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**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





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## **FUEL STORAGE AND HANDLING 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.



**RUWAIS REFINERY  
EXPANSION PROJECT**

**EPC-4 TANKAGE AND ASSOCIATED  
INTERCONNECTING PIPING**

**DAEWOO E&C**

**AGREEMENT No. 09-5578-E-4**

PROJECT No. 5578

Doc. No. 5578-E4-HSE-HU-00023

Rev. 0

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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 All previous issues are hereby superseded and are to be destroyed.

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**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.



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## 1. INTRODUCTION

### 1.1 Purpose

The purpose of this procedure is to outline minimum guidelines for the use and storage of flammable and combustible liquids to eliminate or reduce as far as reasonably practical, the hazards inherent to fuel storage handling and transportation.

### 1.2 Scope

This procedure applies to the construction activities at the project. This procedure is developed to provide guidelines in ensuring safe storage & handling in order to prevent damage to people and environment. This will also provide guidelines in the case of spills or releases to the environment in order to limit impacts of such spills or releases.

## 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. TERMINOLOGY

- **Closed Container**

A container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures.

- **Combustible Liquid**

Any liquid having a flashpoint at or above 37.8°C.

- **Flammable Liquid**

Any liquid having a flashpoint below 37.8°C.

- **Safety Can**

An approved container of not more than 19 Liter capacity, having a spring-closing lid and spout cover designed that it will safely relieve internal pressure when subjected to fire exposure.

- **Ventilation**

As specified in this section for the prevention of fire and explosion. It is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit.

- **NFPA**

National Fire Protection Association

- **Container**

Any can, barrel, tank or drum

- **Bonding**

Bonding is the preventative measure for assuring equal electrical potential in the dispensing and receiving of vessels during liquid transfer.

### 4. RESPONSIBILITIES

#### 4.1 Project Manager

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

#### 4.2 Section Manager

The Section Manager is responsible for ensuring that;

- Monitoring and checking of the compliance of this procedure
- The environment is protected from spills and releases that could arise during the construction activities.

- Manpower, equipment and funds are available to effectively contain and clean up oil spills in case they occur during the construction activities.

#### **4.3 HSE Manager**

The HSE Manager is responsible for ensuring that, when working with hazardous materials, chemicals, and agents or where there is the potential for spills or releases.

- Proper training is conducted
- Toolbox meeting is conducted.
- JSA system is applied.
- Hazardous spills or releases prevention and containment measures are in place.
- All identified necessary work and precautions are properly executed.
- Ensuring that Material Safety Data Sheets (MSDS) are available.
- Ensuring that records, including inventories, of hazardous substances are properly maintained. The Material Controller is responsible for maintaining the inventory.
- Maintaining records concerning any spill or release to the environment.

#### **4.4 HSE Officers**

The HSE Officers are responsible for

- Identifying the construction activities that could lead to spills or releases.
- Ensuring that JSA related to activities which may result in spills or releases are properly conducted.

#### **4.5 Supervisors**

The Supervisors are responsible for ensuring that all oil and chemicals are stored in designated and secure areas with secondary containment and that adequate fire-fighting and first-aid facilities are available. They must also ensure that they understand the contents of the MSDS related to these products.

### **5. LIQUID FUEL**

#### **General Safety Precautions**

Prior to bringing any fuel or other hazardous materials to site, CONTRACTOR shall review, perform and document completion of actions required by COMPANY.

Only designated persons shall conduct fueling operations.

In case of spillage, filler caps shall be replaced and spillage disposed of before engines are started.

Engines shall be stopped and operators shall not be on the equipment during refueling operations.

Smoking and open flames shall be prohibited in areas used for fueling, fuel storage or enclosed storage of equipment containing fuel.

Equipment shall be refueled only at designated locations.

Liquid fuels not handled by pump shall be handled and transported only in portable containers or equivalent means designed for that purpose. Portable containers shall be metal, have tight closures with screw or spring covers and shall be equipped with spouts or other means to allow pouring without spilling. Leaking containers shall not be used.

Liquid fuel dispensing devices, such as pumps, shall be mounted either on a concrete island or be otherwise protected against collision damage.

