



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no.. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
	Date revised : 09/08/99
	Page : 1/1

CONTENTS

2.1	PLATFORM CONSTRUCTION
2.2	ENVIRONMENTAL DESIGN CRITERIA
2.3	GEOTECHNICAL AND STRUCTURAL INSTRUMENTATION
2.4	PRIMARY STRUCTURE
2.5	SECONDARY STRUCTURE
2.6	RISERS AND FLOWLINES
2.7	MATERIALS AND CONSTRUCTION
2.8	CATHODIC PROTECTION
2.9	INSPECTION AND MAINTENANCE



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.1 - PLATFORM CONSTRUCTION	Date revised : 09/08/99
	Page : 1/2

CONTENTS

1. GENERAL
2. DESIGN CRITERIA



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.1 - PLATFORM CONSTRUCTION	Date revised : 09/08/99
	Page : 2/2

1. GENERAL

Treatment Platform 1 (TP1) is registered as 10/1 - FRIGG - TP1 as an offshore installation. It is a concrete gravity structure comprising a skirt, base and caisson surmounted by two columns supporting a steel deck and stands in 103m of water. Gas produced and treated on the Alwyn Field platforms is transported via TP1 to the St Fergus Gas Terminal on the Scottish coast through the 32in line or via TCP2.

TP1 Riser Platform (TP1) is a concrete gravity structure supporting facilities for gas handling and export. The primary structure was designed by the Sea Tank Company in France and constructed by Sir Robert McAlpine Ltd. at Ardyne Point in Scotland. The secondary structure and support frame were designed by McDermott-Hudson, London. The secondary structure was built by Mercantile Marine Engineering and Graving Docks, Antwerp, and the support frame by Construction Metallique de Provence at Dunkerque.

2. DESIGN CRITERIA

Summary

The platform has been designed in accordance with the requirements of the Department of Energy, bearing in mind environmental conditions detailed in Section 2.2 and taking into consideration certain other factors such as those briefly described below.

Soil Foundation

Information on the foundation was based upon the interpretation of soil data reported by the Norwegian Geotechnical Institute in their report dated December 12, 1973.

Wave and Current Forces

Wave theory; Stokes 5th Order. The current velocity was added vectorially to the wave particle velocity before the total force was computed using the Morison O'Brien formula. Wind, wave and current were assumed to act in the same direction.

Boat shock was also considered in terms of a 2500 ton supply ship striking columns at speeds of up to 3 knots.

No allowance was made for marine growth.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.2 - ENVIRONMENTAL DESIGN CRITERIA	Date revised : 09/08/99
	Page : 1/3

CONTENTS

1. SOIL PROFILE
2. SEABED AND FOUNDATION CONDITIONS
3. SETTLEMENT
4. ENVIRONMENTAL DESIGN CRITERIA



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.2 - ENVIRONMENTAL DESIGN CRITERIA	Date revised : 09/08/99
	Page : 2/3

1. SOIL PROFILE

Tabulated below is the soil profile as defined by samples taken from boring B6A in TP1 location.

Depth Below Seabed (m)	Soil Description	Water Content	CaCO₂ Content %
0 to 8	Brownish grey to grey; fine-to-medium-sand with shell fragments; some gravel.	19 to 25	3.2 at 1m
8 to 12	Thin layer of fine sand Brownish grey clay followed by a thin layer of sand and gravel.	16 to 28	19.7 at 9m
12 to 16	Brownish grey medium sand.	16 to 25	
16 to 19.5	Thin layers of brownish grey clay and fine sand.	23 to 29	
19.5 to 24	Brownish grey clay with pockets of silt and fine sand.	26 to 31	14.6 at 23m
24 to 33	Several layers of brownish grey sandy silt, fine silty sand and silty clay.	11 to 21	7.4 at 29m
33 to 45	Dark grey sandy clay with pockets of fine sand and layers of silt.	11 to 28	1.4 at 34m
45 to 76	Dark grey hard clay.	18 to 23	2.1 at 46m



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.2 - ENVIRONMENTAL DESIGN CRITERIA	Date revised : 09/08/99
	Page : 3/3

2. SEABED AND FOUNDATION CONDITIONS

Platform TP1 has a concrete skirt of 2m which is penetrating the seabed. Small local depressions have been covered by sandbags to prevent further development. On the west side, the flowlines and cables to the flare platform are covered with gravel for protection.

