ABU DHABI OIL REFINING COMPANY (TAKREER)

RUWAIS REFINERY EXPANSION (RRE) PROJECT

PROJECT NO. 5578 / AGREEMENT NO. 09-5578-E-4

EPC PACKAGE - 4 : TANKAGE AND ASSOCIATED INTERCONNECTING PIPING

DOCUMENT / DRAWING COMMENTS SHEET

COMMENTS TO BE RETURNED TO:
COMPANY/PMC

FAX NO.:

BY DATE:

FAX NO.:

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COMMENTS:

By: **Signed** **Date**

Review Code:

1. REJECTED : REVISE AND SUBMIT ☐
2. COMMENTS AS NOTED : WORK MAY PROCEED SUBJECT TO COMPLIANCE WITH AND INCORPORATION OF COMMENTS ☐
3. NO COMMENTS : WORK MAY PROCEED ☐
4. INFORMATION ONLY. : ACCEPTED FOR INFORMATION ONLY ☐

No. of Pages attached to this form :

SPRAY AND PAINTING WORK PROCEDURE

AGREEMENT NO.	**:**	**09-5578-E-4**
PROJECT NAME	**:**	**Ruwais Refinery Expansion Project EPC-4: Tankage & Associated Interconnecting Piping**
COMPANY	**:**	**Abu Dhabi Oil Refining Company (TAKREER)**
PMC	**:**	**Mott MacDonald Ltd.**
CONTRACTOR	**:**	**Daewoo Engineering & Construction Co., Ltd.**

This page is a record of all revisions of this document. All previous issues are hereby superseded and are to be destroyed.

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SIGNED (Initials)							

NOTES:

(a) Revisions are denoted by a vertical line placed in the right-hand margin against the revised text.

(b) PREP = Prepared by, CHKD = Checked by, REVD = Reviewed by, APP'D = Approved by.

(c) In case of conflict between any requirements stipulated in this document with the contractual requirements, the contractual requirements shall prevail.

REVISION INDEX DETAILS

Rev	Location of Change	Brief Description of Change

CONTENTS

1. INTRODUCTION

1.1 Purpose

The purpose of this procedure is to ensure that spray and painting activity is carried out in a safe and efficient manner. Spray and painting operations can give rise to a range of health and safety problems. Problems of acute and chronic health effects can be caused by the overexposure to hazardous substances used in spray and painting operations. Therefore, safety is particularly important where risk to the health of personnel is prevalent. The risks to health of employees in any painting process are covered by the provisions of the Hazardous Chemicals and Substance Procedure (5578-E4-HSE-HU-00040).

1.2 Scope

This procedure is applicable to all situations where spray and painting work will be done on the jobsite.

To prevent the hazards affecting personnel, it is essential for all personnel to be aware of and understand the nature of the hazards, and how to protect themselves against these hazards.

2. DEFINITIONS AND ABBREVIATIONS

COMPANY	-	Abu Dhabi Oil Refining Company (TAKREER)
CONTRACTOR	-	Daewoo Engineering & Construction Co., Ltd. or DAEWOO
PROJECT	-	EPC-4: Tankage & Associated Interconnecting Piping for Ruwais Refinery Expansion (RRE) Project
WORK	-	Means and includes all work and services to perform and GOODS and other things to provide by CONTRACTOR for EPC-4 Package of RRE Project.
SUBCONTRACTOR	-	any person, firm, or company, employed by CONTRACTOR to perform any work or duty on their behalf
Home Office	-	Execution location of the PROJECT's engineering and procurement activities in Seoul, Korea
UAE	-	United Arab Emirates
SITE	-	Location of the Project in Ruwais, Abu Dhabi, UAE
AGREEMENT	-	means the Signature Agreement, the Articles of Agreement and the EXHIBITS
Document	-	Any form, letter, facsimile, contract, subcontract, specification, requisition, drawing, or record of any kind required to transmit information from one party to another. It also includes computer generated drawings, lists, charts etc., and other data used to form a permanent record of the Project progress and "As-Built" condition.

3. RESPONSIBILITIES

3.1 Project Manager

The Project Manager is responsible for ensuring that the requirements of this procedure are adhered strictly to during execution of the project.

