refer to Item 9 of Section 2 : Instructions to Tenderers |
| c) Warranty period          | 12 months after date of work completion                  |

### 2.2 Scope of the Activities

Refer to **Section 6 : Technical Specifications and Scope of Works.**

### 2.3 Contract and Payment

The contract for the activities will be made between UCHA and the success tenderer with the payment terms as stated in **item 7.3 c) of Section 2 : Instructions to Tenderers.**

## **3. TENDERER QUALIFICATIONS**

For a tenderer, hereinafter called the “Tenderer”, to be considered eligible in the tender for the Activities and accepted for further evaluation, all of the following qualifications must be met:

- 3.1 The Tenderer shall be a juristic person professionally in business of mechanical or process equipment fabrication, installation and construction services with petrochemical plant. Joint venture or consortium or the likes will not be eligible for tender submission.
  - a) The Tenderer shall has experiences in related field of mechanical or process equipment fabrication, installation and construction services with petrochemical plants for at least 5 years with registered capital Baht 1,000,000 as minimum.
  - b) The Tenderer shall has experience in petrochemical plant with job value Baht 1,000,0000 and above.
- 3.2 The Tenderer is properly qualified, fully registered, licensed, equipped, organized, and financed to perform the Activities under the Tender Documents.
- 3.3 The Tenderer shall not be charged with, or be affected by another person(s) or juristic person(s) charged with debarment due to abandonment of Activities, and shall not be named in the “Black List” circulated among all government agencies as persons excluded from Royal Thai Government procurement programs.
- 3.4 The Tenderer shall certify that he is without a special privilege or immunity which enables him to refuse being taken to a Thai court or, if he has such privilege or immunity, certify that such privilege or immunity has been waived.
- 3.5 No officer of UCHA and related company is connected with the Tenderer as a manager, managing partner, managing director, executive or person authorized to operate the business of a natural person or juristic person or a partner in ordinary partnerships or limited partnerships, or a major shareholder in limited companies or public limited companies, or a consultant to such business.

## **4. ISSUANCE OF COMPLETE TENDER DOCUMENTS**

Tender Documents consist of the following section:

- SECTION 1 - Invitation to Tender
- SECTION 2 - Instructions to Tenderers
- SECTION 3 - *(Intentionally left blank)*
- SECTION 4 - Form of Contract
- SECTION 5 - Conditions of Contract
- SECTION 6 - Technical Specifications and Scope of Works

Announced on : 16 May 2024

by

**Bidding Committee - N<sub>2</sub>O Abatement Technology Construction and Modification Package**

**SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**



\_\_\_\_\_  
(Mr. Pattana Pongsirirachkul)

Committee



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(Mr. Kengkaj Pattamarat)

Committee



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(Mr. Paitoon Akkarasorawich)

Chairman

**SECTION 2**  
**INSTRUCTIONS TO TENDERERS**

**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY**  
**CONSTRUCTION AND MODIFICATION PACKAGE**

**THIS PACKAGE IS A PART OF**  
**SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**



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## 1. DEFINITIONS

- 1.1 The words and expressions defined elsewhere in the Tender Documents shall apply equally hereto, except where the context otherwise requires for example those specific terms and meaning in other documents.
- 1.2. Additional definitions of words and expressions, which are not defined elsewhere, or which require re-definition for the purposes of the Instructions to Tenderers, are given below:

|                          |   |
|--------------------------|---|
| “Activities”             | means lump sum works for N <sub>2</sub> O Abatement Technology Construction and Modification Package which is a part of Secondary Catalytic N <sub>2</sub> O Abatement Process Project at Caprolactam Plant of UCHA in Rayong.                              |
| “Activities Schedule”    | means required completion schedule of individual scopes and overall scope as specified in <u>item 9 of this Section</u> .   |
| “Contract”               | means the contract between UCHA and the Contractor for the Activities dated together with the Contract Documents, and any amendment thereof (if any)  |
| “Contract Documents”     | means documents specified in the Contract as forming integral part of the same.   |
| “Contractor”             | means the Tenderer who submit the Tender for the Activities, win the bid as judged by UCHA, and agrees to sign the Contract to accomplish the Activities and includes the Contractor’s personal representatives, legal successors, and permitted assignees. |
| “Tender”                 | means an offer to perform the Activities submitted by a Tenderer in response to the Tender Documents.   |
| “Tenderer”               | means the eligible Tenderer who has qualifications satisfied and invited by UCHA to receive Tender Documents and accept such invitation.  |
| “Tender Submission Date” | means the appointed date and time that the Tenderer shall submit the Tender to the Bidding Committee as specified in <u>item 11.1 of this Section</u> .   |
| “Successful Tenderer”    | means the Tenderer who passed evaluation by UCHA with the highest Evaluation Score and proposed to be winner of bidding for the Activities.   |
| “UCHA”                   | means UBE Chemicals (Asia) Public Company Limited.  |

## 2. TENDER DOCUMENTS

- 2.1 Tender Documents consist of the following parts:

SECTION 1 - Invitation to Tender  
SECTION 2 - Instructions to Tenderers  
SECTION 3 - *(Intentionally left blank)*  
SECTION 4 - Form of Contract  
SECTION 5 - Conditions of Contract  
SECTION 6 - Technical Specifications and Scope of Works

- 2.2 The Tenderer shall submit his Tender on the understanding that the Tender Documents are intended to cover all the Activities within the scope of any resultant Contract and that any and all labor and materials not indicated therein, but which may be necessary to complete any part of the Activities in a proper and workmanlike manner, are considered to be included and are to be furnished by the Contractor.

### 3. CLARIFICATION OF TENDER DOCUMENTS

3.1 Throughout the bidding period, the official communication from the Tenderer to UCHA in connection with this procurement process shall be in the form of the Request for Clarification procedure using the form given in Appendix 2-1.

3.2 Correspondence

a) Such correspondence are to be specified with following information:

Project name: N<sub>2</sub>O Abatement Modification Package

Dispatch Date: [Day/Month/Year]

Ref. No.: N<sub>2</sub>O Abatement Modification Package / [XX]

From: [Name of Tenderer]

Subject: [Topic]

[Representative : Mr. Pattana Pongsirirachkul - Procurement Office, Administration Building - 2<sup>nd</sup> Floor]

E-Mail to : [pattana@ube.co.th](mailto:pattana@ube.co.th)

Subject : Clarification Needs/N<sub>2</sub>O Abatement Modification Package/[Name of Tenderer] : [Topic]

[E-mail size shall not over 20 MB]

b) All correspondence shall be delivered by hand, registered courier, or e-mail to reach UCHA **not later than June 14, 2024**. UCHA will not be responsible for non-receipt of any correspondence sent by the Tenderer. It is the Tenderer's responsibility to confirm that the correspondence has been delivered properly.

c) Responses by UCHA to any Request for Clarification will be issued as early as possible and prior to the Tender Submission Date. Such responses will be copied to all Tenderers.

3.3 Any clarifications, modifications or amendments to the Tender Documents shall only be made by official responses to Requests for Clarification together with modifications and amendments through official addenda issued by UCHA, otherwise they shall be deemed invalid.

### 4. SITE SURVEY

The Tenderer shall request for site survey, if requires, by using Request for Clarification form as given in Appendix 2-1, **not later than June 10, 2024**. The Tenderer shall clearly describe required survey topic together with name list of site survey team in the request. UCHA will appoint the Tenderer for site survey **not later than June 17, 2024**.

### 5. TENDERER UNDERSTANDING

The Tenderer shall be deemed to have carefully examined all of the Tender Documents including any clarifications, modifications or amendments thereto and to have fully informed himself as to all conditions, local and/or otherwise, affecting the carrying out of the Activities of the Contract, and to have calculated the equipment and facilities available and needed, for the performance thereof. Failure to do so will be at the Tenderer's own risk and cost.

### 6. TENDER COSTS

All and any costs incurred in the preparation and submission of the Tender and all matters arising therefrom shall be totally at the Tenderer's expense.

## 7. PREPARATION OF TENDER

### 7.1 Language

The Tender shall be prepared in English. Supplementary documents issued by government agencies of Thailand may be in Thai.

### 7.2 Authentication

The original Tender shall be affixed with the Tenderer's company seal (if any) and manually signed by a person authorized to bind the Tenderer and a Power of Attorney indicating such authority shall be submitted with the Tender. Any correction, erasure or overwriting in the Tender shall be affixed with the Tenderer's company seal (if any) and initiated by the person signing the Tender.

### 7.3 Proposal

The Tender shall be organized the proposal that consists of following three (3) parts:

#### a) Part 1 - Tenderer Qualification Documents

Part 1 shall consist of following documents.

(1) *Intentionally left Blank*

(2) Tenderer Qualification Documents shall consist of .-

- i. If the Tenderer is an ordinary partnership or limited partnership - certified copies of incorporation documents, affidavit or by-laws, showing managing partners list, authorized administrator, issued and certified by the competent authority no more than six (6) months prior to submission of the Tender. Or, if the Tenderer is a limited company or limited public company - certified copies of incorporation documents, affidavit or by-laws, showing managing directors list, authorized administrator, authorized signatory, current shareholders list, current memorandum, and company objectives issued and certified by the competent authority no more than six (6) months prior to submission of the Tender.
- ii. Tenderer company registration.
- iii. Copy of Value Added Tax registration (if any).
- iv. Tenderer declaration letter confirming non-relationship status with other opposing bidders.
- v. Power of Attorney (Submission) according to the form as given in Appendix 2-4 shall be affixed the thirty (30) baht value of duty stamps and provided with copies of identity card or passport of the persons who act for and on behalf of the company and the authorized representatives. In the case of a foreign Tenderer, such Power of Attorney (Submission) shall be certified by a Notary Public.
- vi. Company profile with reference job list in related field of the Activities present the experiences in related field of mechanical or process equipment fabrication, installation and construction services with petrochemical plants for at least 5 years.
- vii. Certify letter for job in related field of the Activities with minimum job value Baht 1,000,000, if any.

#### b) Part 2 - Technical Proposal,

Part 2 shall consist of following declaration tables and documents as described below.

- (1) Declaration tables for the Activities which meet the requirements detailed in Section 6 including its annexes. The Tenderer shall provide with scope of work declaration table in the proposal.

Table 1. Scope of works declaration

| No. | Description  | Tenderer's Declaration | Remarks |
|-----|--|------------------------|---------|
| 1   | Supply material according to item 4.1 of Section 6.  | [Comply or Not Comply] |         |
| 2   | Prepare welding procedure and welder qualification according to item 4.2 of Section 6.                                 | [Comply or Not Comply] |         |
| 3   | Fabrication in accordance with drawings, engineering specification and standard as specified in item 4.3 of Section 6. | [Comply or Not Comply] |         |
| 4   | Fabrication, inspection and provide report according to item 4.4 of Section  | [Comply or Not Comply] |         |
| 5   | Delivery and unloading according to item 4.5 of Section  | [Comply or Not Comply] |         |
| 6   | Modify the Lugs according to item 4.6 of Section   | [Comply or Not Comply] |         |
| 7   | Fabrication and installation with tolerance according to item 4.7 of Section   | [Comply or Not Comply] |         |
| 8   | Provide labor, construction accessories, tools, equipment and utilities according to item 4.8 of Section               | [Comply or Not Comply] |         |
| 9   | Provide documents according to item 4.9 of Section   | [Comply or Not Comply] |         |

- (2) Fabrication shop
- (3) Inspection and test plan
- (4) Project schedule including Gantt chart presentation.
- (5) Catalogue or technical data of materials from manufacturer.
- (6) Other technical info, if any.
- (7) If any, the Tenderer shall provide with his Tender full details, including but not limited to name of any subcontractor whom he intends to appoint to perform any aspect of the Activities.

*Note: Strictly no prices or reference to price shall be in the Technical Proposal. Violation of this requirement will be reason for rejection of the Tenders.*

c) Part 3 – Price Proposal,

Part 3 shall consist of following documents.

- (1) Price proposal letter with lump sum price for the Activities in THB currency, excluding VAT.
- (2) Acceptance letter on payment terms and payment conditions.

The Tenderer shall accept payment terms and conditions as described below:

i. Payment terms

- Advance Payment **30% of Contract Price**
- Achievement Upon contract signing, which is tentatively scheduled to be signed by July 16, 2024
- Payment Due Date +45 days from billing date

The Contractor shall provide bank guarantee as Advance Payment Bond in the amount equal to thirty (30) percent of the Contract Price to UCHA before

payment due date. The Advance Payment Bond shall be validated until the achievement date of Activities Milestone 2.

- Activities Milestone 1 **50% of Contract Price**

Achievement Upon delivery of all fabrication items to UCHA's site which is tentatively scheduled to be achieved by November 15, 2024

Payment Due Date +45 days from billing date

- Activities Milestone 2 **20% of Contract Price**

Achievement Upon Provisional Acceptance Completion (successful completion of modification and installation and handover of final project documents) which is tentatively scheduled to be achieved by December 31, 2024

Payment Due Date +45 days from billing date

The Contractor shall provide bank guarantee as Warranty Bond in the amount equal to ten (10) percent of the Contract Price to UCHA before payment due date. The Warranty Bond shall be validated for 12 months from the achievement date of Activities Milestone 2.

ii. Invoicing

The Contractor shall issue invoice for such payments to UCHA upon receiving of achievement certificate issued by UCHA.

iii. Payment of Contract Price

The Contractor will receive the payment for such payment terms within 45 days after invoicing date with completion of required documents.

iv. Bank Guarantee

The Contractor shall provide bank guarantee as Advance Payment Bond in the amount equal to thirty (30) percent of the Contract Price to UCHA before the payment due date for Advance Payment to the Contractor. The Advance Payment Bond shall be deemed as Performance Security and validated until the achievement date of Activities Milestone 2.

The Contractor shall provide bank guarantee as Warranty Bond in the amount equal to ten (10) percent of the Contract Price to UCHA before payment due date for Activities Milestone 2 to the Contractor. The Warranty Bond shall be validated for 12 months from the achievement date of Activities Milestone 2.

(3) Acceptance letter on Conditions of Contract as described in Section 5 which shall be a part of the Contract.

(4) Acceptance letter for project execution by knowing that UCHA is a registered industrial company in UBE Group (Thailand) Free Zone area, the Tenderer shall prompt to conduct such obligations for the Activities and coordinate with UCHA complying to regulations and requirements of the Customs Office.

The Tenderer shall also acknowledge that UCHA is eligible for exemption of import duties under Free Zone privilege. The Tenderer may quote for the best prices with applicable and eligible privilege such as duty drawback under Section 29 of Customs Act B.E. 2560, or completely import equipment.

(5) Table of price breakdown.

7.4 The Tenderer shall provide one (1) original for Part 1, 2 and 3, one (1) hard copy of Part 1, 2 and 3, and one (1) set of electronic files for Part 2. In any case where a Tenderer submits original documents but fails to provide the requisite number of copies as stipulated above then UCHA shall obtain such copies and charge all expenses incurred in so doing to the relevant Tenderer.

7.5 Packaging

Each part of the proposal as detailed in Item 7.3 shall be placed in separate and sealed packages, each bearing the address given in Item 11.2 of this Section. In addition, each package shall be clearly marked "**Tender for N<sub>2</sub>O Abatement Technology Construction and Modification Package**" together with the relevant part number and title as given in Item 7.3.

## 8. VALIDITY OF TENDERS

The Tender shall remain valid not less than sixty (60) calendar days from the Tender Submission Date. Tenders must be firm and cannot be altered (except as allowed for in the Tender Documents), withdrawn or resubmitted within such period.

## 9. ACTIVITIES SCHEDULE

The Tender shall perform to complete such works of the Activities within following schedule

9.1 Completion of fabrication by October 31, 2024 and prompt to delivery to site during November 1-15, 2024 upon request by UCHA.

9.2 Mechanical Completion, which shall mean completion of modification and installation within 3 working days, during December 1-3, 2024.

9.3 Provisional Acceptance Completion, which shall mean successful completion of modification and installation which shall be proofed by operation of equipment after plant start up without problem from default of the Activities and handover of final project documents, by December 31, 2024.

10. *Intentionally left blank*

## 11. SUBMISSION OF TENDER

11.1 Tender Submission Date

The Tender shall reach the Bidding Committee not later than **Monday, July 1, 2024 – 16:00 Bangkok Time Zone**.

11.2 Tender Submission Address

The Tenderer shall submit the Tender to the Bidding Committee by hand or registered courier at below address.-

Bidding Committee - N<sub>2</sub>O ABATEMENT TECHNOLOGY CONSTRUCTION AND MODIFICATION PACKAGE  
SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT  
UBE Chemicals (Asia) Public Company Limited  
140/6 Moo 4, Tapong Sub-district,  
Muang District, Rayong 21000,  
THAILAND  
[Procurement Office, Administration Building - 2<sup>nd</sup> Floor]

11.3. The Bidding Committee Bidding will:

- a) accept the Tender Documents, register them as evidence and sign and make a note on the envelope as to whom they belong.

- b) check Tender Security (if any) and issue a receipt to the person who submits the Tender package as evidence. If the Tender package is not correct, a note shall be made on the receipt and in the report.
- c) receive documents and evidence according to the list of documents of the Tenderers including catalogs or drawings, and specifications (if any) and to note the report if it is incorrect.

11.4 The Bidding Committee will not accept a Tender if:

- a) the Tenderer submits details different from the conditions stipulated in the Tender Documents and their differences cause any advantage or disadvantage to other Tenderers, and/or
- b) any correction, erasure or overwriting in the Tender submitted has not been duly signed and stamped by an authorized person, and/or
- c) the Tender reach the Bidding Committee later than date and time specified in item 11.1 of this Section.

## 12. TENDER EVALUATION

The Bidding Committee shall evaluate the Tender as follows.

### 12.1 Technical Proposal Evaluation

The Bidding Committee shall check and score required documents as described in item 7.3 a) (2) and 7.3 b) of this Section. Only Technical Proposal with score not less than 70% will be justified as passed for further Price Proposal evaluation

The Bidding Committee may ask for clarification from Tenderers as it deems necessary provided always that Tenderers shall provide the clarification(s) asked for without in any way changing or violating the substance of their Tender. Such clarification may be sought either through correspondence or by a meeting as UCHA may require. Any clarification shall be made within the time to be specified by UCHA otherwise the Tenderer will be either disqualified or his Tender evaluated accordingly at the sole discretion of UCHA. In the case of meetings, the Tenderer shall be represented by persons with adequate specialized knowledge and full delegated authority in writing to make decisions for and on his behalf in order that clarifications may be fully discussed and appropriate decisions reached at each such meeting. The Tenderer's response to any request for clarification made by UCHA shall be signed by the same person as the original Tender, or an alternate with a similar Power of Attorney to that called for in Item 7.3 a) (2) v. of this Section, and shall become part of his Tender. The Tenderer shall be solely responsible for all consequences of any failure on his part in making clarifications as required and within the time specified by UCHA.

The Bidding Committee will evaluate Technical Proposal by following guideline.

Table 2. Guideline for Technical Proposal Evaluation

| Subject   | Weight | Consideration                            | Point          |
|---|--------|--|----------------|
| 1. Tenderer Qualification Documents item 7.3 a) (2) i, ii and iii | 2%     | Availability and satisfaction level      | 0-100          |
| 2. Tenderer Qualification Documents item 7.3 a) (2) vi and vii    | 3%     | Availability and satisfaction level      | 0-100          |
| 3. Scope of works declaration                                     | 40%    | Comply all items or not                  | 0-100          |
| 4. Fabrication shop   | 20%    | Offer with satisfactory fabrication shop | 0/25/50/75/100 |
| 5. Inspection and test plan                                       | 10%    | Provide with satisfactory plan           | 0/25/50/75/100 |



|  |      |  |                |
|--|------|--|----------------|
| 6. Project schedule including Gantt chart presentation                             | 20%  | Provide with reasonable and clear time frame | 0/25/50/75/100 |
| 7. Other technical and project planning including organization and subcontracting. | 5%   | Provide with reasonable and clear info       | 0/25/50/75/100 |
| Total  | 100% |  |                |

Score of Technical Proposal will be a part of total score with 70% weight.

## 12.2 Price Proposal Evaluation

The Bidding Committee shall check required documents as described in item 7.3 c) of this Section. Only tenderer with score of Technical Proposal not less than 70% will be qualified for Price Proposal evaluation.

The Bidding Committee will evaluate Price Proposal by following guideline.

Table 3. Guideline for Price Proposal Evaluation

| Subject  | Weight | Consideration  | Point          |
|--|--------|--|----------------|
| 1. Price   | 50%    | Price in comparison with budget                          | 0 - 100        |
| 2. Acceptance to payment terms and conditions (7.3 c) (2))       | 20%    | Acceptance with or without conditions acceptable by UCHA | 0/25/50/75/100 |
| 3. Acceptance to conditions of contract (7.3 c) (3))             | 15%    | Acceptance with or without conditions acceptable by UCHA | 0/25/50/75/100 |
| 4. Acceptance and acknowledgement of Free Zone condition of UCHA | 15%    | Acceptance with or without conditions acceptable by UCHA | 0/25/50/75/100 |
| Total  | 100%   |  |                |

Score of Price Proposal will be a part of total score with 30% weight.

## 13. RESERVED RIGHTS

- 13.1 UCHA reserves the right to cancel the Invitation to Tender or reject any or all of the Tenders, based on its best interest, and is not bound to accept any of the Tenders, and Tender Security (if any) of any rejected Tender will be returned accordingly.
- 13.2 UCHA reserves the right to accept, at its sole discretion, any minor error, irregularity, omission or disorder in a Tender, if it considers, based on its own interpretation, that the errors, irregularities, omissions or disorders are minor or immaterial.
- 13.3 UCHA reserves the right to accept any Tender – including but not limited to the lowest – which it considers to be in its best interests.
- 13.4 UCHA reserves the right to modify or amend any or all of the Tender Documents and notify the Tenderers in the form of an Addendum. Each Addendum shall be numbered sequentially as issued. The Tenderer will be notified of and provided with each Addendum sequentially as issued. All Addenda so issued shall form an integral part of the Tender Documents. The Tenderer should note that each Addendum issued will be accompanied by a form of “Confirmation of Receipt of Addendum”, which the Tenderer shall sign as instructed therein and return to UCHA, no later than two (2) working days after the receipt thereof.
- 13.5 UCHA reserves the right to accept or reject Tender in whole or in part.

- 13.6 UCHA reserves the right to evaluate reservations in the Tender. Tenders containing major deviations or reservations will be rejected.
- 13.7 UCHA shall not be liable to any claim regarding such waiver or rejection or any procedure of the evaluation of the Tender and not be bound to give any reasons for the decision to any Tenderer.
- 13.8 UCHA reserves the right to review the total prices and purchase any part or all items proposed by the Successful Tenderer.
- 13.9 If the Successful Tenderer fails to enter into a contract or agreement with UCHA within the time specified under the Tender Documents, the Committee may consider the Tenderer who has the next rank of total proposal score.
- 13.10 In case it appears that only one Tenderer has been passed the evaluation, UCHA may, at its absolute discretion upon reasonable ground, proceed with procurement process without having to cancel the Tender.
- 13.11 Should a Tenderer either withdraw his Tender before the expiration of the validity period or extension thereof or, in the event that he has been selected as the Successful Tenderer, refuse or fail to execute the Contract within a period of fifteen (15) days of the Notice of Award of such selection or deposit the Performance Security in accordance therewith, then without prejudice to any other rights which UCHA may possess, UCHA shall confiscate the Tender Security (if any) and reject the Tender. In addition, UCHA reserves the right to add the name of any such Tenderer to the “Black List” of persons excluded from procurement programs of UCHA.
- 13.12 If the Successful Tenderer fails to enter into a contract within the time specified in accordance with Item 14 of this Section by its default, UCHA shall confiscate the Tender Security (if any) and claim the Tenderer for any cost of damages which may occur. In addition, UCHA reserves the right to add the name of any such Tenderer to the “Black List” of persons excluded from procurement programs of UCHA.
- 13.13 UCHA reserves the right to modify any of the conditions contained in the Contract provided always that such modification shall be in accordance with any UCHA requirements and/or related laws.

#### **14. AWARD OF CONTRACT**

The Contract will be awarded as soon as practicable to the most satisfactory Tenderer by the issue of a formal Letter of Intent to Award the Contract. Within three (3) calendar days from the date of receipt of the Letter of Intent to Award the Contract, the Successful Tenderer shall confirm its acceptance to engage into the contract with UCHA by authorized representative empowered to execute the Contract.