3. SETTLEMENT

The settlement of the concrete structure is on average measured once or twice a year by optical means using platform QP as a reference. Settlement of TP1 has reached a stable condition.

4. ENVIRONMENTAL DESIGN CRITERIA

The platform design was based on the following characteristic values:

Wave height :	Storm condition :	H = 29 m
	Operating condition:	H = 17,4 m
Current :	Storm conditions :	V = 1,35 m/s
	Operating conditions:	V = 1,00 m/s
	(Values given at sea surface)	
Wind :	Storm conditions:	Max. one-minutes
	Sustained wind velocity:	50 m/s
	Max. gust velocity :	62,5 m/s
	Operating conditions:	Max. one-minute
Sustained wind :	35 m/s	

Covering environmental data are given in Doc SPGE 10 00 0012 "Environmental Specification Frigg Area".



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.3 - GEOTECHNICAL AND STRUCTURAL INSTRUMENTATION	Date revised : 09/08/99
	Page : 1/2

CONTENTS

1. GENERAL



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.3 - GEOTECHNICAL AND STRUCTURAL INSTRUMENTATION	Date revised : 09/08/99
	Page : 2/2

1. GENERAL

The structural data acquisition system has been abandoned since 1 June 1986. Consequently no platform data have been recorded since then and the system has been removed.

Platform tilt and vertical settlement are measured optically from QP.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.4 - PRIMARY STRUCTURE	Date revised : 09/08/99
	Page : 1/3

CONTENTS

1. GENERAL
2. COLUMN WATER CIRCULATION
3. COLUMN DEWATERING

DIAGRAMS

Primary Structure



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.4 - PRIMARY STRUCTURE	Date revised : 09/08/99
	Page : 2/3

1. GENERAL

Platform TP1, standing in 103m of water is a concrete gravity structure comprising a skirt, base, caisson and two deck support columns.

The area of the base slab is 5184 m². Voids between the base and the seabed are filled with grout.

Skirt walls, 2m deep, are provided along grid lines 1,3,4,6 A/C/D and F. These skirt walls taper from 900mm at the base slab to 300mm at the tip. Penetration of the seabed by the skirt walls provides protection against scour resulting from movement of water induced by wave effects. Further protection against scour is provided by bags of gravel surrounding the base slab.

The caisson is formed by a series of vertical concrete walls set in the base slab and crossing each other at right angles to form 25 cells. These walls are built on grid lines 1 to 6 and A to F. Cells C1 and C2 form the bases of the deck support columns, the remaining cells being enclosed by the caisson roof.

To provide extra ballast the base is covered with concrete up to elevation -97.000m in all the cells.

The columns are pilings of tapered and cylindrical shell elements of a thickness varying from 0.800m at roof level (elevation -65.000m) to 0.400m at deck level (elevation +19.000m).

At elevation -65.000m their external diameter is 13.800m tapering to 8.800m at elevation -24.500m the wall thickness is a constant 0.800m. The columns then taper to 8.000m external diameter at elevation +3.000m, while the wall thickness decreases to 0.400m. From elevation +5.000m to +16.000m each column is formed from a constant cylinder and is completed by a top collar 0.860m thick, having an external diameter of 8.920m. The top collars are thickened to provide a greater bearing surface for the transition places between the columns and the support frame.

Risers, vent lines, immersion monitoring pipes and instrumentation piping are led up the inside of the columns to the deck. They are secured to the walls by means of sockets, pad-eyes and bracing.

The secondary structure is connected to the tops of the support columns by steel transition caps (tie-in cans) bolted to the concrete structure by prestressing bolts.