3.2 Section Manager

The Section Manager is responsible for supporting its application and ensuring that all entities at the site actively participate.

3.3 HSE Manager

The HSE Manager is responsible for monitoring and ensuring that the spray & painting works are conducted in safe manner.

3.4 HSE Supervisor

The HSE Supervisor is responsible in ensuring that all personnel shall execute the spray & painting job in safe manner as laid down in this procedure and the deficiency are corrected & reported.

4. GRIT AND SHOT BLASTING

The abrasive material used in grit and shot blasting and the particles generated by the process are a serious health hazard both to the operator of the equipment and to other persons in the area.
Grit and shot blasting activities are a source of static electricity and therefore an ignition source. A Hot Work Permit shall be issued for grit and shot blasting operations.
The nozzle of the equipment must be fitted with a 'shut off' control of the deadman type. This is essential to reduce the risk of injury to any persons in the area should the hose be accidentally dropped.
The nozzle of the equipment must be electrically earthed (grounded) to prevent a static electrical charge from developing.
When grit and shot blasting operations are taking place the area in the vicinity quickly becomes dust laden. In addition, when shot blasting, particles of shot can be deflected by the work piece around the area in all directions and at great speed.

- All the hose fittings must be secured.
- The area must be barricaded and a windshield provided.
- Equipment must be gas free.

Grit and shot blasting of surfaces can create waste, detrimental to the environment. Waste shall be managed in accordance with Environmental Management Plan Procedure (5578-HSE-HU-00005.)

CONTRACTOR personnel and contractors, involved in activities associated with grit and shot blasting shall have received the relevant training, and approval from the supervisor for that area.

5. PAINTING

5.1 Hazard

Workmen engaged in surface preparation and paint application can be exposed to various hazards depending on the equipment and materials being used.

Surface preparation may include grit blasting, flame cleaning and/or solvent wiping. These provide hazards from dust and noise, fire and explosion, and from toxic solvents and their vapours.

Health hazards from solvents and their vapours can arise from inhalation, ingestion or skin absorption. Spray painting causes hazards from high concentrations of vapour that could result in fire, explosion or oxygen deficiency in a confined area. Portable powered hand tools, such as grinders and wire brushes, and spray-painting equipment are also hazardous.

5.2 General Instruction

- Spray & painting shall only be performed by competent and trained employees.
- Spray & painting shall only be performed in designated areas. Where it is required that spray & painting be done on site, the supervisor in charge of the task must take adequate precautions to protect other employees and equipment in the area.
- Areas in which spray & painting is to be carried out shall be clearly identified and a sign stating "SPRAY & PAINTING AREA - AUTHORIZED PERSONS ONLY" will be posted. Minimum signs should be written in English and the local language.
- Adequate protective equipment is to be provided for use by persons involved in spray & painting. Protective equipment shall include an approved cartridge respirator designed to protect against organic vapors and protective clothing.
- All HOT WORK shall be prohibited 15 meters away from any spray & painting activity and storage area. If the work is carried out within paint work areas, specific precautions of the task shall be taken.
- When spraying two-part epoxy or polyurethane paint or when painting is to be conducted within a confined space where paint fumes might become concentrated, an air supplied respirator is to be used.
- Suitable hand cleaning compounds are to be made available to spray painters for removing paint from hands and exposed skin. Thinners or harsh solvent based materials are not to be used for cleaning skin.
- All necessary precautions are to be taken to ensure over-spray and fumes will not pollute public places and living quarters.
- No smoking, naked lights or other forms of ignition are permitted in areas where spray & painting is being performed. Only approved electrical equipment is to be used in the vicinity of spray & painting work area.
- Unwanted flammable materials including paint thinners, rags and cotton waste impregnated with flammable spirits, paint and other waste generated during spray & painting activity, are to be kept in metal drums with close fitting lids and disposed off in a safe manner away from spray & painting areas. Disposal of waste should be in accordance with Waste Management Procedure