#### **15. PREPARATION AND EXECUTION OF THE CONTRACT**

Two (2) original copies of the Contract Documents will be prepared by UCHA and will be submitted to the Successful Tenderer. The Successful Tenderer shall execute the Contract and submit both original copies to UCHA along with Performance Security. UCHA will execute both copies, retain one (1) copy, and forward one (1) copy to the Contractor.

The Contractor shall provide three (3) copies of the Technical Proposal and other engineering data, special forms or other documents, which are required to be incorporated in the Contract to UCHA.

#### **16. LIQUIDATED DAMAGES**

In the event that the Mechanical Completion of Activities is delayed for other than excusable causes beyond **December 3, 2024**, the Contractor agrees to pay to UCHA as liquidated damages starting from the date following the specified date up to the actual Mechanical Completion date, in the amount of one-tenths (0.1) percent of the Contract Price per day.

## 17. INSURANCE

The Contractor shall provide the insurances as follows:

### 17.1 Insurance of Activities

The Contractor shall, so far as insurable by using his best effort and its own cost, insure in the joint names of UCHA with insurer registered in Thailand against all loss or damage to the Activities from whatever cause including strike, riot, and civil commotion, arising during the performance under the Contract are covered up to the end of Warranty Period.

### 17.2 Liability Insurance

The Contractor shall carry insurances, at his own cost, with insurer registered in Thailand for:

- a) Cargo Transit Insurance;
- b) Construction All Risks Insurance;
- c) Third Party Liability Insurance;
- d) Automobile Liability Insurance;
- e) Workmen's Compensation;
- f) Existing Facility Insurance; and
- g) Such other insurance as may be specifically agreed upon by the parties

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**APPENDIX 2-2**

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**APPENDIX 2-3 FORM OF BANK GUARANTEE (Advance Payment)**

**FORM OF BANK GUARANTEE**

**(Advance Payment)**

No. \_\_\_\_\_

Date: \_\_\_\_\_

WHEREAS, \_\_\_\_\_ [Name of Contractor] has entered into a Contract with UBE Chemicals (Asia) Public Company Limited (hereinafter called UCHA) to undertake \_\_\_\_\_ [Activities] as per Contract No. \_\_\_\_\_ [Contract Number] executed on \_\_\_\_\_ [date] (hereinafter referred to as "the Contract"). Whereby \_\_\_\_\_ [Name of Contractor] is entitled to an advance payment of Baht \_\_\_\_\_ [figure] ( \_\_\_\_\_ [in words] Baht only) which is equivalent to \_\_\_\_\_ [in word] ( \_\_\_\_\_ [figure] ) percent of items defined in the Contract.

WHEREAS \_\_\_\_\_ [Name of Contractor] wishes to draw the said advance payment of Baht \_\_\_\_\_ [figure] ( \_\_\_\_\_ [in words] Baht only ) from UCHA against presentation of a Bank Guarantee for the same amount.

NOW THEREFORE, by this Letter of Guarantee, we \_\_\_\_\_ [Name of Commercial Bank in Thailand] Business Address No. \_\_\_\_\_ hereby agree to guarantee to UCHA under the Conditions set below:

1. We hereby guarantee repayment of the advance money received by \_\_\_\_\_ [Name of Contractor] to the extent of Baht \_\_\_\_\_ [figure] ( \_\_\_\_\_ [in words] Baht only).
2. This Letter of Guarantee shall be valid and in full force and effect from the date of execution of the above-mentioned Contract until \_\_\_\_\_ [date] (the date of the achievement of Activities Milestone 1). We shall in no event withdraw this Letter of Guarantee for any reasons so far as the period stipulated under the Contract.
3. If \_\_\_\_\_ [Name of Contractor] is required to refund advance money stated in clause 1 above to UCHA in a case where \_\_\_\_\_ [Name of Contractor] acts contrary to or fails to act in accordance with the Contract thereby resulting in failure to meet, or in breach of the Contract, or any of the Conditions attached thereto, or if \_\_\_\_\_ [Name of Contractor] is required to refund the said advance money to UCHA in any other case we hereby agree to repay the said advance money in the full amount of Baht \_\_\_\_\_ [figure] ( \_\_\_\_\_ [in words] Baht only) or the outstanding amount thereof, to UCHA within seven (7) days from the receipt of written request to do so from UCHA, without the necessity of previous request to \_\_\_\_\_ [Name of Contractor] for repayment of the same without whatsoever right of objection on our part.
4. We agree unconditionally to irrevocably guarantee as primary obligator, the payment to UCHA on its first demand, without whatsoever right of objection on our part and without its first claim on \_\_\_\_\_ [Name of Contractor] in the amount of not exceeding Baht \_\_\_\_\_ [figure] ( \_\_\_\_\_ [in words] Baht only) in the event of any damages, liquidated damages (penalty), expenses or if any obligations expressed in the above-mentioned Contract have not been fulfilled by \_\_\_\_\_ [Name of Contractor].
5. If, at any time in the course of the execution of the Contract UCHA grants a time extension, or allows \_\_\_\_\_ [Name of Contractor] to deviate from any terms and conditions of the Contract without our knowledge, it shall be deemed that such grants shall have been made with our consent. The validity of this Guarantee shall be extended accordingly.
6. We shall in no event withdraw this Guarantee for any reason so far as \_\_\_\_\_ [Name of Contractor] is still liable to UCHA under the Contract.

IN WITNESS WHEREOF, we \_\_\_[Name of Commercial Bank in Thailand]\_\_\_ have caused these presents to be signed by our authorized representative and our corporate seal to be herein to affixed.

(Signed) \_\_\_\_\_ Guarantor  
( \_\_\_\_\_ )

(Signed) \_\_\_\_\_ Witness  
( \_\_\_\_\_ )

(Signed) \_\_\_\_\_ Witness  
( \_\_\_\_\_ )

**APPENDIX 2-4 FORM OF POWER OF ATTORNEY (Submission)**

**FORM OF POWER OF ATTORNEY**

(Submission)

We, [Name of Company], a corporation duly registered and existing under the laws of [country] having its head office at [address] (hereinafter called the "Company"), represented by [name of registered authorizer] acting for and on behalf of the Company, hereby execute this Power of Attorney for the following purposes :

1. The Company appoint, constitute and authorize [name of the authorize representative] to be the true and lawful agent and attorney-in-fact of the Company (hereinafter called the "Authorized representative") to do, execute and perform all or any of the acts and things, as stated in clause 2 below, relating to UCHA's announcement of invitation to Tender No.      for                     .
2. The Authorized representative shall be entitled to act on the followings:
  - sign, seal, initial and certify any documents pertaining to the Tender Documents (if any); and
  - submit the Tender Documents to the Bidding Committee on designated date, time and place; and
  - give explanations and/or clarifications related to our Tender Documents to the Bidding Committee; and
  - sign, initial, certify, and deliver any documents and/or related amendments pertaining to the aforesaid Tender Documents; and
  - sign, seal, initial and certify any documents pertaining to the Contract and amendments, exhibits, schedule and/or related attachments and do all acts and things whatsoever necessary and proper to execute the Contract and/or its amendments.
3. The Company hereby ratify and confirm whatsoever the Authorized representative under the Power of Attorney may lawfully do and/or cause to be done by virtue thereof as if those acts and things have been done by us and with our full responsibility.

IN WITNESS WHEREOF , this Power of Attorney has been duly executed on this      day of     .

(Signed) \_\_\_\_\_

the Company Authorized Representative

( \_\_\_\_\_ )

(Signed) \_\_\_\_\_ Witness

( \_\_\_\_\_ )

(Signed) \_\_\_\_\_ Witness

( \_\_\_\_\_ )



## **SECTION 3**

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**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY  
CONSTRUCTION AND MODIFICATION PACKAGE**

**THIS PACKAGE IS A PART OF  
SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**

**SECTION 4  
FORM OF CONTRACT**

**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY  
CONSTRUCTION AND MODIFICATION PACKAGE**

**THIS PACKAGE IS A PART OF  
SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**

**CONTRACT NO. ....**

**LUMP SUM CONTRACT  
FOR  
N<sub>2</sub>O ABATEMENT TECHNOLOGY  
CONSTRUCTION AND MODIFICATION PACKAGE**

**BETWEEN  
UBE CHEMICALS (ASIA) PUBLIC COMPANY LIMITED  
AND  
[CONTRACTOR]**

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| <b>Part I</b>   | <b>Form of Agreement</b>                           |
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**JULY 16, 2024**

**PART I**  
**FORM OF CONTRACT**

**LUMP SUM CONTRACT FOR N<sub>2</sub>O ABATEMENT TECHNOLOGY  
CONSTRUCTION AND MODIFICATION PACKAGE**

This Lump Sum For N<sub>2</sub>O Monitoring System Package (“**Contract**”) is made and entered into on this 16<sup>th</sup> day of July, 2024 (“Effective Date”) in Bangkok, Thailand.

By and between

**UBE CHEMICALS (ASIA) PUBLIC COMPANY LIMITED**, a public limited company organized and existing under the laws of Thailand having its registered principal place of business at 98 Sathorn Square Office Tower, 18th Floor, North Sathorn Rd., Silom Sub-district, Bangrak District, Bangkok 10500 (hereinafter referred to as the “**UCHA**”); and

**[CONTRACTOR NAME]**, a company organized and existing under the laws of Thailand having its registered principal place of business at **[ADDRESS]** (hereinafter referred to as the “**Contractor**”).

**Whereas,**

UCHA desires to engage the Contractor to the Lump Sum Contract for N<sub>2</sub>O Abatement Technology Construction and Modification Package at UCHA’s site in Rayong Province, Thailand, and the Contractor has agreed to such engagement upon the subject to the terms and conditions hereinafter specified:

**Now It Is Hereby Agreed as Follows:**

1. The principal subject matter of this Contract is engineering design, supply of required materials, fabrication, delivery, modification and installation, and guarantee of supply and workmanships to UCHA for N<sub>2</sub>O Abatement Technology Construction and Modification Package as described in Part III - Technical Specifications and Scope of Works (hereinafter referred to as “**Activities**”).
2. The details of the Activities to be performed by the Contractor shall be as specified in Part III attached hereto.
3. In consideration of the Activities to be performed by the Contractor, UCHA commit to pay the Contractor for the Lump Sum Price excluding value added tax (hereinafter referred to as the “**Contract Price**”) as described here below,

**THB: XXX,XXX (XXXXXXXXXXXXXXXXXXXXXXXXXX Thai Baht Only)**

4. The Contract Price shall be paid by UCHA, to the Contractor corresponding to the payment terms as specified in clause 7 against presentation by the Contractor of the following documents to UCHA:
  - a) Commercial Invoices
  - b) UCHA’s certificate certifying that the Contractor has achieved the relevant progress for the payment.
5. Value added tax of such payments will be deducted with withholding tax and the settled value shall be paid to the Contractor by UCHA together with withholding tax certificate issued by UCHA.
6. The following schedule shall be applied to this Contract:

Effective Date : July 16, 2024  
Mechanical Completion : December 3, 2024  
Provisional Acceptance Date : December 31, 2024

7. Payment Terms and Due Date

a) Advance Payment **THB xxxxxxxx (30% of Contract Price)**

|              |                              |
|--------------|------------------------------|
| Achievement  | <u>Upon contract signing</u> |
| Due Date     | <u>16 July 2024</u>          |
| Billing Date | <u>by 31 July 2024</u>       |
| Payment Date | <u>by 15 September 2024</u>  |

The Contractor shall provide bank guarantee as Advance Payment Bond in the amount equal to thirty (30) percent of the Contract Price to UCHA before payment due date. The Advance Payment Bond shall be validated until the achievement date of Activities Milestone 2.

b) Activities Milestone 1 **THB xxx,xxx (50% of Contract Price)**

|              |  |
|--------------|--|
| Achievement  | <u>Upon delivery of all fabrication items to UCHA's site</u> |
| Due Date     | <u>15 November 2024</u>                                      |
| Billing Date | <u>by 30 November 2024</u>                                   |
| Payment Date | <u>by 15 January 2025</u>                                    |

c) Activities Milestone 2 **THB xxx,xxx (20% of Contract Price)**

|              |  |
|--------------|--|
| Achievement  | <u>Upon Provisional Acceptance Completion (successful completion of modification and installation and handover of final project documents)</u> |
| Due Date     | <u>31 December 2024</u>  |
| Billing Date | <u>by 15 January 2025</u>  |
| Payment Date | <u>by 28 February 2025</u>   |

The Contractor shall provide bank guarantee as Warranty Bond in the amount equal to ten (10) percent of the Contract Price to UCHA before payment due date. The Warranty Bond shall be validated for 12 months from the achievement date of Activities Milestone 2.

8. This text of Contract and the documents attached hereto shall constitute an integral part of the Contract and are intended to be correlative, complementary and mutually explanatory of one another.
9. This Contract and the documents attached hereto constitutes the entire agreement between UCHA and the Contractor with respect to the subject matter of the Contract and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made prior to the signing of date of this Contract. In case any discrepancies occur between this Contract and the documents attached, this Contract shall prevail.

- Signing next Page -

**IN WITNESS WHEREOF**, UCHA and the Contractor have caused this Contract to be duly executed on the Effective Date mentioned above and signed by their duly authorized representatives.

**UBE Chemicals (Asia) Public Company Limited**

By \_\_\_\_\_ and \_\_\_\_\_  
(Mr. Watchara Pattananijnirundorn) (Mr. Benjaphol Tangsripairoje)  
President & CEO Executive Vice President

.....

By \_\_\_\_\_ and \_\_\_\_\_  
([insert name]) ([insert name])  
[Position] [Position]

**SECTION 5  
CONDITIONS OF CONTRACT**

**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY  
CONSTRUCTION AND MODIFICATION PACKAGE**

**THIS PACKAGE IS A PART OF  
SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**

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### **Article 1 : Definitions**

The following words and expressions shall have the meaning hereby assigned to them except where the context requires otherwise:

- 1.1 **Activities** means all the works to be executed by the Contractor according to Part III - Technical Specifications and Scope of Works.
- 1.2 **Appendix** or **Appendices** means the documents listed, and attached to the Contract and incorporated therein and made the integral part hereof.
- 1.3 **Certificate of Final Acceptance** means a certificate to be issued by UCHA upon completion of all Activities, obligations and Contractor's liabilities according to Scope of Works.
- 1.4 **Certificate of Provisional Acceptance** means a certificate to be issued by UCHA upon successful completion of proof of function during normal operation conditions.
- 1.5 **Commissioning** means the carrying out of the Activities in order to ensure that all units are ready and safe for operation. Commissioning shall be carried out in an orderly manner and in accordance with the best practices of the industry and will include the calibration of all instruments and setting of electrical and other safety devices.
- 1.6 **Commissioning Completion** means the completion of all installation works, including commissioning and training.
- 1.7 **Completion Date** means the completion date as specified in Certificate of Provisional Acceptance.
- 1.8 **Contract** means this contract between UCHA and the Contractor and all documents, appendices referred to herein, and which form an integral part of this agreement.
- 1.9 **Contract Price** means the total value of this Contract as set forth in the Contract, subject to such additions thereto or deductions therefrom as may be made due to execution of Contract Amendments.
- 1.10 **Contractor** means **[Company]** who agrees to undertake to perform the works according to Scope of Works, inter alia, the Contractor's authorized representatives, successors, permitted assignees, sub-contractors, and Vendors
- 1.11 **Day** means calendar day as refer to local time of Thailand.
- 1.12 **Effective Date** means the signing date hereof.
- 1.13 **Provisional Acceptance** means the successful completion of proof of function during normal operation conditions of the plant.
- 1.14 **Schedule of Work** means those activities and times set forth in the Part III - Technical Specifications and Scope of Works and Part IV – Contractor's Proposal.
- 1.15 **Scope of Works** means those activities set forth in Part III - Technical Specifications and Scope of Works attached hereto undertaken and completed by the Contractor.
- 1.16 **Technical Specifications** means the technical standards included in Part III - Technical Specifications and Scope of Works, and such other technical standards and design criteria included in the Appendices attached hereto, as have been or may be developed for the Plant pursuant to this Contract.
- 1.17 **UCHA** means **UBE Chemicals (Asia) Public Company Limited**, its representatives, consultants, employees and any third party whom UCHA authorizes in writing from time to time to act on behalf of UCHA.
- 1.18 **Vendor** means any person or company to whom a purchase order is issued by the Contractor for the supply of equipment including Vendor's service for erection, training and commissioning of any such Equipment (but not for the supply of erection labor) and materials.

**Article 2: Independent Contractor**

The Contractor at all times hereunder in the performance of Activities shall act as an independent Contractor and not as the agent of UCHA and, as such, any and all individuals utilized by the Contractor shall be the employees of the Contractor and not those of UCHA or UCHA's authorized representative(s), and the Contractor shall be solely responsible for the payment of any individual. The Contractor will have the authority to control and direct the performance of its employees with respect to the detail of its Activities, subject to UCHA's right to give general instruction and of inspection and supervision as specified in this Contract. The presence of and the inspection and supervision by UCHA's representative shall not relieve the Contractor from its obligations and responsibilities.

The Contractor represents that it is fully experienced, properly qualified, registered, licensed, equipped, organized, and financed to perform the Activities under this Contract. Nothing contained in this Contract or any subcontract award by the Contractor shall create any contractual relationship between any such Vendor or sub-contractor and UCHA or UCHA's authorized representative(s). The Contractor shall perform its Activities hereunder in accordance with its own methods subject to compliance with the Contract.

The Contractor shall, at its own cost, supply and provide accommodation, food, transportation and all other necessary facilities for all its personnel including those of sub-contractors and Vendors, and shall pay all salaries, benefits, taxes and all other costs for such personnel in accordance with laws and regulations of Thailand.

**Article 3: UCHA's Representative**

3.1 UCHA shall appoint UCHA's Representative and notify the Contractor in writing of the name of UCHA's Representative. UCHA may from time to time appoint some other person as UCHA's Representative in place of the person previously so appointed and shall give written notice to the Contractor without delay.

UCHA's Representative for this Contract is as follows:

UCHA's Representative                      Mr. Pasit Dokkulap  
[pasit@ube.co.th](mailto:pasit@ube.co.th)

3.2 UCHA's Representative shall represent and act for UCHA at all times during the terms of the Contract. All notices, instructions, orders, certificates, approvals and all other communications under the Contract given by UCHA shall be given by UCHA's Representative, except as herein otherwise provided. All notices, instructions, information and other communications given by the Contractor to UCHA under the Contract shall be given to UCHA's Representative, except as otherwise provided.

**Article 4: Contractor's Representative**

4.1 The Contractor shall appoint the Contractor's Representative and shall notify UCHA in writing of the person so appointed.

The Contractor's Representative for this Contract is as follows:

Contractor's Representative                      [Name]  
[\[e-mail\]](#)

4.2 The Contractor's Representative shall represent and act for the Contractor at all times during the terms of the Contract and shall give to UCHA all notices, instructions, information and all other communications under the Contract. All notices, instructions, information and all other communications given to the Contractor under the Contract shall be given to the Contractor's Representative, except as herein otherwise provided. The Contractor shall not revoke the

appointment of the Contractor's Representative without UCHA's prior written consent, which shall not be unreasonably withheld.

- 4.3 From the commencement of the Activities at the site until the Provisional Acceptance date, the Contractor's Representative shall appoint a suitable person as the project manager (hereinafter referred to as "**Project Manager**").

The Project Manager shall supervise all Activities according to Scope of Works done at the site by the Contractor and shall be presented at the site throughout normal working hours. Whenever the Project Manager is absent from the site, a suitable person shall be appointed to act as his deputy. UCHA and UCHA's Representative shall give all notices, instructions, information and other communications appertaining to the execution of the work at the site to the Project Manager, or, in his absence, his deputy.

#### **Article 5: UCHA's Responsibility**

- 5.1 UCHA shall ensure the correctness and exactitude of all information and/or data to be supplied by UCHA for the Contractor to perform the Scope of Works hereto except when otherwise stated in this General Conditions of the Contract.
- 5.2 UCHA shall be responsible for acquiring and providing legal and physical possession of the site and accesses thereto and providing possession and use of and access to all other areas required for the Activities including all requisite rights of way according to Scope of Works.
- 5.3 UCHA shall be responsible for the making of payments as specified in the Contract.

#### **Article 6: Contractor's Responsibility**

- 6.1 The Contractor shall exercise all reasonable skill, care and diligence in the performance of its obligations under the Contract and shall carry out all its responsibilities in accordance with recognized professional standards and good engineering practice.
- 6.2 The Contractor shall employ only competence and skilled personnel to perform the Activities. UCHA reserves the right to require the removal of any personnel of the Contractor without stating a reason. The Contractor is responsible for maintaining labor relations in such manner that there is harmony among all personnel.
- 6.3 The Contractor shall cooperate with UCHA in enforcing UCHA's rules and regulations and in maintaining conditions which maximize the efficiency of the performance of the Activities including, but not limited to, starting and quitting times, smoking regulations, check-in and check-out procedures, safety regulations, and daily clean-up.
- 6.4 The Contractor shall have the sole responsibility of satisfying itself concerning the nature and location of the work, and the general and local conditions, particularly those conditions affecting transportation, access, disposal, availability and quality of labor, availability and condition of roads; physical conditions at the site as a whole; subsurface geology, and nature and quantity of surface and subsurface materials to be encountered; Equipment and facilities needed preliminary to and during performance of this Contract; and all other matters which can in any way affect performance of this Contract or the cost associated with such performance. The failure of the Contractor to acquaint itself with any applicable conditions shall not relieve it from the responsibility for satisfactorily performing this Contract.
- 6.5 The Contractor shall comply with all laws and regulations in force in Thailand whether national, provincial, municipal or otherwise, affecting the performance of the Contract and binding upon the Contractor.

- 6.6 The Contractor shall at its own expenses acquire all permits, approvals and/or license from all local, state or national government authorities of public service undertaking in Thailand which such authorities require the Contractor to obtain its name and which are necessary for the performance of the Contract.
- For the Construction Permit from local government, if required, the Contractor is responsible to provide necessary documents for permission application by UCHA.
- 6.7 The Contractor shall prepare all the plans and specifications necessary for the efficient and timely conduct of procurement and construction related to Scope of Works. All plans, specifications are subject to UCHA's review, comments and approval.
- 6.8 Except as may be expressly provided otherwise in this Contract, the Contractor shall procure, furnish and deliver to site, all equipment and materials to be incorporated into the Activities. Contractor shall perform all checks and approvals of drawings and specifications submitted by Vendors and sub-contractors and shall perform all expediting, inspection, transportation and receiving functions necessary to complete the Activities.
- 6.9 The equipment and materials procured for incorporation into the Scope of Works shall be manufactured by or procured from the firm specified in Approved Vendor List (AVL), if any, except as may be otherwise approved by UCHA.
- 6.10 Except utilities and consumable for commissioning activities and utilities supplied through UCHA's facilities i.e., fuel gas, steam, water, nitrogen (N<sub>2</sub>) and etc. which will be provided by UCHA at UCHA's cost, the Contractor shall provide at its expenses all consumable and utilities for construction and cleaning works.
- 6.11 The Contractor shall be responsible in delivery of all equipment and materials to the site including its unloading, discharging and landing, storing and preserving on the site at the Contractor own cost.
- 6.12 The Contractor shall offer the right of first refusal to UCHA to purchase any surplus equipment and materials and the price for such equipment and materials shall be negotiated in good faith. In no case shall the price be greater than the Contractor's invoice price.

**Article 7 : Commencement, Prosecution and Completion of Work**

- 7.1 The Contractor shall commence the Activities on the Effective Date and shall proceed the Activities according to the Schedule of Works.
- 7.2 The Contractor shall monitor progress of all works specified in the program and shall prepare and supply a progress report to UCHA timely. The progress report shall be in a form acceptable to UCHA and shall indicate;
- a) Percentage completion achieved compared with the planned percentage completion for each activity,
  - b) Whether each activity is ahead of or behind the program, and in the latter case, giving comments and likely consequences and stating the corrective action being taken.
- 7.3 If at any time the Contractor's actual progress fall behind the program referred to in Article 7.2, or it becomes apparent that it will so fall behind, the Contractor shall produce, a revised program taking into account the prevailing circumstances and notify UCHA of the steps being taken to expedite progress so as to attain required targets within the time specified in Schedule of Works.
- 7.4 The Contractor shall be solely responsible for all equipment and materials until the Activities are accepted as indicated by issuance of the Final Acceptance Certificate.
- 7.5 The Contractor shall conduct its operations as not to damage, close, or obstruct any utility installation (such as water lines, gas lines, sewage lines, electrical and telephone lines) or other

property until permits thereof have been obtained from UCHA. If facilities are closed, obstructed, damaged or rendered unsafe by the Contractor's operations, the Contractor shall, at its expense, make such repairs and provide such temporary guards, lights and other signals as necessary or required for safety and as will be acceptable to UCHA.

