KUWAIT OIL COMPANY (K.S.C.)

A subsidiary of Kuwait Petroleum Corporation

إحدى شركات مؤسسة البترول الكويتية
A Subsidiary of Kuwait Petroleum Corporation

PRODUCTION & PROJECTS (GAS) GROUP

GAS PROJECTS TEAM - II

Mutriba Remote Boosting Facility (MRBF) at North Kuwait

Appendix -14

Material Requirement for Mechanical Equipment

(Doc. # MRBF-ME-MR-002)

0	05-AUG-2024	ISSUED FOR TENDER	JS	GMK	MOHD. SALEH
REV. NO.	**DATE**	**DESCRIPTION**	**PREPARED BY**	**REVIEWED BY**	**APPROVED BY**

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

TABLE OF CONTENTS

1.0 PURPOSE....1

2.0 KOC STANDARDS....1

3.0 INTERNATIONAL CODES AND STANDARDS:....2

4.0 ABBREVATIONS....2

5.0 GENERAL REQUIREMENTS....4

6.0 MINIMUM METALLURGICAL REQUIREMENTS....4

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

1.0 PURPOSE

The purpose of this document is to provide Minimum Metallurgical Requirement for Mechanical Equipment for Mutriba Remote Boosting Facility.

2.0 KOC STANDARDS

The following KOC standards shall be referred along with this document:

Table: KOC Standards

DOCUMENT NO.	DESCRIPTION
KOC-MP-010	KOC Standard for Piping Material Classes
KOC-MP-002 Part 1	KOC Standard for Carbon Steel Pipes for Sour Service
KOC-P-001	KOC Standard for Painting and Coating of External Metal Surfaces
KOC-P-002 Part 1	KOC Standard for Internal Lining of Tanks and Vessels: Part 1: Gunite Lining of Steel Vessels
KOC-P-002 Part 2	KOC Standard for Internal Lining of Steel Tanks & Vessels: Part 2: Internal Lining of Above Ground Steel Tanks
KOC-P-002 Part 3	KOC Standard for Internal Lining of Steel Tanks & Vessels: Part 3: Internal Lining of Steel Vessels
KOC-P-005	KOC Standard for Internal Coating of Pipelines
KOC-L-012	KOC Standard for Cathodic Protection Material
KOC-L-015	KOC Standard for External Cathodic Protection of Underground Steel Pipelines & Piping Networks
KOC-L-018	KOC Standard for Cathodic Protection of Internal Surfaces of Steel Tanks & Vessels
KOC-G-007	KOC Standard for Basic Design Data
KOC-MV-001	KOC Standard for Pressure Vessels
KOC-MV-007	KOC Standard for Field Erected Storage Tanks
KOC-ME-008 Part 2	KOC Standard for Centrifugal Pumps
KOC-ME-009	KOC Standard for Stationary Firewater Pump sets
KOC-ME-006 Part 3	KOC Standard for Positive Displacement Pumps - Rotary

Appendix-14
Material Requirement for Mechanical Equipment

DOCUMENT NO.	DESCRIPTION
KOC-MV-006 Part 2	KOC Standard for Shell and Tube Heat Exchangers

3.0 INTERNATIONAL CODES AND STANDARDS:

The following International Codes for material selection shall be referred along with this document:

Table: International Codes and Standards

CODES	DESCRIPTION
ASME Sec II	Materials
NACE-MR-0175 / ISO15156	Petroleum and Natural Gas Industries – Materials for use in H2S-containing Environments in Oil and Gas Production
NACE-TM-0284	Evaluation of Pipeline and Pressure Vessel Steels for Resistance to Hydrogen-Induced Cracking

4.0 ABBREVATIONS

The table of abbreviations with description is listed below:

Table: Abbreviations

ABBREVATIONS	DESCRIPTION
AGI	Acid Gas Incineration
ASTM	American Society for Testing and Material
BOPD	Barrels Of Oil Per Day
BS&W	Basic Sediment & Water
CA	Corrosion Allowance
CC	Corrosion Coupon
CD	Closed Drain
CI	Corrosion Inhibitor
CP	Cathodic Protection
CRA	Corrosion Resistant Alloy