The caisson and support columns are filled with sea water up to sea level. This water acts as ballast and ensures that no pressure differential exists between the inside of the structure and surrounding sea.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.4 - PRIMARY STRUCTURE	Date revised : 09/08/99
	Page : 3/3

2. COLUMN WATER CIRCULATION

Heating of water in the support columns due to hot gases in the risers is controlled by a water circulation system. The design allows for a temperature differential of 12°C between the water in the column and the surrounding sea.

Cold water is admitted to the columns via 8in lines at elevation -6.000m, and via gate valves to diffuser outlets at -98.75m.

Hot water is discharged overboard as required by two manually operated electrically driven submersible pumps.

3. COLUMN DEWATERING

The platform normally works with the two columns full of water, but it will be necessary to dewater from time to time for maintenance and inspection purposes.

To accomplish dewatering the OIL STATE RUBBER seals are installed at all the riser/tunnel entrances inside the columns. To empty the columns the water is pumped overboard by two manually operated electrically driven pumps installed at the base of each column. In addition, acting as back-up to the OSR main seals minipacker seals could be inflated with nitrogen.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.5 - SECONDARY STRUCTURE	Date revised : 09/08/99
	Page : 1/5

CONTENTS

1. GENERAL
2. PRODUCTION ZONES
3. DECK LOADING PLAN

DIAGRAMS

Secondary Structure



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.5 - SECONDARY STRUCTURE	Date revised : 09/08/99
	Page : 2/5

1. GENERAL

The main deck structure (steel support frame) is of tubular truss type. The main trusses, SC and SB are 6.5m deep and span 93m on the north-south axis of the platform. The width of the structure is 22m, the "wings" giving a maximum width of 44m between axes S3 and S4. The main trusses are supported on two 5.5m diameter tubes cantilevered from the steel extension of the support columns.

The central main structural member in the column/deck frame is used as a storage tank. The tank is divided into three sections giving storage facilities for methanol, diesel oil and glycol.

Skid beams welded to the top chord of the main trusses are used to support the production modules.

The production decks or pancakes are supported on brackets welded to the lower chord of the main and transverse trusses.

The Cellar Deck (Lower deck) level is at elevation +23.00m and the Module Deck (Upper deck) is mounted on the upper chord of the deck truss at elevation +28.500m.

The Cellar Deck is divided into zones numbered 06 to 13, and the Lower and Upper decks are divided into zones numbered 01 to 05.

Bridges connecting TP1 with QP and TCP2 have their landings built into the decks of Zones 05 and 03 respectively.

The pedestals for cranes M7 and M8 are integral parts of the modules forming the south-west and north-east corners respectively of zones 04 and 03.

A pancake named Module 23 is situated on the upper chord of the deck trusses just above column C2.

2. PRODUCTION ZONES

The main items of equipment or systems within each Zone are given below :

Cellar Deck

Zone 06	Air Condition Room, Instrument Interface Rooms 1 and 2, Switchboard and Switchgear Rooms, Transformer Room
Zone 07	Firepump House and Utilities Pumps
Zone 08	Workshops and waste treatment unit
Zone 09	<u>Active equipment</u> Glycol pumps
Zone 09	<u>Passivated Equipment</u> Condensate pumps
Zone 09/10	Bulk storage of glycol, methanol and diesel fuel,



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.5 - SECONDARY STRUCTURE	Date revised : 09/08/99
	Page : 3/5

2. PRODUCTION ZONE (conts.)

Zone 10 Active equipment
Methanol & diesel fuel pumps, Nitrogen H.P. compressor

Zone 10 Passivated equipment
Flare scrubber

Zone 11 Active equipment
Nitrogen Unit

Zone 12 Firepump house

Lower Deck

Zone 01 Crane pedestal no. 1

Zone 01 Passivated equipment
Condensate and fuel gas systems

Zone 02 Passivated equipment
Free water knockout separators

Zone 03 Passivated equipment
Glycol contactors

Zone 04 Crane pedestal no. 2

Zone 04 Passivated equipment
Glycol regenerators

Zone 05 Warehouse

Upper Deck

Zone 01 M28 Pig Receiver, M3 Pig Launcher, pedestal no. 1, SP45 Cold vent Stack, V47 Knock out Drum, Alwyn Tie-In Process Piping and Valves