- 7.6 The Contractor shall preserve and protect all cultivated and planted areas, and vegetation such as trees, plants, shrubs and grass on or adjacent to the premises, which, as determined by UCHA, do not unreasonably interfere with the performance of this Contract. The Contractor shall be responsible for damage to any such areas and vegetation and for unauthorized cutting of trees and vegetation, including without limitation, damage arising from the performance of its Activities through operation of equipment or stockpiling of materials. All costs in connection with any repairs or restoration necessary or required by reason of any such damage or unauthorized cutting shall be solely borne by the Contractor.
- 7.7 The Contractor shall, at all times, keep its work areas in a neat, clean, and safe condition. Waste material shall be removed by the Contractor from work areas on a continuous basis and dumped at a Contractor determined disposal area. Upon completion of any portion of the Activities, the Contractor shall promptly remove all of its equipment, construction plant, temporary facilities and surplus materials not to be used at or near the same location during later stages of Activities. Upon completion of any portion of the Activities and when needed by reason of UCHA, the Contractor shall at its expense, carry out the following to the satisfaction of UCHA:
- Dispose of all plant, rubbish, unused materials, and other equipment and material belonging to it or used in the performance of the Activities in the areas designated by UCHA.
  - Clear the site from all materials, earth and debris, grade it and leave the premises in a neat, clean and safe condition.

If the Contractor fails to comply with the foregoing, the same may be accomplished by UCHA at the Contractor's expense.

- 7.8 Throughout the performance of the Activities, the Contractor shall conduct all operations in way as to minimize impact upon the natural environment and comply with all laws, regulations, and rules in respect of environmental protection applicable to the site. The Contractor shall, at its expense, provide satisfactory facilities to prevent the introduction of any substance or materials into any body of water, including ground water, which may pollute the water or be harmful to life. The Contractor shall be responsible for all costs and expenses incurred due to its failure to observe this obligation. The Contractor further to undertake to hold harmless and indemnify UCHA against any losses, costs and damages incurred or suffered by UCHA due to the failure or negligence of the Contractor.
- 7.9 The Contractor shall at all times conduct all works under this Contract in a manner to avoid bodily harm to persons or damage to property. The Contractor shall promptly take all precautions, which are necessary and adequate against any condition, which involves a risk of bodily harm to persons or a risk of damage to any property. The Contractor shall continuously inspect all works, materials and equipment to discover and determine any such conditions and shall be solely responsible for the discovery, determination, outcome and correction of such conditions. In case there is any bodily harm to persons or damage to property caused by the Contractor, its employee or its sub-contractor, the Contractor shall be responsible for all damages at its own cost.
- The Contractor shall comply with all applicable safety laws, regulations and standards. The Contractor shall coordinate with other contractors and sub-contractors on the site on safety matters and shall promptly comply with any specific safety instructions or directions given to the Contractor by UCHA.
- 7.10 The Contractor shall comply with all applicable laws, regulations and standards pertaining to fire prevention and protection matters, including specific instructions or directions given to the Contractor by UCHA.

### **Article 8: Change of Works**

- 8.1 UCHA shall have the right to request and subsequently to order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the Activities (hereinafter called "**Change**"), provided that such Change falls within the general scope of the Activities and does not constitute new or unrelated work and that it is technically practicable, taking into account both the state of advancement of the Activities and the technical compatibility of the change envisaged with the nature of the Activities as initially agreed between UCHA and the Contractor.
- 8.2 The Contractor may from time to time during its performance of the Contract propose to UCHA any Change, which the Contractor considers necessary or desirable to improve the quality, efficiency or safety of the Activities including but not limited to the discovery of underground obstructions on the site (but not merely variations in soils conditions from those anticipated) which directly affect the Activities and could not reasonably have been foreseen by Contractor. UCHA may at its discretion approve or reject any Change proposed by the Contractor, provided that UCHA shall not unreasonably disapprove any Change proposed by the Contractor to ensure the safety of the Activities and/or related to such underground obstruction discovery.
- 8.3 Notwithstanding Article 8.1 and Article 8.2 above, no change made necessary due to any default of the Contractor in the performance of its obligations under the Contract nor any change made necessary to fulfill safety or good engineering practice under the Contract shall be deemed to be a Change and such change shall not result in any adjustment of the Contract Price or the Completion Time Guarantee.

In addition, a request by UCHA that the Contractor perform the Activities not specifically included within the Scope of Activities will not be considered a request for Change in the Scope of Activities if it is reasonable to infer that the Activities requested were intended to be within the Scope of Activities.

- 8.4 The Contractor shall at all times continue the Activities in accordance with the Contract as modified by the Change under this Clause. Any protest on the part of the Contractor or any dispute whatsoever shall not be reason for work stoppage, interruption, or delay on the part of the Contractor.

### **Article 9 : Payment and Invoicing Procedures**

#### 9.1 Contract Price

Unless otherwise specified, the Contract Price represents the sum of the individual lump sum prices as further broken down in **Part IV – Contractor’s Proposal** for all the Activities included and defined in this Contract.

Such Contract Price includes, but not limited to, the following specific items:

- a) All costs for Contractor’s, sub-contractors’ Vendors’ personnel during design, procurement, installation, construction, commissioning until the expiration of the warranty obligations as specified in Article 13 hereof.
- b) Except to the extent expressly provided otherwise, Contract Price including overhead, costs and profit and all taxes, customs duties and other duties, levies and charges which the Contractor, sub-contractors, Vendors, and their respective personnel are required to pay including, but not limited to, the following:
  - (1) Stamp duties, business tax, municipal tax, companies’ income tax, profit, remittance tax and all other taxes, surcharges, penalties and interest payable under the revenue code and other laws of Thailand.

- (2) All fees and other charges payable to any Governmental Organizations of Thailand, regarding the importation, unloading, clearing and transportation of equipment and materials into Thailand for the Activities.
  - (3) Fees and any other charges for visas, work permits, tax clearances and similar expenses for the Contractor's, sub-contractor's, and Vendor's personnel visiting or working in Thailand, including without limitation workmen's compensation, contributions to Compensation Fund, disability payments and other benefits.
  - (4) Any and all tariffs, duties, taxes and charges levied by any foreign jurisdiction on the Contractor, sub-contractors, Vendors, Licensers and their personnel;
  - (5) All costs of import and deport of construction plant temporary facilities, construction camp, special tools and instruments imported into Thailand for the purpose of performing the Activities, or Personal effects of the Contractor's, sub-contractor's, and Vendor's personnel, and on all other goods imported or deported by the Contractor, sub-contractors and Vendors.
  - (6) All income taxes, surcharges, penalties and interest payable by personnel of the Contractor, sub-contractors and Vendors.
  - (7) All fees and other costs in connection with the grant of licenses.
  - (8) All fees and other costs in connection with obtaining licenses, permits and other permissions required to do business in Thailand or perform the Activities.
- c) The Contract Price is not subject to escalation for any reason. No adjustments in the said Contract Price will be made as a result of changes in the value of any currency and shall be payable only in the currency stated herein or as mutually agreed to by the parties.
- The Contract Price shall be adjusted only as provided by the terms of this Contract.
- d) The Contract Price for this contract is agreed under import duties and import taxes exemption privilege of UCHA in which the site of the Activities is in UBE Group (Thailand) Free Zone area that UCHA is an industrial operator and has the said privilege.
- e) The Contract Price is excluding value-added tax.

Subject to the provisions of the above clauses, all cost of the executing the Activities including overhead and profit shall be at the sole risk of the Contractor who shall be deemed to have obtained all information and taken into account all circumstances which may affect the costs in establishing the Contract Price.

## 9.2 Invoicing Procedures

The payment of Contract Price shall, subject to the approval of UCHA, be made in the following manners:

### a) Invoicing

The payment shall be made upon payment term and milestones achievement corresponding to the progress of Activities as specified in Form of Contract, within forty-five (45) days after receipt of the following documents from the Contractor:

- (1) Commercial Invoice in two (2) copies. The invoice shall be specified with full description of VAT and WHT.
- (2) UCHA's certificate certifying that the Contractor has achieved the conditions of Activities for term or milestone for payment.

### b) Payment

The Contractor will receive the payment for such payment term and milestones within forty-five (45) days after invoicing date with documents specified in a).

Any and all banking charges to be incurred due to the receiving of any payments of this Contract shall be at the Contractor's account, and any and all of those incurred for making of any payment of this Contract shall be at UCHA's account.

#### **Article 10 : Taxes and Duties**

The Contractor shall be responsible for any and all taxes, duties and other levies imposed by any government agencies in Thailand in connection with the Activities performed under this Contract including but not limited to stamp duty for this Contract

Unless otherwise explicitly stated in this Contract, UCHA shall not be liable for any taxes or duties being assessed on the Contractor by Thai governmental and/or Thai municipal authorities in connection with the Activities performed under this Contract.

The Contractor shall define, indemnify and hold harmless UCHA from any liability resulting from:

- The Contractor's failure to make timely payment of or to pay the taxes and duties or failure to comply with the reporting, return of other procedural requirements with respect to their payments. Any interest, penalties or other liabilities arising from such failures shall be borne by the Contractor.
- Failure of any employee of the Contractor or its sub-contractor and Vendors to pay their tax liabilities.
- Any interest, fines or penalties assessed against or imposed upon UCHA relating to import licenses, taxes and duties obtained by and payments made by UCHA which result directly or indirectly from the acts or omissions of the Contractor or its sub-contractors, and Vendors.

The Contract Price excludes value-added tax. UCHA shall pay value-added tax in addition to the Contract Price. The Contractor agrees that UCHA shall pay this value-added tax amount after deducting withholding tax at the rate in accordance with Thai Law, UCHA shall provide to Contractor certificates of such withholding tax in a form acceptable to the Thai Revenue Department.

#### **Article 11 : Completion and Acceptance**

- 11.1 The Contractor shall complete all the Activities entrusted to it under the Contract, including such additions or changes as may be directed by UCHA by virtue of the rights vested in it thereunder, so that the Activities shall, in every respect, be completed and ready for issuance of Certificate of Final Acceptance.
- 11.2 The Contractor shall conduct all equipment testing or testing procedures according to details specified in Scope of Works. Upon the successfully achievement of such equipment testing's or testing procedures, and punch list items with impact to Commissioning work including training have been completed within the period specified in project schedule, UCHA shall issue Certificate of Commissioning Completion to the Contractor.
- 11.3 Upon completion of the obligations for Warranty as described in Article 13, UCHA shall issue Certificate of Final Acceptance to the Contractor.

#### **Article 12 : Suspension**

- 12.1 UCHA may by notice in writing to the Contractor order the Contractor to suspend performance of all or any of its obligations under the Contract. Such notice shall specify the obligations of which performance is to be suspended, its effective date and the reasons therefor.

The Contractor shall thereupon suspend performance of such obligation (except those which are necessary for the care or preservation of the Activities) until order in writing to resume such performance is given by UCHA.



If, by virtue of a suspension order given by UCHA for reasons not deriving from the Contractor's default or breach of the Contract, the Contractor's performance of aggregate period of ninety (90) days, then the Contractor may give written notice to UCHA requiring that UCHA shall within twenty-eight (28) days of receipt of the notice either order the resumption of such performance or issue a Change in accordance with Article 8 hereof excluding the performance of the suspended obligations from the Contract. If UCHA fails to do so within such period, the Contractor may, by a further written notice to UCHA, elect to treat the suspension where it affects a part only of the Activities as a deletion of such part in accordance with Article 8 hereof.

In a case of such suspension is attributable to the Contractor's default or breach of the Contract, UCHA shall not be responsible for any costs and expenses of the Contractor including but not limited to rentals, maintenance, storage incurred by Contractor, sub-contractors and vendors of the effective date of the suspension up to the date UCHA notifies Contractor to resume or terminate the Activities.

Contractor shall propose costs and schedule impact due to the above reason to UCHA for review and approval.

Suspension of the Activities due to Force Majeure according to Article 19 is excluded from this Article.

- 12.2 During the period of suspension, the Contractor shall not remove from the site any equipment, materials or tools without prior written consent of UCHA.

#### **Article 13 : Warranty**

- 13.1 The Contractor shall exercise all reasonable skill, care and diligence in the performance of its obligations under the Contract and shall carry out all its responsibilities in accordance with recognized professional standards and good engineering practice.
- 13.2 The Contractor warrants that the Basket Bottom, Supports and Lugs shall be manufactured in accordance with the reference drawings, engineering specification and applicable standards of internationally accepted manufacturing and workmanship to ensure that the Basket Bottom, Supports and Lugs will function in accordance with the requirements of UCHA.
- 13.3 The Contractor warrants that the materials for making of the Basket Bottom, Supports and Lugs shall be of the kind and specified quality and suitable for the specific purpose of the UCHA, comply with all applicable standards, brand new, unused and free from defects in material, manufactured by internationally accepted manufacturer(s), and provided with traceable quality records.
- 13.4 The Contractor accepts liability for all defects resulting from poor material and bad workmanship for a period of twelve (12) months from the Provisional Acceptance Date. The Contractor shall promptly remedy such defects or deficiency by carrying out the repair or replacement with all costs being on the Contractor's account.
- 13.5 Notwithstanding the above mentioned warranty period, the warranty obligation periods shall be extended for the length of time necessary to carry out such repair or replacement and shall continue thereafter upon completion of such repair or replacement. For the repaired or replaced parts, the warranty obligation period shall be extended for an additional period of twelve (12) months from the date of the completion of such repair or replacement.

#### **Article 14 : Liquidated Damages**

- 14.1 The Contractor shall pay liquidate damages to UCHA in the event that the Mechanical Completion of Activities is delayed for other than excusable causes beyond December 3, 2024, the Contractor agrees to pay to UCHA as liquidated damages starting from the date following the specified date up to the actual Mechanical Completion date, in the amount of one-tenths (0.1) percent of the

Contract Price per day. Total value of the liquidated damages shall not exceed ten (10) percent of Contract Price.

- 14.2 It is understood and agreed between the parties that payment of liquidated damages by the Contractor shall not relieve the Contractor from its obligation to make any and all necessary correction and/or modification of the Activities including, but not limited to, repair or replacement of the Activities or any portion of the Equipment in order to enable the Activities to fully meet the guaranteed performance.
- 14.3 In respect of any liquidated damages payable to UCHA hereunder, UCHA shall be entitled to claim the amount of liquidated damages directly from the Contractor whereby the Contractor shall be bound to make the payment as demanded by UCHA within thirty (30) days after received UCHA's invoice or from the Contractor's guarantor under the bond issued in accordance with the provisional of Article 15 as UCHA may deem appropriate.
- 14.4 The liquidated damages under Article 14.1 are sole remedy available for UCHA for the delay completion of the Activities.

#### **Article 15 : Bonds**

- 15.1 The Contractor shall provide bank guarantee as Advance Payment Bond in the amount equal to thirty (30) percent of the Contract Price to UCHA before the payment date that UCHA will pay the payment for Advance Payment to the Contractor. The Advance Payment Bond shall be deemed as Performance Security and validated until the achievement date of Activities Milestone 1.
- 15.2 The Contractor shall provide bank guarantee as Warranty Bond in the amount equal to ten (10) percent of the Contract Price to UCHA before the date that UCHA will pay the payment for Activities Milestone 2 to the Contractor. The Warranty Bond shall be validated for twelve (12) months from the achievement date of Activities Milestone 2.
- 15.3 Bank charges in relation to those bonds shall be solely borne by the Contractor.

#### **Article 16 : Test and Inspection**

- 16.1 The Contractor shall, at its expense, carry out at the site all such test and inspection of the equipment and any part of the Activities as are specified in Scope of Works. If it is impossible to conduct the test and inspection of the equipment at the site, the test and inspection may be performed at the place of manufacture.
- Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give reasonable advance notice of such test and/or inspection and/ or the place and time thereof to UCHA.
- 16.2 UCHA shall be entitled to attend the aforesaid test and/or inspection by its own duly authorized and designated inspector provided that UCHA shall bear all expenses of its incurred in connection with such attendance.
- 16.3 The Contractor shall provide UCHA with a certified report of the results of any such test and/or inspection. The certified report shall have the same results as referred to in Part III : Project Specifications and Scope of Works.
- 16.4 Whether UCHA attends the test and/or inspection or not, the Contractor shall in no event be released from its obligations under this Contract.
- 16.5 UCHA may require the Contractor to carry out any test and/or inspection not described in the Contract, Contractor shall propose cost and schedule impact to UCHA for approval, if any.

**Article 17 : Insurance**

- 17.1 The Contractor shall at its expenses take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contractor, the insurance set forth below. The identity of the insurers, insured amounts with the deductibles and the form of policies shall be subject to be approval by UCHA, such approval shall not be unreasonable withheld.
- (a) Cargo Transit Insurance covering loss or damage (including SRCC risks) occurring, whilst in transit from the supplier's or manufacturer's Activities or stores until arrival at the site, to the equipment and materials provided by the Contractor.
  - (b) Construction All Risks Insurance covering physical loss or damage (including SRCC risks) to the Activities at the site, occurring prior to the date of Notice of Provisional Acceptance, with an extended maintenance coverage for the Contractor's liability in respect of any loss or damage occurring during the warranty period while the Contractor is on site for the purpose of performing its obligations during the warranty period.
  - (c) Third Party Liability Insurance covering bodily injury or death suffered by third party including UCHA's personnel, and loss of or damage to property (including UCHA's property and any parts of the Activities, which have been accepted by UCHA) occurring in connection with the execution of the Activities.
  - (d) Automobile Liability Insurance covering use of all vehicles used by the Contractor (whether or not owned by it) in connection with the execution of the Activities.
  - (e) Workmen's Compensation in accordance with the statutory requirements applicable in Thailand.
  - (f) Existing Facility Insurance covering physical loss or damage of existing facility of UCHA with limitation in an appropriate amount.
  - (g) Such other insurance as may be specifically agreed upon by the parties.
- 17.2 UCHA shall be named as co-insured under all insurance policies taken out by the Contractor except for the Workmen's Compensation, and all insurer's right of subrogation against such co-insured for the losses or claims arising out of the performance of the Contract shall be waived under such policies.

**Article 18 : Indemnity**

- 18.1 The Contractor shall indemnify and hold harmless against all actions, claims, demands, costs, charges, fines, and expenses imposed against UCHA by the Contractor's employees, representatives, sub-contractors, any third parties and/or government agencies in connection with the performance of the Contractor under this Contract.
- 18.2 The Contractor shall indemnify and hold harmless UCHA against all actions, claims, demands, costs, charges, fines and expenses arising from or incurred by reason of any infringement or alleged infringement of letter patent, registered design, trademark, or copyright of other protected rights by the use of any item (s) of equipment or any parts of the Activities as provided hereunder.
- 18.3 In the event of any claim being made or action brought against UCHA arising out of the matters referred to in these sub-Article 18.1 and 18.2, the Contractor shall be promptly notified thereof.
- 18.4 Upon receiving of UCHA's notice of such claim or action, the Contractor shall promptly render all necessary assistance to UCHA in defending such claim or action. UCHA shall have the option to demand the Contractor to assume full control of such claim or action.
- 18.5 In the event the Contractor fails to render such assistance promptly and fully, UCHA shall be entitled to settle and such claims or action with all expenses and damages incurred being for the Contractor's account.
- 18.6 The Contractor shall be responsible for all costs and expenses incurred by UCHA in defending as well as conduction such claim.

- 18.7 For Article 18.3 here above, if the judgment disallows further use of any item of the equipment by UCHA, the Contractor shall be liable for any claim from Contractor's employees, representatives, sub-contractors, any third parties and/or government agencies according to Clause 18.1 and/or 18.2 suffered by UCHA by reason of the cessation of use of the equipment or the Activities, provided that the liability of the Contractor shall not exceed the Contract Price.

**Article 19 : Force Majeure**

- 19.1 Any delay in or failure of performance of either party hereto shall not constitute default hereunder or give rise to any claim for damages if and to the extent such delay or failure of performance is caused by and occurrences beyond the control of the party affected including, but not limited to, Acts of God (such as fire, floods, earthquakes), act of the public enemy, expropriation or confiscation of facilities, compliance with any order or request of any governmental authority, war (declared or undeclared), mobilization, currency restriction, insurrections, civil commotion, riots, strikes, lock-outs or any causes of the same class or kind as those specifically above noted which are not within the reasonable control of the party affected.
- 19.2 The party affected by Force Majeure shall be entitled to have a corresponding extension of time for fulfilling its obligation to the extent affected by Force Majeure and each of the parties hereto shall not claim from the other party hereto any liquidated damages or lodge any other claim in respect of loss incurred by reason of the failure or delay caused by Force Majeure. The party so affected shall notify the other party as early as possible of such prevention or delay and the cause thereof and shall use reasonable efforts to mitigate the effect thereof upon its performance of the Agreement and to fulfill its obligations under this Agreement.
- 19.3 In the event that the duration of any cessation due to Force Majeure has exceeded three (3) months, both parties shall, upon request of either party, meet together to review the situation and agree upon equitable measures to be taken by the parties for further performance of this Contract or for other decision made by mutual agreement. UCHA may terminate this Contract at its own discretion and the payment of the Contract Price shall be made in proportion up to the extent of Activities actually completed by the Contractor on the date of notice of termination.

**Article 20 : Assignment and Sub-contract**

- 20.1 The Contractor shall not, without the consent in writing of UCHA, which shall be subject to UCHA's sole discretion, assign or transfer the Contract or the benefits or obligations thereof or any part thereof to any other persons.
- 20.2 The Contractor shall not, without the consent in writing of UCHA, which shall not be unreasonable withheld, make any sub-contract with any other person for the execution of any part of the Contract, but the restriction contained in the Article shall not apply to sub-contracts for materials, for minor details, or for any part of the Activities of which the manufacturers are named in the Contract. Any such consent shall not relieve the Contractor from its obligations under the Contract.

**Article 21 : Non-Disclosure**

The Contractor shall keep confidential all information, plans, drawings, technical descriptions and other data furnished to it by UCHA under this Contract or learned or acquired by the Contractor during the term of this Contract for the duration of ten (10) years, unless otherwise agreed upon in writing by UCHA. This confidential obligation of the Contractor shall be survived after expiration or termination of this Contract for an indefinite period.

**Article 22 : Intellectual Property**

The Contractor acknowledges that all intellectual property and ownership of plans, drawings, technical descriptions and other data and any intellectual property materials furnished, used or created in connection with the Activities under this Contract shall vest to UCHA. The Contractor shall have no right to use such items unless otherwise agreed upon in writing by UCHA.

**Article 23 : Language**

- 23.1 English shall be the language of this Contract and all documents pertaining thereto.
- 23.2 All the Communications and notifications between UCHA and the Contractor as well as other writings shall be made in the English language. The Contractor shall make sure that drawings, document and other related technical literature shall be supplied to UCHA in the English language. No other language shall be acceptable unless there is mutual agreement between UCHA and the Contractor.

**Article 24 : Governing Law**

The laws of the Kingdom of Thailand shall govern this Contract.

**Article 25 : Arbitration**

All dispute, controversy or claim arising out of this Contract shall be settled in an amicable way between both parties. Either party shall send the notice to other party requesting for settlement. Failing to find amicable settlement within ninety (90) days from the receiving date of the notice, such dispute, controversy or claim shall be submitted and settled by arbitration in accordance with the arbitration rules of the Thai Arbitration Institute (“TAI”), Office of the Judiciary applicable at the time of submission and the conduct of the arbitration thereof shall be under the auspices of the TAI. The arbitration shall be conducted in Thai language. Place of arbitration shall be Bangkok, Thailand. The decision of Arbitrator (s) shall be final and binding upon both parties.

**Article 26 : Non-Waiver**

No delay or failure of either party hereto in exercising any right, power or remedy hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any such right, power or remedy preclude other or further exercise thereof or exercise of any other right, power or remedy.

**Article 27 : Giving of Notices**

All notices which may be given or served in connection with this Contract shall be so given or served in writing at the respective addresses specified by:

- (i) handing the same to the addressee, or
- (ii) sending the same by registered or certified airmail or courier service, or
- (iii) transmitting the same by facsimile or telex with charges prepaid, confirmed by signed copy sent by registered or certified mail, with postage prepaid or courier service with charges prepaid.