Flammable liquids may be dispensed in the open from a tank or from other vehicles equipped for delivering fuel to another vehicle only if:

- Dispensing hoses do not exceed 15.24 meter in length; and
- Any powered dispensing nozzles used are of the automatic-closing type.

Wherever fuel is being stored or consumed on site internationally recognized hazard warning signs (English or any appropriate language) and dedicated dry powder fire extinguishers will be provided by CONTRACTOR. This fire extinguisher must be within 20 meters of the fuel storage area at all times.

See the following examples:



List of signs (minimum requirement):

- Danger Flammable Liquids
- No smoking
- No naked lights
- Fire extinguisher

The requirements specified in CONTRACTOR "Environmental Emergency and Response Procedure".

Fuel shall be contained in bulk storage tanks with outlet nozzles securely locked and keys controlled by responsible CONTRACTOR personnel.

All storage areas will have a covering (e.g. Roof) to provide protection from the environment. Storage tanks will be protected from impact damage by delivery vehicles etc. by the provision of appropriate steel or concrete barricades.

## 6. FUEL STORAGE

Fuel storage tanks will be in accordance with local legislation and requirement.

Fuel Storage tanks should be constructed of mild steel, earthed and should be in the open air, on level ground well clear of any openings such as windows or doors. Level indicators should be provided for each tank and will be regularly inspected and maintained. Tank seals will be tested for leaks and test certificates submitted to HSE Manager for approval prior to use. Fuel storage tanks shall be equipped with appropriate emergency venting devices.

Storage tanks shall be contained by secure bund walls with impermeable liners (e.g. concrete) and with facilities for water draining. Drain valves must be closed during normal operation and only opened for water draining with an operator in attendance. Fuel shall be kept in closed containers when not actually in use.

Bulk supplies of more than 200 liter will be stored in an area allocated by COMPANY. The storage area will be furnished by CONTRACTOR with bund walls capable of containing total 110% of fuel stored. All small (20 liters or less) containers shall be tightly sealed when stored. Fuel storage tanks shall not be closer than 7 meters from any building.

All sources of ignition must be kept at least 15 meters away from fuel storage areas. "NO SMOKING" and "NO NAKED LIGHTS WITHIN 15 METERS" signs will be posted at all storage areas, visible from all approaches. All signs will be in Arabic and English languages.

A 4 meter wide access way to permit potential approach of fire control apparatus shall be maintained within 70 meters of fuel storage tanks.

## 7. BONDING

Grounding and bonding shall be in place for the duration of gravity transfer of flammable liquids (including diesel fuel) from storage vessels to approved safety containers.

All piping, tanks, valves and dispensing equipment shall be bonded continuously so that all non-current-carrying metal parts have the same potential to ground. All dispensing equipment including pumps, hoses and nozzles must be authorised for the intended usage, this will ensure that the hose and nozzle are designed to provide a continuous bond from shore side equipment to the tank being filled, which allows static electricity to flow to ground. To avoid static electricity discharge, all equipment must be bonded. If authorised equipment is not used, it is necessary to attach a bonding wire from shore side piping to both the nozzle and the tank being filled.

Pumping from a truck requires that a bonding wire be attached any time flammable liquids are discharged into a top fill tank. Bonding lines shall be connected between storage tanks and vehicle before the dispensing process has begun.

Trucks shall be insulated from ground by rubber tires, so when a bonding wire is attached to the tank being filled, a continuous path to ground is provided. Trucks shall be grounded in addition to bonding to the tank being filled. This is required by OSHA regulation.

Allowing a few minutes before removing nozzles when the pumping is complete also helps assure that static electricity has dissipated.

## 8. REFUELING

Whenever practical, vehicles and other mobile equipment shall be driven to the storage areas for refueling. Loading/unloading (including refueling) shall take place within designated areas with secondary containment.

To perform any loading/unloading activity outside the approved areas a specific approval from HSE Manager shall be obtained.

Refueling mobile construction equipment (welding sets, generators, compressors, cranes etc.) will be done by authorized and trained personnel.

A trained and responsible operator must be present at all times during the loading/unloading of tanker trucks.

Trained CONTRACTOR's personnel will undertake refueling operations for static construction equipment (welding sets, generators, compressors, cranes etc.).