Zone 02 Active equipment
Hydraulic unit

Zone 02 Passivated equipment
Separator valves

Zone 03 Passivated equipment
Glycol equipment



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.5 - SECONDARY STRUCTURE	Date revised : 09/08/99
	Page : 4/5

2. PRODUCTION ZONES (conts.)

Zone 04 Passivated equipment
Pig receiver M1 and M2

Zone 05 (Lub.oil cooler and Inlet and Exhaust Ducts) Passivated equipment

3. DECK LOADING PLAN

Definition

Dead load

Weight structure inclusive of cladding etc. in the module and the dry weight of the known equipment in the structure.

Variable load

Variable part of the equipment load inside the structure. This includes water, oil, glycol, methanol etc. inside the equipment.

Live load

It includes allowance for change in equipment or use of extra loads caused by unspecified storage, any extra load imposed by ice and snow, water or people moving machinery etc. Live load is considered to act on large areas uncovered by equipment.



TP1 OPERATIONS MANUAL			Ref. No.: DocsOpen no. 77355
VOLUME	1	- TP1 PLATFORM	Date effective : 27/01/97
SECTION	2	- PLATFORM STRUCTURE	Revision No. : 4
	2.5	- SECONDARY STRUCTURE	Date revised : 09/08/99
			Page : 5/5

3. DECK LOADING PLAN (conts.)

Table of Loads

Module	Dead Load	Variable Load	Live Load	Total	
	KN		KN	KN	KN
01	12630		2030	0	14666
02	6925		515	88	7528
03	10564		851	88	11503
04	9627		1309	0	10936
05	7373		25	0	7398
06		1920		0	1920
07		1844		0	1844
08		1986		400	2386
09		2287		225	2512
10		1611		225	1836
12		1660		117	1777
13		935		1960	2895
23	1579		120	0	1699
Bridge to QP	1128	24			1153
Bridge to TCP2	2648	28			2677
Cellar Deck	25673				25673
Piping (not modules)			890		890
Peripheral piping			125		125
Sub total	68053	13887	5917	3220	
GRAND TOTAL	91077				

Note: For modules 06, 07, 08, 09, 10 and 12 the table does not allow for split loads in dead and live loads. The sum of these undistributed loads is indicated below the sums of the dead and live loads and must not be forgotten in the total sum.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.6 - RISERS AND FLOWLINES	Date revised : 09/08/99
	Page : 1/2

CONTENTS

1. GENERAL

DIAGRAMS

Risers and Flowlines



TP1 OPERATIONS MANUAL			Ref. No.: DocsOpen no. 77355
VOLUME	1	- TP1 PLATFORM	Date effective : 27/01/97
SECTION	2	- PLATFORM STRUCTURE	Revision No. : 4
	2.6	- RISERS AND FLOWLINES	Date revised : 09/08/99
			Page : 2/2

1. GENERAL

Subsea flowlines and their associated risers and "J" tubes are provided to, (or reused as) :

- a) Compressed air reservoir
- b) Import dry gas from Alwyn Field
- c) Export dry gas to St. Fergus

The risers enter the platform through inflatable seals located in the caisson and support column walls. The risers and "J" tubes are routed up the inside of the support columns to the process areas.

Subsea flowline routes and their associated risers and "J" tubes are shown in the following table :

Tag Nos.	Riser Dia (in)	Flowline Dia (in)	Line Content	Column Number	Line Route
R1	32	-	Gas	2	Not used
R1X	32	-	Gas	2	Not used
R2	24	-	Gas	2	Not used
R2X	24	24	Gas	2	Alwyn to TP1
R3	26	-	Gas	1	Not used
R4	26	-	Gas	1	Not used
R5	26	26	Compr. air	1	CDP1 to TP1
R6	26	26	Compr. air	1	CDP1 to TP1
R7	24	24	Gas	2	
R8	32	32	Dry gas	2	TP1 to MCP01
J1	18	-	Two power cables	1	
J2	10.75	-	Empty		
J3	10.75	2	Fuel gas	1	
J4	18	8	Nitrogen	2	TP1 to CDP1
J5	10.75	4	Compr. air	1	CDP1 to TP1