**Article 28 : Order of Precedence**

The order of precedence shall be:

1. Part I - Form of Contract : Lump Sum Contract for N<sub>2</sub>O Abatement Technology Construction and Modification Package
2. Part II - Conditions of Contract
3. Part III - Technical Specifications and Scope of Works
4. Part IV - Contractor's Proposal

#### **Article 29 : Termination**

- 29.1 In the event that either party becomes insolvent or bankrupt, the other party may terminate this Contract by giving a seven (7) days prior written notice to such defaulting party.
- 29.2 In the event that the Contractor fails to perform its material obligations as specified in the Contract and the Appendices attached, and fails to remedy the same within seven (7) days after receipt of written notice from UCHA, UCHA may terminate this Contract by giving a seven (7) days prior written notice to the Contractor and the payment of the Contract Price shall be made in proportion up to the extent of Activities actually completed by the Contractor on the date of notice of termination. In this case, the Contractor shall be responsible for all costs, expenses and damages incurred by UCHA including but not limited to all costs and expenses necessary for the remedy and completion of the Activities.
- 29.3 In the event that UCHA fails to perform any of its material obligations as specified in the Contract and the Appendices attached and fails to remedy the same within thirty (30) days after receipt of written notice from the Contractor, the Contractor may terminate this Contract by giving a thirty (30) days prior written notice to UCHA. In this case, UCHA shall pay to the Contractor the portion of the Contract Price up to the extent of Activities actually completed by the Contractor on the date of notice of termination.
- 29.4 UCHA shall be entitled to terminate the Contract for its convenience by giving a seven (7) days prior written notice to the Contractor.

In case UCHA issue the termination notice under Clause 29.1, 29.2 or 29.4, the Contractor shall:

- (a) Cease all further Activities, except for such work as UCHA may specify in the termination notice.
- (b) Deliver to UCHA the parts of the Activities already executed and completed up to the date of termination,
- (c) Upon UCHA's request, assign to UCHA all rights, title and benefit of the Contractor to the Activities and in the equipment and materials.

In this case UCHA shall pay to the Contractor the portion of the Contract Price up to the extent of Activities actually completed by the Contractor on the date of notice of termination.

#### **Article 30 : Liability**

Notwithstanding the provision in Article 14 hereabove, the total liability of the Contractor and its employees in Contract, tort, breach of statutory duty, or otherwise (including negligence, warranty, and strict liability) relative to or arising out of the Activities shall be limited to an amount not to exceed the Contract Price.

However, the Contractor shall not be liable for any consequential damage, incidental, or indirect losses and damages arising from this Contract, including but not limited to any loss of profit or revenue, loss of the production or any financial or economic losses to UCHA that may be suffered by UCHA unless such losses or damages have been caused by willful conduct or negligence of the Contractor or its personnel, sub-contractor or Vendor.

**Article 31 : Modification**

This Contract shall not be changed, modified, abrogated or superseded except it was made in writing and signed by authorized person(s) of both parties.

**Article 32: Survivor**

The Articles 18, 21, 22 and 30 shall survive the end and/or termination of this Contract.

**Article 33: Severability**

If any provision of this Contract shall be held unenforceable or in conflict with the law, the validity of the remaining parts or provisions shall not be affected by such holding.

**Article 34: Entire Contract**

This Contract and its Appendices embodies all understanding between the parties hereto. Any promises, agreements, understanding, arrangement, representations or obligation which may have been previously made or undertaken by either party to the other and not set forth herein are cancelled and shall be of no further force or effect.

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**SECTION 6**  
**TECHNICAL SPECIFICATIONS AND SCOPE OF WORKS**

**FOR**

**N<sub>2</sub>O ABATEMENT TECHNOLOGY**  
**CONSTRUCTION AND MODIFICATION PACKAGE**

**THIS PACKAGE IS A PART OF**  
**SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**



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## TECHNICAL SPECIFICATIONS

### 1. INTRODUCTION

- 1.1 Nitrous oxide (N<sub>2</sub>O) is a greenhouse gas (GHG) with a global warming potential 273 times higher than that of carbon dioxide (CO<sub>2</sub>). One of the sources of N<sub>2</sub>O emissions is the manufacture of nitric acid and caprolactam, which is mainly used to produce nitrogen fertilizers and used in manufacture of fiber synthesis respectively. Despite the availability of effective abatement technologies at comparatively low cost, N<sub>2</sub>O from nitric acid and caprolactam production continues to be released into the atmosphere in most countries of the world, as there are usually no economic or corporate incentives for plant operators to reduce emissions.

To tap the global mitigation potential of this sector, the German Federal Ministry for Economic Affairs and Climate Action (BMWK) has launched the Nitric Acid Climate Action Group (NACAG) initiative. This initiative promotes the phasing out of global N<sub>2</sub>O emissions in the production process of nitric acid and caprolactam. The program provides:

- i) technical advisory and financial support for the installation of abatement technologies and nitrous oxide emissions monitoring equipment,
- ii) as well as assistance to governments for the development of public policies addressing the regulation of such N<sub>2</sub>O emissions.

In 2023, Thailand signed the commitment to minimize N<sub>2</sub>O emissions from caprolactam production within 3 years, which opens the possibility for caprolactam plants to apply for the funds for the installation and operation of N<sub>2</sub>O abatement technologies, and N<sub>2</sub>O monitoring systems.

Under the NACAG initiative framework, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is working with a caprolactam producing company, which has a well-advanced process to sign a grant contract. The grant covers the cost of purchasing and installing nitrous oxide reduction equipment as well as emissions monitoring technology. Under the NACAG initiative regulation, the tendering of the equipment acquired through the grant must be purchased by the company via an international bidding process under national public procurement procedures.

- 1.2 UBE Chemicals (Asia) Public Company Limited, hereinafter called UCHA, intent to purchase N<sub>2</sub>O Abatement Technology Construction and Modification Package (for one out of three Ammonia Oxidizers) which is a part of Secondary Catalytic N<sub>2</sub>O Abatement Process Project at Caprolactam Plant of UCHA in Rayong, hereinafter called the “Activities”. The Activities shall consist scopes of works hereafter described in this Section.

### 2. TECHNICAL SPECIFICATIONS DOCUMENTS AND DEFINITIONS

#### 2.1 TECHNICAL SPECIFICATIONS DOCUMENTS

- a) The Technical Specifications Documents constituted as Section 6 of Tender Documents for N<sub>2</sub>O Abatement Technology Construction and Modification Package, consists of:
- (1) This document;
  - (2) Annex A : General Arrangement Drawing No. 5341-01-000;
  - (3) Annex B : Fabrication Drawing No. 5341-02-200 Sheet 2 of 3;
  - (4) Annex C : Fabrication Drawing No. 5341-02-200 Sheet 3 of 3;
  - (5) Annex D : UBE-H-321 : Welders Qualification Test;
  - (6) Annex E : UBE-H-331 : Welding Procedure Qualification.

## 2.2 DEFINITIONS

- a) Unless stated otherwise in its contents, terms and abbreviations used in this documents and other incorporated documents are described for details for the purpose of this Technical Specifications Documents as follows:
  - (1) “Contractor” refers to the successful Tenderer who signs the contract with UCHA for the provision of N<sub>2</sub>O Abatement Technology Construction and Modification Package under this Technical Specification Documents;
  - (2) “Tenderer” refers to the juristic person who is eligible to submit Tender Proposal to UCHA regarding to this Activities;
- b) All terms and abbreviations used in this Technical Specification Documents are for the purpose of describing the requirements. Tenderer may use their own names or terms, associated with their products and models, or others as appropriate, provided that they are clear and without ambiguities.

## 3. CONCEPT OVERVIEW

- 3.1 UCHA needs to reduce N<sub>2</sub>O emission from existing process equipment 1210-R1-3 Ammonia Oxidizer by replacing existing ceramic packing with N<sub>2</sub>O abatement technology catalyst. By replacing with N<sub>2</sub>O abatement technology catalyst, there will be changes in operating condition and UCHA shall replace the existing Basket Bottom and its support (SA240 TP310S) inside the Ammonia Oxidizer with new material (SA240 TP321H) to resist additional temperature and stress.

UCHA needs to complete one (1) Basket Bottom replacement for 1210-R1-3 during turnaround period in coming November-December 2024.

UCHA plans to continue Basket Bottom replacement for other two (2) Ammonia Oxidizers (1210-R1-1 and 1210-R1-2) in 2027 after proofing of successfulness in N<sub>2</sub>O emission reduction after utilizing of new N<sub>2</sub>O abatement technology catalyst in 2026.

- 3.2 UCHA needs a new set of Basket Bottom and Supports made from upgrade material as specified in the fabrication drawings. The Basket Bottom and the Supports shall be fabricated from qualified fabrication shop and ready to deliver to the site before commencement of plant turnaround period which was scheduled on November 15, 2024.

The Basket Bottom and Supports shall be completely installed after completion of replacement of the support lugs. Installation shall be completed within 1 working day after replacement of the lugs (shall be completed by November 30, 2024 tentatively) to allow time for other continuous works needed for plant start-up.

- 3.3 UCHA needs new support lugs made from upgrade material as specified in the fabrication drawings. The support lugs shall be fabricated from qualified fabrication shop and delivered to the site together with the Basket Bottom and Supports. Replacement of the Lugs on internal surface of the Ammonia Oxidizer shall be completed within 2 working days after UCHA disassemble the existing basket bottom.

#### 4. SCOPE OF WORKS

The Contractor shall be responsible in following scope of works:

4.1 Supply material for fabrication of 1 (one) set of the Basket Bottom, Supports and Lugs. Such material shall be new and manufactured from following approved sources.

| No. | Material             | Manufacturer | Country of Origin                               |
|-----|----------------------|--------------|---|
| 1   | Pipe                 | -            | Japan, South Korea, Western Europe, USA, Canada |
| 2   | Plate                | -            | Japan, South Korea, Western Europe, USA, Canada |
| 3   | Formed Steel Section | -            | Japan, South Korea, Western Europe, USA, Canada |
| 4   | Bolt/Nut             | -            | Japan, South Korea, Western Europe, USA, Canada |

4.2 Prepare welding procedure and welder qualifications required for fabrication and erection of the Basket Bottom, Supports and Lugs.

4.3 Fabricate the Basket Bottom, Supports and Lugs in accordance with following fabrication drawings, engineering specifications and applicable standards.

- (1) Fabrication Drawing No. 5341-02-200 Sheet 2 of 3
- (2) Fabrication Drawing No. 5341-02-200 Sheet 3 of 3
- (3) UBE-H-321 : Welders Qualification Test
- (4) UBE-H-331 : Welding Procedure Qualification
- (5) ASME BPVC-IX - BPVC Section IX - Welding and Brazing Qualifications

4.4 Fabricate the Basket Bottom, Support and Lugs and perform inspection and testing at fabrication shop and provide reports as follows.

| No. | Work Sequence   | Required Inspection and Testing   | Required Report                 | Inspection by UCHA   |
|-----|---|---|---------------------------------|--|
| 1   | Material receiving  | Mill Certificate<br>Certificate of Origin<br>Visual Inspection<br>PMI<br>Thickness Inspection | Yes<br>Yes<br>Yes<br>Yes<br>Yes | Document Approval<br>Document Approval<br>Required<br>Required<br>Required |
| 2   | Cutting   | Dimensional Check   | Fabricator's Standard           | -  |
| 3   | Cleaning before assembling                                  | Visual Inspection   | Fabricator's standard           | Random   |
| 4   | Assembling  | Dimensional Check   | Fabricator's Standard           | Random   |
| 5   | Welding Procedure and Welder Qualification                  | WPS<br>PQR<br>WPT   | Yes<br>Yes<br>Yes               | Document Approval<br>Document Approval<br>Document Approval                |
| 6   | Welding   | Weldment Inspection<br>PT   | Yes<br>Yes                      | Random<br>Random   |
| 8   | Pickling of weldments                                       | Visual Inspection   | Fabricator's Standard           | -  |
| 8   | Fabrication completion of Support Pipe of the Basket Bottom | Visual Inspection<br>Dimensional Check  | Yes<br>Yes                      | Random   |
| 9   | Fabrication completion of Grating of the Basket Bottom      | Visual Inspection<br>Dimensional Check  | Yes<br>Yes                      | Random   |
| 10  | Fabrication completion of the Supports                      | Visual Inspection<br>Dimensional Check  | Yes<br>Yes                      | Random   |
| 11  | Fabrication completion of the Lugs                          | Visual Inspection<br>Dimensional Check  | Yes<br>Yes                      | Random   |

|    |  |  |            |          |
|----|--|--|------------|----------|
| 12 | Pre-assembly of the Basket Bottom, Supports and Lugs | Visual Inspection<br>Dimensional Check | Yes<br>Yes | Required |
| 13 | Packing  | -                                      | Photo      | -        |
| 14 | Loading for delivery                                 | -                                      | Photo      | -        |

4.5 Deliver the Basket Bottom, Supports and Lugs to the site at UCHA plant and unload.

4.6 Replace the Lugs on 1210-R1-3 and install the Supports and the Basket Bottom at the site of UCHA and perform inspection and testing and provide reports as follows.

| No. | Work Sequence   | Required Inspection and Testing  | Required Report                 | Inspection by UCHA                                       |
|-----|---|--|---------------------------------|--|
| 1   | Prepare inside equipment protection for 1210-E1-3 (lower part of 1210-R1-3) | -  | Photo                           | Required   |
| 2   | Remove existing supports  | -  | Photo                           | -  |
| 3   | Remove existing lugs from 1210-R1-3 by grinding                             | PT after ground flush  | Yes                             | Required   |
| 4   | Assemble and weld the Lugs  | Positioning Check<br>Weldment Inspection<br>PT<br>Visual Inspection<br>Positioning Check | Yes<br>Yes<br>Yes<br>Yes<br>Yes | Required<br>Required<br>Required<br>Required<br>Required |
| 5   | Install the Supports  | Level Check<br>Bolt Tightening Check<br>Check of Tack Welding                            | Yes<br>Yes<br>Yes               | Required<br>Required<br>Required                         |
| 6   | Install the Basket Bottom   | Positioning Check<br>Level Check<br>Bolt Tightening Check                                | Yes<br>Yes<br>Yes               | Required<br>Required<br>Required                         |

4.7 Fabricate and install the Basket Bottom, Supports and Lugs with following tolerance.

| No. | Part          | Dimension | Level  | Position |
|-----|---------------|-----------|--------|----------|
| 1   | Basket Bottom | ± 3 mm    | ± 3mm  | ± 5 mm   |
| 2   | Supports      | ± 2 mm    | ± 2 mm | ± 2 mm   |
| 3   | Lugs          | ± 2 mm    | ± 2 mm | ± 2 mm   |

4.8 Provide labor, construction accessories, tools, equipment and utilities which are needed to perform and complete the works.

*Note : Contractor can utilize existing electric rail hoist of UCHA for installing the Basket Bottom.*

4.9 Provide following documents.

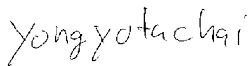
- (1) Welding Procedure Specification and Procedure Qualification Record
- (2) Welder Qualification Test Record
- (3) 3 Manufacturer Data Record + 1 E-file
- (4) Inspection and Test Plan
- (5) Inspection Report
- (6) 3 As-built drawings for dwg. no. 5341-02-200 sheet 2 of 3 and sheet 3 of 3, and AutoCAD files

**5. Warranty**

- 5.1 The Contractor shall exercise all reasonable skill, care and diligence in the performance of its obligations under the Contract and shall carry out all its responsibilities in accordance with recognized professional standards and good engineering practice.
- 5.2 The Contractor warrants that the Basket Bottom, Supports and Lugs shall be manufactured in accordance with the reference drawings, engineering specification and applicable standards of internationally accepted manufacturing and workmanship to ensure that the Basket Bottom, Supports and Lugs will function in accordance with the requirements of UCHA.
- 5.3 The Contractor warrants that the materials for making of the Basket Bottom, Supports and Lugs shall be of the kind and specified quality and suitable for the specific purpose of the UCHA, comply with all applicable standards, brand new, unused and free from defects in material, manufactured by internationally accepted manufacturer(s), and provided with traceable quality records.
- 5.4 The Contractor accepts liability for all defects resulting from poor material and bad workmanship for a period of twelve (12) months from the Provisional Acceptance Date. The Contractor shall promptly remedy such defects or deficiency by carrying out the repair or replacement with all costs being on the Contractor's account.
- 5.5 Notwithstanding the above mentioned warranty period, the warranty obligation periods shall be extended for the length of time necessary to carry out such repair or replacement and shall continue thereafter upon completion of such repair or replacement. For the repaired or replaced parts, the warranty obligation period shall be extended for an additional period of twelve (12) months from the date of the completion of such repair or replacement.

----- EOL -----

**TOR Drafting Committee - N<sub>2</sub>O Abatement Technology Construction and Modification Package  
SECONDARY CATALYTIC N<sub>2</sub>O ABATEMENT PROCESS PROJECT**



(Mr. Yongyutachai Choengkraiayang )  
Committee



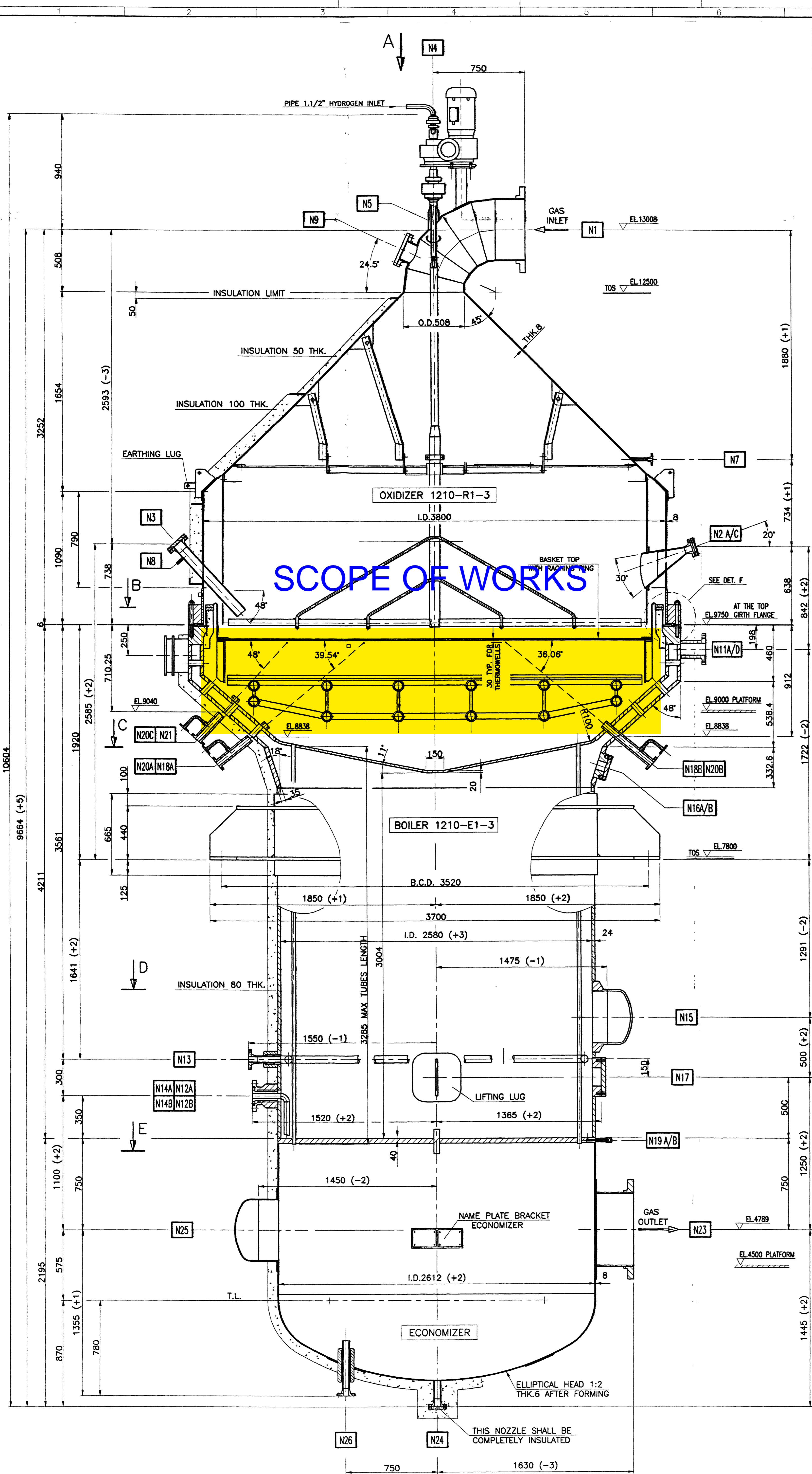
(Mr. Pasit Dokkulap)  
Committee



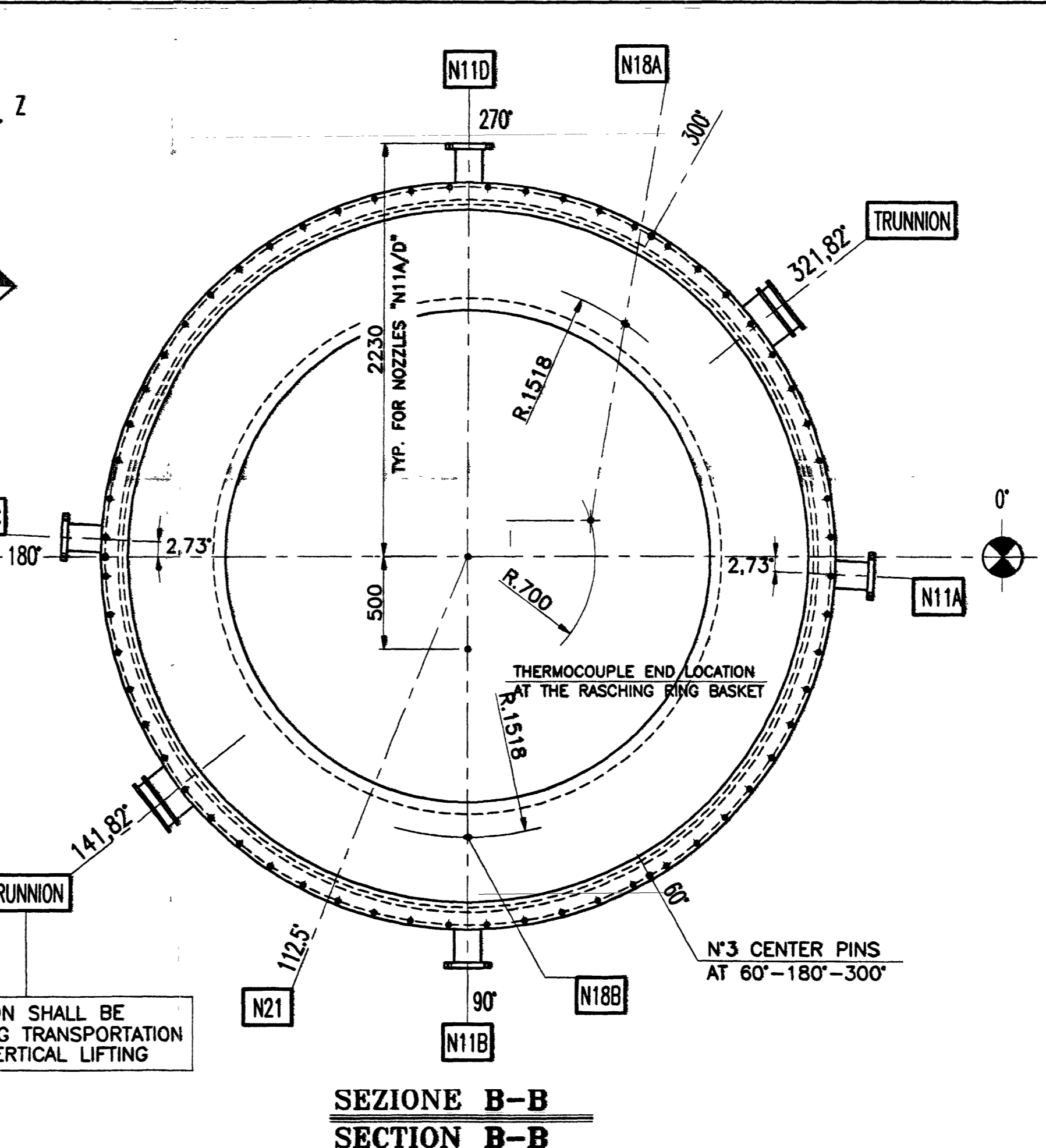
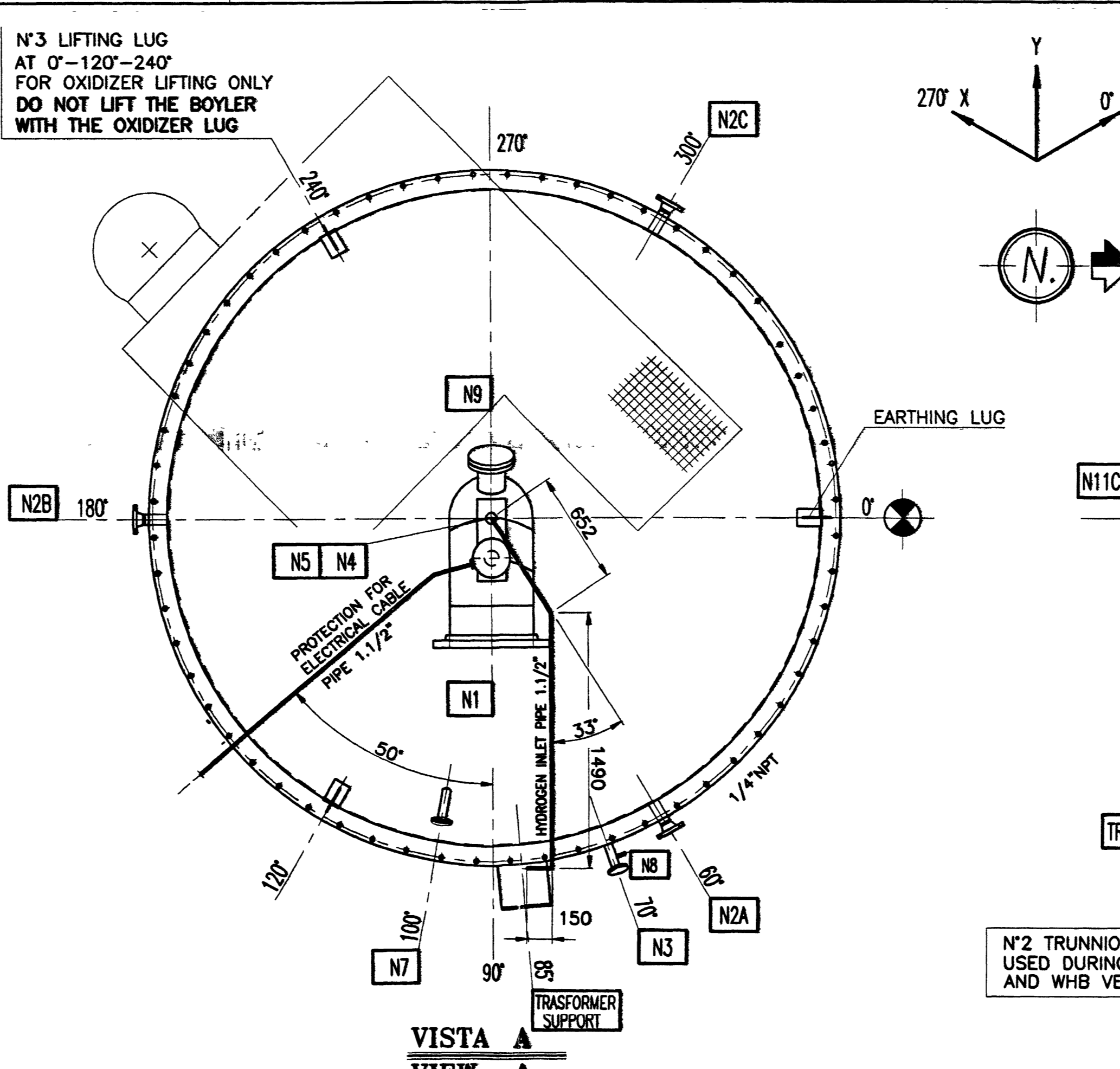
(Mr. Pattana Pongsirirachkul)  
Chairman