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

ABBREVATIONS	DESCRIPTION
CS	Carbon Steel
DM	Demineralized Water
SDSS	Super Duplex Stainless Steel
ESSC	External Stress Corrosion Cracking
FBE	Fusion Bond Epoxy
FG	Fuel Gas
GOR	Gas to Oil Ratio
GTG	Gas Turbine Generator
H&MB	Heat And Material Balance
HIC	Hydrogen Induced Cracking
HP	High Pressure
HSE	Health, Safety, Environmental
IA	Instrument Air
ICCP	Impressed Current Cathodic Protection
ISO	International Organization for Standardization
KOC	Kuwait Oil Company
LP	Low Pressure
LLP	Low (Very) Low Pressure
MDMT	Minimum Design Metal Temperature
MMSCFD	Million Standard Cubic Feet per Day
mmpy	Milli-meters per year
MOC	Material of Construction
MP	Medium Pressure
MPFM	Multi-Phase flow meter
MSG	Material Selection Guide
MSD	Material Selection Diagrams
mpy	Mils per year
NACE	National Association of Corrosion Engineers
NDE	Non Destructive Evaluation
NPS	Nominal Pipe Size
NWRA	North West Raudhatain
PCV	Pressure Control Valve
P&ID	Process & Instrumentation Diagram
PFD	Process Flow Diagram
ppm	parts per million
PSV	Pressure Safety Valve
PVRV	Pressure Vacuum Relief Valve
PWHT	Post Weld Heat Treatment
RO	Reverse Osmosis
RP	Recommended Practice

Appendix-14
Material Requirement for Mechanical Equipment

ABBREVATIONS	DESCRIPTION
RVP	Reid Vapour Pressure
SA	Sacrificial Anode
SCC	Stress Corrosion Cracking
SDSS	Super Duplex Stainless Steel
SDV	Shutdown Valve
SLC	Service Life Corrosion
SRB	Sulfate Reducing Bacteria
SS	Stainless Steel
SSC	Sulphide Stress Cracking
STMBOPD	Stock Tank Thousand Barrels of Oil per Day
SUL	Safe Use Limit
TLC	Top of Line Corrosion
UFD	Utility Flow Diagram
VT	Valve Trim
WGR	Water to Gas Ratio

5.0 GENERAL REQUIREMENTS

Equipment in Sour Service shall comply with NACE MR-0175/ISO 15156. In addition to this HIC testing shall be performed in accordance with NACE TM 0284 for wetted parts of carbon steel plates, welded pipes and welded fittings.

Dissimilar metals joints shall be provided with Isolating Gaskets Kit to prevent Galvanic Corrosion.

6.0 MINIMUM METALLURGICAL REQUIREMENTS

The material specified below is the Minimum Metallurgical Requirement for equipment.

Contractor has to conduct Material Selection Study during detail engineering and confirm that the specified metallurgy meets the design life requirement based on the process conditions.

However, based on the results of Material Selection Study, if metallurgy of any equipment needs upgradation, then Contractor has to upgrade the metallurgy of that equipment at no additional cost to meet design life requirement and inform the Company about the change.

All painting materials shall preferably be selected from KOC approved Vendor list.

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

Table: Minimum Metallurgical Requirement

Equipment	Component	Materials	CA (mm)	NACE + HIC	Internal lining / Cladding	Internals	Remarks
CRUDE PREHEATER, SEPARATOR & PUMPING SYSTEM							
Inlet Crude Preheaters	Shell	SA 516 Gr 60/70 N	3	Yes	**Channel / Bonnet on Tube side:** Inconel 625 cladded		External Painting and Coating as per KOC Standard KOC-P-001
	Tubes	Inconel 625		Yes			
3-Phase HP Separator	Shell /Dish	SA 516 Gr 60/70 N	-	NACE -Yes HIC-No	Inconel 625 cladded	**Inconel 625:** Inlet Device, Baffle, Foam Breaker, Coalescing Element, Wire Mesh demister, Oil Weir, etc.	External Painting and Coating as per KOC Standard KOC-P-001
MULTI PHASE PUMP PACKAGE							
Multiphase Pumps							As per Vendor recommendation
HOT OIL SYSTEM PACKAGE							
Heater	Housing/ coil	Carbon steel/SA106 gr.B	3				The materials shall be as per Vendor recommendation
Tank	Body	SA 516 Gr 60/70 N	3				
Recirculation Pumps	Body/ Impeller	Cast iron					
Stack	Body	Carbon Steel	3				
Fan	Housing	Carbon Steel					
CLOSED AND OPEN DRAIN SYSTEM							
Closed Drain Vessel	Shell/Dish	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating		Internal coating as per KOC Standards KOC-P-002, Part 3