Transfer of fuels from one portable transporting container to another shall be done only when containers are electrically interconnected (bonded).

Safety cans and drums used for transporting fuel shall be constructed as per Korean standard (KOSHA) and/or International standards, free from defects, leak proof with tight fitting seals and approved for use by HSE Manager. Such transporting devices must be designed for the specific purpose of transporting fuel or flammable liquids. All fuel trucks will have permanently attached hoses and auto-shutoff nozzles. Drip pans will be used when refueling equipment.

The containers will be fixed to the trucks.

All dispensing nozzles must be equipped with automatic-closing devices.

A clearly identified and easily accessible switch shall be provided at a location remote from dispensing devices to shut off the power to all dispensing devices in the event of emergency. A shut-off procedures shall be developed and the "trained and responsible" operator" must be trained in the shut-off procedure.

The motors of all equipments being fueled must be shut off during fueling operation.

Fuel containers must be clearly labeled with the name of the contents; type of hazards (e.g. flammable) and date the container was filled. All labels must be written in appropriate language and English.

The use of gasoline driven construction equipment is restricted and previously formally approved by HSE Manager.

## 9. FIRE CONTROL FOR FLAMMABLE & COMBUSTIBLE LIQUID STORAGE

At least one portable fire extinguisher having a rating of not less than 20 kg/Type-B, shall be located outside of, but not more than 3 meter from the door opening into any room used for storage of more than 0.23 cubic meter of flammable or combustible liquids.

At least one portable fire extinguisher having a rating of not less than 20 kg/Type-B, shall be located outside of, not less than 7.5 meter nor more than 22.5 meter from any flammable liquid storage area .

At least one portable fire extinguisher having a rating of not less than 20 kg/Type-BC, shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids.

**10. HANDLING LIQUID AT POINT OF FINAL USE**

Flammable liquids shall be kept in closed containers when not actually in use, leakage or spillage disposed of promptly and safely, and be used only where there are no open flames or other sources of ignition within 15 meter of the operation, unless conditions warrant greater clearance.

**11. SERVICE AND REFUELING AREA**

Flammable or combustible liquids shall be stored in approved closed containers, in tanks located underground, or in aboveground portable tanks.

The dispensing hose and nozzle shall be of an approved type. The nozzle shall be an automatic-closing type without a latch-open device.

There shall be no smoking or open flames in the areas used for fueling, servicing fuel systems for internal combustion engines and receiving or dispensing of flammable or combustible liquids.

**12. FUEL TRUCK OPERATION**

The fuel truck operator shall be properly trained for his/her specific responsibilities and will be responsible for the safe operation of this vehicle.

**General Requirements;**

- Inspect truck daily.
- Check brakes, lights, turn signals, and backup alarm.
- Be sure static ground is contacting the ground.
- Inspect fire extinguishers to be sure they are full and operable.
- Check exhaust system to ensure it is sound.
- Keep vehicle clean. Do not allow accumulations of residue such as oil or grease or rags to build up on truck.
- Keep vehicle 15 meters from any hot work, open flames, or other spark and fire producing work.
- When entering a work area, check to ensure that no hot work is being performed or that no machinery is running that will pose a hazard.
- Pay particular attention to driving under pipe racks and other overhead structures to ensure that no hot work is being performed that would drop a spark on or near the truck.
- Shut-off engines on all equipment while refueling.

- Keep a spill tray with the vehicle to use, if there are chances of spill.
- Be careful not to overfill fuel tanks or spill fuel onto the ground. Report all spills to the HSE department/HSE representative or designated person immediately. In addition, all spills will be reported to the HSE Manager.
- Never use gasoline for any purposes other than fuel.
- Never use gasoline to prime carburetors.
- Non-impervious gloves shall be worn to protect the fuel truck driver from coming in contact with, fuels, greases, oils or other chemicals.
- Ensure that dispensing hose is equipped with a pressure release nozzle (dead man switch).

### 13. SPILLAGE AND INCIDENT REPORTING

In the event of a spillage, action should be taken according to the "Environmental Emergency and Response Procedure".

All spillages shall be reported according to the "Incident Investigation & Reporting Procedure"