**Annex A**

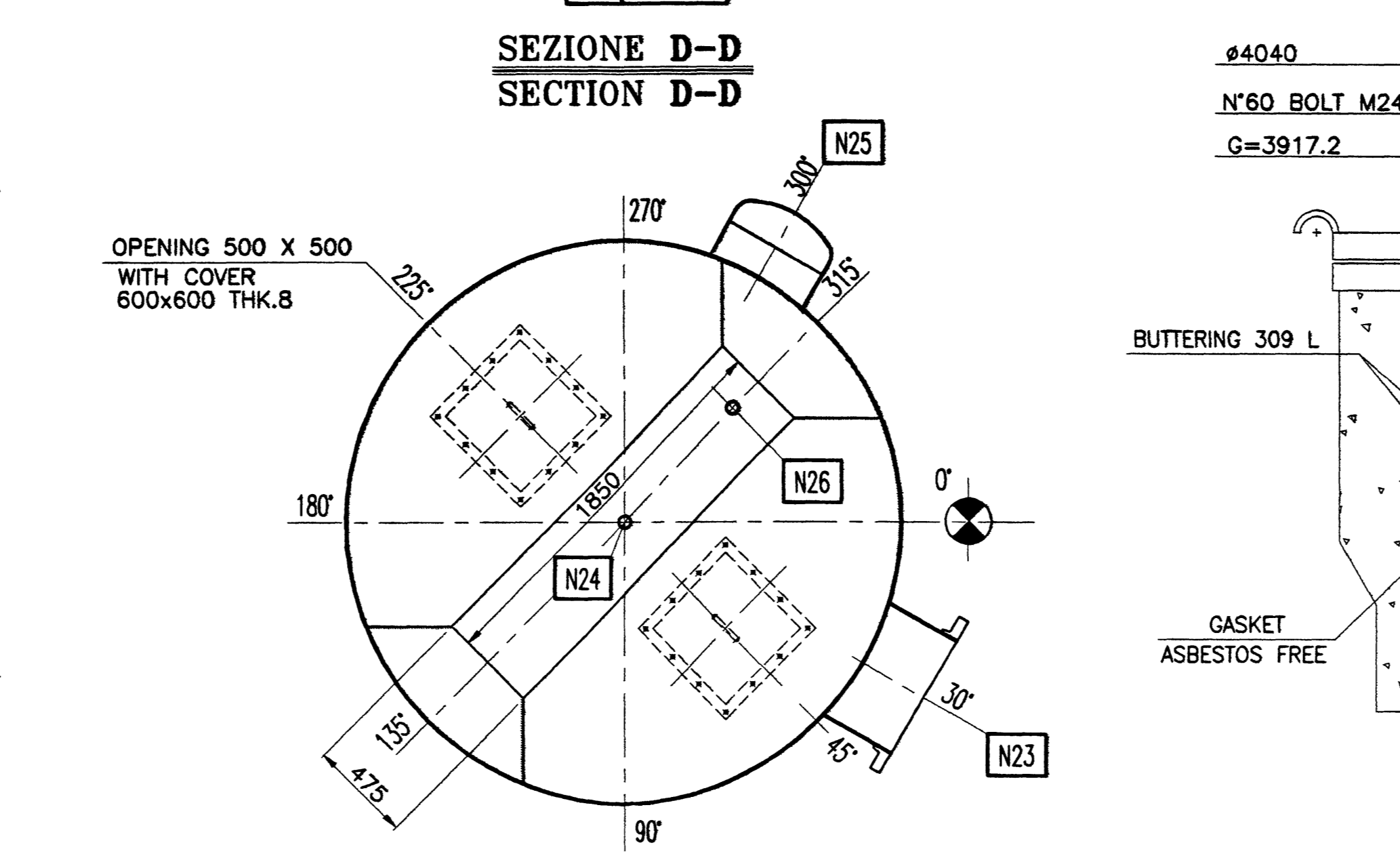
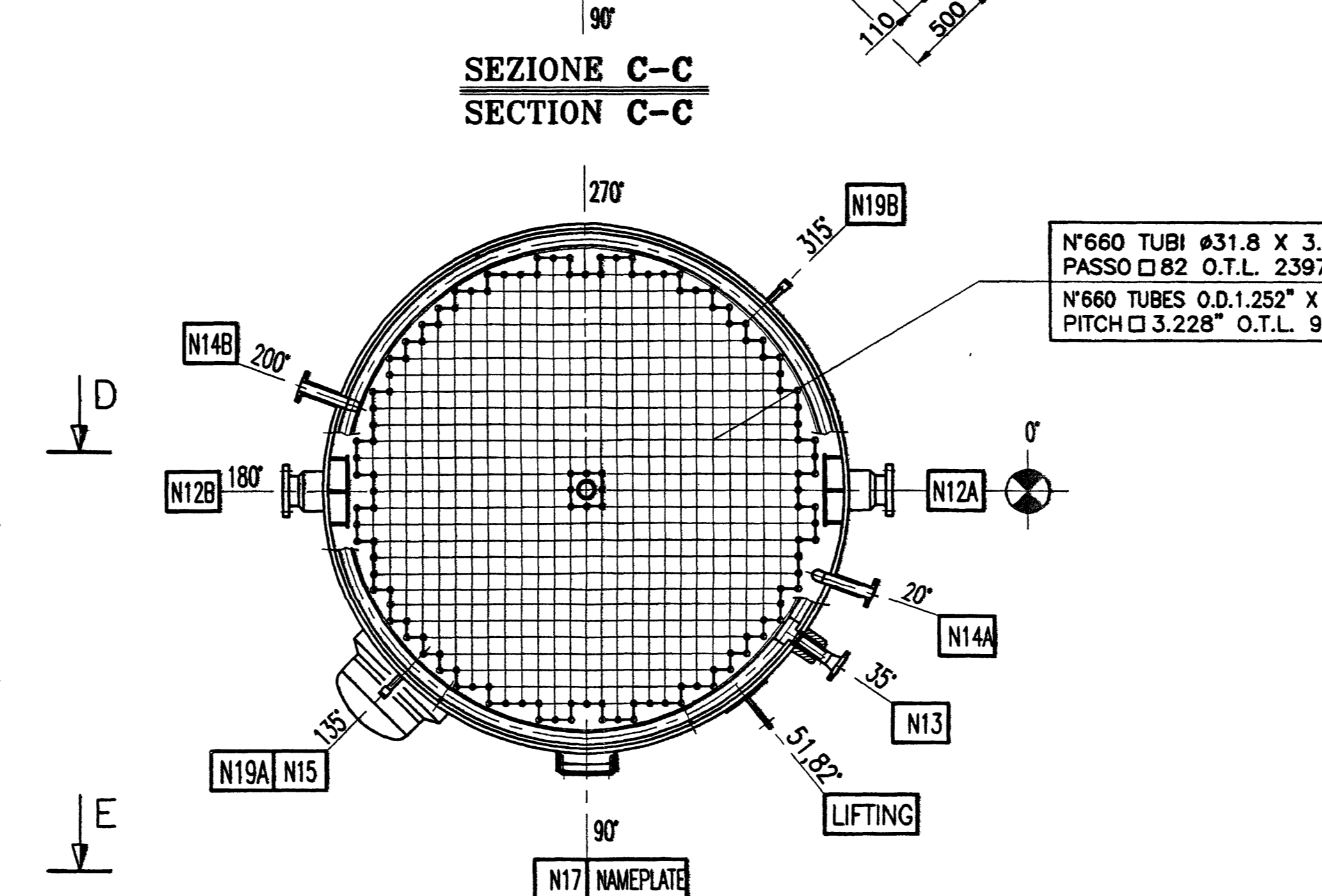
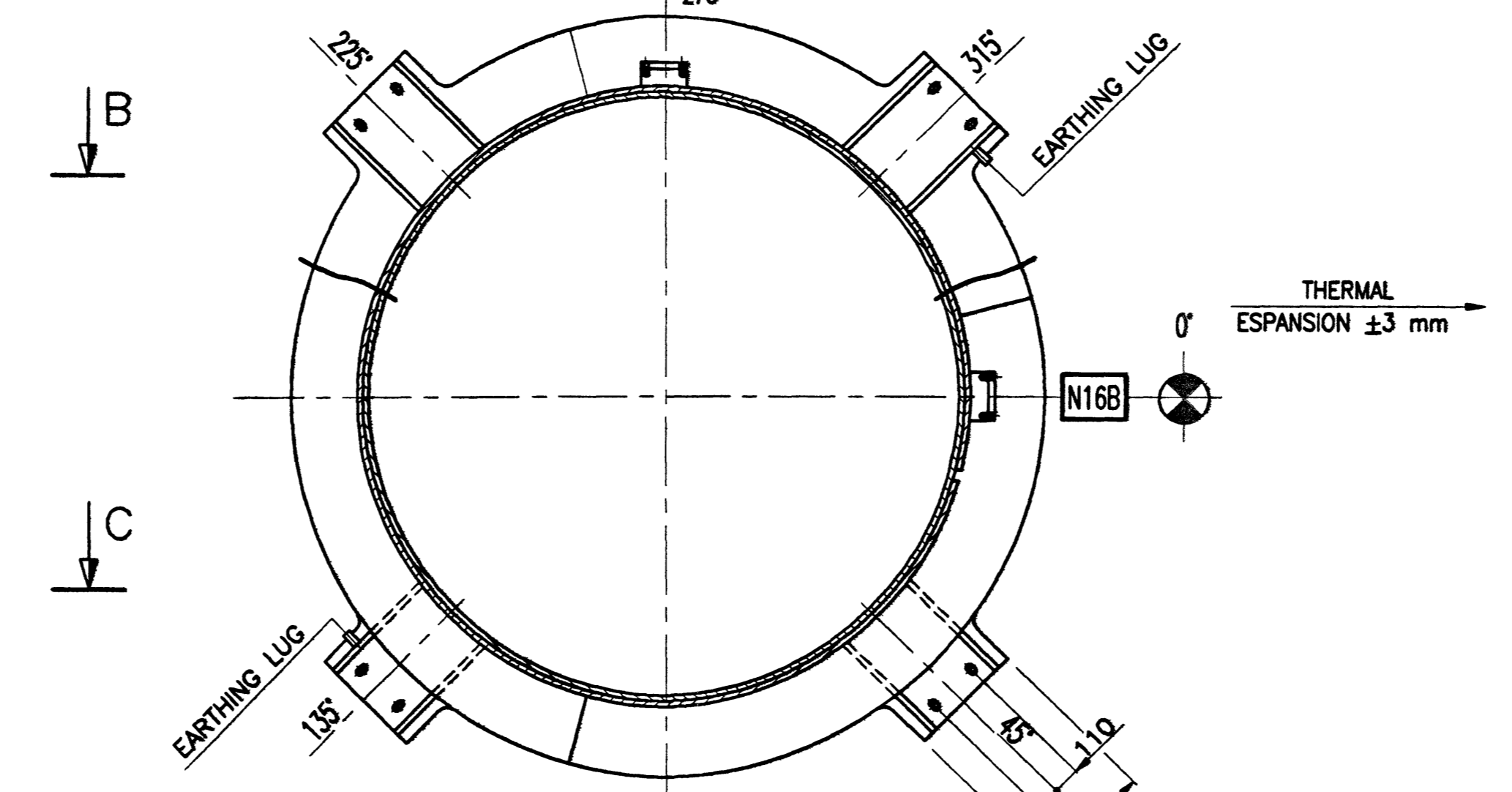
**General Arrangement Drawing No. 5341-01-000**



**SCOPE OF WORKS**



**FOR REFERENCE ONLY**



|    |  |  |
|----|--|--|
| 28 | LA PROVA IDRAULICA SARÀ ESEGUITA IN ACCORDO ALLA PROC. FIM NR. P17M-001 REV. 2   | HYDRAULIC TEST WILL BE PERFORMED IN ACCORDANCE WITH FIM SPEC. NO. P17M-001 REV. 2  |
| 27 | SPECIFICAZIONE DELL'APPARECCHIO IN ACCORDO AL DL. 5341/01/900  | SHIPPING OF THE UNIT IN ACCORDANCE WITH DL. 5341/01/900  |
| 26 | PARTI INTERNE DELL'OXIDIZER INSTALLATE DOVRANNO ESSERE RIMOSE DURANTE IL MONTAGGIO   | THE SHIMS & DEVICE INSTALLED INSIDE THE OXIDIZER DURING TRANSPORTATION MUST BE REMOVED DURING ERECTION   |
| 25 | TEMPER. DI PARETE IN PROVA IDR. >= 17°C. PER PROVA IDR. USARE ACQUA DEIONIZZATA CON 25 PPM MAX. DI CLORURO USARE GASKETS DI PROVA UGUALI A QUELLE DI SERVIZIO. PER LATO MANIFOLLO E LATO TUBO. | WALL METAL TEMP. IN HYDR. TEST >= 17°C. FOR HYDR. TEST USE DEMINERALIZED WATER WITH 25 PPM CHLORIDE MAX. SHALL BE USED. TEST GASKETS SHALL BE OF THE SAME MAT. AS SERV. GASKETS. FOR BOTH SIDES SHELL & TUBES. |
| 24 | TEMPERATURA DI PROGETTO TUBI 371°C PIASTRA TUB. INGRESSO E USCITA 300°C  | DESIGN TEMP. TUBES 371°C TUBESHEET INLET & OUTLET 372°F  |
| 23 | CORROSIONE TUBI 8 mm PIASTRA TUB. INGRESSO 1.5 mm (TOTALE) PIASTRA TUB. USCITA 1.5 mm (TOTALE) CARICIA INTERNA 1.5mm   | CORR. ALLOW. TUBES 8 mm TUBESHEET INLET 0.06 INCH (TOTAL) TUBESHEET OUTLET 0.06 INCH (TOTAL) INNER JACKET 0.06 INCH  |
| 22 | APPARECCHIO CON P.V.M.T. VERNICIARE IN LINGUA INGLESE CON CARATTERI ALTI 100 mm "STRESS RELIEVED VESSEL NO WELDING PERMITTED"  | VESSEL WITH P.V.M.T. PAINT WITH ENGLISH LETTERS 100 MM HIGH "STRESS RELIEVED VESSEL NO WELDING PERMITTED"  |
| 21 | TEST SU PIASTRA TUBERIA INFERIORE -US DOPO ORE LAVORAZIONE DI MACCHINA -MAGNETIC TEST DOPO LAVORAZIONE DI MACCHINA   | TEST ON THE LOWER TUBESHEET PLATE -US ON EDGE AFTER MACHINING -MAGNETIC TEST AFTER MACHINING   |
| 20 | NON SI SA POSSIBILE RADDOPPIARE LEGGIURE CONTROLLI CON LA TRASDIZIONE O MAGNETIC   | WHERE NOT POSSIBLE TO INSPECT WITH ULTRASONIC OR MAGNETIC TEST.  |
| 19 | PROVA DI RESILIZIONE NON RICHIESTE IN ACCORDO A UCS-66 E UHA 51  | IMPACT TEST EXEMPTED ACCORDING TO UCS-66 AND UHA 51  |
| 18 | PER LA FINITURA VEDI PROC. N° 5341/00-PE-001   | FOR FINISHING SEE PROC. N° 5341/00-PE-001  |
| 17 | PER PARTI DI SCORTA E PARTI A CORROSIONE VEDI SPEC. 5341/00-SP-000   | FOR SPARE PARTS AND EQUIPMENTS PARTS SEE SPEC. 5341/00-SP-000  |
| 16 | PER ISPEZIONI E COLLAUDI VEDERE ISPECTION PLAN N° 5341/01/001 & 5341/02/001  | FOR INSPECTIONS AND TESTS SEE ISPECTION PLAN N° 5341/01/001 & 5341/02/001  |
| 15 | PER PROCEDIMENTI DI SALDATURA VEDI WELDING MAP N°5341/01/001 & 5341/02/001   | FOR WELDING PROCEDURE SEE WELDING MAP N°5341/01/001 & 5341/02/001  |
| 14 | PER SALDATURE TUBI-PIASTRA TUBERIA E ALLETTE USARE METE BISSO E PROCEDERE  | WELDING SAMPLE TUBE TO TUBESHEET AND STAYS SHALL BE TAKEN ON INK AND PROCEDURE   |
| 13 | SALDATURE INTERNE A CONTATTO COL GAS SARANNO VOLATE PER POSSIBILE FORMAZIONE DI CONDENSATA   | INTERNALS WELDS IN CONTACT WITH GAS TO BE GRIND TO AVOID POSSIBLE CONDENSATE TRAPPING IF NECESSARY   |
| 12 | SALDATURE INT. ESTERNE DEL MAT. S. STEEL DOVRANNO ESSERE DECAPATE E PASSIVATE  | OUT SIDE & INSIDE WELDS OF S.S. MATERIAL WILL BE PICKLED & PASSIVATED  |
| 11 | I SIMBOLI DELLE SALDATURE D'ANGOLO SONO IN ACCORDO CON AWS A 2.4 E INDICANO LA DIMENSIONE DEL LATO DELLA SALDATURA   | FILLET WELD SYMBOL ARE IN ACCORDING WITH AWS A 2.4 WELD LEG SIZE ARE SHOWN THEREIN   |
| 10 | TUTTI I BOCCHELLI CON SALDA PENA PENETRAZIONE CONTINUA CON LATO MIN. DI 9 mm.  | ALL NOZZLE NECKS ATTACHED TO THE UNIT BY FULL PENETRATION GROOVE WELDS SHALL HAVE A FILLET WELD ALL AROUND WITH A MIN LEG DIMENSION OF 9 mm.   |
| 9  | LE QUARAZZIONI DEVONO ESSERE MONTATE CON UNO DEI SEI LATERALI.   | GASKETS SHALL BE MOUNTED FREE OF ANY KIND OF SEALING COMPOUND.   |
| 8  | TRINANTI, BULLONE E DATTI DEVONO ESSERE LUBRIFICATI CON SECCO MOLYCOITE G  | BOLTS, STUDS AND NUTS SHALL BE LUBRICATED AS FOLLOWS - MOLYCOITE G   |
| 7  | LA FORATURA DELLE FLG. PRINC. E DEI BOCCHELLI SEVE RISULTARE FLUORI DAGLI ASSI PRINCIPALI  | MAIN FLANGE AND NOZZLE BOLT HOLES SHALL STRADDLE NATURAL CENTERLINES.  |
| 6  | I SALDATORI SONO QUALIFICATI SECONDO ASME SEZIONE IX E SOTTO LA RESPONSABILITÀ DEL COSTRUTTORE.  | WELDERS ARE QUALIFIED ACCORDING TO ASME SECTION IX RULES AND MANUFACTURER RESPONSIBILITY.  |
| 5  | INSPEZIONE A CARICO DEL CLIENTE  | INSPECTION SHALL BE CARRIED OUT BY CUSTOMER  |
| 4  | PER TOLLERANZE DI COSTRUZIONE VEDI SPEC. N. 1172-0108. SE NON INVERSIAMENTE INDIC.   | FOR CONSTRUCTION TOLERANCES SEE SPEC. N. 1172-0108. IF OTHERWISE INDICATED   |
| 3  | I CERTIFICATI DEI MATERIALI OVE SPECIFICATO SARANNO EMESSI IN ACC. ALLA NORMA EN 10204   | MATERIALS CERTIFICATES WHERE SPECIFIED, SHALL BE IN ACCORDANCE WITH EN 10204   |
| 2  | Φ PUNTO DI RIFERIMENTO PER IL MONTAGGIO  | Φ DENOTES MATCH MARK FOR ASSEMBLY  |
| 1  | SALVO DIVERSA INDICAZIONE, TUTTE LE DIMENSIONI SONO IN MILLIMETRI  | UNLESS OTHERWISE INDICATED ALL DIMENSIONS ARE IN MILLIMETERS   |

| WEIGHT (EMPTY)                        |         |           |           |
|---------------------------------------|---------|-----------|-----------|
| OXIDIZER                              | 245 T   |           |           |
| BOILER                                | 245 T   |           |           |
| WEIGHT OF OXIDIZER / WHB / ECONOMIZER |         |           |           |
| OXIDIZER                              | 36 T    |           |           |
| BOILER                                | 57 T    |           |           |
| FULL OF WATER (HELL SIDES)            |         |           |           |
| OXIDIZER                              | 36 T    |           |           |
| BOILER                                | 57 T    |           |           |
| FOUNDATION LOADS                      |         |           |           |
| LOAD                                  | SECTION | HYDROTEST | OPERATING |
| VERT. TV                              | NA      | 520       | 520       |
| SEAR. FM                              | NA      | 14        | 14        |
| TRUNN. W.                             | NA      | 2         | 2         |
| ASME SECTION IX                       |         |           |           |
| ITEM N° 5341-01                       |         |           |           |
| GENERAL ARRANGEMENT DRAWING           |         |           |           |
| DRAWING NUMBER 5341-01-000            |         |           |           |
| SHEET 1 OF 1                          |         |           |           |