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

Equipment	Component	Materials	CA (mm)	NACE + HIC	Internal lining / Cladding	Internals	Remarks
							External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic Protection as per KOC-L-018
Open Drain Vessel	Shell/Dish	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating		Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic Protection as per KOC-L-018
Closed Drain Pump	Body	SDSS		Yes			Metallurgy as per API-610, D2 material
	Impeller	SDSS		Yes			
Open Drain Pump	Body	SDSS		Yes			Metallurgy as per API-610, D2 material
	Impeller	SDSS		Yes			
INSTRUMENT AIR PACKAGE							
Instrument Air Package	Package	Carbon Steel					
Instrument Air Receiver	Body	SA 516 Gr 60/70 N	3.2		Internal epoxy coating		Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001
NITROGEN PACKAGE							
Nitrogen Package	Package	SS 316L					
Nitrogen Receiver	Body	SA 516 Gr 60/70 N	3.2		Internal epoxy coating		Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001
FUEL GAS SYSTEM							
Fuel Gas Pre	Body	SA 516 Gr	3.2	Yes	Internal		

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

Equipment	Component	Materials	CA (mm)	NACE + HIC	Internal lining / Cladding	Internals	Remarks
Heater		60/70 N			epoxy coating		External Painting and Coating as per KOC Standard KOC-P-001
HP Fuel Gas Scrubber	Body	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating	SS-316	Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic Protection as per KOC-L-018
LP Fuel Gas Scrubber	Body	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating	SS-316	Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic Protection as per KOC-L-018
Filter Coalescer	Body	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating	SS-316	Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic Protection as per KOC-L-018
FLARE SYSTEM							
HP KO Drum	Body	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating		Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

Equipment	Component	Materials	CA (mm)	NACE + HIC	Internal lining / Cladding	Internals	Remarks
							Protection as per KOC-L-018
LP KO Drum	Body	SA 516 Gr 60/70 N	3.2	Yes	Internal epoxy coating		Internal coating as per KOC Standards KOC-P-002, Part 3 External Painting and Coating as per KOC Standard KOC-P-001 Galvanic Anode Cathodic Protection as per KOC-L-018
HP Flare KOD Pump	Body	Stainless Steel		Yes			Metallurgy as per API-610, A8 material
	Impeller	Stainless Steel		Yes			
LP Flare KOD Pump	Body	Stainless Steel		Yes			Metallurgy as per API-610, A8 material
	Impeller	Stainless Steel		Yes			
HP Flare Stack	Riser	Carbon Steel		Yes			
	Tip	Stainless Steel		Yes			
LP Flare Stack	Riser	Carbon Steel		Yes			
	Tip	Stainless Steel		Yes			
Air Blowers	Body	Carbon Steel					
FIRE WATER SYSTEM							
Fire Water Tanks	Body	SA 516 Gr 60/70 N	3 mm for shell and bottom plate, 1.6 mm for roof		Tank Bottom and Lower shell: Fiber Glass Reinforced Lining upto 0.6 m. Shell and structure : Phenolic		Internal Coating as per KOC-P002 Part -2 External Painting and Coating as per KOC Standard KOC-P-001 Impressed Current Cathodic Protection as per KOC-L-018 Bottom Plate ICCP as per KOC-L-026

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

Equipment	Component	Materials	CA (mm)	NACE + HIC	Internal lining / Cladding	Internals	Remarks
					Epoxy / High Build Epoxy Nozzle and Pipe Internals : Phenolic Epoxy / High Built Epoxy Roof Underside and Truss : Phenolic Epoxy Tank Bottom Plate Soil Side : HBE		
Fire Water Main & Jockey Pump	Body	SDSS					Metallurgy as per API-610, D2 material Casing Ni Al Bronze B148 C95800 /SDSS with PREN >40 & Impeller Monel K500 or SDSS with PREN >40.
	Impeller	SDSS					
DIESEL STORAGE TANK							
Diesel Storage Tank	Body	SA 516 Gr 60/70 N	3.2				External Painting and Coating as per KOC Standard KOC-P-001 Cathodic Protection for External Surface if installed on soil pad
Diesel Day Tank	Body	SA 516 Gr 60/70 N	3.2				External Painting and Coating as per KOC Standard KOC-P-001
Diesel Transfer Pump	Body	Carbon Steel					
	Impeller	Carbon Steel					
CHEMICAL INJECTION SYSTEM							
Anti-Foam	All wetted parts	SS-316L					

KUWAIT OIL COMPANY (K.S.C.)
(Register of Commerce No. 21835)

Mutriba Remote Boosting Facility (MRBF), at North Kuwait

Appendix-14
Material Requirement for Mechanical Equipment

Equipment	Component	Materials	CA (mm)	NACE + HIC	Internal lining / Cladding	Internals	Remarks
Corrosion Inhibitor	All wetted parts	SS-316L					
Scale Inhibitor	All wetted parts	SS-316L					
Demulsifier	All wetted parts	SS-316L					
Biocide	All wetted parts	SS-316L					