The flowlines are retained in their positions by saddles.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.7 - MATERIALS AND CONSTRUCTION	Date revised : 09/08/99
	Page : 1/4

CONTENTS

1. GENERAL
2. CONTRACTORS
3. DESIGN CODES
4. PAINTS AND COATINGS
5. PIPELINE IDENTIFICATION SYSTEM



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.7 - MATERIALS AND CONSTRUCTION	Date revised : 09/08/99
	Page : 2/4

1. GENERAL

The following material are used in the platform structure:

- a) Concrete grade C50 to CP 110 specification.
- b) Structural steel used for load-carrying members SHSS20, SHSS40 and ST-52-3N to DIN 17100.
- c) Non-structural mild steel for module guides, walkway, supports etc. MS-ST 37 to DIN 17100.

2. CONTRACTORS

The primary structure was designed by the Sea Tank Company, France and constructed at Ardyne Point in Scotland by Sir Robert McAlpine Ltd.

The structural support frame was designed by McDermott-Hudson Engineering, London, and fabricated by Construction Metallique de Provence at Dunkerque, France.

The main contractor for design and fabrication of the secondary structure was McDermott-Hudson Engineering, London. Fabrication was carried out mainly at Mercantile Marine Engineering and Graving Docks, Antwerp.

3. DESIGN CODES

The platform complies with the following codes and regulations :

- American Petroleum Institute - API - RP2A
- American National Standards Institute - ANSI - A58 (Loads only)
- American National Standards Institute - ANSI - B31.3 (Piping)
- American Society of Mechanical Engineers - ASME, Section VIII, Pressure Vessel Design Standard
- American Welding Society - Structural Welding D.11, Code 1977
- British Standard Institution - BS 5500
- British Standards - for electrical installations
- Department of Energy - Offshore Installations - Guidance on Design and Construction
- Department of Trade, Marine Division - Continental Shelf Act 1964
- Department of Trade - Markings of Offshore Structures, 1976



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.7 - MATERIALS AND CONSTRUCTION	Date revised : 09/08/99
	Page : 3/4

3. DESIGN CODES (conts.)

- Det norske Veritas - Rules for Fixed Offshore Structures, 1974
- ELF Norge - Fabrication Specification 1052 - No. 3/155, rev. 2/JPS, February 1974 and No. 2110-50-1 for Class EC.
- The Institution of Electrical Engineers - Regulations for the Electrical Equipment of Buildings - IEE
- Institute of Petroleum - Code of Safe Practice Electrical - Part 1, 1965
- Institute of Petroleum Model Code of Safe Practice Part 8, 1972 - Drilling, Production and Pipeline Operations in Marine Areas
- International Conention for Safety of Life at Sea - 1960
- International Electrotechnical Commissioning (IEC)
- International Telecommunication Union - Radio Regulations
- Norwegian Coast Directorate - Regulations for Marking of Production Platforms
- Statutory Instruments 1976 - No. 1019 The Offshore Installations (Operational Safety, Health and Welfare) Regulations, 1976
- United Kingdom Home Office Specification - S

4. PAINTS AND COATINGS

All surface preparation and coating on the platform complies with the following codes :

- Swedish Standard SIS.05.5900 - Pictorial Surface Preparation Standards for Painting Steel Surfaces - 1977
- Surface Finish of Blast Cleaned Steel for Painting - BS 4232 - 1967
- European Scale of Degree of Rusting of Anti-corrosive Paints - Stockholm - 1961
- SSPC - Surface Preparation Specification, VIS1
- ELF Norge - Frigg Field "Painting Specification for Steel Structures" DEP 1052 No. 3 - 169, Rev. 1 - March 1974
- ELF - RE Standard Specification P7, "Coating for Marine Structures" DGEP 01.E.90 no. 2 - 530, rev. 0 - September 1972
- Secco "Standard Specification for Application of Coating on Steel Parts", Secco A922 HZ/Mg - April 1974.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.7 - MATERIALS AND CONSTRUCTION	Date revised : 09/08/99
	Page : 4/4