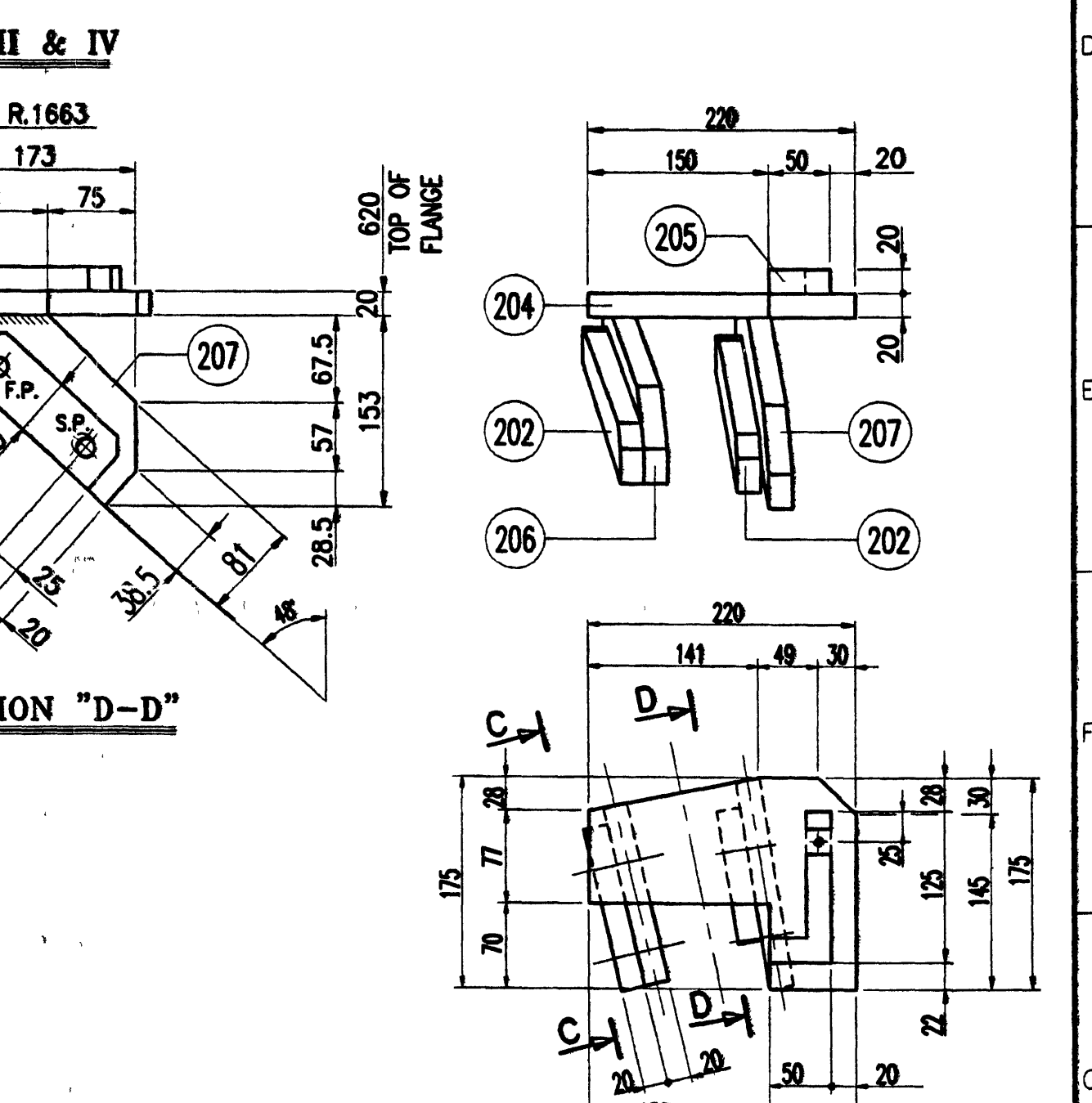
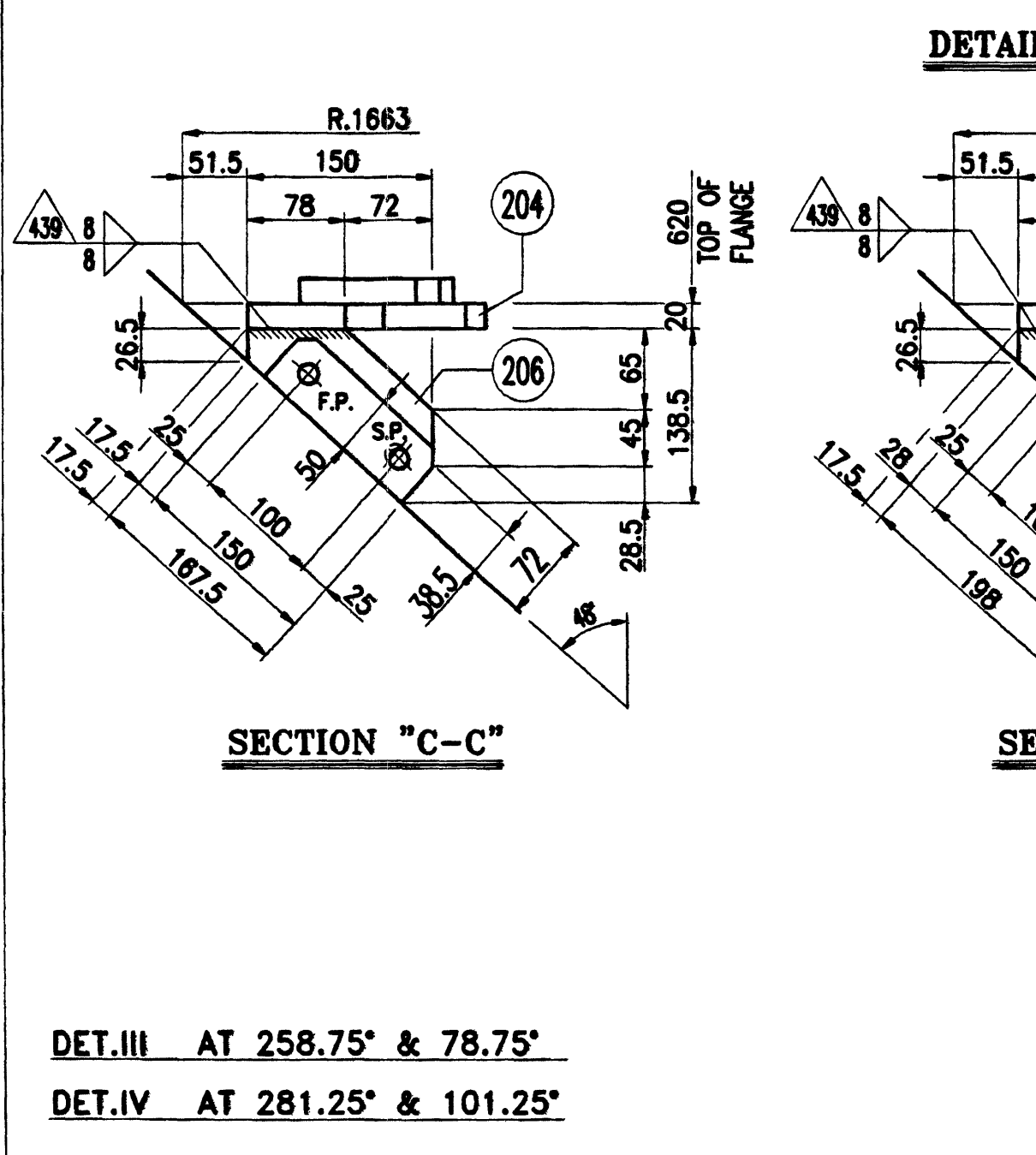
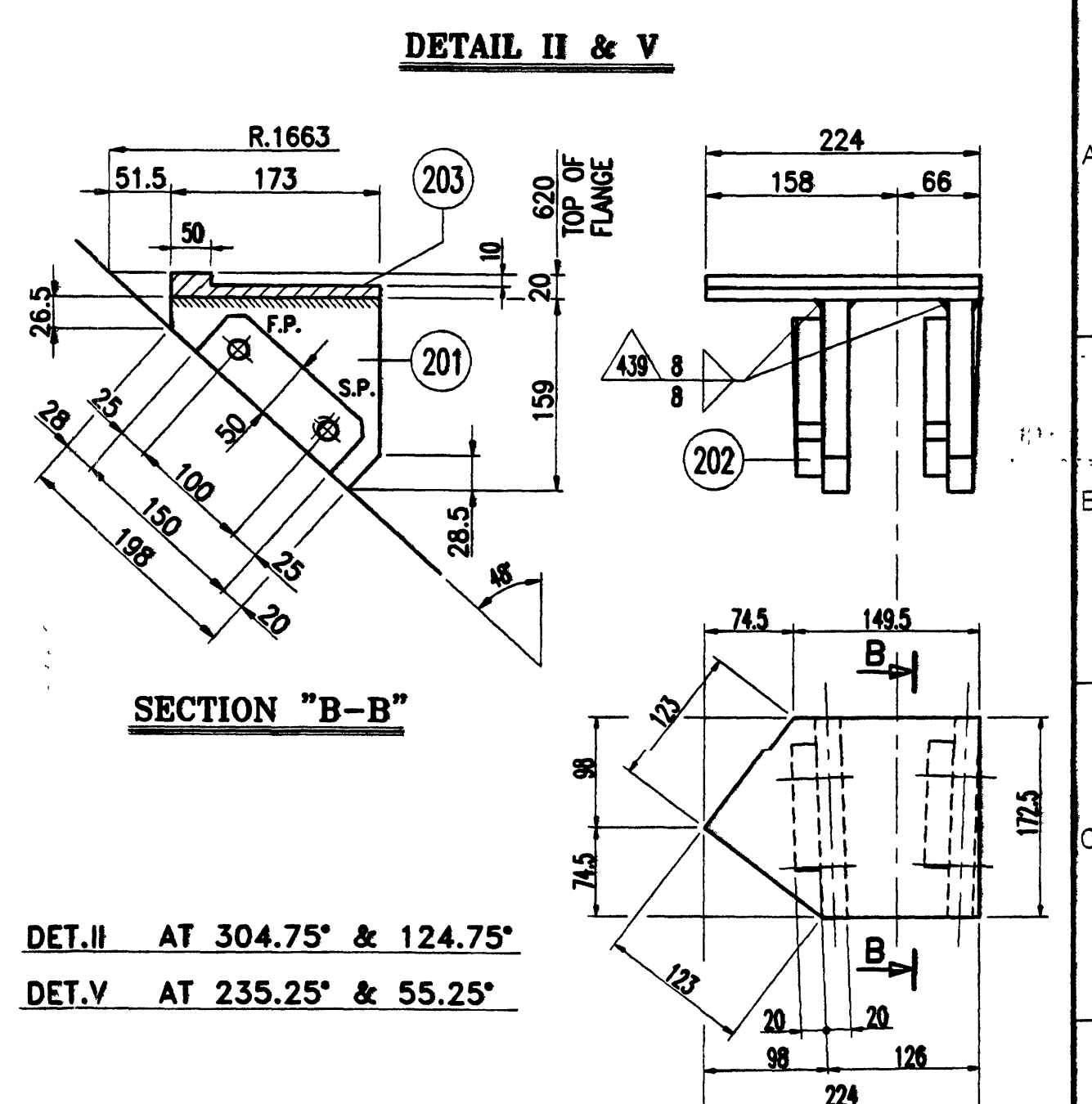
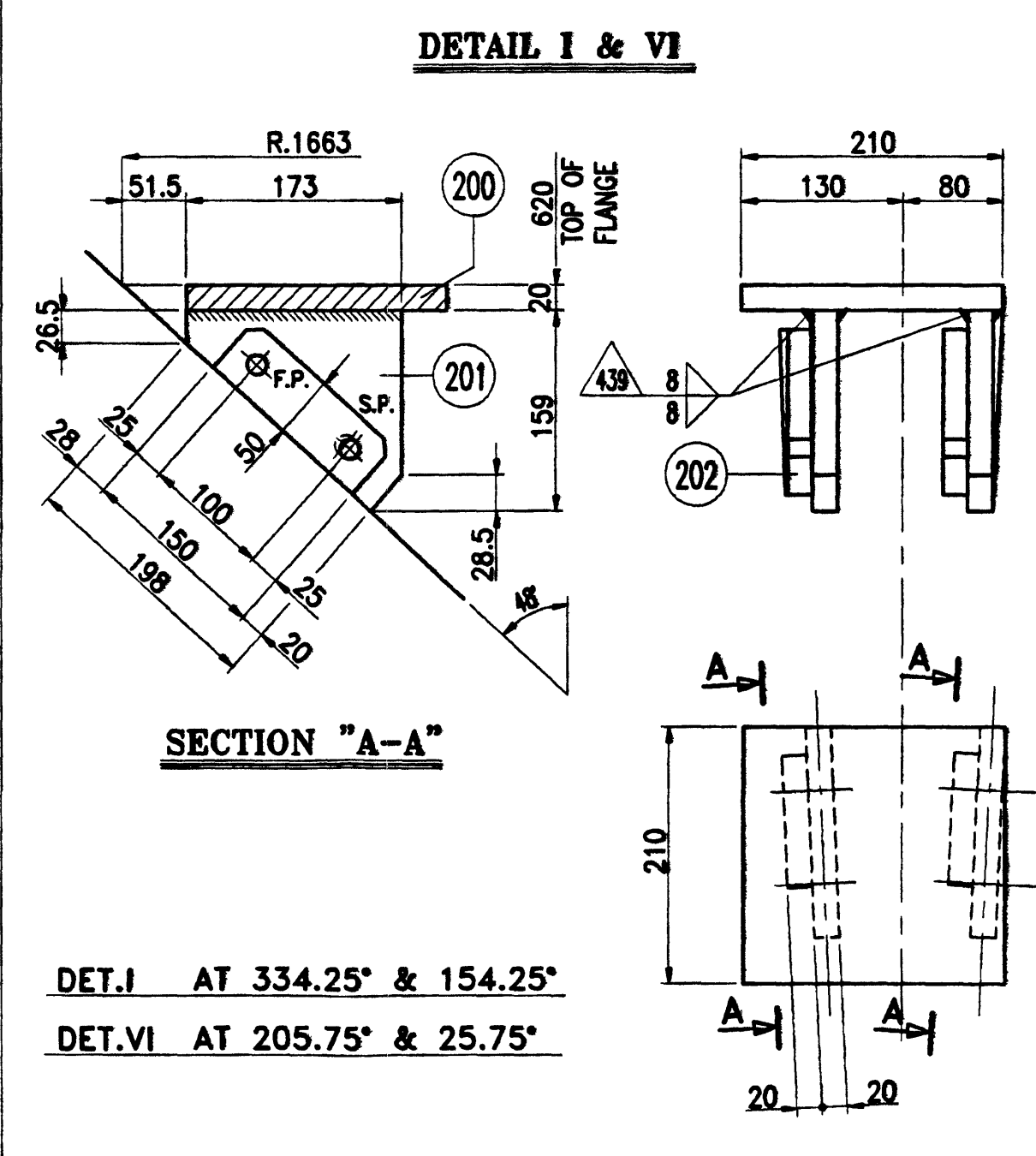
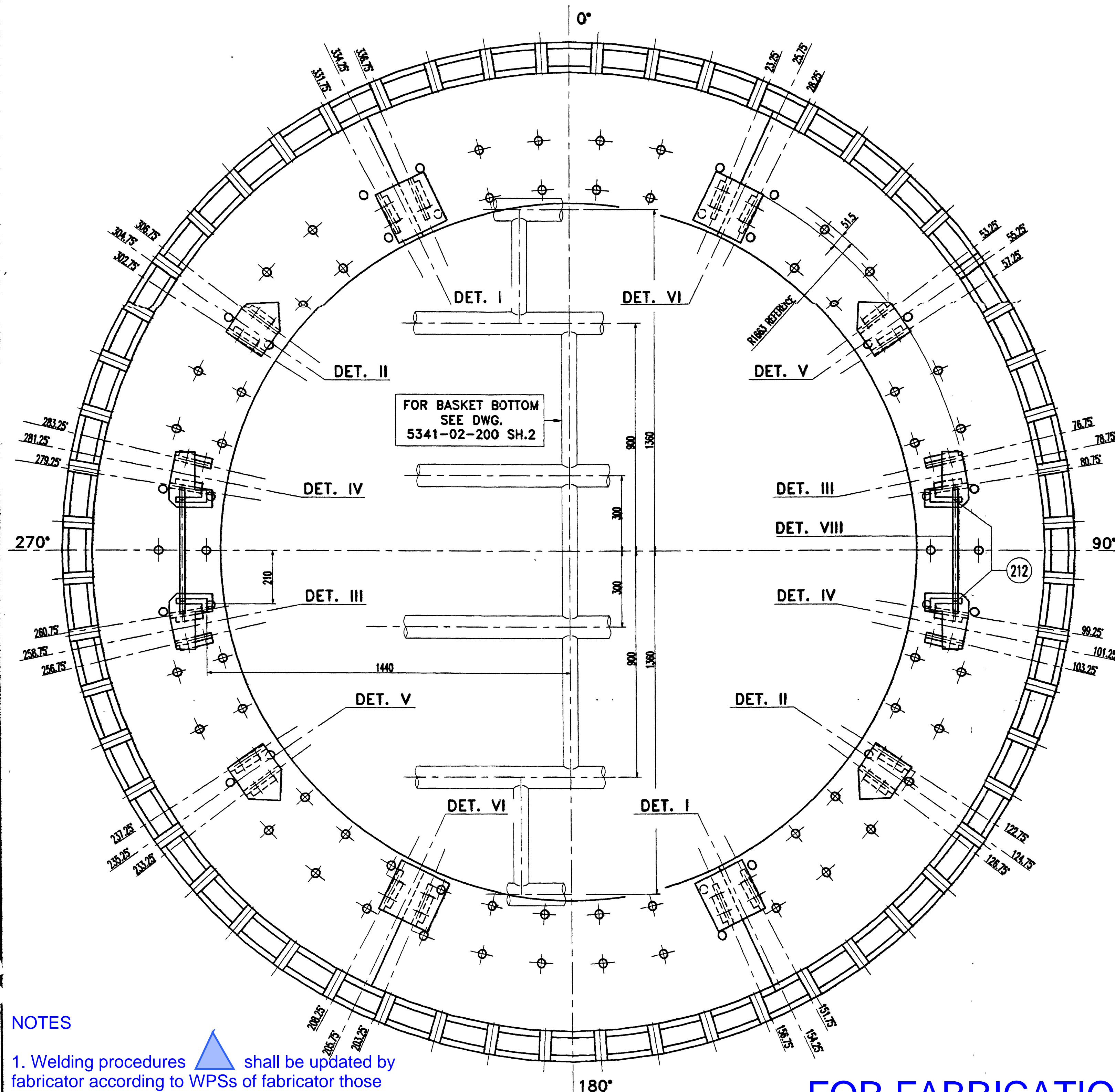
**Annex B**

**Fabrication Drawing No. 5341-02-200 Sheet 2 of 3**



**Annex C**

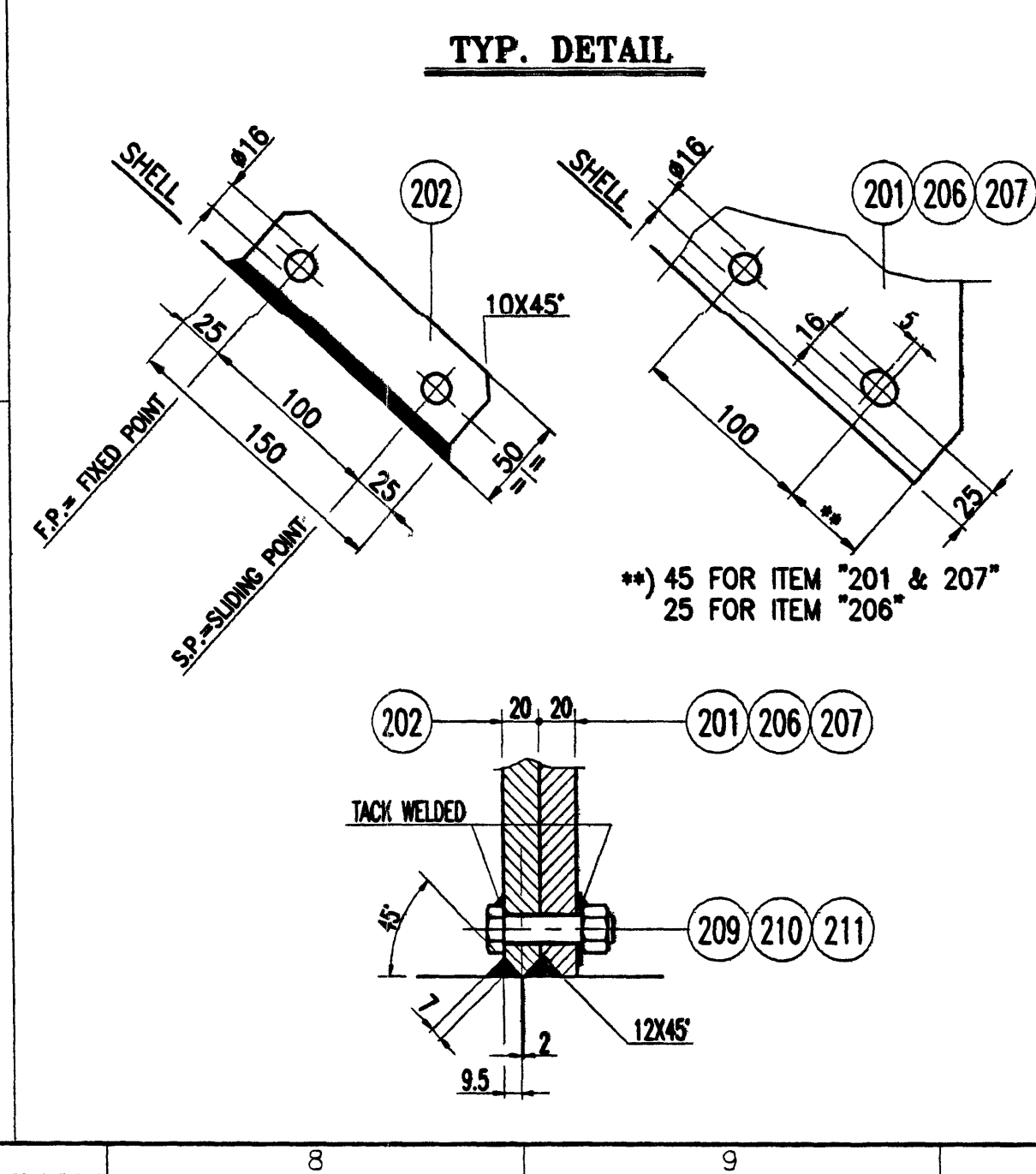
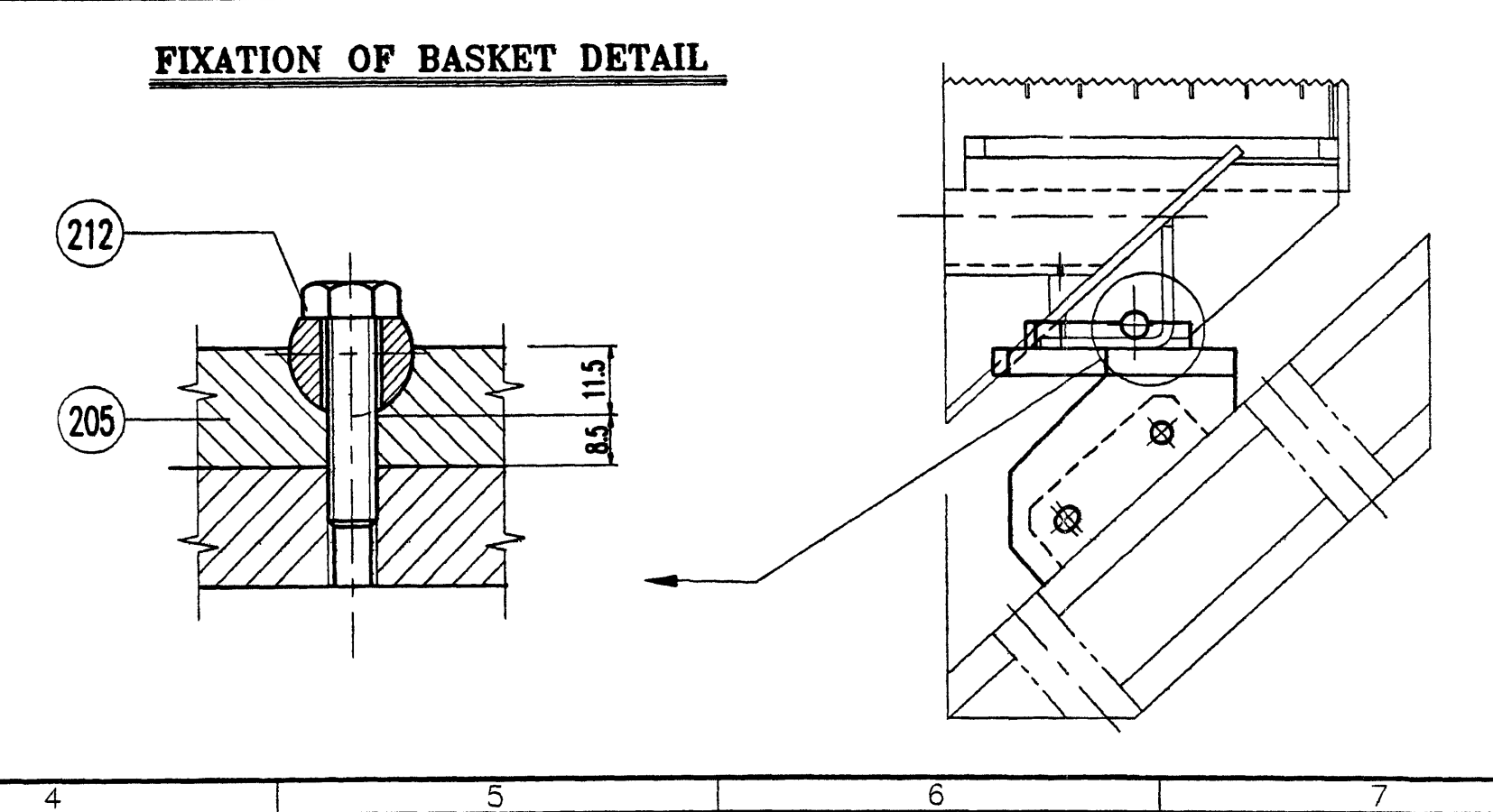
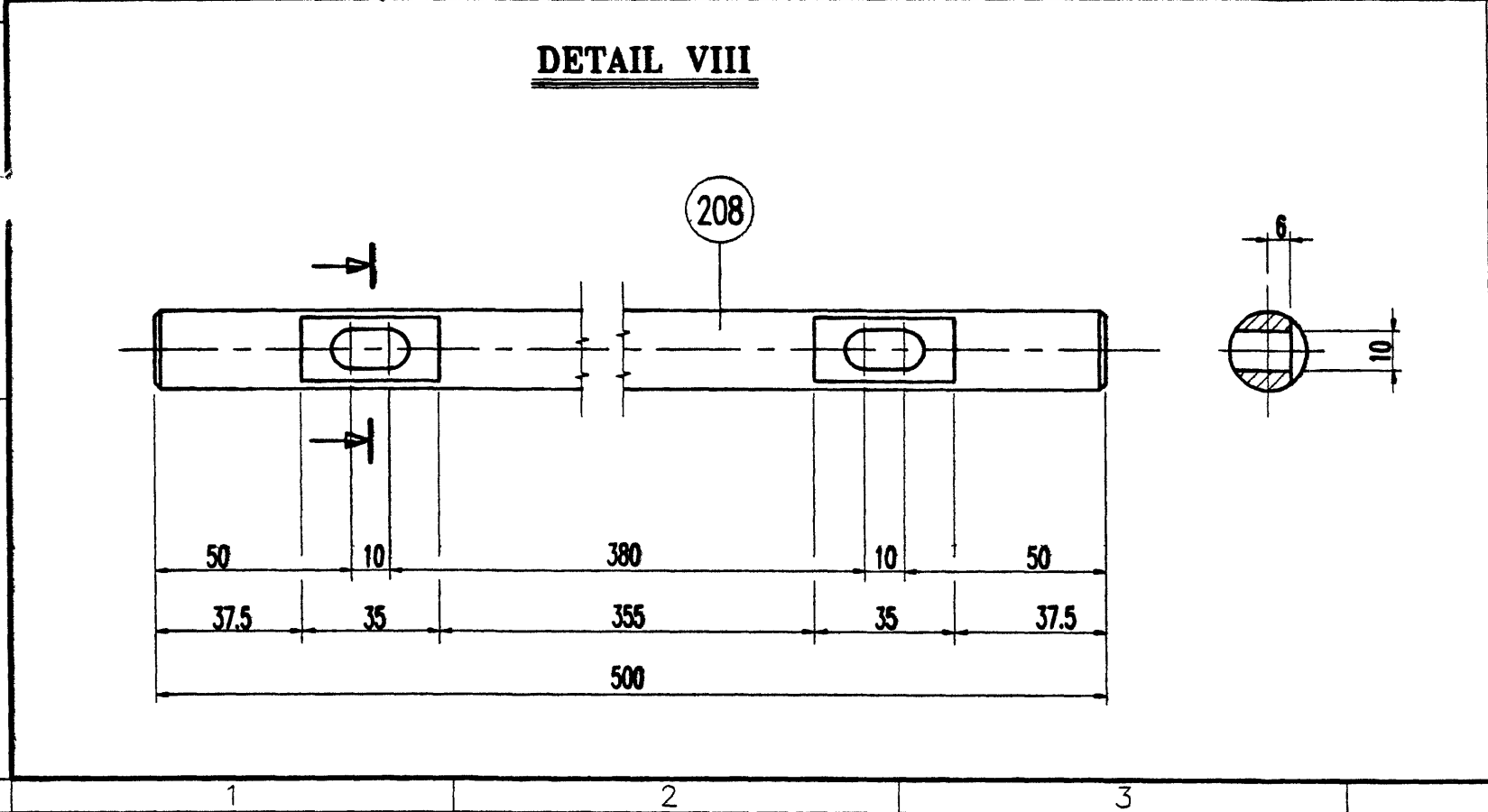
**Fabrication Drawing No. 5341-02-200 Sheet 3 of 3**