- Flammable materials are to be stored well clear of spray & painting areas.
- Stand by firefighting equipment/fire extinguisher shall be provided in all areas where painting activities will be conducted including painting materials storage area. It shall be located in areas where it is easily accessible and visible.
- Since spraying/painting produces a lot of fumes which are flammable and hazardous to health when working in covered area or accumulation of flammable gases is possible; sufficient exhaust ventilation shall be provided to keep the concentration of solvent vapors below ten (10) percent of the Lower Explosive Limit(LEL). Frequent tests shall be made by a competent person to ascertain the concentration. Particular attention shall be paid when working in confined or enclosed spaces as specified in the Permit to Work system.
- When personnel are not involved directly in, but are required to be in proximity to, the painting process and may be exposed to hazardous levels of fumes or vapors; they shall be supplied with adequate respiratory protective devices.
- Foodstuffs shall not be brought into or consumed on premises where paint is stored handled or used.
- All painting application equipment to be used shall be properly maintained, inspected and tested prior to use, and where necessary the equipment shall be correctly certified.
- The person supervising the spray and painting works must ensure that tool box meeting is carried out as required, and that all employees are aware of possible hazards, as well as fully trained in the use of the required PPE.
- Some paints exert harmful effects, the main routes into the body being inhalation, skin absorption and ingestion. Personnel should avoid skin contact with paints and thinners because they may have irritant, sensitizing properties or be harmful to the skin. Paint solvents can penetrate the skin and cause harmful effects. Gloves are an obvious solution (nitride gloves offer the best resistance to solvents), while barrier creams are of some value, particularly in protecting the skin around and under fingernails.

5.3 Safety Precautions

Cartridge respirators shall always be worn during flame cleaning in open areas or spaces. The type of cartridge respirator required will be dependent on the surface preparation. If there is any doubt as to the suitability of any cartridge respirator then breathing apparatus is to be worn.
All flammable material is to be cleared from the area before commencing flame cleaning.
Solvent wiping or the painting of flame-cleaned surfaces shall not be carried out until the surface has cooled to approximately ambient temperature.
Great care is to be taken when using airless spray painting equipment. The airless spray gun operates at very high pressure and the ejected paint can penetrate the skin or cause serious eye injuries. Protective overalls and eye protection shall be worn.
Adequate ventilation shall be provided before and throughout the following:

- Flame cleaning.
- Solvent wiping.
- Opening solvent containers and mixing paints.

- Paint spraying.

As a general rule, forced ventilation shall be used to keep vapour concentrations at a safe level, as natural ventilation is not normally sufficient. The ventilation shall be kept in operation during the painting application and continued until the coating is dry to the touch.
Forced ventilation shall be used in confined spaces, Force ventilation will keep the Threshold Limit Values (TLV) and Exposure limits well in control.
Before any person enters any enclosed space that is being or has been recently painted, oxygen content and explosion checks shall be carried out.
Adequate washing facilities shall be readily available, any paint or solvent splashes on to the body shall be washed off immediately and splashes in the eye shall be flushed out with copious amounts of water.

6. Personal Protective Equipments

Persons performing spray & painting work shall wear;

- Suitable Respirator (e.g. half face mask with organic filter, full face mask)
- Air supplied respirator's helmet if necessary
- Coverall with hoods
- Safety Goggles (Eye Wash Kit or Station should be provided)
- Gloves
- Safety shoes
- Full body harness if necessary
- Aprons
- Ear protector (e.g. earplug, earmuff)

Hoods and aprons must be certified according to the Korean standard (KOSHA) or a recognized international standard and marked accordingly.

Respirator's helmet shall be positive air pressure type and shall be rigged and used according to manufacturer's instructions.

The respirator's helmet shall be provided with air at a rate of not less than 0.17 cubic meters per minute that has passed through;

- An efficient filter to remove dust, oil, gas and other potentially harmful contaminants
- An efficient conditioner which will deliver air at a temperature not higher than ambient temperature
- An efficient condensate trap with drain cock to remove any condensed liquid
- An efficient pressure reducing or limiting device
- The helmet shall be fitted with wide-angle transparent visors.

7. ATTACHMENT

Workplace Exposure Limits

Workplace Exposure Limit.pd