4. PAINTS AND COATINGS (conts.)

All structural and support steelwork and external surfaces in the tidal range and splash zone are painted with red antifouling paint as follows :

1 coat primer	75 microns
2 tie coats	100 microns each
2 antifouling coats	40 microns each

External surfaces in the Emerged Zone are painted as follows :

1 coat epoxy reinforced with glass flakes - 500 microns

High temperature surfaces (+110°C to +400°C) are painted silver as follows :

1 coat primer	50 microns
2 tie coats	25 microns each
2 top coats	25 microns each

Non-skid surfaces are painted pearl grey (Signalec colour code GR4) as follows :

1 coat primer	75 microns
2 tie coats	100 microns each
1 top coat	75 microns

Before the second tie coat dries, internal surfaces are sprinkled with 0.1mm to 0.5mm inert grit; external surfaces are sprinkled with 0.5mm to 2mm inert grit.

Galvanised surfaces are etched and degreased and painted in accordance with the above specifications.

5. PIPELINE IDENTIFICATION SYSTEM

Pipelines systems are identified by coloured arrows superimposed on coloured bands located at convenient intervals. Flow direction is shown by the arrows which also have the pipeline contents stencilled on them in black letters.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.8 - CATHODIC PROTECTION	Date revised : 09/08/99
	Page 1/3

CONTENTS

- 1. GENERAL**
- 2. DESIGN CRITERIA**
- 3. REFERENCE ELECTRODES**
- 4. BONDING**
- 5. MONITORING PANEL**

DIAGRAMS

Cathodic Protection



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.8 - CATHODIC PROTECTION	Date revised : 09/08/99
	Page 2/3

1. GENERAL

To prevent corrosion by galvanic action, sacrificial Zn anodes are located at strategic points around the structure.

A monitoring system is installed to keep the levels of protection of the various pipes and risers under constant review.

The monitoring system has been removed.



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.9 - INSPECTION AND MAINTENANCE	Date revised : 09/08/99
	Page : 1/2

CONTENTS

1. GENERAL
2. MAINTENANCE AND INSPECTION



TP1 OPERATIONS MANUAL	Ref. No.: DocsOpen no. 77355
VOLUME 1 - TP1 PLATFORM	Date effective : 27/01/97
SECTION 2 - PLATFORM STRUCTURE	Revision No. : 4
2.9 - INSPECTION AND MAINTENANCE	Date revised : 09/08/99
	Page : 2/2

1. GENERAL

The Frigg Field straddling the UK/Norwegian dividing line has three platforms subject to British Jurisdiction, CDP1, TP1, QP; and two, DP2 and TCP2 under Norwegian Jurisdiction. In order to operate the three UK sector platforms, it is a legal requirement to have a current Certificate of Fitness, which is issued by a certifying Authority on behalf of the Department of Energy. This certificate is not required for the Norwegian sector platforms, although a condition evaluation is made by the Norwegian Petroleum Directorate.

In order to obtain the basis for renewal of the Certificate of Fitness and meet the requirements of the condition evaluation all platforms are subjected to major survey.

2. MAINTENANCE AND INSPECTION

Maintenance and Inspection responsibilities are to ensure that all platforms, systems and equipments are kept in a proper state to meet the required production under safe conditions and according to relevant regulations.

Maintenance and Inspection activities are managed through the computer based Maintenance Management System called OPTIMIS and a Computerised Risk Inspection System CRIS. The purpose of the systems is to:

- organize (7-week plan, weekly plan, maintenance routines),
- formalize (Maintenance Request),
- follow up reports,
- the work of all trades involved in maintenance activities, i.e. mechanics, electricity, instrumentation, telecom, inspection, production,
- on all equipment i.e. process, utilities, static or moving, vessel or machinery.

The individual preventive routines, originally compiled from vendors recommendations are constantly revised to take advantage of the operational experience feedback.