**NOTES**

1. Welding procedures shall be updated by fabricator according to WPSs of fabricator those approved by UCHA.
2. All weldments shall be pickled.

**FOR FABRICATION**



| POS. | DESCRIPTION | N. | MATERIALS | DIMENSIONS           |
|------|-------------|----|-----------|----------------------|
|      | SHELL       | 1  | SA516-70  | THK.20               |
| 212  | WIRE T.E.   | 4  | 2.3       | M8 L=35              |
| 211  | DADO        | 48 | 2.3       | M14                  |
| 210  | RONDELLA    | 48 | 2.3       | M14 THK.2.5          |
| 209  | VITE T.E.   | 48 | 2.3       | M14 L=80             |
| 208  | TANGO       | 2  | 2.3       | #20 L=500 (SEE DET.) |
| 207  | PIATTO      | 4  | 3.1.B.    | 153X173 THK.20       |
| 206  | PIATTO      | 4  | 3.1.B.    | 150X138.5 THK.20     |
| 205  | PIATTO      | 4  | 3.1.B.    | 50X125 THK.20        |
| 204  | PIATTO      | 4  | 3.1.B.    | 175X220 THK.20       |
| 203  | PIATTO      | 4  | 3.1.B.    | 172.5X224 THK.20     |
| 202  | PIATTO      | 24 | 3.1.B.    | 50X150 THK.20        |
| 201  | PIATTO      | 18 | 3.1.B.    | 173X158 THK.20       |
| 200  | PIATTO      | 4  | 3.1.B.    | 210X210 THK.20       |

CLIENT : THAI CAPROLACTAM PUBLIC COMPANY LTD.  
 PROJECT : -  
 PLANT : RAYONG - THAILAND  
 ORDER : P01120633 - 17387

**AS BUILT**

DATE: 19/03/03 F. LEONI / 19/03/03 R. VILLA  
 24-01-03 F. ROTA / 24-01-03 F. ROTA  
 28/05/02 C. BOTTI / 29/05/02 F. ROTA  
 05/03/02 F. LEONI / 06/03/02 F. ROTA

REVISIONS:

| REV | DESCRIPTION                   | DATE     | DRAWN    | DATE     | CHECKED  |
|-----|-------------------------------|----------|----------|----------|----------|
| 3   | AS BUILT                      | 19/03/03 | F. LEONI | 19/03/03 | R. VILLA |
| 2   | REVISED AS INDICATED WITH (2) | 24-01-03 | F. ROTA  | 24-01-03 | F. ROTA  |
| 1   | REVISED AS INDICATED WITH (1) | 28/05/02 | C. BOTTI | 29/05/02 | F. ROTA  |
| 0   | ISSUED FOR APPROVAL           | 05/03/02 | F. LEONI | 06/03/02 | F. ROTA  |

CD 5341-02 SERVICE : OXIDIZER BASKET SUPPORTS

DRAWING NUMBER: 5341-02-200

SCALE: 1:1.2

SHEET 3 OF 3

SECTION G  
 page 11  
 COPIA CONFORME ALL' ORIGINALE  
 CERTIFIED TRUE COPY TO THE ORIGINAL  
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**Annex D**

**UBE-H-321 : Welders Qualification Test**



ENGINEERING SPECIFICATION  
FOR  
**WELDERS QUALIFICATION TEST**

**ES NO. UBE-H-321**

|             |                    |             |                |              |                |
|-------------|--------------------|-------------|----------------|--------------|----------------|
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| 0           | Original           | 30 Sep. '13 | NPT            |              |                |
| <b>Rev.</b> | <b>Description</b> | <b>Date</b> | <b>Prepare</b> | <b>Check</b> | <b>Approve</b> |

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| <br><b>UBE</b><br>UBE GROUP (THAILAND) | ENGINEERING SPECIFICATION<br>FOR<br><b>WELDERS QUALIFICATION TEST</b> | UBE-H-321            |
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## **1. GENERAL**

### 1.1 Intent and Scope

This Specification covers general requirements for the qualification test of welders who will engage in welding work for the piping work, steel structure work and tankage work of the plant to be constructed by Contractor who manage and control the work.

### 1.2 Codes and Standards

The related codes and standards to supplement this Specification shall be listed in Engineering Specification UBE-H-301 and follow ASME Section IX.

### 1.3 Related Engineering Specification

The related Engineering Specifications to supplement this Specification is as follows:

- UBE-H-301 Piping Construction Works  
 - Engineering Specification for Steel Structure

## **2. PREPARATION OF QUALIFICATION TEST**

### 2.1 Qualification Required for Application

Applicants for the qualification test shall be welders having authorized license, enough experience or trained.

### 2.2 Document

2.2.1 Applicants for the qualification test shall be required to submit following documents filled in with the necessary data prior to the test. The type of qualifications, required test and qualified range of welder shall be in accordance with Table 1.

- (1) Application for Qualification Test for Welders (Form 1)
- (2) Welder Performance Qualification Test Record (Form 2)

2.2.2 Qualification Certificate as per Form 3 will be issued to the welders who passed the qualification test. The period of validity of the certificate shall be one year from the date of issuance in specific job. Validity may be extended until the completion of the work, when the welder continues to work beyond the one year limit. If the welders who passed the qualification test cannot do his job to meet the welding specification for continuous 3 months, the validity shall be canceled.

2.2.3 Record of tests for welder shall be filled in Form 2 and kept them until the completion of the work.

2.2.4 The qualification certificate shall be returned to Contractor when welders who leave from job site or completion of the job.

### 2.3 Preparation of Test Coupon

2.3.1 Pipe test coupons shall be used for the qualification test of pipe welder. However, plate test coupons may be used for welder qualification test of pipe welder instead of pipe test coupons. In case of using plate test coupons instead of pipe test coupons, qualification by this plate test coupons shall cover the pipe welder for over NPS 24 in. only.

2.3.2 Edge preparation of test material shall be done by machining.

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2.3.3 Dimensions and shape of edge preparation of test coupons shall be as Fig. 1 (a) and Fig. 1 (b).

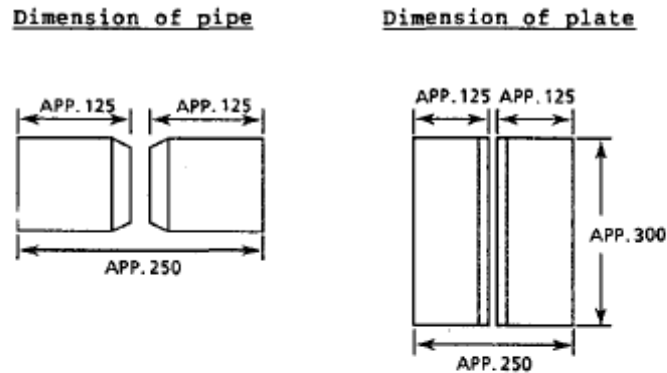


Fig. 1 (a) Dimension of Test Coupon

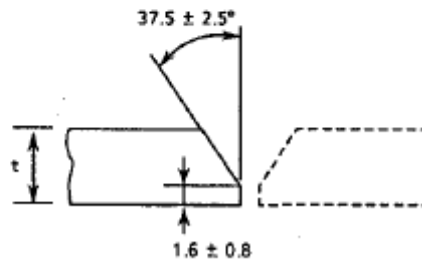


Fig. 1 (b) Edge Preparation

2.3.4 Fixing of test coupon and welding position shall be as follows:

- (1) In case of pipe test coupon, 6G position or 2G + 5G position shall be applied.
- (2) In case of plate test coupon, 2G, 3G and 4G shall be applied. Qualification by plate test coupon shall cover the pipe welder for over NPS 24 in.

### 3. **WELDING**

#### 3.1 General

- 3.1.1 Procedure for welding shall be in accordance with qualified welding procedure specification (WPS).
- 3.1.2 Welding shall be performed from one direction of pipe or plate and back welding shall not be performed.
- 3.1.3 Any heat treatment is not required to the test coupon before and after welding.

#### 3.2 Welding Manner for Pipe Welder

- 3.2.1 Welding of the pipe test coupon shall be performed according to the following manner in case 2G + 5G position.
  - (1) Fix the test coupon horizontally (5G).

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- (2) Weld the test coupon from A to B and from A to D portions as shown in Fig. 2. The point A shall be at the bottom at this time. The welding shall be performed up to the final layer.
- (3) Change fixing position of the test coupon from horizontal to vertical position (2G).
- (4) Weld the test coupon between B, C and D completely. Welding may be started either B or D.
- (5) Boundary parts between weld seams at point B and D in Fig. 2 may be treated with grinder so as to remove crater.

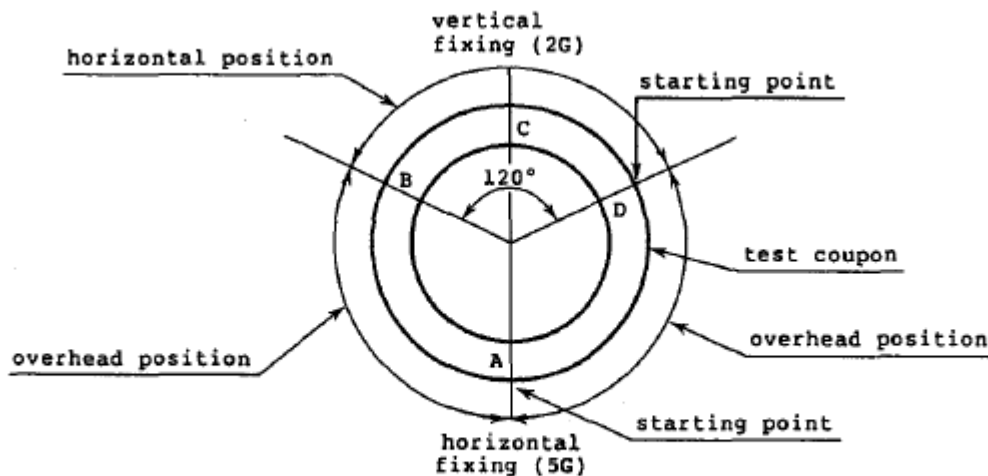


Fig. 2

- 3.2.2 Welding at 6G position shall be performed without changing of position.
- 3.2.3 Welding of the plate test coupon shall be performed according to the following manner:
  - (1) Provide the plate test coupons made of material from the same P-No. of applied pipe test coupon.
  - (2) Weld the test coupons in vertical (3G), horizontal (2G) and overhead (4G) positions respectively as applied position of applicant.

#### **4. INSPECTION AND ACCEPTANCE**

##### 4.1 Inspection Item

- 4.1.1 Visual inspection shall be carried out in accordance with Table 2.
- 4.1.2 Radiographic examination shall be carried out in accordance with Article 2 of ASME Section V after visual inspection has been successfully completed.

##### 4.2 Acceptance Criteria

- 4.2.1 Welder shall be qualified by radiographic examination result in accordance with QW-191 of ASME Section IX.
- 4.2.2 Welder, who has failed the qualification test, may apply to requalification test but once after enough training.

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## **5. QUALIFICATION OF TACK WELDER. SUPPORT WELDER**

### 5.1 Tack Welder, Shoe Welder

Welders who carry out tack welding and welding between shoe or the similar non pressure parts and piping components (pressure parts) shall have the same qualification as pipe welder stipulated in Par.2, 3 and 4.

### 5.2 Support and Steel Structure Welder

5.2.1 Welders who carry out support and steel structure welding of carbon steel material (P-No.1) shall be qualified in accordance with this specification with one (1) plate coupon so that one-half welding seam of plate coupon shall be 2G position and the remaining half welding seam shall be 3G position.

5.2.2 Judgment shall be done by the visual inspection in accordance with Par.4.1.1 and no radiographic examination may be applied.

## **6. RETESTS OF QUALIFICATION**

6.1 When the qualification coupon has failed the visual examination, retesting shall be by visual examination and mechanical testing (as QW-302.1 of ASME Section IX).

When an immediate retest is made, the welder shall make two consecutive test coupons for position which he has failed, all of which shall pass the test requirements.

6.2 When the qualification coupon has failed the radiographic examination, retesting shall be by the radiographic examination method. The retest shall be to examine one set for a total of 12 in. of weld, which shall include the entire weld circumference (for small diameter pipe the total number of consecutively made test coupons need not exceed eight inches).

6.3 If this retest does not meet the standards, the welder has failed the retest. He cannot work for this project.

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Table 1 Type of Welder's Qualifications

(1) Pipe Welder

| Group Name | Welding Process | Test Coupon (Pipe) | P No. | F No.  | Base Material Qualified Range   |
|------------|-----------------|--------------------|-------|--------|---|
|            |                 | Material           |       |        |   |
| C/G        | GTAW            | A53 GR.B or eq.    | 1     | 6      | Carbon Steel (P-1, F-6)   |
| C/GS       | GTAW+SMAW       | A53 GR.B or eq.    | 1     | 6+( 3) | Carbon Steel (P-1, F-.6 + 3, 2, 1)  |
| CI/GS      | GTAW+SMAW       | A53 GR.B or eq.    | 1     | 6+4    | Carbon Steel (P-.1, F-.6 + 4, 3, 2, 1)  |
| DI/G       | GTAW            | A335 GR.P1 or eq.  | 3     | 6      | Carbon & Low Alloy Steel (P-1, 3, 4, 5, F-6)                                  |
| DI/GS      | GTAW+SMAW       | A335 GR.P1 or eq.  | 3     | 6+4    | Carbon & Low Alloy Steel (P-1, 3, 4, 5, F-6 + 4, 3, 2, 1)                     |
| BI/G       | GTAW            | A312 TP,304 or eq. | 8     | 6      | Austenitic Stainless Steel (P-1, 8, F-6)                                      |
| BI/GS      | GTAW+SMAW       | A312 TP,304 or eq. | 8     | 6+5    | Austenitic Stainless Steel (P-1, 8, F-6 + 5)                                  |
| FI/G       | GTAW            | A333 GR.P3 or eq.  | 9B    | (6)    | Carbon & 3 <sup>1</sup> / <sub>2</sub> % Ni Steel (P-1, 9B, F-6)              |
| FI/GS      | GTAW+SMAW       | A333 GR.P3 or eq.  | 9B    | (6)+4  | Carbon & 3 <sup>1</sup> / <sub>2</sub> % Ni Steel (P-1, 9B, F-6 + 4, 3, 2, 1) |

(2) Support and Steel Structure Welder

| Group Name | Welding Process | Test Coupon (Plate) | P No. | F No. | Base Material Qualified Range           |
|------------|-----------------|---------------------|-------|-------|---|
|            |                 | Material            |       |       |   |
| S          | SMAW            | SS 400 (JIS) or eq. | 1     | 3     | Carbon Steel (P-1, F-2, 1) Support only |

Remarks:

1. Abbreviations used are:
  - GTAW : Gas Tungsten-Arc Welding
  - GTAW : Shield Metal-Arc Welding
2. Welding rods used for the test shall be in accordance with Engineering Specification H-30IE unless otherwise specified.
3. A test coupon of which root pass already made by other welder may be used for the qualification test of the respective group, and the welder tested requires to carry out only subsequent layers (cover passes).

This qualification covers SMAW cover pass only, but not root pass. It is noted that Group Name involving such welder is categorized in CIS in case carbon steel.

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(3) Qualified Range of Welder

| Test Coupon <sup>(2)</sup> | Qualified Range |                       |
|----------------------------|-----------------|-----------------------|
|                            | Thickness (mm)  | Size (NPS in.)        |
| Pipe Size (NPS in.)        |                 |                       |
| 1/8 <sup>(1)</sup>         | Max 2T          | 1/8 - No limitation   |
| 1/4 <sup>(1)</sup>         | Max 2T          | 1/4 - No limitation   |
| 1/2 <sup>(1)</sup>         | Max 2T          | 1/2 - No limitation   |
| 3/4 <sup>(1)</sup>         | Max 2T          | 3/4 - No limitation   |
| 1 <sup>(1)</sup>           | Max 2T          | 3/4 - No limitation   |
| 1 1/2 <sup>(1)</sup>       | Max 2T          | 3/4 - No limitation   |
| 2                          | Max 2T          | 3/4 - No limitation   |
| 2 1/2 ≤                    | Max 2T          | 2 1/2 - No limitation |

Notes:

- (1) Min weld length of coupon(s) shall be 6 in. (152 mm). And for small diameter pipe, multiple coupons may be required. But the number need not exceed four consecutively made test coupons.
- (2) Alternatively, a 6 in. (152 mm) length of first production weld made by a welder may be qualified. But, the original document shall be reviewed by Owner and qualification shall be judged by Owner.

Remark:


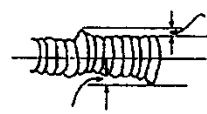

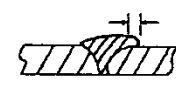
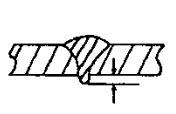
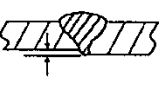

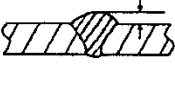

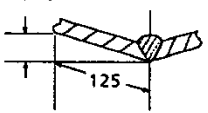
T means nominal thickness of test coupon. When test coupon having  $T \geq 3/4$  in. (19 mm), no thickness limitation is qualified.

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Table 2 List of Items for Visual Inspection

| Item   | Degree of Defect Criteria   | Sketch No. |
|--|---|------------|
| 1. Uneven bead                               | No marked defect  | 1.         |
| 2. Uneven bead width                         | No marked defect  | 2.         |
| 3. Undercut                                  | 1.0 or less<br>25 or less for length of one undercut,<br>88 or less of peripheral length for total length               | 3.         |
| 4. Overlap                                   | No marked defect  | 4.         |
| 5. Excessive penetration                     | No marked defect  | 5.         |
| 6. Inner surface misalignment                | No marked defect  | 6.         |
| 7. Bead center shift                         | No marked defect  | 7.         |
| 8. Height of reinforcement of weld           | No excess reinforcement of weld   | 8.         |
| 9. Incomplete weld penetration               | 0.5 or less<br>25 or less for length of one incomplete penetration,<br>48 or less of peripheral length for total length | 9.         |
| 10. Angle (strain angle after plate welding) | 8° (mm)   | 10.        |
| 11. Crack                                    | Not allowed   |            |

**Sketch**

|   |   |   |  |   |
|---|---|---|--|---|
| 1.<br> | 2.<br> | 3.<br> | 4.<br> | 5.<br>             |
| 6.<br> | 7.<br> | 8.<br> | 9.<br> | 10.<br>8° (18)<br> |

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Form 1

| <b>APPLICATION FOR<br/>QUALIFICATION TEST FOR WELDERS</b>  |   |   |  |
|--|---|---|--|
| <input type="checkbox"/> 1st Application<br><input type="checkbox"/> 2nd Application   |   | Date _____                              |  |
| Contractor   | P.  | Applicant                               |  |
| ATTENTION: Construction Manager  |   | Address of Company _____                |  |
|  |   | Name of Company _____ TEL _____         |  |
|  |   | Name of representative _____ seal _____ |  |
| <div style="border: 1px solid black; width: 100px; height: 100px; margin: 0 auto;"> <p style="text-align: center; margin: 0;">Photo</p> </div> | Place of registration _____<br>Present address _____<br>Name _____<br>Birth date _____ Age _____ seal _____ |   |  |
| Group name of qualification test _____   |   |   |  |
| Attached WPS No. _____   |   |   |  |
| Qualification already acquired (issued by ..., Date, Classification, Number)   |   |   |  |
| Experience in welding (incl. No. of years)   |   |   |  |
| _____  |   |   |  |
| _____  |   |   |  |
| _____  |   |   |  |
| * Entry by Contractor  |   | Test date                               |  |
| Date of receipt  |   |   |  |

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Attachment 1 - 2/3

Form 2

| WELDER PERFORMANCE QUALIFICATION TEST RECORD (WPQ)          |                    |            |              |          |                                 |               |        |  |      |  |  |
|---|--------------------|------------|--------------|----------|---------------------------------|---------------|--------|--|------|--|--|
| 1. Welder   | Name               |            |              |          | Company                         |               |        |  |      |  |  |
|   | Application No.    |            |              |          | Type of Quali-<br>fication Test |               |        |  |      |  |  |
| 2. Test Material  | Material           |            |              |          | Dimension                       |               | Pipe   |  |      |  |  |
|   |                    |            |              |          |                                 |               | Plate  |  |      |  |  |
| 3. Welding Position   | Pipe (2G, 5G, 6G)  |            |              |          | Plate (2G, 3G, 4G)              |               |        |  |      |  |  |
| 4. Welding Machine  | TIG                |            |              |          | Arc                             |               |        |  |      |  |  |
| 5. Preparation (Show Sketch)                                |                    |            |              |          | Witness                         |               |        |  |      |  |  |
|   |                    |            |              |          |                                 |               | Date   |  | Sign |  |  |
|   |                    |            |              |          | TEC                             |               |        |  |      |  |  |
| 6. Welding Condition  | Number of Pass     |            | Root Pass    |          | 2nd Pass and over               |               |        |  |      |  |  |
|   | Welding Procedure  |            |              |          |                                 |               |        |  |      |  |  |
|   | Electrode          |            |              |          |                                 |               |        |  |      |  |  |
|   | Electrode Size     |            |              |          | mmφ                             |               | mmφ    |  |      |  |  |
|   | Drying Condition   |            |              |          | °C h                            |               | °C h   |  |      |  |  |
|   | Shield Gas (Argon) |            | Torch Side   |          | 1/min.                          |               | 1/min. |  |      |  |  |
|   |                    |            | Back Side    |          | 1/min.                          |               | 1/min. |  |      |  |  |
|   | Welding Current    |            |              |          | A                               |               | A      |  |      |  |  |
|   | Welding Voltage    |            |              |          | V                               |               | V      |  |      |  |  |
| Welding Speed   |                    |            |              | cm/min.  |                                 | cm/min.       |        |  |      |  |  |
| Heat Input  |                    |            |              | J/cm     |                                 | J/cm          |        |  |      |  |  |
| 7. Heat Treatment   | Preheating °C      |            |              |          | Interlayer Temp. °C             |               |        |  |      |  |  |
|   | Postheating °C     |            |              |          | Stress Relief °C h              |               |        |  |      |  |  |
| 8. Atmospheric Condition                                    | Out-door           | Weather    | Atmos. Temp. | °C       | Humidity                        | Wind Velocity | m/s    |  |      |  |  |
|   | In-door            | Room Temp. | °C           | Humidity | -                               | -             |        |  |      |  |  |
| 9. Visual Inspection  | Result             |            | Date         |          | Inspector's Sign                |               |        |  |      |  |  |
|   |                    |            |              |          |                                 |               |        |  |      |  |  |
| 10. Radiography   |                    |            |              |          |                                 |               |        |  |      |  |  |
| Judgement: <u>Good , No Good</u><br>Approval : _____<br>TEC |                    |            |              |          |                                 |               |        |  |      |  |  |

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Attachment 1 - 3/3

Form 3

**WELDER'S TECHNIQUE  
QUALIFICATION CERTIFICATE**

|   |  |
|---|--|
| <b>WELDER'S TECHNIQUE<br/>QUALIFICATION CERTIFICATE</b>   |  |
| <b>CERTIFICATE NO.</b> _____<br><b>WORK NO.</b> _____<br><b>ISSUE DATE</b> _____  | <div style="border: 1px dashed black; width: 80px; height: 60px; margin: 0 auto;"> <p style="text-align: center; margin: 0;">SEAL</p> </div> |
| <div style="border: 1px dashed black; width: 100px; height: 50px; display: flex; align-items: center; justify-content: center; margin: 5px 0;"> <span style="font-size: 0.8em;">PHOTO</span> <span style="font-size: 0.8em; margin-left: 10px;">SEAL</span> </div>  | <b>NAME</b> _____<br><b>BIRTH DATE</b> _____<br><b>ADDRESS</b> _____   |
| <b>APPLICANT</b> _____<br><b>ADDRESS OF APPLICANT</b> _____   |  |
| <p><b>QUALIFIED EXTENT</b></p> <p style="text-align: center;">         THIS QUALIFICATION CERTIFICATE IS TO<br/>         CERTIFY THAT THIS WELDER HAS PASSED<br/>         QUALIFICATION TEST CARRIED OUT BY TEC.<br/>         PERIOD OF VALIDITY OF THIS QUALIFICATION<br/>         CERTIFICATE SHALL BE AS FOLLOWS BUT<br/>         VALIDATED IN ONLY THE SAME JOB.       </p> |  |

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**Annex E**

**UBE-H-331 : Welding Procedure Qualification**



ENGINEERING SPECIFICATION  
FOR  
**WELDING PROCEDURE QUALIFICATION**

**ES NO. UBE-H-331**

|             |                    |             |                |              |                |
|-------------|--------------------|-------------|----------------|--------------|----------------|
|             |                    |             |                |              |                |
|             |                    |             |                |              |                |
|             |                    |             |                |              |                |
|             |                    |             |                |              |                |
| 0           | Original           | 30 Sep. '13 | NPT            |              |                |
| <b>Rev.</b> | <b>Description</b> | <b>Date</b> | <b>Prepare</b> | <b>Check</b> | <b>Approve</b> |

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|   |  |                      |
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| <br>UBE GROUP (THAILAND) | ENGINEERING SPECIFICATION<br>FOR<br><b>WELDING PROCEDURE<br/>QUALIFICATION</b> | UBE-H-331            |
|   |  | Rev.0 : Sep.30, 2013 |
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- 1.3 Related Engineering Specifications

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- 2.2 Preparation of WPS and PQR
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### **3. SUPPORTING DOCUMENTS**

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- Table-1 Standard Selection of Welding Procedure Specification (WPS)
- Fig.1 Joint Sketch

#### **APPENDIX**

- Welding Procedure Specification (WPS)
- Procedure Qualification Record (PQR)

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|   |   | Rev.0 : Sep.30, 2013 |
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## **1. GENERAL**

### 1.1 Scope

This Specification stipulates welding procedure specification and welding procedure qualification of the welding work for the piping construction work, steel structure and tankage work, which will be included in the plant to be constructed by who manage and control the work.

### 1.2 Codes and Standards

The applicable codes and standards to supplement this Specification shall be as listed in Engineering Specification UBE-H-301 and follow ASME Section IX.

### 1.3 Related Engineering Specifications

The related Engineering Specifications to supplement this Specification are as follows:

- |     |           |   |
|-----|-----------|---|
| (1) | UBE-H-103 | Piping Materials                              |
| (2) | UBE-H-301 | Piping Construction Works                     |
| (3) | UBE-H-321 | Welders Qualification Test                    |
| (4) | -         | Engineering Specification for Steel Structure |

## **2. WELDING PROCEDURE SPECIFICATIONS (WPS)**

### 2.1 Requirements for WPS

2.1.1 WPS shall be the written qualified welding procedure prepared to provide direction for making production weld and shall be provided before welding work starts.

The record of welding procedure qualification shall be issued to Owner for approval before welding work starts.

2.1.2 The WPS shall have supporting Procedure Qualification Record (PQR) which is the record of the welding data used to weld the test coupon.

2.1.3 Formats to be used for WPS and PQR shall be referred to attached Form sheets "WELDING PROCEDURE SPECIFICATION" and "PROCEDURE QUALIFICATION RECORD" or the similar formats.

### 2.2 Preparation of WPS and PQR

2.2.1 Applicable WPS for the specific job shall be prepared in accordance with Attached Table 1 "Standard Selection of Welding Procedure Specification (WPS)", Engineering Specification UBE-H-103 and UBE-H-301.

2.2.2 Qualification thickness limits and test specimens for PQR shall be in accordance with QW 451 of ASME Section IX

2.2.3 WPS and PQR qualified by Contractor to apply for the work shall be issued to Owner for review.

2.2.4 The welding procedure qualification shall be performed at an agreed location.

### 2.3 Joint Design

Joint designs referred to in each WPS are as illustrated in Attached Fig.

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|   |  | Rev.0 : Sep.30, 2013 |
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### **3. SUPPORTING DOCUMENTS**

The following documents shall be attached to this engineering specification as Specific Job Requirements:

- (1) Part-1 Welding Procedure Specifications
- (2) Part-2 Procedure Qualification Records
- (3) Part-3 Welding Filler Metal Catalogs

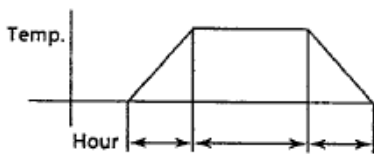
### **4. MODIFICATION OR CHANGES**

Any modifications and changes to the WPS may be made by Contractor to suit production welding conditions on construction phase in compliance with the applicable code and standard.

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**FIELD INSPECTION REPORT**

|  |   |
|--|---|
| WELDING PROCEDURE SPECIFICATION<br>WPS<br>1/2  | WORK No. :  |
|  | REPORT No. :  |
|  | DATE :  |
| NAME of WELD or APPLICABLE JOINT No. _____   |   |
| WELDING PROCESS(ES) _____ TYPES <u>Manual, Automatic, Semi - Aut.</u>  |   |
| <b>JOINTS (QW-402)</b><br><br>Groove Design _____<br>Single<br><u>Groove, Double bevel</u><br><br>Backing _____<br>Other _____   | <b>BASE METALS (QW-403)</b><br><br>_____ to _____<br>P-No. _____ to P-No. _____<br>Thickness Range _____<br>Other _____   |
| <b>FILLER METALS (QW-404)</b><br><br>Weld Metal Analysis A No. _____<br><br>Filler Metal F No. _____<br>Spec. No. _____<br>AWS No. _____<br>Size of Electrode _____<br><br>Size of Filler _____<br><br>Flux Composition _____<br><br>Particle Size _____<br><br>Electrode Flux Compo. _____<br><br>Consumable Insert _____<br><br>Drying Temp. of Electrode & Flux _____ | <b>PREHEAT (QW-406)</b><br><br>Preheat Temp. _____ °C<br>Interpass Temp. _____ °C<br>Preheat Maintenance _____<br><br>Postheating _____   |
| <b>POSITION (QW-405)</b><br><br>Position of Groove _____<br><br>Welding Progression <u>Forhand, Backhand</u><br><br>Other _____  | <b>POSTWELD HEAT TREATMENT (QW-407)</b><br><br><br><br><b>GAS (QW-408)</b><br>Shielding Gas(es) _____<br><br>Percent Composition _____<br><br>Flow Rate _____<br><br>Gas Backing _____<br>Trailing Shielding Gas Composition _____<br><br>Other _____ |

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| WELDING PROCEDURE SPECIFICATION<br>WPS   |  | WORK No. :   |         |      |       |                       |                               |
|--|--|--------------|---------|------|-------|-----------------------|-------------------------------|
| 2 / 2  |  | REPORT No. : |         |      |       |                       |                               |
|  |  | DATE :       |         |      |       |                       |                               |
| <p><b>ELECTRICAL CHARACTERISTICS (QW-409)</b></p> <p>Current <u>AC, DC</u>    Polarity <u>SP, RP</u></p> <p>Other _____</p> <p><b>TECHNIQUE (QW-410)</b></p> <p>String or Weave Bead<br/><u>String Bead, Weave Bead</u></p> <p>Orifice or Gas Cup Size _____</p> <p>Initial &amp; Interpass Cleaning<br/><u>Brushing, Grinding</u></p> | <p>Method of Back Gouging _____</p> <p>Oscillation _____</p> <p>Contact Tube to Work Distance<br/><u>Use, Not Use</u></p> <p>Multipass or Single Pass<br/><u>Multipass, Single Pass (Per Side)</u></p> <p>Single or Multiple Electrodes<br/>_____</p> <p>Other _____</p> |              |         |      |       |                       |                               |
| <b>WELDING SEQUENCE &amp; PROCEDURE</b>  |  |              |         |      |       |                       |                               |
| Sequence   | Bead No.   | Electrode    | Dia. mm | Amps | Volts | Travel Speed cm / min | Max. All Thermal-Input J / cm |
|  |  |              |         |      |       |                       |                               |
|  |  |              |         |      |       |                       |                               |
|  |  |              |         |      |       |                       |                               |
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|  |  |              |         |      |       |                       |                               |
| <b>COMMENTS</b>  |  |              |         |      |       |                       |                               |
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H-331  
Appendix (2) - 1/2

**FIELD INSPECTION REPORT**

| <b>PROCEDURE QUALIFICATION RECORD</b><br>PQR<br>1/2   | WORK No. : _____<br>REPORT No. : _____<br>DATE : _____  |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|-----------------|----------|-----------|---------|-----------------------|-----------------------------|-----------------------|-----------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| WPS No. _____   |   |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| WELDING PROCESS(ES) _____ TYPES <u>Manual, Automatic, Semi-Aut.</u>   |   |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| JOINTS (QW-402)<br><br><br><p style="text-align: center;">Groove Design Used _____</p> BASE METALS (QW-403)<br>Material Spec. _____ to _____<br>Type of Grade _____<br>P-No. _____ to P-No. _____<br>Thickness _____<br>Diameter _____<br>Other _____   | PREHEAT (QW-406)<br>Preheat Temp. _____ °C<br>Interpass Temp. _____ °C<br>Postheating _____<br>Other _____  |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| FILLER METALS (QW-404)<br>Weld Metal Analysis A No. _____<br>Filler Metal F No. _____<br>Spec. No. _____<br>AWS No. _____<br>Size of Electrode _____<br>Other _____   | POSTWELD HEAT TREATMENT (QW-407)<br><div style="text-align: center;"> </div> GAS (QW-408)<br>Type of Gas or Gases _____<br>Composition of Gas Mixture _____<br>Other _____  |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| POSITION (QW-405)<br>Position of Groove _____<br>Weld Progression <u>Forehand, Backhand</u><br>Other _____  | ELECTRICAL CHARACTERISTICS (QW-409)<br>Current <u>AC, DC</u> Polarity <u>SP, RP</u><br><br>TECHNIQUE (QW-410)<br>String or Weave Bead<br><u>String Bead, Weave Bead</u><br>Oscillation _____<br>Multipass or Single Pass<br><u>Multipass, Single Pass (Per Side)</u><br>Single or Multiple Electrodes _____ |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:12.5%;">Welding Process</th> <th style="width:12.5%;">Bead No.</th> <th style="width:12.5%;">Electrode</th> <th style="width:12.5%;">Dia. mm</th> <th style="width:12.5%;">Amps</th> <th style="width:12.5%;">Volts</th> <th style="width:12.5%;">Travel Speed cm / min</th> <th style="width:12.5%;">Max. All Thermal-Input J/cm</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> |   | Welding Process | Bead No. | Electrode | Dia. mm | Amps                  | Volts                       | Travel Speed cm / min | Max. All Thermal-Input J/cm |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Welding Process   | Bead No.  | Electrode       | Dia. mm  | Amps      | Volts   | Travel Speed cm / min | Max. All Thermal-Input J/cm |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |   |                 |          |           |         |                       |                             |                       |                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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FORM No. P-002    1 OF 2    INSPECTION Gr. \_\_\_\_\_

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| PROCEDURE QUALIFICATION RECORD<br>PQR<br>2/2   |                |                     |   |                            | WORK No. :   |                                 |
|--|----------------|---------------------|---|----------------------------|--|---------------------------------|
|  |                |                     |   |                            | REPORT No. :   |                                 |
|  |                |                     |   |                            | DATE :   |                                 |
| TENSILE TEST (QW-150)  |                |                     |   |                            |  |                                 |
| Specimen No.   | Width mm       | Thickness mm        | Area mm <sup>2</sup>  | Ultimate Total Load kgf[N] | Ultimate Total Stress kgf/mm <sup>2</sup> [N/mm <sup>2</sup> ] | Character of Failure & Location |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
| GUIDED BEND TESTS (QW-160)   |                |                     |   |                            |  |                                 |
| Type and Figure No.  | Result         | Type and Figure No. | Result  |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
| TOUGHNESS TESTS (QW-170)   |                |                     |   |                            |  |                                 |
| Specimen No.   | Notch Location | Notch Type          | Test Temp. °C   | Impact Values kgf-m[J]     | Lateral Exp.   |                                 |
|  |                |                     |   |                            | % Shear  | mm                              |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
|  |                |                     |   |                            |  |                                 |
| Type of Test _____<br>Deposit Analysis _____<br>Other _____<br>Welder's Name _____ Clock No. _____ Stamp No. _____<br>Test Conducted by : _____ Laboratory Test No. _____<br>per : _____ |                |                     |   |                            |  |                                 |
| We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX of ASME Code.       |                |                     |   |                            |  |                                 |
| Date _____   |                |                     | Manufacture _____<br>by _____<br>Toyo Engineering Corp. _____<br>by _____ |                            |  |                                 |

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Attachment (1) - 1/1

Attached Table 1 Standard Selection of Welding Procedure Specification (WPS)

| P.No.   | TQC<br>Material<br>Group<br>Code | Size Range & Type of Weld             |   |           |   |           |   |          |   |          |   | Welding Process |                                  |                               |                                  | Welding Rod (Option)                     |              | Supporting<br>PQR |                            |  |
|---|----------------------------------|---------------------------------------|---|-----------|---|-----------|---|----------|---|----------|---|-----------------|----------------------------------|-------------------------------|----------------------------------|--|--------------|-------------------|----------------------------|--|
|   |                                  | Joint Design No. (from Attached Fig.) |   |           |   |           |   |          |   |          |   | GTAW            | SMAW<br>(Low Hydro-<br>gen Type) | "URANAMI"<br>1st-pass<br>(*1) | "Non Shield"<br>1st-pass<br>(*2) | "Inertite"<br>Type<br>Cover pass<br>(*3) | PWHT<br>(SR) |                   |                            |  |
|   |                                  | B1-B5                                 |   | A1-A3     |   | C1, C2    |   | (Square) |   | (Square) |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
|   |                                  | 1/2-1 1/2                             | 2 | 1/2-1 1/2 | 2 | 1/2-1 1/2 | 2 | 2        | 2 | 2        | 2 |                 |                                  |                               |                                  |  |              |                   |                            |  |
| A   |                                  | B                                     |   | C         |   | D         |   | E        |   | F        |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 1   | 1                                |                                       |   |           |   |           |   |          |   |          |   | G               | S                                | U                             |                                  |  | I            | (*4)              | See<br>Attached<br>Table 2 |  |
| 1. Carbon Steel for Water Services                              |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| Carbon Steel for Steam & Process Services                       |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| Carbon Steel for Caustic Services                               |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 2. Al-Killed Carbon Steel for Low Temp. Services                |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 3. C-1/2%Mo Steel   |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 4. 1 1/4%Cr-1/2%Mo Steel  |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 5. 2 1/4%Cr-1%Mo Steel  |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 6. Austenitic Stainless Steel (Type 304)                        |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 7. Austenitic Stainless Steel (Type 304) for Low Temp. Services |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 8. Austenitic Stainless Steel (Type 316L)                       |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 9. Austenitic Stainless Steel (Type 321H)                       |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| 10. 3 1/2%Ni Steel for Low Temp. Services                       |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| Example:  |                                  |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| (1)   | WPS No. 1-1A (U. I)              |                                       |   |           |   |           |   |          |   |          |   |                 |                                  |                               |                                  |  |              |                   |                            |  |
| (2)   | WPS No. 8-10B-CS                 |                                       |   |           |   |           |   |          |   |          |   | G               | S                                | U                             |                                  |  |              |                   |                            |  |
| (3)   | WPS No. 5-1D-S-SR                |                                       |   |           |   |           |   |          |   |          |   | D               | S                                |                               |                                  |  |              |                   |                            |  |

Note: \*1 "URANAMI" welding rod used for 1st layer by SMAW Process, but non-applicable for TCL project.

\*2 "Non Shield" is flux type welding rod used for 1st layer without inert gas back shielding by GTAW method.

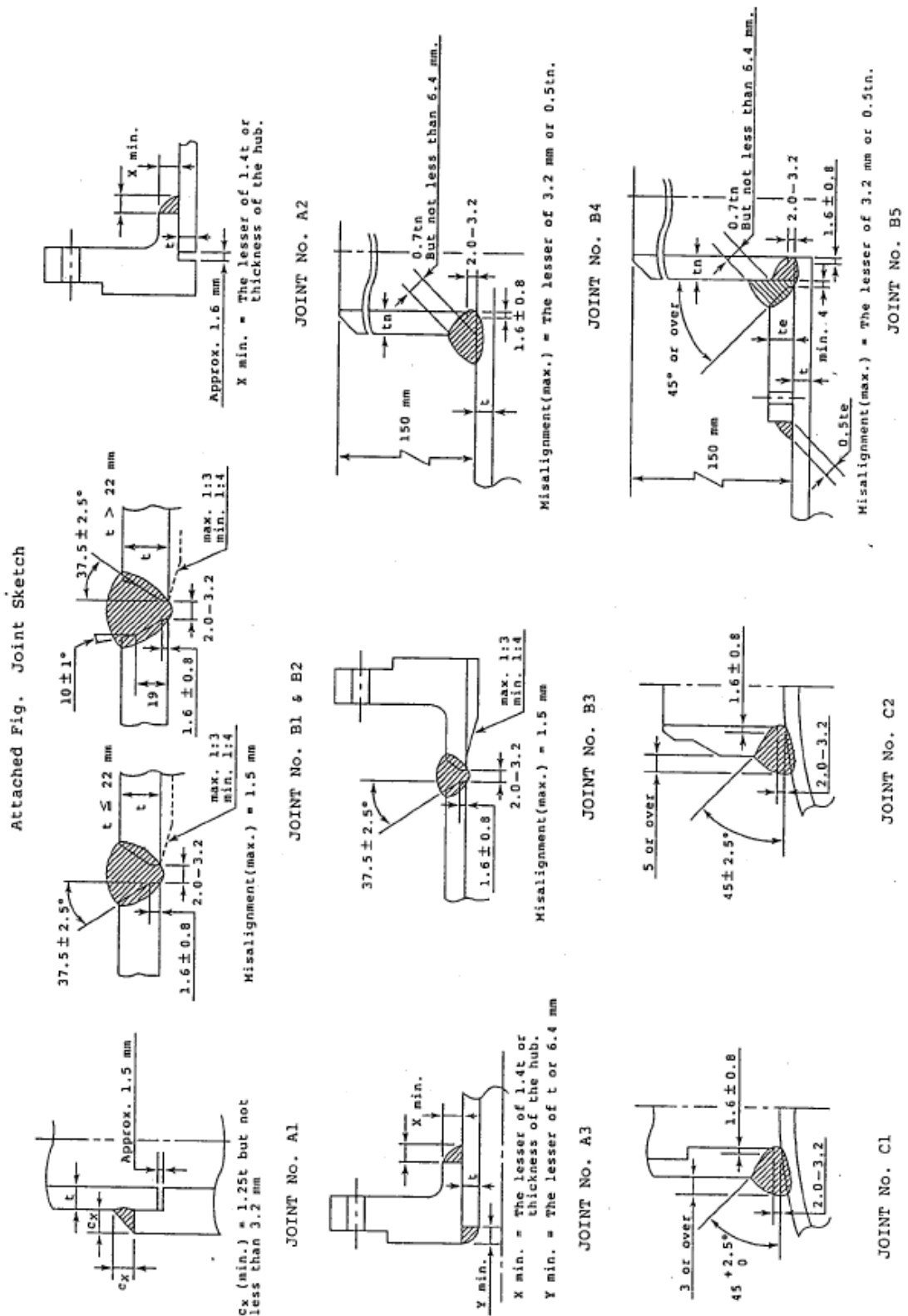
\*3 "Inertite" is inertite flux type welding rod by SMAW process.

\*4 As per the requirement of Engineering Specification II-301.

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Fig.1 Joint Sketch



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